CIA4OPM

Common Impact Assessment for Optimising the Policy Mix

CAPACITIES

Optimizing the research and innovation policy mix:

The practice and challenges of impact assessment in Europe

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Findings from FP7 OMC-net project 234501

'Optimising the Policy Mix by the Development of a Common Methodology for the Assessment of (Socio-) Economic Impacts of RTDI Public Funding (CIA4OPM)'

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Preface

This report reflects the main outcomes of FP7 (Capacities) OMC-net project 234501 'Optimising the Policy Mix by the Development of a Common Methodology for the Assessment of (Socio-) Economic Impacts of RTDI Public Funding'.

The views presented in the report have largely benefited from the inputs of related work by the OECD Working Party on Innovation and Technology Policy (TIP) and draw on previous work by INNO-Appraisal. The insights presented here benefited significantly from the input of many contributions by external experts made during regular working party meetings and the three EU presidency conferences during the Swedish, Spanish, and Belgian Presidencies of the EU. An overview of these inputs is provided in Annex I.

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Jacques Bonnin and Benedikt Hermann were the project officers involved from DG Research (European Commission).

Ian Gauci Borda, Lucie Vavrikova, Daniel Frank and Heidi Deblanc harmonised the lay-out of the report. Dita Uslu and Ward Ziarko coordinated the administrative aspects.

Peter Teirlinck (Belgian Science Policy Office and Hogeschool-Universiteit Brussel) was the scientific coordinator and has been supported by Arnold Verbeek (Idea Consult) and Henri Delanghe (while at Idea Consult).

Executive summary

BACKGROUND

European challenges and the importance of impact assessment

As a follow-up to the Lisbon strategy, the European Commission (EC) presented the 'Europe 2020' stratey. The main vision underlying this strategy is to turn Europe's socio-economic development and progress into a smart, sustainable and inclusive economy delivering high levels of employment, productivity and social cohesion. Public European and, even on a larger scale, national (and regional) RTDI funding plays an important role in making 'Europe 2020' ambitions a reality. This role relates to the reality of market failures, which prevent the private sector from investing in research at a socially-optimum level.

The Europe 2020 Flagship Initiative Innovation Union states that 'progress' should be measured at the European Council level for monitoring and intervention purposes, and that close monitoring of the impacts of the various policy measures is required. The realisation of the Europe 2020 objectives is hence the shared responsibility of the European Institutions and national and regional authorities of the Member States.

Impact assessment and RTDI policy design in Europe

Evaluation activities of many Member States (and of the Community) have reached a certain level of maturity. The need to strengthen the impact of evaluations on policy and policy design remains a major concern, and is something which requires closer interaction between policy decision makers, those entrusted with policy implementation, and those undertaking evaluation activities.

This proves to be a daunting task, since 'the policy cycle is not closed'. One of the most important factors which hinders the utilization of IA in policy optimization is the lack of (early) involvement of government administrations/agencies, politicians and the programme management agencies/organisations in IA studies. Methodologically, there are also some serious challenges, concerning the take-up of IA findings and results into 'ex-ante' policy formulation. This leads to a 'missing link' between the impact assessment and the take-up of its results by policy makers. There are often no feedback loops between policy formulation, implementation, and optimisation. Hence, there is a need for a Europe-wide exchange of IA practices and experiences.

The OMC-net project

The OMC (Open Method of Coordination) generally rests on soft law mechanisms such as guidelines and indicators, benchmarking and sharing of best practice. Taking into account initial expertise, experience and expectations, and the main strengths of public administrations and agencies in terms of policy formulation and support, the primary goal of underlying OMC-net project has been: (i) to increase the usefulness of IA in the context of RTDI policy formulation, or in other words, making sense of IA for policy making, and (ii) to provide a useful framework facilitating communication between policy makers and different stakeholders in the policy making process.

The focus of this work is on ex-post IA and its role in RTDI policy making, particularly in the areas of 'public funding of private RTDI', 'industry-science linkages', and the 'performance-based funding of universities'. In order to improve feedback from ex-post IA exercises to policy making, more attention needs to be paid to: (i) accommodating the shift in emphasis from outputs to results and impacts; (ii) accommodating the shift from single measure ex-post IA to policy mix ex-post IA; (iii) accommodating the dual role of ex-post IA – learning and accountability; and (iv) embedding lessons learning. These elements can be crucial for closing the policy cycle and the take-up of the results of IA exercises in policy development.

The OMC-net project reflects on how to appreciate whether the policy measures are heading the right way, before, during and after their implementation, and the role of IA in this context. It pays particular attention to mutual learning, harmonisation, and usefulness for policy design. Four horizontal topics with respect to IA are targeted:

- **The practice of IA in the policy cycle;**
- **The governance of the IA process to increase the use of IA as a tool for policy making;**
- **The barriers and critical success factors in the transfer of best IA practices;**
- **Methods and indicators for performance-based funding of research.**

KEY FINDINGS

The main findings presented below are derived from this final report of the OMC-net project. They have been thoroughly discussed and debated at the Belgian EU Presidency Conference 'Common Impact Assessment for Optimising the Policy Mix' held on December 8th 2010 in Brussels.

The 'practice' of Impact Assessment in the policy cycle

During the course of the project implementation, various literature sources on IA and policy design and evaluation have been reviewed (European Commission, OECD, etc.). When combined with the analysis of a large number of case studies by the OMC-net partners, a good insight into the use and practices of IA in Europe today was obtained:

- **There is an increased interest and use of IA in policy making towards RTDI in Europe, albeit often on an ad-hoc and exceptional basis;**
- **Heterogeneous visions and terminology for IA exist; there is thus a 'space' for further conceptual and practical harmonization in Europe while respecting the 'no one size fits all' principle;**
- **Minimal attention is paid to the broader societal impact of public RTDI funding, although policies increasingly target wider societal 'grand' challenges. This is largely due to a lack of suitable indicators and data. But this may not be used as an 'excuse' for engaging in impact assessment;**
- **Minimal attention is given to additionality and the interaction between different forms of additionality;**
- **The policy making cycle is not 'closed': policy uptake of outcomes of IA exercises is suboptimal. Early involvement of policy makers is essential.**

In IA of RTDI policy measures the focus remains on the 'mere' measurement of outputs, outcomes, impacts, goal attainment, and in few cases, on additionality.

Too little attention is paid to policy/strategy development and project implementation efficiency and how the IA can contribute hereto. The policy cycle remains 'unclosed'. Less than 50% of the IA studies requested by government administrations/agencies really involve policy makers and/or programme management in an early stage. Similar concerns apply to the involvement of the 'beneficiaries' of specific measures. The broader policy design is also not an objective in more than 50% of the IA exercises, and its influence on and relationship with other policy measures (e.g. in terms of re-design or merger) are not considered. This reveals the minimal attention paid to the broader policy mix, and thus the lack of a systemic approach and perspective in the IA exercises.

There are serious methodological and technical challenges. It is difficult to approach the complexity of the issue and to find appropriate indicators to measure the different impacts (scientific, technologic, economic and societal). It is also challenging to address the causality between public funding of RTDI policy measures and their impacts. The appropriability of indicators is case dependent. Societal impacts appear especially difficult to measure. Progressing in the development and usage of 'appropriate' indicators for measuring the socio-economic impact can help the formulation of the 'logic intervention model'. Moreover, this will enhance the usefulness of IA as a tool for policy makers since policy making still largely becomes evidence-based (e.g. the 'Europe 2020' strategy).

Governance of IA projects

Governance of IA relates largely to the way IA-exercises are designed and managed throughout their implementation:

- **The design and governance of IA play a critical role in the usefulness of IA for policies improvement;**
- **Methodological and governance choices are clearly driven by the objectives of the IA, and the specificity of the policy area and the RTDI measures - the setup is 'situational';**
- **Sufficient attention should be paid to the 'design of IA processes' and to the role of the programme manager (agency or administration);**
- **Impact assessments should be an ongoing 'learning process' which requires a smart broad involvement of different stakeholders;**
- **Sufficient attention should be paid to the 'follow-up of the IA results', to timing and to how results are communicated to policy makers.**

Impact assessments, when carried out properly, can be a source of legitimacy for policy makers and can be useful as a policy 'learning' tool. However, to be effective, careful attention needs to be paid to 'product factors' related to the results of findings of the IA exercise (operational learning, policy feedback, system impact, presentation of information, and scope) and to 'process factors' related to the usefulness of IA created during the process of its conduct (timing; programme objectives; policy-makers' expectations; policy-makers' engagement; trust and compliance of all stakeholders and dissemination).

It is essential that IA is considered early on in the programme design phase (ex-ante) as a process and not only as an event in its life cycle. Impact assessment should be an integral part of a learning process in parallel to the other activities of the RTDI programme. Impact assessment should also be 'broad' enough, i.e. focused not only on the outcome of the programme, but also included in the operations of the agencies/programme management. With a clear description of the context, objectives, needs and issues related to the study, a high quality 'terms of references' (ToR) is necessary for a high quality IA. Timing is a central planning and design factor - from the time of the study and its different stages to the point where its impacts begin to materialize. Innovation impacts typically take some time to become observable (in terms of years).

Impact assessment should be conceived as an open and ongoing process, based on the accumulated learning effects achieved through sequencing various studies over time. The learning process regards evaluation can be strengthened through international benchmarking and review of IA studies, accounting for those differences between national contexts which must be taken into consideration. Consultation processes or discussion panels (external peer reviews) may be very useful. Trust and compliance are other useful factors of usefulness. Involving stakeholders from the outset by creating transparent objectives, scope and methodologies is also essential. Evaluation is as much a social process as in any other business operation.

Formulation of the policy recommendations is an essential part of the IA exercise which determines the quality and relevance of the information regarding policy feedback. The background and expertise of the evaluator should be part of the selection criteria for evaluators. Language and format policy recommendations must be accessible for the dissemination process. In order to establish an effective platform for utilization or usefulness, evaluation and IA should be linked to decision points at policy, agency or programme level. An agency should involve itself in turning evaluation results into action. These actions should be carefully planned in order to support stakeholders (including beneficiaries) to exploit the results of evaluations and IA.

Barriers and critical success factors for transferability of impact assessment practices

- **RTDI policy instruments are not always 'open' in terms of design, context, indicators, and methods, which hinder transferability and mutual learning.**

- **The design, implementation and modalities of RTDI policies differ throughout countries and regions, which makes transferability of IA approaches quite challenging.**
- **The transferability of IA exercises depends on the presence of the context specific critical success factors which explain the diversity of RTDI policy measures.**
- **Due to the diversity of policy measures which are devised in specific contexts, it is necessary to design IA exercises in a variety of different ways.**

The conditions required in order to share future knowledge and experiences related to IA practices and results also have to be considered. In the context of this OMC-net study, it became clear that in order to share knowledge and experiences, IA practitioners and analysts have an enormous responsibility – equivalent to that of policy makers on various levels. Impact assessment exercises should be well documented, in such a way that the approach (and ideally the results) can be reproducible (methodological details are thus needed). Policy makers should have the responsibility for documenting and describing the particular policy measures in order to understand their role in the design of the IA process. Likewise, they should choose analysts/evaluators who are known for their transparent and well-documented IA exercises. To disseminate successfully IA practices in Europe (assuming that this is a legitimate objective), openness and transparency and 'situational' thinking should be required. An European IA protocol could be very useful in this respect.

Methods and indicators for performance-based funding of research

- **Even though performance-based funding sounds a rather homogenous concept, it is applied differently. Therefore, both the specific context and culture need to be taken into account when assessing the impact of performance-based funding policy instruments.**
- **To increase the acceptability of performance-based research funding schemes, the targeted actors need to be appropriately involved in the process of designing such schemes.**
- **The impact of performance-based funding can only unfold after a longer time period. This and any unintended consequences have to be taken into account during IA planning.**
- **The use of a single quantitative and qualitative assessment method has its flaws. It is therefore necessary to implement combinations of various quantitative and qualitative methods so as to provide a more adequate (holistic) overview of the impact of performance-based funding of research. But even when doing so, it has to be taken into account that many limitations still remain for the assessment of performance-based funding of research.**

Increasingly, performance-based funding is an important policy choice made in the context of discussions on competitive versus block funding models. Despite the similarities in the objectives and rationales of performance-based funding schemes, the design of the respective policy instruments vary from country to country, reflecting specific political and regional contexts. Because of the short duration of performance-based funding schemes, there is only limited evidence regarding the effects and impacts of such measures.

With regard to recommendations relating to IA of performance-based funding, some pitfalls need to be avoided. They include the need to take into consideration national characteristics and the multi-tasked nature of higher education systems and/or the systems associated with performance-based funding. When designing and implementing impact assessment exercises, incentives regarding research efforts have to be balanced so as to prevent suppressing the intrinsic motivations of academics or streamlining their activities towards certain activities, irrespective of their particular talents. It should also be borne in mind that these schemes can introduce an abrupt and complete departure from the previous system unless 'grind-in' possibilities are introduced for the affected institutions and personnel in order to ensure the acceptance of the scheme by the academic community. Despite the merits of performance-based funding schemes, it is important to recognize that many limitations and problems still

remain. Therefore, some main conclusions for the policy level is that they are aware of the diverse limitations of performance-based research funding schemes; to address them as far as possible and to recognize that further work (particularly on effects and impacts of the schemes implemented) has to be done in order to address effectively such limitations.

LESSONS LEARNED AND THE WAY FORWARD

Where do we go from here?

When it comes to priority areas for further development with regard to the use of IA, three areas for prioritisation of future work have been explored. They include: further methodological development and learning, development of indicators for IA, and the take-up of usefulness of evaluation and IA outcomes in policy making. In that respect, the following recommendations have been identified:

- **A new conceptual framework and way of thinking on how to 'close the policy cycle' should be developed**

There is still a long way to go for ex-post IA in RTDI policy making, particularly concerning the setup and governance of IA exercises (process and product factors) to ensure smooth execution of IA exercises and maximum take up of results for policy improvement. The latter is what we earlier coined as 'closing the policy cycle'. In this perspective a new conceptual framework and way of thinking on how to close the policy cycle is urgently needed.

- **There is a need to establish a permanent EU-wide IA community and to bring it closer together in order to share experiences**

This OMC-net project clearly illustrated the usefulness of exchanging practices and experiences by countries, funding agencies and IA practitioners. There is a strong plea to continue these kinds of harmonization efforts in future, and to take into account more carefully the starting points of the various actors and their level of experience with IA. An EU wide IA community could ensure systematic coordination and exchange of experiences (a pool of knowledge). Such an IA community could be linked to the existing European Evaluation Network which is currently moderated and facilitated by the European Commission. One advantage of a pool of IA practitioners is that national governments and agencies could involve members of this pool as 'peers' in setting up and implementing their own IA.

Such a community, if clearly identifiable, could help the further introduction of IA particularly in those countries where there is less experience and clearly a greater need for impact assessments. It seems to be challenging to agencies when they need to select the right experts to support the design and implementation of an impact assessment. As an analogy to the concept of the 'peer review', one could think of creating regular peer reviews of impact assessments in different countries and regions. For example, 'peers' - who have sufficient demonstrational expertise and commitment - could be involved when setting up and/or carrying out an impact assessment exercise.

- **Paying attention to the 'design' and the 'governance' of IA is essential, where a systemic ('holistic') approach is advisable**

The OMC-net project has clearly illustrated numerous shortcomings in the design and governance of evaluation and IA studies in Europe. Practical 'tips' and 'tricks' will help funding agencies and other practitioners to improve the setup of IA exercises and also to increase the chances of better uptake of the findings into new policy development. However, the results also show that there is a need to better understand (both conceptually and methodologically) what it means that RTDI policy is increasingly aiming to tackle the 'grand challenges'. Framing and measuring the societal impacts thus requires a new methodological and indicator framework, and a higher level of analysis than the individual policy measures allowed. This requires a more holistic programme perspective, and even an RTDI policy measures cluster perspective. Adequate metrics are also an important element herein. This also implies that multiple impacts - economic, scientific, technological and societal - have to be considered on all EU governance levels.

- **Ex-post IA starts ex-ante; mid-term IA should check, whether we are still 'on course'**

It is important to ex-ante identify the expected effects and impacts of a specific policy measure. It needs then to be considered ex-post whether the expected effects and impacts have been realized. One should not neglect the importance of mid-term assessments, which provide an opportunity to adjust the ongoing policy measures towards the desired goals, results and impacts. There is no doubt that mid-term assessments cannot fully appreciate the (potential) outcomes/impacts due to the time lag between policy intervention and resulting impacts. It can, however, provide early signals about the likelihood of achieving the desired impact.

- **Policy makers and administrators should be trained in IA**

The practice and experience gained under this OMC project clearly highlights the importance of the training of policy officers in funding agencies. The most important element for the closure of the policy cycle is the human factor. Programme managers, policy officers and policy makers need to understand how an IA project works, and how the recommendations provided can be turned into reality. Impact assessment practitioners and programme managers in funding agencies need to know how to create the necessary 'buy in' in order to mobilize the drivers for policy improvement at all echelons after assessment. Investment in training is essential.

The perspective of the OMC-net participants

Considering the lessons learned from this OMC-net project, it is important to take into account the initial context in terms of experiences, expertise and interests of the participants. The IA expertise of the project partners at the beginning of the project was moderate, their experience was limited and their interests were mainly related to methods for IA, and gaining mutual learning from the existing practices.

With regard to mutual learning about impact assessment in general, all participants agree that the project strongly improved their knowledge in terms of the terminology used for IA. Also, in terms of the particular learning aspects, the project stimulated an improved understanding of methods for IA and of the place (usefulness) of IA in the policy cycle.

With regard to the practice of IA, the picture is somewhat nuanced. At least for some of the partners, the acquired knowledge is not sufficient to allow them to practice their own IA exercises. Or it is not sufficient in terms of setting up and managing an IA exercise. This could be because the practice of IA was 'quasi non-existent' for many participants at the beginning of the project. However, although it was not a primary objective of the project, half of the participants went on to implement or will implement during the following six months their 'own' IA exercise, which was a direct result of this particular OMC-net project. At first glance, this seems to be rather low compared to the existing immediate need, with over 80% of the participating organisations carrying out IA. It turned out that there was one important reason for this: the fact that the people involved in the organisation of the project did not have direct responsibility for IA exercises.

Concerning the need for continuation of the work undertaken, and the necessity for content and process-wide changes and improvements, all partners believe that such continuation (in the form of a follow-up OMC-net project) is both desirable and necessary. The practical implementation of IA exercises is considered to be as one of the ways forward. The need to work with comparable methodologies in different countries has also been identified. This would involve further reflection and research into how the EU dimension/benchmark perspective can be useful to promote IA, and what role it can take in the further development of a program to support research in methodology.

Related to the need for a more practical and harmonised approach in a next phase (potentially of the OMC-net project) and taking into account the welcome common learning and understanding gained through this project– from the perspective of the partners who participated in the project - a further step for IA would be oriented towards a more balanced level of practical experience and expertise focused at more narrowly defined objectives. Given the considerable variety in focus and expectations of the different stakeholders (which provided enriching insights during this project), working in smaller more homogenous teams

in the next phase would enhance efficiency and provide possibilities for better sharing of responsibilities between partners. This would also allow them to work together more profoundly in the areas of methodology diffusion, training and to nurture research and expertise in the practice of impact assessment.

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Introduction

Over the last decade more resources have been allocated to Research, Technological Development and Innovation (RTDI) policies. Evaluation (impact assessment) of these policies has been stepped up with some delay, there has been progress in methods for IA, and more data is now available. In other words, there is both greater demand for evaluation of various policies which absorb increasing resources and supply in terms of sophisticated methods, data collections, and experience. In Europe, as with ex-post evaluation in the 1990s, ex-post assessment of the socio-economic impacts of public policy is becoming increasingly important as the changing role and position of government has resulted in a growing demand for evidence-based policies. However, in most countries, planning impact assessments in the policy cycle still takes place on an ad hoc or exceptional basis. Moreover, often it is administration or agency dependent, and despite the objectives of the 'Europe 2020' strategy, little attention is still paid to broader societal impacts of public funding for RTDI.

This report reflects the outcomes of the FP7 policy network 'Optimising the Policy Mix by the Development of a Common Methodology for the Assessment of (Socio-) Economic Impacts of RTDI Public Funding'. Launched in March 2009, the project brought together 15 partners - mainly public administrations and agencies - from around Europe, with the goal of exchanging information and mutual learning on national activities with respect to the assessment of (socio-) economic impacts of RTDI policies.

Taking into account the existing work and insights in the field of impact assessment of public funding for RTDI and the policy-support related backgrounds of most of the project partners, the main purpose of the project has been to increase the usefulness of IA in the context of RTDI policy formulation. In other words, the project has to make sense of impact assessment with the goal of improved RTDI policy making. The insights presented in this report intend to contribute to two needs which have not been covered in a systematic manner. First, to increase awareness amongst stakeholders of the need for a common methodology for IA aimed at evidence-based policies improvement; and second, to establish a framework which facilitates the communication between policy makers and different stakeholders during policy-making processes.

Inherent to an OMC-net project is the focus on mutual learning and exploration of - not yet fully understood - areas for possible harmonization at all EU levels. Possibilities for harmonisation of IA approaches have been explored by means of benchmarking and collective learning. The project mainly relied on in-depth exploration of existing case studies (impact assessment exercises). A particular focus was given to studies ordered by public organisations (administrations/agencies) and related to broad (i.e. not thematic) RTDI policy measures.

By conducting case studies applying a self-assessment approach, and through collecting the experiences of policy makers and programme managers through interviews and identifying good practices, some policy recommendations from the key findings are developed to improve the usefulness of IA for policy making. Over one hundred case studies were examined in three main policy areas: incentives to stimulate business R&D and innovation; instruments to promote industry-science relations; and performance-based funding for research in universities. The mutual learning objective was facilitated by seven multiple day consortium meetings, which supported the exchange of findings, experiences and good practice.

The OMC-net project has focused on four horizontal topics, which are particularly relevant to strengthen IA practices in these three policy areas. The first theme is the practice of IA in the policy cycle, focusing on the process of IA from design to take-up of results. Chapter 2 '**The practice of impact assessment in the policy cycle in Europe**', is based both on the review of the literature on the role of IA in the policy cycle and on a review of practices in Europe. The second theme is that of the governance of IA. Chapter 3, '**Governance and usefulness of impact assessments**' examines the product and process factors that help to increase the usefulness of IA as a tool for policy making. The third theme is that of transferability of best practices of IA and policy instruments to other countries. Chapter 4, '**Context and transferability of impact assessment: experiences and lessons from policies for science-industry relationships**' examines the role of the context in which IA takes place and the potential barriers or favourable factors to conduct similar IA in different countries. The fourth major issue is that of methodology, specifically including indicators for

IA. Chapter 5, '**Impact assessment and performance-based funding of universities**', focuses on performance based funding of RTDI to deal with this issue. The outcomes of the work related to each of these areas and the three policy clusters have been summarized in Chapter 1, '**Methodological approach and policy recommendations**'. The focus of this chapter is on the policy recommendations and identification of the ways forward for impact assessment.

Finally, the context for this OMC-net project also needs to be highlighted. As illustrated in Chapter 1, the starting point of most of the project partners was one of limited experience and expertise in the field of impact assessment of RTDI. Therefore, the identification of a common understanding with regard to impact assessment and the mutual learning provided by the project implementation have been experienced in a very positive manner by the partners. The project clearly illustrated the usefulness of exchange of practices and experiences among countries, funding agencies and IA practitioners. There is a strong interest in continuing mutual learning and harmonization efforts in future. An establishment of EU wide IA community could ensure systematic coordination and exchange of experiences (a pool of knowledge). Such an IA community could be linked to the existing European Evaluation Network which is currently moderated and facilitated by the European Commission. An important advantage of this would be that national governments and agencies could involve members of this pool as 'peers' in setting up and implementing their own IA.

Thanks to the OMC-net project, many partners have implemented or intend to implement IA in their organisation at short notice. The practice and experience gained under this OMC project clearly points to the necessity and importance of training policy and programme officers in funding agencies. Programme managers, policy officers and policy makers need to understand how an IA project works, and how the recommendations or the IA products can be used in the closure of the policy cycle. The impact assessment practitioners and programme managers in ministries or funding agencies need to know how to add value and how to create the necessary 'buy in', in order to mobilize the drivers for policy improvement at all echelons after assessment. In addition, this project also identified a strong need among impact assessment practitioners (in funding agencies) to promote research and knowledge diffusion about impact assessment methods and indicators. Investment in training on the take-up of the results of IA in policy making and on methods and indicators for impact assessment is thus essential.

Chapter 1: Methodological approach and policy recommendations

Peter Teirlinck (BELSPO/Hogeschool-Universiteit Brussel) and Arnold Verbeek (Idea Consult)

1.1 Impact assessment: a policy need?

Public European and, even on a larger scale, national (and regional) RTDI funding plays an important role in realizing 'Europe 2020' ambitions. The main vision underlying this strategy is to turn Europe's socio-economic development and progress into a smart, sustainable and inclusive economy delivering high levels of employment, productivity and social cohesion (European Commission, 2010a). The key role assigned to public funding relates to the reality of market failures, which prevent the private sector from investing in research at the socially optimum level.

It is thus clear that prior to public intervention, governments must carefully design the way in which they will intervene (SEC, 2007). This will help to ensure that RTDI support is provided in the most appropriate areas (with large spillover effects and where the private sector would not get involved on its own) and through the most effective instruments. A wide range of tools is available to optimize the RTDI policy formulation process. These include the comparative analysis of input and output indicators; foresight and technological assessment analysis; the benchmarking of national R&D policy actions and instruments; growth and competitiveness analysis; consultation with stakeholders; the ex-post evaluation and impact assessment (IA) of RTDI support programmes, and the take-up of the feedback thereof in ex-ante evaluation/IA (the 'closure' of the policy making cycle). The latter is essential for the optimization of existing policies, and the introduction of new and even better policies and policy mixes.

Evaluation activities of many Member States (and of the Community) have reached a certain level of maturity. A major concern which remains is the need to increase the impact of evaluations on policy and policy design, something that requires closer interaction between policy decision makers, those entrusted with policy implementation, and actors performing evaluation activities. In this respect there is a clear need for better integrating 'evaluation' (in a broad sense) into the policy planning cycle.

1.2 Objectives and design of the OMC-net project

1.2.1 Objectives

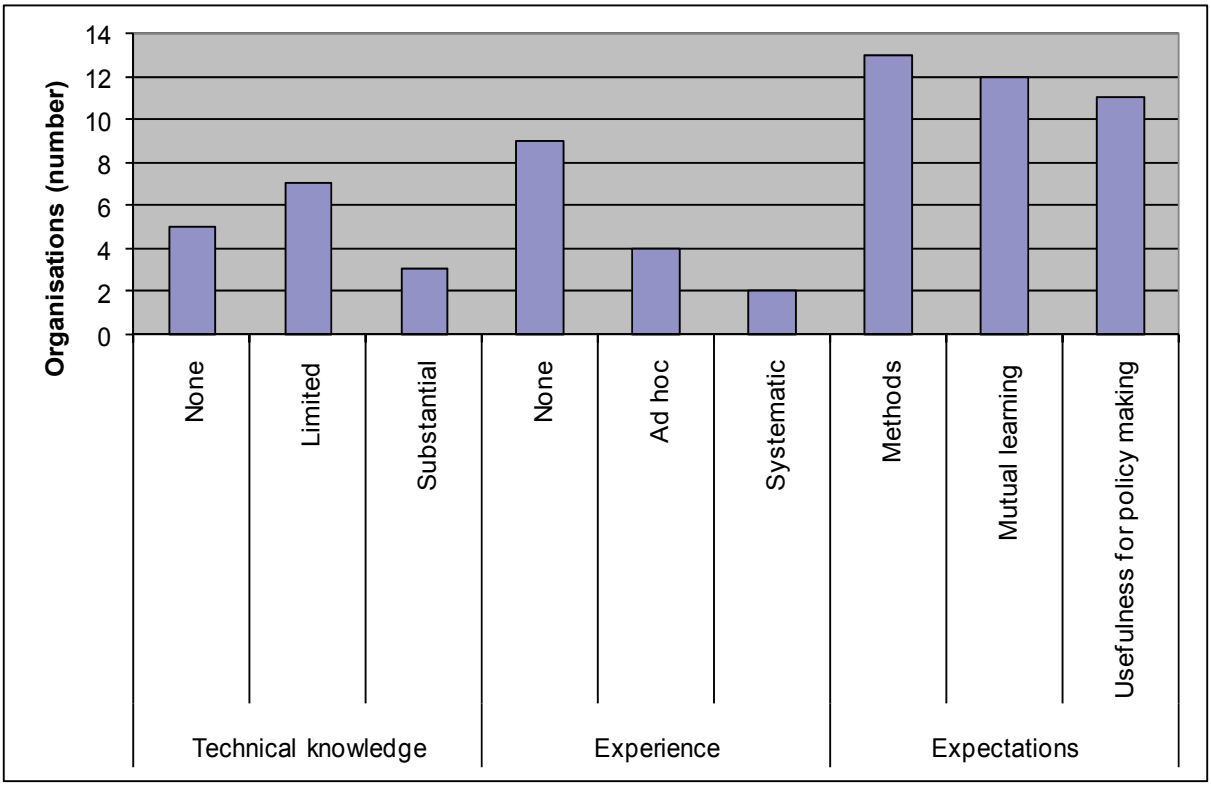
The demand for IA of public RTDI programmes can be seen as one element in the process towards a knowledge-based society, since such evaluations can increase our understanding about the links between R&D funding, knowledge production (publications, patents…), knowledge exploitation (innovation) and value creation (productivity, employment). Policymakers thus want to fully understand the results of their past policies in order to have a better idea of what the results of future policies are likely to be. More and improved IA is an obvious response to this requirement.

As will be highlighted throughout this report, the particularities of the practice of IA and the lessons learned from it cannot be seen independently from the organisational context in which it is undertaken. Therefore, the starting point of the project is the needs in terms of IA of the 15 public administrations and agencies involved in the project (see the 'Introduction', above). Based on a survey among these organisations (see Annex 1.1) attention is paid to three contextual aspects: the prior technical knowledge in (potential) IA methods; previous experiences in IA exercises; and the motives for participating in the OMC-net project.

With regard to the technical knowledge, the majority of the partners had some - albeit rather limited - technical knowledge in IA methods and its potential applications. However, in terms of experience, most of the partners had not been involved in IA before. Only two partners (VINNOVA and MESR) were involved in IA in a systematic way.

Given this rather limited prior technical knowledge and experience, it is not surprising that three main reasons for participation in the project can be revealed: to learn more about methodological aspects (including indicators) related to IA; to (mutually) learn more about IA in general; and to gain insights into the usefulness of IA for policy making. The latter should be seen in relation to the fact that the project only included public administrations and agencies. The necessity to improve our understanding of IA in these three areas was shared by the literature review and by the OECD Technology and Innovation Policy Working Group which was involved in the project during its biannual meetings. The level of high interest combined with relatively low practical experience also explains why the topic of IA was studied in an OMC-net context.

Figure 1.1: Initial expertise, experience and expectations from the OMC-net partners



Source: Survey on value added of OMC-net project for participants (Annex 1.1)

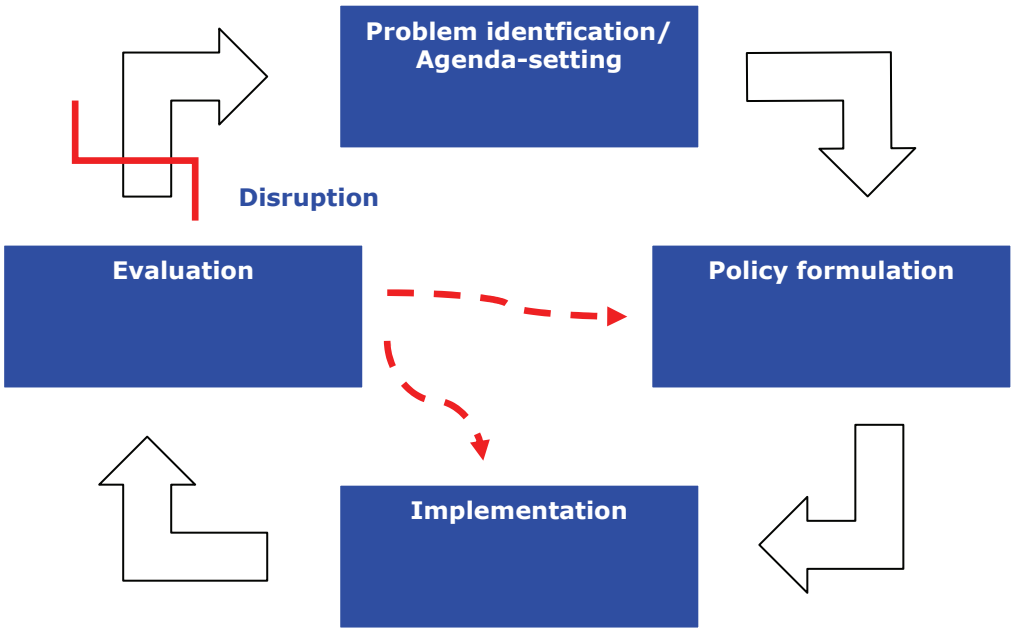
Throughout this report (and particularly in Chapter 2), attention will be paid to the fact that effective assessment of the different economic, scientific, technologic and societal impacts of RTDI policies is not a straightforward task. There are several methodological challenges, as there are issues concerning the take-up of IA findings and results. Several factors prevent the full utilization of IA and its results for the optimization of RTDI policies. One of the main factors is the lack of (early) involvement of government administrations/agencies, politicians and the programme management agencies/organisations in IA studies, which occurs too frequently. This leads to the so-called 'missing link' between assessment and the take-up of the results by policy makers: the policy cycle is not closed. This means that there is no feedback loop between policy formulation, implementation and policy optimisation. Another important factor points towards the relative isolation in which IA is carried out, meaning that influence on, and relation with, other policy measures (other instruments in the policy mix) is often (too) limited (as will be further elaborated upon in Chapter 3).

Taking into account the initial expertise, experience and expectations, and the main strengths of public administrations and agencies in terms of policy formulation and support, the primary goals of the OMC-net project have been to:

- **Increase the usefulness of IA in the context of RTDI policy formulation, or in other words, make sense of IA for policy making;**
- **Provide a useful framework facilitating communication between policy makers and different stakeholders in the policy making process.**

From this perspective, the project aims to provide a response to the European Community and different Member States which are seeking to increase the impact of evaluations on policy and policy design. This requires closer interaction between policy decision makers, those entrusted with policy implementation and actors performing evaluation activities. In order to improve the usefulness of evaluation and IA there is a need for better integrating evaluation into the policy planning cycle. If we consider the policy process from the sequential approach (Jones, 1977), we can note that it is constituted by different steps as a cycle (Figure 1.2).

Figure 1.2: The policy planning cycle



Source: Adapted from Jones (1977)

As the inputs to agenda setting can come from different channels (public mobilizations, political game, etc.), evaluation is part of the expertise channel and can be considered a scientific or technical input (Adams and Hairstone, 1995). Noting the previous figure, we can state that there is a disruption in the policy cycle from an evaluation perspective, which is linked to the use and the follow up of the process, conclusions and recommendations (Iriti et al., 2005) of the evaluations, and more broadly, to its usefulness. This suggests that the programme objectives, programme implementation and programme outputs and impacts need to be better linked.

(1) The intervention logic of a programme needs to be clearly defined and programme objectives need to be linked to instruments.

(2) The policy cycle and the entire evaluation cycle including ex-ante, interim, upon completion, and ex-post evaluations, need to correspond, so that a systemic and cyclic

feedback between policy planning, implementation and evaluation emerges rather than limited linear cause-effect relationships.

Given the limited experience and the multitude of views and understandings with regard to IA (Delanghe and Teirlinck, 2009), it was clear that a common understanding (framework) for IA was essential at the initial set-up of the project. Therefore, without claiming to have used the only 'true' definition on IA, the project has chosen the 'logic intervention model' as its reference point. This model states that regardless of its nature (policy, programme, measure, project), a public intervention can be analysed as a set of financial, organisational and human resources mobilised to achieve, in a given period of time, an objective or set of objectives, with the aim of solving or overcoming a problem or difficulty affecting targeted groups. 'Logic models' are (European Court of Editors, sd) models that help identify and set out the relationship between the socio-economic needs to be addressed by the intervention and its objectives, inputs, processes, outputs, and outcomes, which include results (immediate changes that arise for direct addressees at the end of their participation in a public intervention) and impacts (longer-term effects of the intervention).

The focus of this report is on ex-post IA and its role in policy making. Ex-post IA (European Court of Editors, sd) is a kind of ex-post evaluation that focuses in particular on the broad, longer term impacts of public interventions. As such it looks mainly at (i) effectiveness (the extent to which the objectives set are achieved); (ii) utility (the extent to which effects corresponded with the needs problems and issues to be addressed); (iii) sustainability (the extent to which positive effects are likely to last after an intervention has terminated); (iv) consistency (the extent to which positive/negative spillovers onto other economic, social or environmental policy areas are being maximised/minimised); and (v) allocative/distributional effects (the extent to which disproportionate negative/positive distributional effects of a policy are minimised/maximised).

This project concerns RTDI policy, and specifically the desired socio-economic impact of public and private investments in RTDI. It is long term, arguably more so than within most policy fields. IA of policy measures can only be done a number of years after the initial implementation of a policy instrument or a program. However, it is necessary to be able to show intermediary results and outcomes. Policy makers need to see that instruments and programs seem to be moving in the right direction: an indication that intended effects will occur. Also, information is needed to provide foundation for midterm decisions of resource allocation. This can be made possible through activities of monitoring and evaluation.

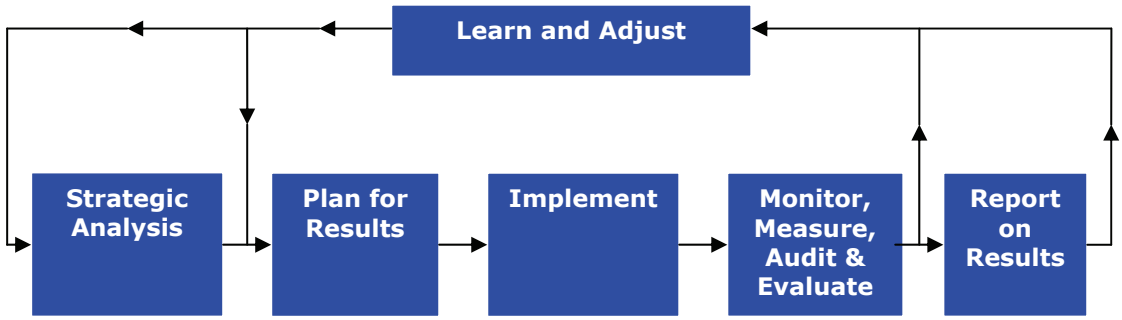
This report intends to clarify what is needed to make it possible to verify whether policy measures are headed the right way, before, during and after their implementation, and the role of IA in this context. The project pays particular attention to mutual learning, harmonisation, and usefulness of IA for policy design. Mutual learning will be achieved by gaining insights in the broad range of existing approaches/instruments/indicators used to perform IA and in the outcomes of the exercises undertaken for both ERA countries and their regions (both in terms of socio-economic impact and in terms of their use in policy making). Possibilities for harmonisation of IA approaches are explored by means of benchmarking and collective learning.

1.2.2 Project design and focus

The closure of the policy cycle (Figure 1.2) depends first and foremost on the usefulness of the evaluation and IA product, which is determined by a variety of product and process factors. The product use of impact assessments is defined as the product use which is linked to the results or findings of the IA. The results or findings of the IA studies can be useful or utilized if they include information relating to operational learning, policy feedback and system impact. The findings of IA studies refer to the evaluation or research questions. The way the findings are presented also affects the usefulness of the impact assessment. The usefulness of an IA is also created during the process it creates. The management or governance of the IA process covers factors such as: timing of the IA; objectives of the programme; policy maker's or programme manager's expectations and engagement during the IA; trust and compliance of all stakeholders and dissemination of the findings.

All these factors are important to facilitate the learning dimension of the evaluation process and the follow-up of the findings, conclusions and recommendations of the evaluative activities. The critical usefulness of the product and process factors which are selectively drawn from experience and literature are examined in detail in Chapter 3. In terms of closure of the policy cycle, evaluations can constitute an input entry for the policy makers decisions, as shown in the following scheme, by providing feedback (Department for Business Innovation and Skills, 2010), lessons, and on-going lesson-drawing.

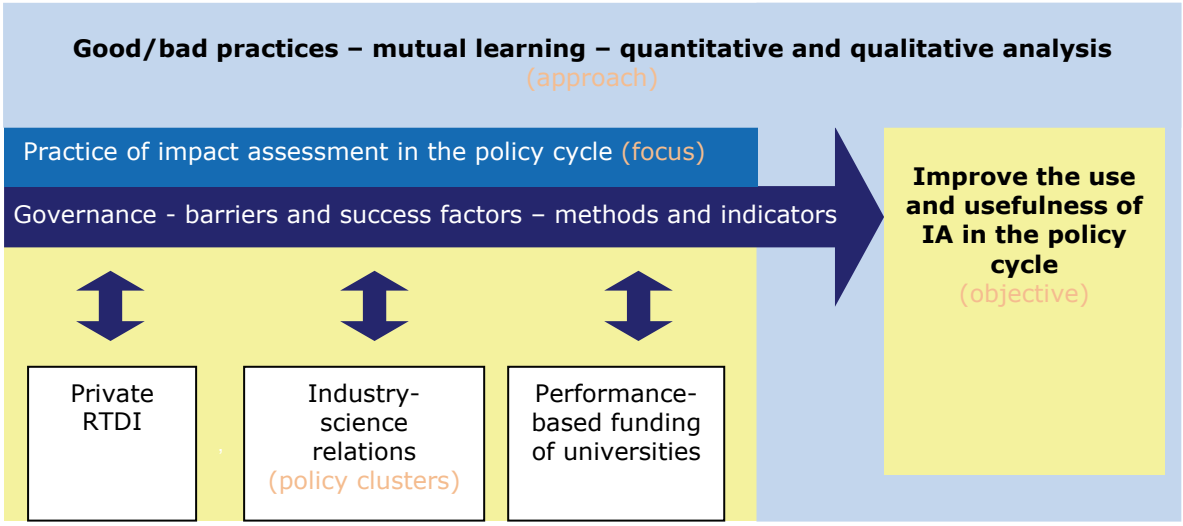
Figure 1.3: A 'learning' process



Source: CEE, 2004

In connection to this 'problem' and its potential 'solutions', this OMC-net project has led to various conclusions and recommendations aiming to close the policy making cycle, and to increase the use and value of IA exercises in RTDI policy making. Taking into account these insights with regard to closing the policy cycle and bearing in mind the objectives as presented in section 1.2.1, the project followed a **two-dimensional approach** by focussing on four horizontal IA topics addressed by IA experiences (dimension 1) in three policy clusters (dimension 2). This is represented in Figure 1.4 below.

Figure 1.4: Interrelation between the overall aim, the four horizontal topics and the three policy clusters of the OMC-net project



Within the project context and based on the current understanding of IA practices, four horizontal topics were targeted:

(1) Regarding the **practice of IA in the policy cycle**, the focus is on approaches, practices and experiences relating to IA in different countries, with a particular focus on the process from design to take-up of results of the IA process.

(2) Regarding governance, the focus is on improving the **governance of the IA process** in order to increase the use of IA as a tool for policy making, aimed at closure of the policy making cycle (as discussed above).

(3) Concerning the context in which IA takes place, attention is paid to the potential **barriers and critical success factors** with the aim of promoting **transferability of best practices** of IA and policy instruments to other countries.

(4) Relating to an improved understanding of **methods and indicators for** IA the focus is on **performance based funding of RTDI**. This is of particular interest in light of the increasing emphasis put on the extent to which public funding of research contributes to a better and more prosperous society.

With regard to the second dimension, the policy clusters, the project pays particular attention to measures in three major policy areas:

(1) **Public funding of private RTDI**. Stimulating private RTDI in order to reduce Europe's R&D and innovation deficit with regard to the US and Japan has been high on the policy agenda in Europe since 2000. Three sub-sets of policy measures deserved particular attention for public funding of private RTDI: direct funding, fiscal incentives and non-financial R&D and innovation support.

(2) **Industry-science linkages**. Since the 1990s, science-industry linkages have received particular attention by policy makers in an attempt to economically valorise public research results. In the project, policies aimed at funding for collaboration and promoting technology centres are analysed in detail.

(3) **Performance-based funding of universities**. Related to funding of research in the public sector, a live debate is underway in policy circles both at EU and OECD level with regard to choosing between block-funding and performance-based funding of university research and important differences in funding approaches exist between countries.

The choice of these three policy clusters is highly justified by an inventory of the obstacles, challenges and weaknesses of the innovation system. A detailed analysis based on ERAWATCH has been undertaken justifying this approach (see Chapter 2). Addressing the four horizontal topics from a three policy cluster based approach fits into a broader (RTDI) policy mix approach. This view is supported by the empirical findings throughout the report (and especially in Chapter 2) that many IA exercises target more than one policy cluster at the same time.

1.3 Setup and methodological approach

Impact assessment of public RTDI funding is a complex issue not only involving well-known methodological pitfalls (problems of attribution, long time span between funding and impacts) but is also characterised by a great diversity of practice (different methodologies, indicators, points in the policy cycle, etc.) depending on the characteristics of the subject of assessment.

With this background in mind, and taking into account the objectives of mutual learning and harmonisation, the basis of this work is an in-depth analysis of the most important studies related to IA which have been ordered by government institutions (policy makers, ministries, agencies) since 2000, in the opinion of the participants regarding their own country, and relating to the three broad policy clusters highlighted above. Important to note is that rather than looking for thematic RTDI policy support, the focus of the project has been on general (i.e. 'non-thematic') RTDI funding. Experiences from IA practices in each of the policy clusters have been used to provide insights in the four horizontal topics (see previous section) identified for the project.

1.3.1 Practice of IA in the policy cycle

With regard to the first topic, gaining deeper insights into the **practice of IA in the policy cycle**, approaches and practices used in different countries and the process from design to take-up of results has been extensively considered. The starting point of the analysis (Chapter 2) was a thorough review of the existing literature mainly aimed at developing a common understanding of what is meant by IA and to identify the main gaps in the IA literature with a focus on the use and usefulness of IA in the policy cycle. Given the limited experience of most of the partners at the beginning of the project this was necessary. As highlighted earlier, the 'logic intervention model' was chosen as a reference point.

Attention has been paid to different approaches and views that exist regarding IA. A questionnaire (Annex 2.1) has been developed on IA practices at both country and organizational level. It has been designed in order to get the maximum synergy possible with other works which exist in the area, mainly the Inno-Policy Trendchart repository of European policy measures and Inno-Appraisal repository of European evaluation studies. Experts involved in these projects have also been involved in the OMC-net project. Topics addressed in the questionnaire are: an overview at country level of the use of IA in public funding for RTDI; a set of IA studies of policy measures funding RTDI carried out in a country since the year 2000 and clarifying if they target the (i) enhancement of private R&D investment; (ii) improved industry-science linkages; or (iii) performance-based funding of research institutions and universities; and a description of each IA study emphasizing its objectives, context, methodology, indicators and results. This questionnaire was completed by the 15 project partners (for 11 countries) and collected 26 studies (see Chapter 2) requested by government organizations. These results formed the basis for a repository of previous IA experiences at the level of public administrations/agencies.

1.3.2 Governance and usefulness of IA

To study the second horizontal topic, the **governance of the IA process** in order to increase its use(fulness) as a tool for policy making, attention has been focused merely on the policy cluster with regard to public funding of private RTDI. This topic is the main subject of Chapter 3 of the report. A twofold approach has been taken: one from the perspective of IA exercises or projects, and one from the perspective of the public administration or agency as a manager of a research program (policy measure).

With regard to the project approach, based on purposive sampling taking into account the participants experiences and aimed at collecting IA practices in three policy sub-clusters or policy typology for public funding of private RTDI (i.e. RDTI funds; RDTI tax & fiscal incentives; and RTDI networks, clusters and transfer policies), 10 qualitative case studies have been the subject of an in-depth analysis. The analyses were based on a broad literature review and templates taking into account the experiences of earlier work in the field by PRO-Inno and Implore (INNO-Appraisal Final Report, 2010 and ImpLore Final Report, 2009) to investigate governance of 'product factors' related to the results of findings of the IA exercise (operational learning, policy feedback, system impact, presentation of information, and scope) and 'process factors' related to the usefulness of IA created during the process of its conduct (timing, programme objectives, policy-makers' expectations, policy-makers' engagement, trust and compliance of all stakeholders, and dissemination). A pre-tested harmonized process flow chart has been developed, including the case study process (from interview guide to report template and verification by the interviewees) and involving for each case study the often differing views of a broad range of interviewees (including policy-makers, programme managers, evaluators, and policy program experts from other public bodies with a clear interest in the IA process). Case studies (see Chapter 3, Table 3.1 for Case Study List and Annex 3.3 for Case Study Summaries) were carried out using primary (interviews with the various stakeholders of IA) and secondary sources (the IA reports itself, other research …).

Through these case studies, the issue of the governance of IAs in relation to product and process factors are analysed and synthesized with 'good' and 'bad' practices to identify how each of them is managed, in order to increase the usefulness for policy makers. Concerning the value-adding perspective of public administration for the IA process consisting of four

sub-processes (set-up – design – assessment – utilisation), three in-depth case studies have been carried out, based on the TAFTIE smart agency self-assessment approach. A structured dialogue approach was followed by one interviewer conducting the three in-depth case studies. The interviews started with a presentation of the self-assessment approach to the members of the programme team (which included both policy makers and practitioners of the assessment exercise), followed by a presentation of the programme and its objectives, instruments and basic activities, an intense dialogue on the objectives and impact logic of the programme, and the IA process or its design phase. The cases have been selected in a purposeful way in order to include a pre-design situation, an ex-ante exercise, and an ex-post case (see Chapter 3, Section 3.6).

1.3.3 Transferability of IA: barriers and critical success factors

With regard to the third horizontal topic, the context in which IA takes place, **barriers and critical success factors** are analysed to promote transferability of best practices of IA and policy instruments to other countries. These aspects have been considered from insights and experiences in the policy cluster on industry-science relationships. Industry-science relationships are very broad in scope, taking several forms. These relationships are often difficult to understand since they often consist of different kinds of actors combined in varying kinds of relationships. Moreover, they are highly context and innovation system dependent. Based on the partners' experiences and the broad range of industry-science relations, the analysis focused mainly on two specific types of policy measures: support measures for cooperation between public and private agents and support measures for technology centres as a node for transfer of scientific research to the production sector.

The methodology is based on three complementary approaches: (i) a literature review on critical success factors of science-industry relationships and on best practices of policy making and policy evaluation; (ii) the exchange of experiences and best practices in the different partner countries for the use and methodology of IA of policies (mainly based on ERAWATCH); and most importantly (iii) a meta-analysis of 32 purposively chosen evaluation studies that analyse the impact of policies that promote industry-science linkages. The latter studies which were explored in-depth included 14 studies which analysed instruments oriented to public private cooperation; 10 studies evaluated the role of technology centres; 6 instruments promoted simultaneously public private cooperation and the role of technology institutes, and 2 evaluated cluster policies. Most instruments did offer support in the form of subsidies for a limited number of proposals which can be related to all types of technological fields or sectors. The policies analysed in the 32 evaluation studies were not generally used to promote certain sectors or technological field but have a rather (general) horizontal character.

The main objective of this meta-analysis and the literature review is the identification of good practices from two perspectives. On the one hand, identification of the best and most accurate methods and research questions. These are analysed in evaluation studies by carrying out a benchmark of the usefulness of the used indicators and methodologies. On the other hand, the identification of success factors for the implementation of the existing policies and improvement of institutional settings generating policy recommendations in the field of policy design for science-industry linkages. This with the aim to increase their efficiency and effectiveness (value for money). The critical success factors were grouped in five broad components or clusters: (1) the overall broad contextual framework conditions which impose constraints on innovation and production and consequently on the industry-science relations; 2) specific characteristics of the innovation system (especially the framework of R&D and innovation policies); 3) internal organization and performance of enterprises and other non-scientific private research organizations; 4) internal organization and performance of R&D in public and private scientific R&D organizations (incl. universities); and 5) interaction mechanism and system performance. Moreover, based on a survey to experts in some selected countries and to the directors of the Spanish technology centres, the role of science in the technology centres was analysed.

A standardised matrix based approach was used to make a quantitative inventory regarding: the type of instruments; the characteristics of the evaluation study; the analysed indicators; and policy recommendations. A multi-method approach was followed in which the matrix model also included a qualitative review about the quality and usefulness of the existing

studies to derive recommendations at the level of policy making and at the level of policy evaluations. Therefore, qualitative information was re-collected about the success factors and good practices included in the conclusions, the executive summaries and the section on policy recommendations of each study.

1.3.4 Assessment of performance-based funding

Finally, related to an **improved understanding of methods and indicators for IA,** the project mainly found inspiration in IA practices in terms of performance-based funding of RTDI in universities (the third policy cluster). The aim of this process is to discuss and reflect on the use and implementation of performance-based funding systems/schemes for universities, particularly the (policy) rationales behind them, their success factors and their limitations. Three complementary activities have been undertaken: (i) a literature review on the performance-based funding of universities and the assessment of university-based research; (ii) analyses of research assessment exercises which are already used by the policy level in performance-based funding systems for funding universities; and (iii) an exchange of experiences and critical discussions by the different partner countries in respective workshops.

Three central research questions are considered: (i) Why are performance-based funding schemes introduced at policy level for the funding of universities? What is the rationale behind that? (ii) Have the performance-based funding systems currently in use been 'successful', or to be more precise, considered to have met expectations at policy level? This is a crucial question for the policy level in general, especially as nearly every country intends to increase its share in performance-based funding (or to introduce such a system); and (iii) What are the limitations and remaining problems for performance-based funding schemes currently in use and what does this imply when setting-up and implementing such schemes?

Performance-based funding schemes have been selected based on their 'relevance' (when they were already in use and therefore linked to concrete funding decisions) and when there was enough information available. The chosen schemes correspond to a high degree with the participating countries (Austria, Czech Republic, Spain, France and Iceland) in order to enable the collection of in-depth information and go beyond the available literature on these assessment practices. In addition, two more schemes (from Germany and the UK) have been added to the list of analyzed cases. Their selection was mainly based on a corresponding work of an Expert Group of the European Commission which also identified a number of interesting research assessment exercises (European Commission, 2010c). These cases are listed in detail in Chapter 5 (Table 5.1).

1.4 Key messages

Related to the three RTDI policy clusters (public funding of private R&D, industry-science linkages, and performance-based funding of universities), and presented regarding each of the four horizontal topics under discussion (see section 1.2.2), the identified lessons and recommendations are summarised below. These insights are derived from Chapters 2 to 5 of this report and have also been presented and discussed at the Belgian EU Presidency Conference 'Common Impact Assessment for Optimising the Policy Mix' of December 8th 2010 in Brussels (see Annex I). The results of this discussion and the feedback of the audience have been included in our overview and will be further presented and discussed in greater detail in section 1.5.

1.4.1 Key messages: 'The practice of IA in the policy cycle'

- There is an increased interest and use of IA in policy making towards RTDI in Europe; however, in most countries the planning of IA at the policy cycle is still on an ad-hoc or exceptional basis
- Heterogeneous visions and terminology for IA exist; there is thus 'space' for further harmonization in Europe while respecting the 'no one size fits all' principle
- Little attention is paid to the broader societal impact of public RTDI funding, although policies increasingly target broader societal 'grand' challenges. This is largely due to a lack of suitable indicators, data and tractable methodology
- The policy making cycle is not 'closed': policy uptake of outcomes of IA exercises is suboptimal. Early involvement of policy makers is essential

The analysis of IA practices (both at case study and policy making level) in Chapter 2 points towards an increased use of IA in RTDI policy making. However, in most countries the planning of IA at the policy cycle level is still on an ad hoc or exceptional basis. In some countries, IA practices are administration or agency dependent. Despite the objectives of the Lisbon strategy and the new EU 2020 Vision on future growth and competitiveness, little attention is paid to broader societal impacts of public funding for RTDI.

Some factors which can hinder the usefulness of IA as a tool for policy making have been identified. Bearing this in mind, three points can be noted:

(1) In IA the focus remains on the measurement of outputs, outcomes, impacts, goal attainment, and additionality. Too little attention is paid to policy/strategy development and project implementation efficiency and how the IA will contribute hereto. This means that the policy cycle is not 'closed', as argued above. This can be related to the fact that in less than 50% of the IA studies ordered by government administrations/agencies, policy makers and/or the programme management are really involved. This confirms the existence of a gap between policy formulation, implementation and subsequent policy adjustment, albeit from a stakeholder involvement perspective.

(2) There seems to be relatively low involvement of those directly or potentially supported by the measure, the so-called 'beneficiaries'. Related to this finding, when it comes to wider discussion of the analysis and recommendations, government and participants or stakeholders are quite frequently not involved.

(3) Concerning the formulation of recommendations based on the IA exercises, the focus mainly lies on the re-design, expansion or management of a programme/measure. Broader policy design is not an objective in over 50% of the IA exercises and the influence and relation with other policy measures (e.g. in terms of re-design or merger) are limited. This reveals little attention to the broader policy mix in IA exercises and thus the lack of a more systemic perspective.

Several reasons are found to explain why IA exercises of public funding for RTDI are not easy to carry out and, as such, hamper their usefulness as a tool for policy making. First, even when considering only three clusters of RTDI policies (the enhancement of private RTDI; the enhancement of industry-science cooperation; and the improvement and governance of public research), most of the assessment studies envisage different policy areas at the same time.

Second, it is difficult to find appropriate indicators both to measure the complexity of different impacts (scientific, technologic, economic and societal) and to address the causality between public funding of RTDI and each of these impacts. The appropriability of indicators turned out to be case dependent and societal impacts appear particularly difficult to measure. This finding is probably - at least to some extent - related to the fact that a majority of IA exercises in Europe failed to consider indicators for IA at the set-up of the policy programme/measure (thus 'ex-ante'). Progressing in the development and usage of 'appropriate' indicators for measuring the socio-economic impact helps to develop the formulation of the 'logic intervention model'. Moreover, this will also enhance the usefulness of IA as a tool for policy makers since policy making should be evidence-based (e.g. the

'Europe 2020' strategy). At the same time, awareness needs to be raised with regards to existing limits for evaluation. These include not only the costs in time and financial budgets but also the difficulties of evaluating (making causal relationships with public funding for research and innovation) and even in measuring long term socio-economic effects. The latter not at least because a broad number of other than RTDI related factors influence such changes and it is not always possible to isolate the policy impact from other explanatory determinants.

1.4.2 Key messages: 'Governance of IA projects'

- 'Process' and 'product' factors play a critical role in the usefulness of IA for better policies
- Sufficient attention should be paid to the 'design of the IA process' and the role of the programme manager (agency or administration)
- Impact assessment should be conceived as an ongoing 'learning process' involving a broad group of stakeholders
- Sufficient attention should be paid to the 'follow-up of the IA results'; but form and format of the communication of results to policy makers are also essential

Governance of IA relates to the way in which IA-exercises are designed and managed through to completion. Factors related to design and implementation are critical to the successful completion and take-up of IA results in policy making circles. Impact assessments, when carried out properly, can provide two types of outcomes or uses. First, they can be a source of legitimacy for policy makers and (political) decision-making. Secondly, impact assessments can be useful as a policy learning tool which provides feedback at the operational, policy and system level. This is important in order to optimize policies for the benefit of society and the efficient spending of public money.

As discussed above, the OMC-net project focuses on this latter type of usefulness by deriving lessons for the governance of IA in order to increase their usefulness and value added as a tool for policy making. The issue of the governance of IA is studied through a number of 'process' and 'product' factors which are critical to a high degree of usefulness. Aside from the attention paid to 'governance' issues, the case studies also shed light on the methodological choices made in each of the case studies. There is no one single methodology to measure the impacts of an RTDI policy. The choice of methodology is dependent upon the purpose of evaluation or IA and its intended use. It can be concluded that a mix of both qualitative and quantitative methodologies is applied in most countries which enables one to cross-check the robustness of conclusions about the impacts assessed, for example.

Three clusters of conclusions and recommendations have been created, which also offer important general messages to IA practitioners and policy makers: (cluster 1) sufficient attention should be paid to the 'design of the IA process'; (cluster 2) impact assessment is a 'learning process'; and (cluster 3) sufficient attention should be paid to the 'follow-up of the IA results'. In each of these clusters there are various factors that play a role. We discuss the most important ones below (more details can be found in Chapter 3).

1.4.2.1 Cluster 1: 'Design of the IA process'

(4) It is necessary to consider IA early in the programme (ex-ante), as a process and not as a single event in its life cycle; a process which involves different stakeholders and experts at various points in time. Impact assessment should be an integral part of a learning process in parallel with the other activities of the RTDI programme.

(5) Impact assessments should not only focus on the outcome of the programme, but should include the wider context, effectiveness and efficiency of the operations of the agencies/programme managers who run the programme. How do they facilitate the programme and create the right conditions for a successful implementation?

(6) The design of the IA study requires using the 'impact logic' approach as its basis, reflecting the rationale for the RTDI policy in question. A broad mix of tailored qualitative and quantitative (preferably) methods and approaches is essential. All this

should be included in a high quality 'terms of reference' (ToR) in order to ensure an effective IA process.

(7) Timing is a central planning and design factor, from the time of the study and its different stages until the impacts materialize. Innovation impacts typically take some time to become observable (in terms of years). Therefore, the results of evaluations must be available when needed and relevant in order to maximise the usefulness of the outcomes.

1.4.2.2 Cluster 2: 'Impact assessments as learning processes'

(8) Impact assessment is a learning process and should be conceived as an ongoing or a repetitive process. There is a cumulating learning effect by the sequencing of various studies over time and by the involvement of all stakeholders. The learning process on evaluation can also be strengthened through international benchmarking (e.g. in the form of external peer reviews) and a review of several studies, knowing that differences between national contexts must be taken into consideration.

(9) Strong stakeholder involvement is important to align interested and expectations and to facilitate learning. But it can also have some adverse effects, particularly in a context of high sensitivity and tension. Trust and compliance are factors of usefulness, and involving stakeholders from the beginning with the transparency of objectives, scope and methodologies can be achieved e.g. with a steering committee (involving all stakeholders, including 'neutral' national and or international experts).

1.4.2.3 Cluster 3: 'Follow-up of the IA results'

(10) Formulation of the policy recommendations of the IA exercise determines the quality and relevance of the information regarding policy feedback. Background and expertise of the evaluator should be part of the selection criteria for evaluators. Language and format in the formulation must be accessible and easy to understand.

(11) In order to establish an effective platform for utilization or usefulness, evaluation and IA should be linked to decision points at policy, agency or programme level. An agency should involve itself in turning evaluation results into action. This implies that agencies have enough 'absorptive capacity' themselves in order to effectively influence the policy making process. This policy feedback should target relevant and interested authorities in a way that is tailored to their needs and background.

1.4.3 Key messages: 'Barriers and critical success factors for transferability'

- The differences in national (and regional) contexts for RTDI urge a differentiated design of policy measures and variation in the ways to design IA studies; understanding these differences and associated critical success factors is essential for 'transferability' of methods and results
- It is the responsibility of the IA commissioners to be transparent in terms of design and context of an IA
- It is the responsibility of the IA practitioners (experts and consultants) to be transparent in the methods and indicators used to carry out the IA

With the aim of identifying best practices and critical success factors (CSF) for the transferability of IA practices and even results to optimise existing policy mixes (what works and what does not?), Chapter 4 of this report identifies the main obstacles, barriers and facilitators by studying the IA of specific Science–Industry linkages. The focus of the industry-science linkages is mainly based on evaluations of (i) joint projects or contract research and (ii) technology centres at the cross-road between science and innovation, although the findings have been generalised to the level of RTDI policies in general.

The objective of the review was to obtain valuable information about the shortcomings and the possible solutions for the improvement of the design of future evaluation and IA studies, and thus the transferability of approaches. It was also to offer a critical view on the quality

and appropriateness of evaluation studies in Europe. Below we present the key findings or critical factors important for transferability of evaluation and IA practices and results.

(12) There is a lack of analysis of the role of the evaluated policy instruments in the policy mix. Evaluation studies should include an analysis of the critical success factors and should likewise identify why the instrument does not have the expected impact and, consequently, offer some hints about how the individual instrument or the policy mix could be improved. One track is that evaluation studies should/could put more emphasis on the evaluation of the administrative efficiency and efficacy and should explain why no (or limited) impact occurs. As such, valuation studies can and should play an important role in the assessment of the failures and obstacles in innovation systems. They can offer useful and qualified information about the barriers and obstacles for policy measures to be successful. They can deliver input for a better implementation and for possible useful additional policy measurements.

(13) There is a lack of analysis about the interaction between the different forms of additionality and a lack of profiling regarding the use of advanced econometric instruments to improve credibility and confidence (lack of complex profiling). Evaluation studies should carry out a more complex and complete analysis of the different forms of additionality, especially by studying their correlation and interaction.

- Additionality is a central factor. It is important to determine whether any financial or behavioural additionality exists in the frame of the evaluated programme. Most studies only analyzed the supported firms, but a counterfactual can be useful in order to assess the additionality of the programme. Therefore, the evaluation studies should also include the non-supported organisations in their analyses.
- One form of behavioural additionality is the increase in the cooperative attitude or culture, while another is the increase of technological capabilities and knowledge base. The increase of such forms of additionality can be considered part of the learning process and can also exist in unsuccessful projects.
- To ensure technical and commercial additionality - or 'externalities' - the supported project must be technically 'successful' and the newly developed technologies should be introduced into the market. This implies that the firms should obtain good technological results and this should help them by opening up new markets and/or improving their competitive position in existing markets. However, taking into account that innovation is a high risk activity, the failure of a relatively high number of projects cannot be considered as direct negative aspect. Indirect ways of generating externalities could be through cost reduction, the improvement of the profitability of the firms' activities, or improved learning with regard to impact assessment practices.

1.4.4 Key messages: 'Assessment of performance-based funding'

- In the case of assessment of performance-based funding the targeted actors also need to be strongly involved in the design and implementation phases
- As knowledge is currently weak, more efforts are needed to assess the (longer term) effects and impacts of performance-based funding of universities
- Performance-based funding takes different forms in different countries and regions; for benchmarking and comparison reasons, these differences need to be taken into account

Performance-based funding is generally an important policy choice made in the context of discussions on competitive versus block funding models. It is increasingly recognised that higher levels of competitive funding benefit quality of research and development, especially of public research institutions and universities. While analysing performance-based funding of universities, several more general lessons could be learnt with respect to performance-based funding as an instrument in general. There is considerable heterogeneity among universities in different countries. Differences in profile related to different functions do not only reflect strategic choices of individual higher education institutions but – for public institutions – also the role they are considered to play in the national higher education and research and innovation system.

Given that the measures are in place for a short period of time in various countries, there is only limited evidence regarding the effects and impacts of the performance-based research funding schemes in the long run. However, for the UK RAE, where it has already been in place for more than two decades, the analysis with regard to the rationale is positive. Irrespective of this limited evidence, the majority of the schemes analysed are considered successful, albeit for different reasons. This is a consequence of the differences in the schemes, because although the objectives and rationales for the use of performance-based research funding schemes are similar, the design of the respective policy instruments varies from country to country, thereby reflecting specific political and regional contexts. Despite their success, all cases analysed are faced with a continuous process of improvement of the scheme.

With regard to recommendations for performance-based research funding, found mainly in Chapter 5, the following pitfalls to avoid when setting-up and implementing the schemes have been identified:

(14) National characteristics of higher education systems and/or systems associated with performance-based funding need to be taken into account when designing and implementing impact assessment exercises. Also, the multi-task nature of universities, with their specific role in a national higher education and research system and the heterogeneity of departments /research groups within universities have important implications for the impact assessment of university-based research and the related performance-based funding schemes. Therefore, indicators have to be designed specific to the characteristics of the individual university or research group and to the purpose of the assessment/ objective targeted.

(15) When funding decisions are based on a specific set of indicators, it is important to take into account that induced incentives regarding research efforts have to be specific and balanced in order to prevent suppressing the intrinsic motivation of academics and refraining from streamline their activities towards certain activities, irrespective of their own particular talents. This is important so that strong incentives for internationally visible research outputs do not have detrimental effects on teaching quality or science-industry collaborations, for example. Therefore, the policy level has to be aware that the introduction of performance-based research funding schemes may result in major changes for university profiles in respective countries, e.g. in a vertical differentiation of the university landscape.

(16) Despite the merits of performance-based research funding schemes, there are still many limitations and problems. This is hardly surprising as such schemes are relatively new and recent policy tools. Some of the identified limitations are more common and can be found in many schemes (vertical differentiation of the university landscape; pure focus on quantitative mechanisms; the missing recognition of the diversity and non-comparability of research disciplines; methodological limitations, etc.) and others are very specific and related to a particular scheme. Therefore, a main conclusion for the policy level is to be aware of the diverse limitations of performance-based research funding schemes, to address them as far as possible and recognize that further work (particularly on effects and impacts of schemes implemented) has to be undertaken in order to address such limitations.

1.5 Lessons learned and the way forward for IA in EU RTDI policy

In order to formulate reflections on the way forward for IA in EU RTDI policy the OMC-net project draws heavily on three inputs:

- First, extensive use is made of the literature review and mutual learning on IA with regard to the four horizontal topics and three policy clusters as presented and addressed in detail in Chapters 2 to 5 of this report.
- Secondly, account is taken of the outcomes of the Belgian EU Presidency Conference 'Common Impact Assessment for Optimising the Policy Mix' in Brussels on December

8th 2010. During this conference the first draft of main policy findings and recommendations from the project were presented to and discussed with a broad audience (over 80 participants) of policy makers from 24 different countries. The debate included reflections on the way forward for IA.

- Third, based on a 'survey on value added of the OMC-net project for its participants' (see Annex 1.1) information has been collected not only about priority areas for further development in IA, but also on what the partners have learned from the project. Or in other words, how useful was the project to its participants?

1.5.1 Lessons learned for the OMC participants

When considering the lessons learned from a project, as highlighted at the beginning of this chapter, it is important to take into account the initial context in terms of the experiences, expertise and main interests of its participants. In this respect it has been highlighted that, on average, IA expertise at the beginning of the project was moderate, experience was limited and that interest could be mainly related to methods for IA, mutual learning from existing practices, and - highly related to the policy making/support environment the participants operate in – the usefulness of IA for policy making.

Table 1.1 reflects the main lessons from the project. In terms of learning achieved, the findings from the project turn out to be very positive. As regards IA in general, all participants agree that the project strongly improved their knowledge in terms of the terminology used for IA. This clearly reflects both the necessity and added value of the project in terms of promoting the use of a common terminology (mainly based on the existing logic intervention model) for IA. Despite the variety of literature and views about IA, this finding clearly highlights that there is considerable work required in order to further develop and implement this (a) common terminology, at least among government administrations and agencies close to policy support/making. By its size, number and the initial experience of its participants, this project (as presented in Table 1.1) undoubtedly helped us to do so. Second, also in terms of learning aspects, the project clearly facilitated an improved understanding of methods for IA and better understanding of the use (and usefulness) of IA in the policy cycle. However, it has to be mentioned that learning about methods was the first motivation for participation (Figure 1.1) and the results from the project are only mildly satisfactory. Therefore, improved understanding of the methods for IA remains an important area for further work.

Table 1.1: Improved understanding and promotion of usefulness of IA: participant's lessons from the OMC-net project

This OMC project has:	Strongly Disagree	Mildly disagree	Agree nor disagree	Mildly agree	Strongly Agree
Increased your knowledge of:					
1. The methods for IA	0	0	0	8	6
2. The terminology used for IA	0	0	0	0	14
3. The place (usefulness) of IA in the policy cycle	0	0	0	4	10
Increased your practical understanding (in doing your own IA) of:					
4. The practice of IA (i.e. how to setup an IA exercise, how to manage it etc.)	0	0	3	5	6
5. The practice of IA (i.e. lessons and experiences of value to you in doing your own IA)	0	0	1	4	9
6. The use of indicators for IA	0	1	4	6	3
7. The place (usefulness) of IA	0	0	0	4	10

in the policy cycle					
Helped to promote:					
8. The usefulness of IA in your country	0	1	2	6	5

Source: Survey on Value-added of OMC-net project for participants (Annex 1.1)

With regard to the practice of IA, the picture is somewhat more nuanced. At least some of the partners did not esteem to have gained sufficient knowledge to allow them to practice their IA, not least in terms of setting up and managing an IA exercise. This can be related to the fact that practical experience of IA by many participants was quasi non-existent at the beginning of the project. On the other hand it turned out that half of the participants - although it was not a primary objective of the project - implemented or will implement their 'own' IA exercise over the next six months, as a direct result of this OMC-net project. At first glance this seems rather low compared to the existing immediate need, which saw over 80% of participating organisations carrying out IA. However, there was only one main reason to explain this, namely the fact that the person involved for the organisation in the project had no direct responsibility within the organisation for implementing IA exercises. This can at least partly explain the relatively low level of practical experience within the project and raises the issue of the need for a **systematic** approach to impact assessment of policy measures in public administrations and agencies.

1.5.2 The way forward for impact assessment

Based on the 'survey on value added of the OMC-net project for its participants' (see Annex 1.1), two questions are addressed with regard to the way forward for IAs of public funding for RTDI. The first one relates to priority areas for further development with regard to the use of IA. The second one provides reflections from the project participants concerning the need for a continuation of the work performed and the necessity for content and process wide changes/improvements.

Partners were asked about priorities for the future use of IA in their agency and country. The focus was on whether methodological development and learning are needed or whether the focus needs to be oriented towards the take-up of evaluation and IA outcomes in policy making. Related to the context at the beginning of the project, three areas for prioritisation of future work have been explored. These include: (i) further methodological development and learning; (ii) development of indicators for IA; and (iii) the take-up of usefulness of evaluation and IA outcomes in policy making. Only one partner was able to prioritize only one of these (i.e. indicators). For half of the participants, each of the three areas is as important. The participants' responses did not reveal any relation between the areas for prioritisation and the initial position in terms of expertise and experience in IA.

As regards whether or not the participants are in favour of a follow-up to this project, they were unanimously positive. An additional question was formulated with regard to what should be different in a follow-up project, both content and process wise. Content wise, the principal and again nearly unanimous answer (provided by each of the respondents independently), was the need for practical implementation of IA. This can both be related to their initial lack of experience and the fact that many of the partners have recently, or will enter the implementation phase with short term notice. In this respect, there is clearly a need to work with comparable methodologies in different countries. This involves further reflection and work on how the **EU dimension/benchmark** perspective can be useful to promote IA and what its role can be in the further development of a program to support research in methodology. Other - but less unanimous - interests relate to more attention to ex-ante IA and increased understanding of indicators to measure societal impacts of research.

Related to the desire for a more practical and harmonised approach in a next phase and taking into account the highly valued common learning and understanding in this project process-wise, and for the partners who have been participating in the project, a next step for IA would be oriented towards a more balanced level of practical experience and expertise focused at more narrowly defined objectives. Given the significant variety in focus and expectations of the different stakeholders (which provided enriching insights during this

project), working in smaller more homogenous teams in future projects would enhance efficiency and provide opportunities for better division of responsibilities between partners.

1.6 Concluding remarks

To conclude this chapter, we set out five key messages and possible areas for the future improvement of IA. They have been identified during mutual learning throughout the OMC-net project, the in-depth analysis of policy-driven IA exercises, and the policy debates during the Swedish, Spanish, and Belgian EU Presidency Conferences:

- The various case studies carried out during this OMC-project have clearly illustrated numerous shortcomings in the design and governance of evaluation and IA studies. These practical 'tips' and 'tricks' will help funding agencies and other practitioners to develop better IA exercises and to increase the chances of better uptake of the findings into new policy development. However, the results also show that there is a need to better understand, both conceptually and methodologically, what it means that RTDI policy is increasingly aiming to tackle so-called 'grand challenges'. RTDI policies should have a clear impact on society and the problems and challenges it is facing. Framing and measuring societal impacts thus require a new methodological and indicator framework, and a higher level of analysis than the individual policy measure. It requires a more holistic perspective, a programme perspective, and perhaps even an RTDI policy measures cluster perspective. Adequate metrics are an important element herein. Holistic also implies that multiple impacts are being considered, on the economic, scientific, technological and societal levels.
- The practice and experience gained under this OMC project clearly points out the importance of training policy makers and programme officers in funding agencies. An important element in the closure of the policy cycle is related to the human factor. Programme managers, policy officers and even policy makers, need to understand how an IA project works, how its results should be interpreted and how the recommendations or IA products can be implemented. Impact assessment practitioners and programme managers in ministries or funding agencies need to know how to add value and how to create the necessary 'buy in' in order to mobilize policy improvement at the higher echelons after assessment. Investment in training is thus essential.
- Ex-post IA begins ex-ante. It is important to identify ex-ante the effects and impacts of a specific policy measure. Ex-post it then needs to be considered whether the expected effects and impacts have been realized. One should also not neglect the importance of monitoring and mid-term assessments. Mid-term assessment provides an opportunity to adjust ongoing policy measures towards the desired goals and results. It is clear that mid-term assessments cannot fully appreciate the (potential) outcomes/impacts due to the so-called time lag between policy intervention and its resulting impact, but it can lead to early signals about the chances of achieving the desired impact and results.
- In order to ensure smooth execution of IA exercises and a maximum take up of results for policy improvement, there is still a long way to go for ex-post IA in RTDI policy making, particularly concerning the design and governance of IA exercises. This is what we have defined as 'closing the policy cycle'. This report provides practical support in terms of process and product factors for impact assessment exercises in order to increase their usefulness for policy making.
- This OMC-net project clearly illustrated the usefulness of exchange of practices and experiences among policy makers, funding agencies and IA practitioners from different countries. There is a strong plea to continue these kinds of mutual learning and harmonization efforts in future, and even better, take into account the starting point of different actors and their level of experience with IA. An EU-wide IA community could nurture a pool of knowledge based on exchange of experiences and coordination. Such an IA community could be linked to the existing European Evaluation Network which is currently moderated and facilitated by the European Commission. An advantage of

such a pool of IA practitioners would be that national governments and agencies could involve members of this pool as 'peers' in setting up and implementing their own IA.

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Chapter 2: The practice of impact assessment in the policy cycle in Europe

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2.1 Introduction

Increased interest in the issue of evaluation of public policies dates back to the 1990s. This was partly due to budget stringency and the need to better allocate increasingly scarce public resources. More fundamentally, however, the focus on evaluation was emblematic of a broader reassessment and examination of the appropriate role of government and of market mechanisms across a number of policy areas. Accountability, transparency and the desire to minimise distortions arising from government policies while maximising their leverage effect were all driving this trend towards more evaluations (Papaconstantinou and Polt, 1997, p. 9).

The aim of this Chapter is to define impact assessment and to position ex-post impact assessment - the focus of this work - in the broader activity of evaluation. The concept of 'impact' and methodological difficulties related to its measurement are highlighted. The focus of the Chapter is on the practice of impact assessment in Europe and particular attention is paid to the place of ex-post IA in the policy cycle. Like ex-post evaluation in the 1990s, ex-post impact assessment is currently enjoying increased attention. Assessing the socio-economic impacts of public policy is becoming increasingly important as the changing role and position of government has resulted in a growing demand for evidence-based policies (OECD, 2007, p.4). In the field of RTDI, expectations from public policies have increased along with public funding. As a result, impact assessment is being increasingly called for.

Once the decision has been made to conduct a new policy, this should be done in the best possible way. Government intervention is based on the idea that it can remedy some of the aforementioned market failures. But government intervention itself can also fail and social costs may end up higher than social benefits. Examples include institutional inertia, a lack of reliable information (e.g. on the impact of policies), a lack of continuity and a long-term perspective, excessive red tape, bureaucratic rivalry, unintended side effects, and so on. Therefore, the benefits of solving market failures must exceed the costs of government failure.

First, a careful choice has to be made as to the area of intervention. The combination of finite resources and a multitude of new emerging research opportunities mean that careful attention must be paid to funding priorities and requires wise choices by policy-makers. Is R&D support provided across the board, to all S&T areas, or is it concentrated in a smaller number of S&T priorities, and if so which ones? Is R&D support provided in research infrastructure, basic research, applied research, and human resources too, or is it concentrated in a single or just a few components of the innovation system, and if so which ones?

Second, the right choice has to be made as to the instrument of intervention. A wide range of possible instruments have emerged since the shift from the linear to the innovation systems paradigm. Governments make use of a flexible and evolving toolkit of instruments adapting to the specific dynamics and composition of the innovation system and addressing existing bottlenecks in the system.

Third, care should be taken not to introduce an excessive number of different instruments and to maintain clear and understandable policy intervention logic. Consistency across instruments should also be ensured (policy mix). Different instruments can work together to

[1] This Chapter has been based on the input of all partners involved in the project. Special thanks to Marie de Lattre-Gasquet, Nikolay Mateev, and Edgar Moya for detailed review comments, to Eric Hauet for the insights provided with regard to assessment of RTDI indicators and to Evelina Santa and Rocio Castrillo for the development of the questionnaire presented in Annex 2.1.

alleviate a particular problem, or they can counteract each other, sometimes in unanticipated ways.

Finally and closely related to the third point, policy support has to be provided at the most appropriate level of governance, and consistency in support has to be ensured across all policy levels. In a world that is increasingly interlinked, government measures will generate effects that go beyond the sheer local, regional and national level. Multi-level governance means finding the most optimal combination of government intervention at all policy levels in order to create synergies which none of the policy actors will be able to achieve on their own.

From the above it is clear that, prior to public intervention, government must carefully design the way in which it will intervene. This will help to ensure that R&D support is provided in the most appropriate areas (with large spill-over effects and where the private sector would not get involved on its own) and through the most effective instruments. A wide range of tools are available to optimise the research policy formulation process. These include the comparative analysis of S&T input and output indicators, foresight and technological assessment analysis, the benchmarking of national R&D policy actions and instruments, growth and competitiveness analysis, the consultation of stakeholders, the ex-post evaluation and impact assessment of past R&D programmes, and the take-up of the feedback thereof in ex-ante evaluation/impact assessment.

Within the aforementioned context, this Chapter starts by presenting and defining a number of key concepts (and their interrelations) which help delineate and understand ex-post impact assessment (Section 2.2). It discusses the role of ex-post impact assessment in the policy cycle (Section 2.3) with a particular focus on RTDI (Section 2.4). Since the literature on 'evidence-based policy-making' is wide-ranging, it is not our purpose here to provide a historical overview of the origin and evolution of these different activities. Instead we have opted in the more theoretical sections for starting from internationally well accepted terminology and models as used by the European Commission and the OECD.

In the second part of the Chapter, empirical evidence is presented on the extent to which IA is being practiced and plays a role in (future) policy design in Europe (Section 2.5). This cannot be viewed independently from the wide range of possible instruments available to policy makers. These will be presented based on information provided by ERAWATCH. Next, the specific characteristics (in terms of field of study, methodology and indicators, and usefulness for policy-making) of ex-post impact assessment exercises in the area of public funding for RTDI will be investigated (Section 2.6). The focus will be on exercises that have been ordered by government organisations only. Section 2.7 presents the main conclusions.

2.2 Ex-post impact assessment

In this section a number of key concepts are defined and their interrelations are usefully brought together in so-called logic models. As will be discussed below, logic models – their building blocks, their interrelations - play a critical role in all of the different activities underpinning 'evidence-based policy-making', whether audit, monitoring or evaluation (including ex-ante evaluation/impact assessment, interim evaluation, ex-post evaluation and ex-post impact assessment).

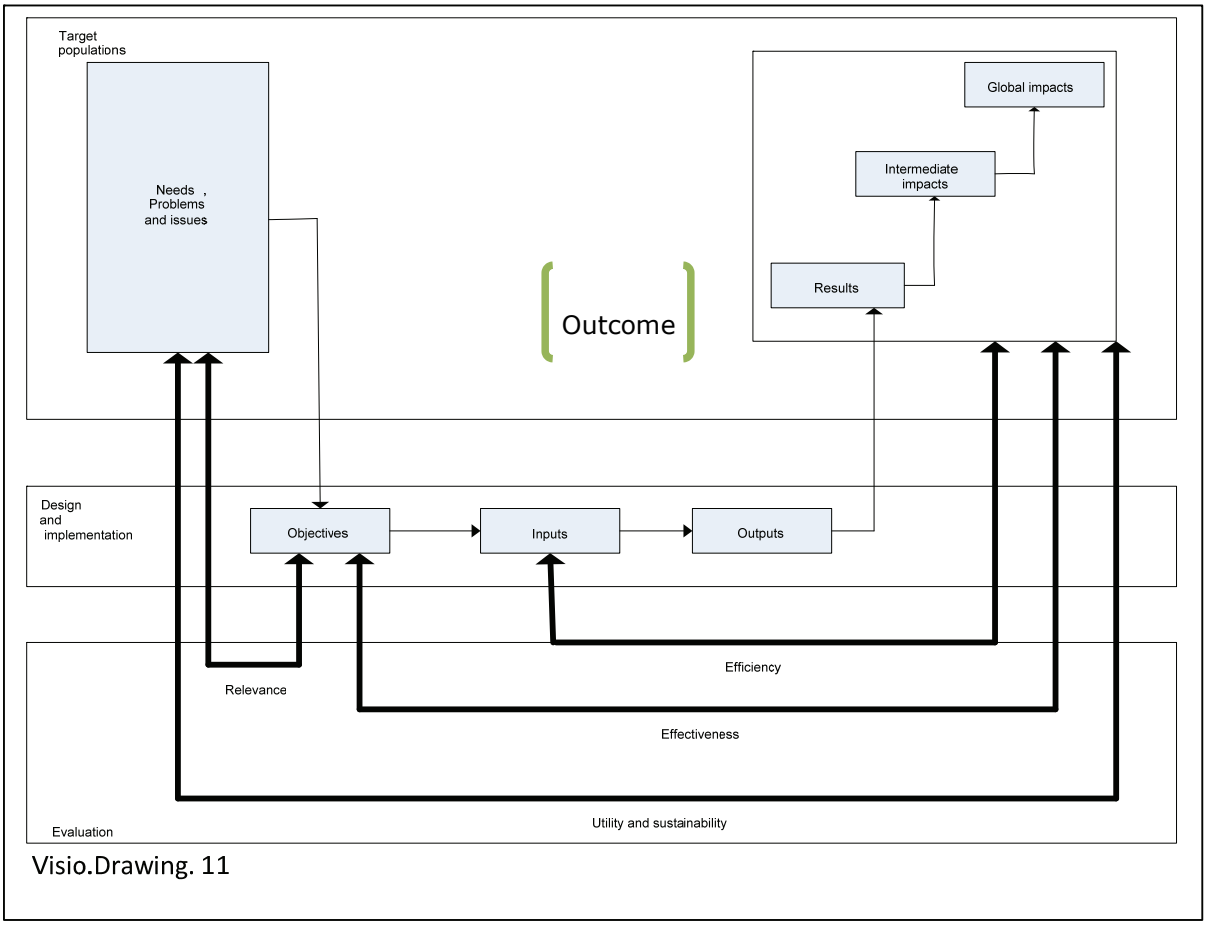
2.2.1 The logic model

Regardless of its nature (policy, programme, measure, project), a public intervention can be analysed as a set of financial, organisational and human resources mobilised to achieve, in a given period of time, an objective or set of objectives, with the aim of solving or overcoming a problem or difficulty affecting targeted groups.

Logic models – or programme models, defined in IKED/VINNOVA (2005) as 'logically consistent descriptions of the design of a programme as well as of the expected impact' (Lengrand et al., 2006, p.76) - are models that help identify and set out the relationship between the socio-economic needs to be addressed by the intervention and its objectives, inputs, processes, outputs, and outcomes, which include results (immediate changes that arise for direct addressees at the end of their participation in a public intervention) and impacts (longer term effects of the intervention) (European Court of Auditors, sd).

The logic model is presented in Figure 2.1. Needs are problems or difficulties affecting concerned groups, which public intervention aims to solve or overcome. Objectives can be defined as initial statements of the outcomes intended to be achieved by an intervention.

Figure 2.1: The Logic Model



*Source: European Commission (2004), p. 72. See also European Court of **Auditors** (sd), p. 17.*

With regard to the other building blocks, we can differentiate according to the level of control and influence. Elements under control include inputs, processes and outputs. Inputs are financial, human, and material resources which are mobilised for the implementation of an intervention. Processes refer to procedures and activities employed to convert inputs into outputs (e.g. procedures for delivering subventions or selecting projects for financing). The concept also covers the generation of management information and its use by managers. Outputs are that which is produced or accomplished with the resources allocated to an intervention (e.g. grants distributed to farmers, training courses delivered to unemployed people, a road built in a developing country).

Results are directly influenced by the policy intervention. They are the immediate changes that arise for direct addressees at the end of their participation in an intervention (e.g. improved accessibility to an area due to the construction of a road, trainees who have found a job).

Finally, impacts can be defined as what a policy measure can influence only indirectly. Impacts refer to longer term socio-economic consequences which can be observed after a certain period after the completion of an intervention, which may affect either direct addressees of the intervention or indirect addressees falling outside the boundary of the intervention, who may be winners or losers. The notion of 'impacts' is of course of critical importance within the context of this project. It is important to note the broad scope ('socio-

economic', direct and indirect, positive and negative) and time dimension ('longer term', 'observed after a certain period after the completion of an intervention') of 'impacts'.

Results and impacts can be covered under the larger umbrella of 'outcomes'. Outcomes are changes that arise from the implementation of an intervention and which normally relate to the objectives of this intervention.

The different building blocks of the logic model can be linked together through different interrelations capturing different 'issues' (European Commission, 2004, p. 39). A first issue is 'relevance', which relates to the extent to which an intervention's objectives are pertinent to the needs, problems and issues to be addressed. Closely related to relevance is the extent to which the intervention logic is non-contradictory/the intervention logic does not contradict other interventions with similar objectives ('coherence') and the extent to which resources are available in due time, in appropriate quantity and quality, and at the best price ('economy').

A second issues is 'effectiveness': the extent to which the objectives set are achieved. The principle of effectiveness is concerned with attaining the specific objectives set and achieving the intended results and impacts.

'Efficiency' refers to the extent to which the desired effects are achieved at a reasonable cost. The principle of efficiency is concerned with the best relationship between resources employed and results and impacts achieved.

A last interrelation links needs with results and impacts. In this respect, 'utility' refers to the extent to which outcomes corresponded with the needs problems and issues to be addressed. 'Sustainability' means the extent to which positive effects are likely to last after an intervention has terminated.

In addition, within the logic model, attention needs to be paid to 'consistency' and 'allocative/distributional effects'. The former concept referring to the extent to which positive/negative spillovers onto other economic, social or environmental policy areas are maximised/minimised. The latter investigating the extent to which disproportionate negative/positive distributional outcomes of a policy are minimised/maximised.

2.2.2 Ex-post impact assessment and evidence-based policy-making

Different activities underpin evidence-based policy-making. Evaluation can be seen as a broad concept including monitoring (audit and implementation), ex-ante evaluation/impact assessment, interim evaluation, and ex-post evaluation/impact assessment. The closer consideration of the logic model and its building blocks as defined above helps distinguish ex-post impact assessment from the other activities. These are briefly described in what follows. Essentially, ex-post impact assessment is defined here as a kind of evaluation that focuses in particular on the broad, longer term impacts of public intervention.

'Monitoring' is a continuous and systematic process carried out during an intervention, which generates quantitative data on the implementation of the intervention: whether activities take place according to schedule, if milestones are being met, whether funds are being used for their intended purposes, etc. The focus tends to be on inputs and activities, and less on outputs and outcomes/effects, though immediate outputs such as project reports and other deliverables are encompassed. The intention is to correct any deviation from the operational objectives, and thus improve the performance of the programme as well as facilitate subsequent evaluation. Monitoring includes both audit and implementation. Audit in the public sector covers a broad range of activities ranging from the traditional financial audit, which concentrates on inputs and outputs, to performance audit, which involves the study of implementation processes and their consequences to provide an assessment of economy, effectiveness and efficiency of an organisation and/or its activities, and in doing so tends to be focused on the **implementation** of an activity and its immediate effects (European Commission, 2004, p.10-11; Lengrand et al., 2006, p.58-59).

'Evaluation' has been defined as a 'judgement of interventions according to their results, impacts and needs they aim to satisfy' (European Commission, 2004, p.9), and as 'a matter

of seeing how well a policy or programme has achieved the objectives set for it' (Lengrand et al., 2006, p.31). Evaluation and audit overlap to some extent. Like performance audit, evaluation involves the study of implementation processes and their consequences to provide an assessment of economy, effectiveness and efficiency of an organisation and/or its activities, but in doing so tends to centre first and foremost on assessing performance in respect to an intervention's **effects**. When evaluation examines implementation it normally tries to explain how the results and impacts of an intervention were conditioned by the implementation mechanisms. Furthermore, a broader range of issues fall under the practice of evaluation including an examination of an intervention's relevance, utility and sustainability (European Commission, 2004, p.11).

Different kinds of evaluation exist and they address different kinds of questions. These are highlighted in Table 2.1.

Table 2.1: Different kinds of evaluation and the issues looked at

	Ex-ante evaluation/ impact assessment	Interim evaluation	Ex-post evaluation	Ex-post impact assessment
Relevance	X	X		
Coherence	X			
Economy	X	X	X	
Effectiveness	X	X	X	X
Efficiency	X	X	X	X
Sustainability			X	X
Utility	X		X	X
Consistency	X	X	X	X
Allocative/ distributional effects	X	X	X	X

Source: Adaptation of the Figure that can be found in European Commission (2004), p. 39.

'Ex-ante evaluation' is not a one-off exercise but a process - an iterative analytical learning process - that supports and is an integral part of the process of preparing, formulating, and designing proposals for new or renewed policies, programmes, measures, or projects. Briefly put, its purpose is to gather information and carry out analyses which help to ensure that the delivery of policy objectives will be successful, that the instruments used are cost-effective and that reliable evaluation will be subsequently possible (European Commission, 2004, p.12-13). Therefore, ex-ante evaluation is a key element in the evidence-based policy-making cycle as it takes account of lessons learned from similar experiences in the past while providing a basis for proper monitoring, ex-post evaluation and ex-post impact assessment. Ideally, an ex-ante evaluation involves a structured reflection on the rationale for public intervention and its likely impact. The example of Community ex-ante impact assessment is presented in Box 2.1.

Box 2.1: Community ex-ante impact assessment

Community Impact Assessment takes account of available monitoring and evaluation results and also discusses future monitoring and evaluation arrangements.

Community Impact Assessment attempts to answer in a systematic manner a number of key questions: (1) What is the nature and scale of the problem, how is it evolving, and who is most affected by it? (2) What are the views of the stakeholders concerned? (3) Should the Union be involved? (4) If so, what objectives should it set to address the problem? (5) What are the main policy options for reaching these objectives? (6) What are the likely economic, social and environmental impacts of those options? (7) How do the main options compare in terms of effectiveness, efficiency and coherence in solving the problems? (8) How could future monitoring and evaluation be organised?

Against the background of these questions, an IA involves a number of key analytical steps, which can be grouped into six categories:

- Identify the problem: describe the nature and extent of the problem; identify the key players/affected populations; establish the drivers and underlying causes; is the problem in the Union's remit to act? Does it pass the necessity and value added test? Does it develop a clear baseline scenario, including, where necessary, sensitivity analysis and risk assessment;
- Define the objectives: set objectives which correspond to the problem and its root causes; establish objectives at a number of levels, going from general to specific/operational; ensure that the objectives are coherent with existing EU policies and strategies, such as the Lisbon and Sustainable Development Strategies, respect for Fundamental Rights as well as the Commission's main priorities and proposals;
- Develop main policy options: identify policy options, where appropriate distinguishing between options for content and options for delivery mechanisms (regulatory/non-regulatory approaches); check the proportionality principle; begin to narrow the range through screening for technical and other constraints, and measuring against criteria of effectiveness, efficiency and coherence; draw-up a shortlist of potentially valid options for further analysis;
- Analyse the impacts of the options: identify (direct and indirect) economic, social and environmental impacts and how they occur (causality); identify who is affected (including those outside the EU) and in what way; assess the impacts against the baseline in qualitative, quantitative and monetary terms. If quantification is not possible explain why; identify and assess administrative burden/simplification benefits (or provide a justification if this is not done); consider the risks and uncertainties in the policy choices, including obstacles to transposition/compliance;
- Compare the options: weigh-up the positive and negative impacts for each option on the basis of criteria clearly linked to the objectives; where feasible, display aggregated and disaggregated results; present comparisons between options by categories of impacts or affected stakeholder; identify, where possible and appropriate, a preferred option;
- Outline policy monitoring and evaluation: identify core progress indicators for the key objectives of the possible intervention; provide a broad outline of possible monitoring and evaluation arrangements;
- Impact Assessment guidelines state specifically that in the case of the expiry/renewal of expenditure programmes, use should be made of monitoring and evaluation results.

Source: European Commission, Impact Assessment Guidelines, January 2009.

'Interim evaluations' take place during the implementation of an intervention and examine an ongoing activity. The results of these evaluations are used to support management, organisational learning, planning and policy making and for accountability purposes. An interim evaluation has an important role to play in producing direct feedback into the implementation process and thus help to improve the quality of ongoing interventions. Moreover, since new initiatives are often prepared long in advance, interim evaluation is also a very important source of information for the design purposes for the next generation of a programme, new policy orientations, etc (European Commission, 2004). The focus of evaluations of this nature is first and foremost on the effects of an intervention on target publics/geographical areas drawing primarily on both quantitative and qualitative data collected. Furthermore, evaluators analyse implementation arrangements and processes in order to assess how the latter affect the attainment of objectives and to be able to provide concrete and practical recommendations for improvement. At the heart of an evaluation of this nature is an assessment of **causality**, i.e. an analysis of the extent to which observed effects on target publics/geographical areas are likely to be a consequence of the intervention. Interim evaluations are structured around a number of key issues that direct the process of data collection and analysis. Interim evaluations focus in particular on relevance, effectiveness (with respect to implementation and early effects), efficiency (with respect to implementation and early effects), and utility (sometimes) (European Commission, 2004, p. 75-76).

'Ex-post evaluations' take place following the implementation of an intervention. As with interim evaluations, the results of ex-post evaluations are used to support management, organisational learning, planning and policy making and for accountability purposes. And like for interim evaluations, the focus of ex-post evaluations is first and foremost on effects, especially on impacts, efficiency and effectiveness, as well as on utility and sustainability (European Commission, 2004, p.75-76; and Lengrand et al., 2006, p. 67).

Finally, 'ex-post impact assessment' is a kind of ex-post evaluation that focuses in particular on the broad, longer term impacts of public interventions. As such it looks mainly at effectiveness, utility, sustainability, consistency and allocative/distributional effects (see before and Table 2.1).

Based on the concepts and insights, two important comments are in order. Firstly, the focus on the broad, longer term impacts of public interventions raises important challenges and has important implications for the **tools** being used (see Sections, 2.4.2, 2.4.3 and 2.4.4 for a RTDI specific discussion). Second, to the extent that ex-post impact assessment looks at issues such as consistency and allocative/distributional effects, it involves looking beyond the single policy, programme, measure or project to the broader **policy mix** (Box 2.2 and Box 2.3). To an increasing extent, the latter is being done (see Section 2.5), sometimes including 'thematic evaluations' (Lengrand et al., 2006).

Box 2.2: The concept of 'Policy Mix' for RTDI

The 'Policy Mix' can be defined as 'the combination of policy instruments, which interact to influence the quantity and quality of RTDI investments in public and private sectors.' In this definition:

- Policy instruments are: 'all programmes, organisations, rules and regulations with an active involvement in the public sector, which intentionally or unintentionally affect RTDI investments'. This usually involves some public funding, but not always, as e.g. regulatory changes affect RTDI investments without the intervention of public funds;
- Interactions refer to: 'the fact that the influence of one policy instrument is modified by the co-existence of other policy instruments in the policy mix';
- Influences on RTDI investments are: 'either direct (in this case we consider instruments from the field of RTDI policy) or indirect (in that case we consider all policy instruments from any policy field which indirectly impact on RTDI investments)'.

Sources: United Nations University, UNU-MERIT, Universiteit Maastricht (2007), Monitoring and Analysis of Policies and Public Financing Instruments Conducive to Higher Levels of R&D Investments – The "Policy Mix" Project – Country Review France, March, p. 3. OECD (2010): STI Outlook.

Box 2.3: VINNOVA's 'Portfolio Approach'

The 'Policy Mix' is the target of VINNOVA's 'Portfolio Approach'. According to VINNOVA, in order to evaluate public initiatives aimed at promoting innovation, it is necessary for the primary focus to be on the combined impacts of public efforts. In other words, a portfolio approach needs to be applied, in which all the projects and activities initiated and influenced by public initiatives are included in the analysis. A one-sided focus on individual projects and events risks leading to incorrect conclusions as to the impact and effectiveness of various public initiatives. In portfolio analyses and portfolio evaluations, the focus is on the results and impact of entire portfolios of projects and activities. The endeavour should be to contribute to a good balance in the composition of various initiatives (the portfolio) thus achieving a well-balanced distribution between risk and potential.

Source: VINNOVA, VINNOVA's Focus on Impact – A Joint Approach for Logic Assessment, Monitoring, Evaluation and Impact Analysis, 2008, p. 31. Note: on the need of a portfolio approach, see also IKED/VINNOVA, 2005.

2.3 Ex-post impact assessment and closing the policy cycle

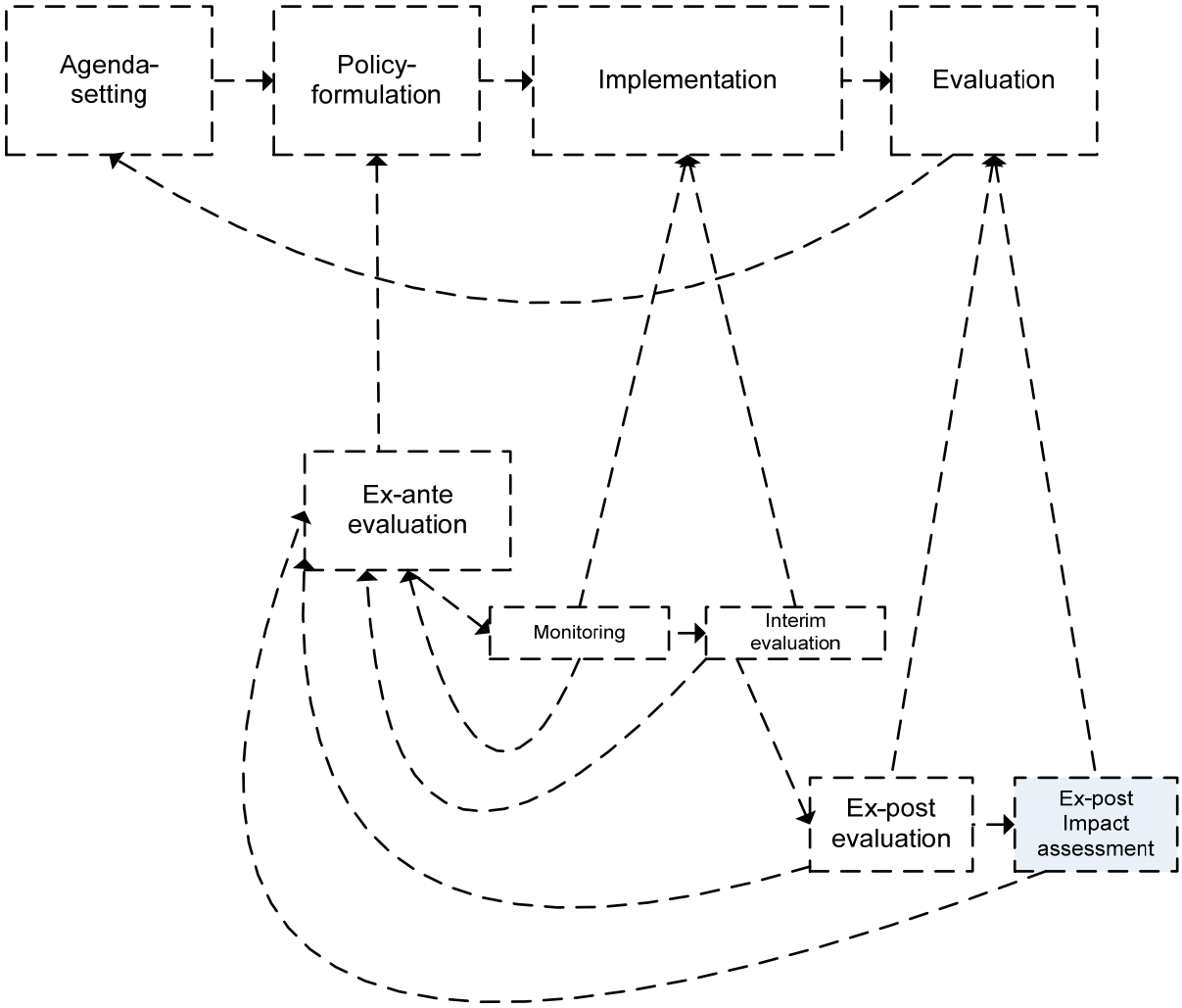
The different evaluation activities share the same logic model as their basic point of reference. In addition, there are explicit links between the different activities. Under ex-ante evaluation/impact assessment, for instance, it was discussed that it should take account of lessons learned from similar experiences in the past while providing a basis for proper monitoring, ex-post evaluation and ex-post impact assessment. The umbrella concept linking the different activities together in a more or less linear manner is that of the 'policy cycle'.

2.3.1 Ex-post impact assessment in the policy cycle

The policy cycle is generally summarized as consisting of a number of basic steps. The number of steps and their precise name varies but the following appears to be an accepted list:

- **Agenda-setting, problem identification**: policy problems are defined and policy issues are raised, introduced to the political stage by different governmental institutions, individuals, interest groups, or specific events;
- **Policy formulation**: analysis and politics determine how the issue is translated into legislation. This stage encompasses several stages including the development and consideration of alternative policy options, the selection of a preferred option, and its adoption;
- **Implementation**: policy is implemented by the bureaucracy, by an agency of government. The bureaucracy or agency interprets the policy into a concrete set of actions, makes judgments as to intent, goals, timetables, program design, reporting methods;
- **Evaluation**: the implementation of policy is evaluated to assess what is working and what is not. The impacts of the policy are assessed. If explicit goals exist, the effectiveness of the policy and its components can be determined. Side-effects must also be discovered and reckoned with.

Figure 2.2: Ex-post impact assessment and the policy cycle



Source: Authors.

The different stages of the policy cycle are underpinned by the various evidence-based policy-making activities mentioned in the previous section. Figure 2.2 shows the place of ex-post IA in the policy cycle taking into account that:

- The policy formulation process is supported by ex-ante evaluation/impact assessment;
- The policy implementation process is supported by monitoring and interim evaluation;
- And the evaluation process consists of ex-post evaluation and ex-post impact assessment.

2.3.2 Closing the policy cycle

The above discussion of some of the different activities underpinning evidence-based policy-making and of the policy cycle assumes the full closure of the policy cycle through full feedback effects and learning from monitoring, interim evaluation, ex-post evaluation and ex-post impact assessment.

The closure of the policy cycle depends first and foremost on the usefulness of the evaluation product, which is determined by a variety of factors. These include (Harty and Newcomer, 2004): the degree of clarity of the initial intervention logic (and the feasibility of the assessment); the timing of the assessment; the extent to which failures are assessed as well as successes; the degree of stakeholder involvement and consensus on evaluation criteria and expectations; the degree to which reasoned, pre-tested methodologies and indicators are used when generating information easily understood and interpreted; the balance between data collection and analysis; the extent to which the information produced is relevant for broader programme and policy design rather than highly context-specific, over - vs. under-generalisation; and the extent of dissemination of information produced. These elements will be dealt with in detail in Chapter 3 'Governance and Usefulness of Impact Assessments'.

Important to highlight here is that most countries are faced with a number of obstacles, especially where the feedback effects from ex-post impact assessment are concerned, so that evaluations are not always utilised (Carlsson et al., 1999; Thoenig, 2000). These obstacles/challenges include:

- **Accommodating the shift in emphasis from outputs to results and impacts**: a shift in attention is taking place from ex-post evaluation to ex-post IA and thus from outputs and results to impacts. However, as will be discussed below, (Section 2.4.2), for various reasons, such as the fact that the relation between research inputs, processes, outputs, outcomes and impacts is not direct, nor unidirectional – determining and measuring the economic, social and environmental impacts of R&D investment is difficult. That also means, however, that drawing valuable lessons from ex-post impact assessment and feeding them back into policy preparation is difficult.
- **Accommodating the shift from single measure ex-post impact assessments to policy mix ex-post impact assessments**: as with ex-post evaluations, ex-post impact assessments increasingly concern themselves with issues such as consistency. It therefore becomes more and more important to look beyond a single measure towards the broader policy mix. This has major implications, however, for the way ex-post IAs are conducted and for the kind of lessons that can be learned. In the case of policy mix ex-post IAs, boundaries are much harder to define. Far more stakeholders are involved. The focus is more diffuse. And often outcomes cannot clearly be attributed to a particular intervention. This makes the process much more complex, particularly when it comes to demonstrating effectiveness. It also means that assessments can take longer, and tend to be more staff and resource intensive. Their attraction, however, is that the lessons learned are likely to be more widely applicable, both in policy and operational terms (OECD, 2001, p.68-69).
- **Accommodating the dual role of ex-post impact assessment – learning and accountability**: ex-post IA has two purposes: accountability and learning. While they are related, they are not the same thing and may not be entirely compatible: the target audiences and the products they require differ and this has implications for how

the whole impact assessment process is managed. Where accountability is the priority, rigour, independence, replicability, and efficiency are of primary importance. Where learning is the priority, the emphasis is more likely to be on achieving 'buy-in' from stakeholders, focusing on the process, and creating space to make sure that experience is properly discussed, and lessons drawn out. Timeliness is also a more important factor, since the desire is to pass on lessons now, not in a year's time when the final report is eventually published. An added difficulty is that as far as learning is concerned, a distinction can be made between 'operational learning' and 'strategic learning'. The former requires information to improve the conduct, quality, responsiveness and effectiveness of a programme, thus raising its leverage effect. The latter requires information to guide resource allocation and more strategic decision processes involving the selection of instruments (e.g. using tax-based measures vs. grants in order to support industrial R&D) or the thrust and direction of technology policies in general (OECD, 2001, p.66-68). With regard to 'strategic learning', a further distinction can be made between 'policy feedback' and 'system impact' (Lengrand et al., 2006; IKED/VINNOVA, 2005).

- **Embedding lesson learning**: influencing policy and practice is one of the key objectives of ex-post IA. Yet not all ex-post impact assessments receive equal attention and not all ex-post IAs are equally influential. There remains a substantial element of randomness in the process. This can be remedied by better embedding lesson learning in the policy cycle. This can be achieved by designing ex-post IAs together with the programme or policy to be assessed in order to secure the collection and provision of data needed and the common acceptance of evaluation procedures and criteria by institutions involved; institutionalising formal disclosure and feedback arrangements; making impact assessment more 'user-oriented', i.e. making sure they address the informational needs of the respective 'clients' (policy makers, firms, programme administrators on various levels) and for that purpose encompass an appropriate mix of methods to produce these different types of information; embedding ex-post impact assessment into a wider system of information gathering and preparation, linking it to technology foresight and technology assessment exercises, conducive to more fundamental shifts and reorientations in technology and innovation policy rather than incremental changes concerning the improvement of individual measures (Papaconstantinou and Polt, 1997, p. 13-14).

Some countries like Sweden, and also the European Union, have advanced significantly towards overcoming these obstacles and progressing towards a fully integrated and 'closed' policy cycle (Box 2.4).

Box 2.4: VINNOVA's impact-enhancing 'Joint Approach for Logic Assessment, Monitoring, Evaluation and Impact Analysis'

According to VINNOVA, to effectively achieve impacts in innovation and sustainable growth through investment in research and development requires a cohesive strategy and organised processes with clear impact goals. This includes an understanding of the challenges in various innovation systems so that initiatives can be directed towards achieving the most important impacts. It also includes continuous monitoring of initiatives so that adaptations can be made as R&D and innovation processes are developed and different surrounding factors change. Furthermore, regular evaluations of completed initiatives are required in order to learn how different types of initiatives and working methods operate. Finally, an in-depth understanding of how R&D investment contributes to the development of innovation systems assumes that impacts and impact connections will be analysed using a time perspective, enabling the full impact to be studied and evaluated. In most cases, such analyses can only be made after a significant time has elapsed since the initiatives were implemented.

Within this context, VINNOVA developed its **joint approach to impact logic assessment, monitoring, evaluation and impact** analysis:

- Before various initiatives are started, an **impact logic assessment** is carried out, meaning that impact logic is designed and tested ex ante; i.e. an advanced description and judgement of what will be achieved and the likely route for getting there. This

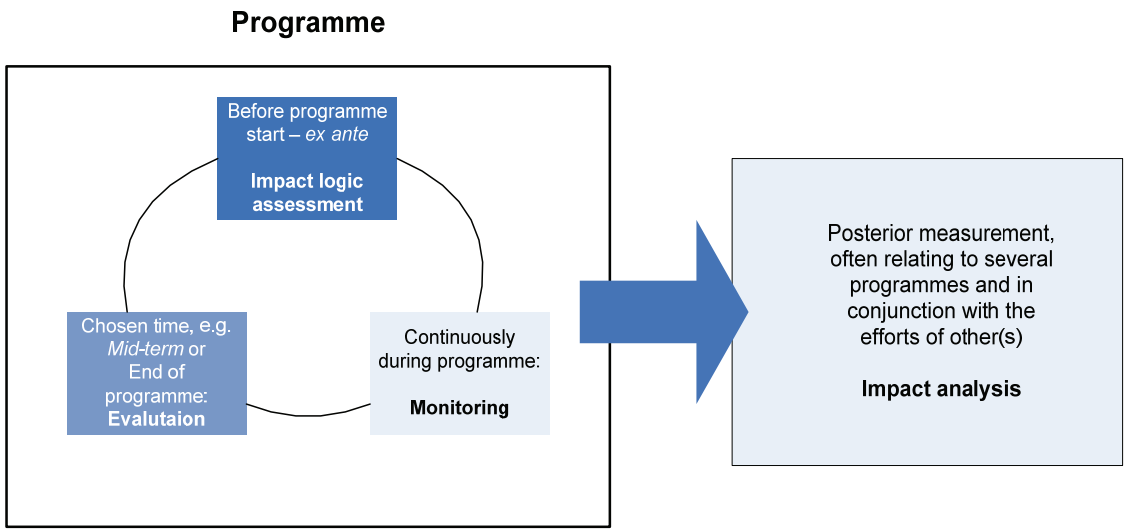
includes identifying desired and achievable results for programmes and calls and formulating impact goals for these; also, identifying indicators as a basis for determining whether the programme and its projects are progressing towards their impact goals;

- The programmes and calls which are started are then subjected to continuous **monitoring**. The aim is for ongoing programmes, calls and projects to secure short-term results in initiatives and give an early indicator of impacts on research, industry and the public sector. Thus, the monitoring is responsible for supporting the programme management and actors in VINNOVA's efforts. It also provides continuously updated information on the composition and development of VINNOVA's portfolio to VINNOVA's management, principals and other actors;

- **Evaluations** are generally carried out in close connection with the implementation of various programmes. Evaluations are commonly carried out at the programme conclusion (ex post) or on one or more occasions during an ongoing programme (mid-term). Evaluations concentrate on clarifying whether the goals for the programme are or have been achieved, and on its functionality and effectiveness. The results of evaluations are used as basis for deciding on changes to ongoing programmes or as a starting point for the design of new programmes;

- **Impact analyses** are conducted to study the long-term impact in terms of sustainable growth. These are often impacts resulting from more and broader impacts than those corresponding to individual programmes. The impacts are studied on the basis of portfolios of various initiatives over a longer period, with the analysis including initiatives implemented by many different participants. They also often occur a long time after the conclusion of programme initiatives – occasionally up to 15-20 years later.

Figure: VINNOVA's Joint Approach for Logic Assessment, Monitoring, Evaluation and Impact Analysis



Source: VINNOVA, VINNOVA's Focus on Impact – A Joint Approach for Logic Assessment, Monitoring, Evaluation and Impact Analysis, 2008, p. 14-15.

2.4 Impact assessment in the field of RTDI policies

Now that we have defined ex-post impact assessment and discussed its role in the policy cycle, it is time to discuss more specifically ex-post impact assessment in the field of RTDI. This section first discusses what we mean by impacts in the field of RTDI. It then goes on to

discuss some of the challenges affecting RTDI impact assessment. The section closes with two sections on tools and indicators for RTDI impact assessment respectively.

2.4.1 The notion of 'impact' in the field of RTDI policies

There are many definitions of 'impacts' which are used by evaluators and policy makers. In general, the definition used will depend on: 1) the nature of the impact (economic, scientific, technological, cultural, societal environmental, etc.); 2) the scope of the impact (systemic, organisational, firm-based); and 3) the timing of the impact (estimated, contemporary, ex-post). The academic literature (OECD, 2009, p. 148-149) provides various definitions of the types of impacts of science and technology (as a subset of RTDI policies):

- **Science impacts**: research results have an effect on the subsequent progress of knowledge. They affect the formation and development of disciplines as well as training and can also affect the development of research itself, generating interdisciplinary and international projects.
- **Technology impacts**: product, process and service innovations as well as technical know-how partly result from research activities. There are few indicators for properly assessing this dimension, other than patents, at least until work based on innovation surveys (e.g. the Community Innovation Survey – CIS) results in more profound analysis of outputs and impacts.
- **Economy impacts**: these refer to the impact on an organisation's budgetary situation, operating costs, revenues, profits, the sale price of products; on the sources of finance, investments and production activities; and on the development of new markets. At the aggregate level, they can also refer to economic returns, either through growth or increased productivity, of a given geographical unit. It is probably the best-known dimension.
- **Culture impacts**: these relate to what people often call public understanding of science, but, above all, to four types of knowledge: know-what, know-why, know-how and know-who. In other words, these are the impacts on an individual's knowledge and understanding of ideas and reality, as well as intellectual and practical skills, attitudes, interests, values and beliefs.
- **Society impacts**: research affects the welfare, behaviour, practices and activities of people and groups, including their well-being and quality of life. It also concerns customs and habits: consumption, work, sexuality, sports, and food. Research can contribute to changing society's views and 'modernise' ways of doing 'business'.
- **Policy impacts**: research influences how policy makers and policies act. It can provide evidence that influences policy decisions and can enhance citizens' participation in scientific and technological decisions.
- **Organisation impacts**: these refer to the effects on the activities of institutions and organisations: planning, organisation of work, administration, human resources, etc.
- **Health impacts**: these relate to impacts on public health, e.g. life expectancy, prevention of illnesses, and the health-care system.
- **Environment impacts**: these concern management of the environment, notably natural resources and environmental pollution, as well as the impacts of research on climate and meteorology.
- **Symbolic impacts**: these are the gains in areas such as credibility due to undertaking R&D or linked to universities or research institutions that offer gains in terms of potential clients, etc.
- **Training impacts**: these are impacts of research on curricula, pedagogical tools, qualifications, entry into the workforce, etc.

The different impacts can be diverse in scope as well as in nature. Impacts may accrue to society as a whole, to a particular group of people, to a research group or to enterprises or other institutions. Identifying the type of impact to be measured is crucial when deciding on the choice of methodology or methodologies for assessing the impact of public R&D. Also, it is

important to relate the different type of impacts to the type of policy instruments used to support RTDI. This will be dealt with in Section 2.6 and in Chapters 3, 4, and 5 which focus on public funding of RTDI in a particular policy area.

2.4.2 Challenges for RTDI impact assessment

The general trends from ex-post evaluation to ex-post impact assessment and from single measure to policy mix ex-post evaluation and ex-post impact assessment are also experienced in the field of RTDI. With the growing emphasis in many countries on policies to foster innovation, governments need to justify how much they invest in innovation, where they invest and how much the public gets in return. Assessing the socioeconomic impacts of public R&D is crucial in order to evaluate the efficiency of public spending, assess its contribution to achieving social and economic objectives and enhance public accountability.

Yet assessing the socio-economic impacts of public R&D is not easy. We describe some of the challenges affecting RTDI impact assessment below:[2]

- **Causality**: there is typically no direct link between a research investment and an impact. Research inputs generate outputs that will then have an impact on society. This relationship is always indirect and therefore difficult to identify and measure. It is also almost impossible to isolate the influence of one specific factor (research output) on one impact, because the latter is in general affected by several factors, which are difficult to control for, would have materialised anyway. This raises the issue of additionality. Moreover, in many cases, the 'causality' between research outputs and impacts cannot be easily demonstrated.
- **Complex transfer mechanisms**: it is difficult to identify and describe all the potential mechanisms to transfer research results to society. Some studies have identified mechanisms of transfer between businesses or between universities and businesses. These models are mainly empirical and often leave the full impact on society of such transfers unrevealed.
- **Sector specificities**: each research field and industry is specific in how output is created and channelled to the end user. This makes one single framework for assessment difficult to achieve.
- **Identification of users**: the identification of all end users who benefit from the research outputs can be difficult and/or costly, especially in the case of basic research.
- **Multiple benefits**: basic research may have an impact in several dimensions, not all of which might be easily identified. It is also easier to identify and measure intended effects than unintended ones. This complicates the identification of the relevant scope of an impact assessment.
- **Lack of appropriate indicators**: since appropriate benefit categories, relevant transfer mechanisms and end users are often lacking, it is also difficult to define and measure appropriate impact indicators related to specific research outputs.
- **International/sectoral spillovers**: the existence of knowledge spillovers has been well documented and demonstrated (Jaffe 1986; Grilliches, 1979). As a result, specific impacts could be partially the result of research performed abroad instead of local research investments, or the result of research carried out in other sectors. At the same time, some of the impacts, whether intended or unintended, may be achieved in other sectors, or other regions or countries, than the ones intended. This complicates fixing the scope the impact assessment.
- **Time lags**: different research investments may have different time lags in having an impact on society. It may sometimes be premature to try and measure the impacts of research, as different investments may require different time spans to generate full impacts. This is particularly true in the case of basic research. This raises the question of when to carry out the impact assessment (see also Lengrand et al., 2006, p.153).

[2] Based on OECD, 2007, p. 6; OECD, 2009, p. 150. See also SMART INNOVATION, p. 151-152 and 154.

- **Interdisciplinary output**: research outputs, e.g. improved skills, may contribute to a set of different impacts, and therefore it may be difficult to identify them all in order to evaluate the contribution of the specific output, let alone that one of the research investment.
- **Valuation**: in many cases, it is difficult to provide a monetary value of impacts to make them comparable. Even if identifiable, non-economic impacts may be difficult to value. There have been some attempts to translate some of these impacts, e.g. the economic savings associated with a healthy population or the calculation of opinion values, into economic terms, but these have typically remained partial and open to subjectivity.

2.4.3 Tools for RTDI impact assessment

This section heavily draws on insights form the OECD work on 'Enhancing Public Research Performance Through Evaluation, Impact Assessment and Priority Setting' (OECD, 2009, p.151 and 159-162). Over time, evaluation methods have evolved significantly driven by changes in technology and innovation policy and a better understanding of innovation processes (Papaconstantinou and Polt, 1997, p. 10-11).

As the emphasis is now shifting from ex-post evaluation to ex-post impact assessment, it seems that a new methodological step forward is needed. Over the past decade, national governments and academics have carried out initiatives to develop new analytical techniques for assessing the impacts of public R&D investment. But there is still a long way to go. Continued international co-operation is needed to improve impact assessment practices and develop comparable indicators and analytical techniques (OECD, 2007, p.9).

What has been understood so far is that IA methodologies are not universally applicable. They depend on the objectives and audience of the IA. In addition, a combination of approaches seems to be necessary to cover the relevant aspects of the IA process.

Some of the most promising and forward-looking practices include general equilibrium models, econometric analyses, data linkages and scientometric methods, survey-based indicators combined with econometric analyses and case studies. They have opened new and encouraging lines of investigation. Yet the outcomes and robustness of such analyses are heavily influenced by the nature of these methods, the assumptions on which they rely and their inherent limitations. In addition, the literature on the non-economic impacts of science is much less abundant and robust than the studies of economic impacts. The reasons for this are that most measurement of science and research has been undertaken in an economic context, that the economic dimension is often easier to measure, while that most of the outputs and impacts of science are intangible, diffuse and often occur with important lags.

It is now agreed that what is needed to make progress in this area is a framework that links research investment and well-being. An example of such a framework is that developed by Sharpe and Smith (2005). Their basic framework links research investment with well-being via the uses made by social actors of the increased knowledge generated by research. This general framework can in principle capture the impact of many different types of research investments used by different social actors to affect numerous dimensions of well-being.

This model requires adopting a four-step approach in order to measure impacts on well-being and establish their connection to public research. These four steps are:

- Define the broad domains of well-being (social, economic, environmental, etc.) of particular interest, as well as sub-domains (*e.g.* within the social domain: child well-being, education, etc.).
- Choose concrete indicators that can capture the domains or sub-domains.
- Identify research investments that influence or determine the chosen indicators and specify the paths through which these investments and the knowledge created affect the indicators.
- Quantify the impact of particular research investments on the indicators of interest.

The model should then be able to use a mix of indicators to track changes in the desired outcome area and should make it possible to attribute the proportions of the changes to the

research effort. Of course, the attribution of effects is not easy, especially given the diverse factors affecting the final outcome and the time that may elapse between the public investment and the perception of the impact. However, such attributions should be made possible thanks to the use of expert judgements, the timing of change or direct causal connections.

In health and environmental sciences, the development of metrics of social impacts is probably more advanced than in other fields, mainly because the causal relationship between investment and impact tends to be clearer and so is the attribution of benefits. However, in other cases, it is very difficult to express the primary social benefits generated by using a common expression of value such as the social rate of return. In general, it must be realised that the most that can be done is to highlight where these impacts occur and articulate qualitatively the 'value' of these impacts on society. To do this comprehensively, it would be necessary to 'tell the story' of the impacts, and that is why the case study approach has mainly been adopted.

As a result, there is still a need to improve the models that link public R&D with well-being in order to overcome some of the difficulties inherent in this type of analysis. In particular, these models should emphasise the need to specify what specific research investments and what dimensions of wellbeing are of interest before undertaking any empirical work to estimate the impacts. Moreover, these models should deal with the problems of attributing the credit for impacts on well-being to public R&D. Several methods, such as the use of expert judgements, the timing of changes or direct causal connections can help, although the attribution can often only be made on the basis of disputable assumptions. Further work is needed to overcome these difficulties and obtain better estimates.

2.4.4 Indicators for RTDI impact assessment

Indicators are of key importance for evidence-based policy making. Therefore, high attention is paid to measuring the effects of RTDI investment. Though they are not the only tool for capturing such effects, policy makers attach great importance to them, and they often attain higher visibility in the policy debate than qualitative impact statements. As far as indicators measuring the effects of RTDI investment are concerned, a clear distinction needs to be made between output indicators, result indicators and impact indicators. Impact indicators clearly concern the measurement of the long-term, broad socio-economic impacts of RTDI investment. The main challenge when dealing with indicators in the context of this work is to identify the good conditions and practices regarding the design and use of indicators to assess the impact of public RTDI financing and as such to make impact assessment a more useful tool for policy making in the field of RTDI. The insights here presented are mainly based on 'Assessing the Socio-Economic Impacts of Public Investment in R&D' (OECD, 2007, p. 6-9) and on 'Enhancing Public Research Performance Through Evaluation, Impact Assessment and Priority Setting' (OECD, 2009, p. 150-151).

Box 2.5: Hierarchy in objectives for indicators for evidence-based policy-making

Evidence-based policy-making includes monitoring, audit and evaluation (including impact assessment). Accordingly, three sets of indicators can be assigned to target each of these hierarchically defined objectives (Casey and Collins, 2004):

- Project monitoring indicators: defined at the operational objectives level;
- Process evaluation indicators: defined at the tactical objectives level and corresponding to the evaluation of projects or programmes;
- Impact assessment indicators: defined at the strategic (*e.g.* Lisbon Aganda) objectives level.

To the extent that the choice of impact indicators depends on the logic model underpinning the public intervention, the starting point for indicators is to define a hierarchy of linked indicators at different levels (output, result, impact) just as the logic model establishes a hierarchy of linked objectives at different levels (operational, immediate, intermediate, higher-level). Within this context, it should be noted that the logic models underpinning public interventions are subject to some evolution during their lifetime – as, for instance, the assumptions on which the original logic model was based change - and that, to the extent

that this is the case, the impact indicators formulated in relation to logic model should also be allowed to evolve.

Because of the emphasis so far on outputs and results rather than impacts, RTDI-related indicator work until now has focused mainly on developing and collecting R&D input and output indicators. Relevant data often fail to allow analyses to take into account non-linear innovation processes, including feedback loops or the interplay of public and private RTDI investment, commercial interests and many other factors. Even more importantly is the fact that, since many of the impacts of RTDI only emerge over time, these kinds of indicators and these types of analyses ignore the long-term benefits of public funding for RTDI for a country's economy and society.

The European Commission has developed a number of tools to collect data on innovation performance in Europe. The Innovation Union Scoreboard Indicators are a good reference point to make sure RTDI policies yield tangible results[3]. These facts, figures and analyses provide an insight into the strengths and weaknesses of national innovation systems. They also help to understand drivers and barriers to innovation. The indicators relate to innovation performance, policy responses and governance, and innovation policy trends across Europe. However, they are mainly presented in terms of results and do not make a direct link between public funding for RTDI and socio-economic impact.

Defining RTDI impact indicators as such is not difficult. Cozzens (2007), for instance, argues that social outcome indicators for research are neither difficult nor rare and that there exist dozens of indicators relating to the public goals of research. What is difficult, however, is choosing the right impact indicators. In this respect, Cozzens (2007) argues that rather than outcome indicators, the logic that connects research and innovation to outcome indicators is lacking. Therefore, more attention needs to be paid to base the choice of impact indicators on the intervention logic model. In this sense, the relevance of impact indicators depends on the extent to which the logic model underpinning the public intervention was thought through.

Also challenging is to link each of these indicators to RTDI investment. This not at least because indicators for RTDI evaluation and IA purposes are very different from traditional, routinely produced generic indicators. They are generally ad hoc, purpose-built, which weaks coherence and reduces opportunities for relevant comparisons and international benchmarking. They are also sometimes insufficiently transparent which creates a risk of misinterpretation. Moreover, indicators are often designed after the policy or programme's objectives and strategic questions involved at a given time.

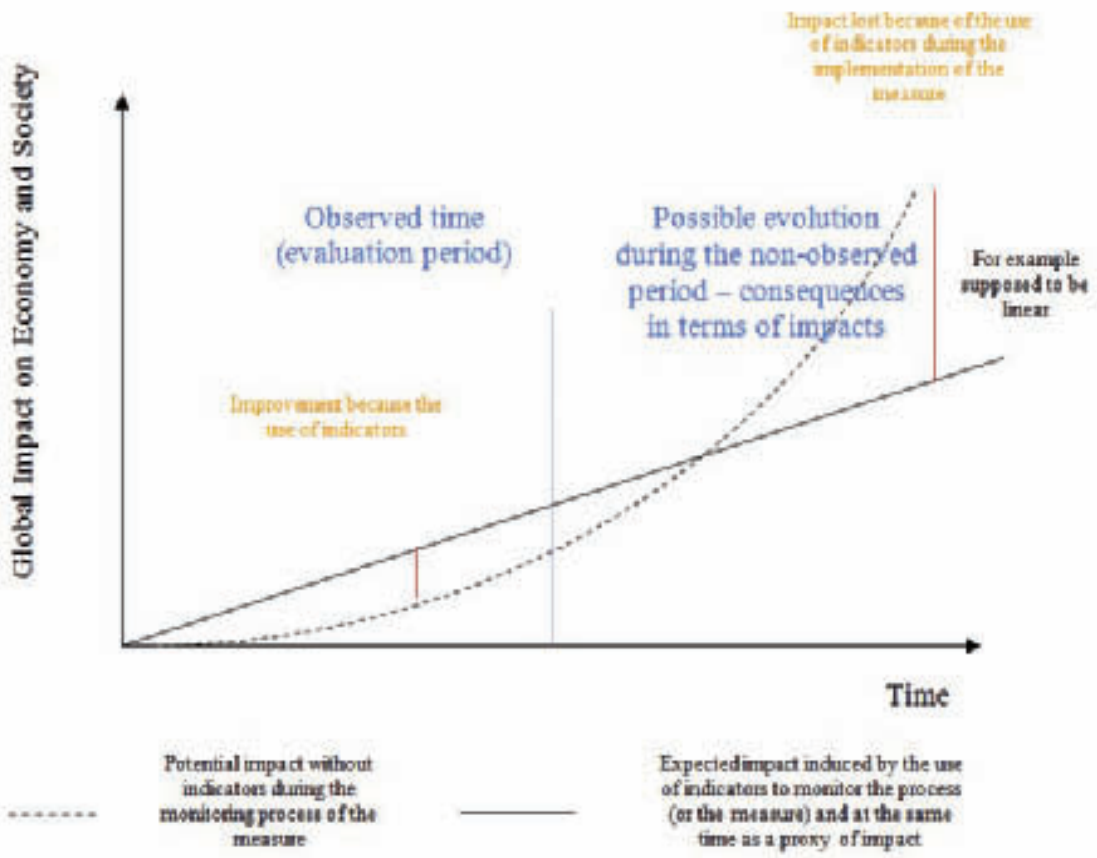
Some of the methodological difficulties related to the ***design*** of relevant indicators to assess the performance of RTDI programmes should take into account that:

- Research activities are long-term impact activities. As a consequence, different types of indicators could be designed according to the IA period and they should take into account evolutions over time;
- Research activities are risky and may fail. Therefore, it is important to consider how RTDI programme indicators take failure into account;
- Indicators used for RTDI policy management are faced with an imputation problem due to policy mix: how to isolate outputs and impacts induced by the targeted policy from outputs and impacts which take origin in other RTDI related policies (horizontal overlapping) or in previous/future identical policies (vertical overlapping).

[3] The 'composite innovation index' includes 25 indicators: http://ec.europa.eu/enterprise/policies/innovation/facts-figures-analysis/index_ en.htm.

Box 2.6: The potential perverse effect of indicators as impact proxy

The use of indicators improves the short term 'impact' of a measure but may also change the global logic/economy of a measure/policy. Indeed, in spite of being an advanced and partial interim measure of the intended objectives of a measure, indicators tend to be confused with the final objectives themselves. Then, the design and the use of indicators contaminates the logic model. The perverse effect may become stronger over time. As a consequence, intended objectives (economic and societal) can remain largely unachieved and impacts can turn out lower.



The possible perverse effect of the use of indicators could have the following implications:

- Indicators don not succeed in measuring all aspects of the reality. Therefore, it may be very costly to develop to succeed in measuring the reality correctly;
- In certain cases, the cost (for example, human costs) to develop a good information system may be as costly as the measure itself (perhaps particularly in a decentralized innovation system where costs are not, by definition, easily mutualised);
- In spite of developing the required conditions, policy makers, beneficiaries of measures, etc. may choose to be satisfied with indicators even if they are not totally adapted to their needs.

This reveals that in certain situations, there is a need to encourage the development of (better) information systems, in other words, there is a need to put the emphasis on the limits, perhaps the dangers of indicators.

The possible scenario shown on the graphic is a strong reason to develop other impact assessment methodologies beside indicators. Moreover, it is advisable to promote more continuity between impact assessment methodologies and priority setting for indicators.

Besides the design of indicators, the ***use*** of indicators to monitor and evaluate programs and institutions can in itself bring unwanted effects:

- Generally speaking, indicators defined ex-ante influence behaviour and may generate perverse effects by influencing the impacts they aim to measure. This 'circular reference' between the impact indicator and the impacts can lead to the paradoxical situation in which the measured scientific impact may improve while at the same time the real economic and societal impacts may decrease. Moreover, the real knowledge creation process may become weaker and financing may become partially inefficient (see Box 2.6);
- Self-evidently, impact indicators defined in an ex-ante manner can only be used to capture **intended** long-term impacts and that after the completion of an intervention. However, an additional effort is needed to define impact indicators capturing **unintended** long-term impacts;
- Finally, the use of indicators to (monitor, evaluate or) assess public funding of RTDI needs a reference to the 'evolutive' knowledge creation process (as it really works). This should be closely related to the assessment context of an underlying intervention framework.

2.5 Impact assessment of RTDI policies in Europe

The primary goal of this report is to increase the usefulness of impact assessment in the context of RTDI policy design. To do so, it envisages the development of a framework facilitating communication between policy makers and different stakeholders in the policy making process. Before doing so in Section 2.5.3, a global analysis of policy measures in Europe is given, based on ERAWATCH data (Section 2.5.1) and R&D and innovation policies are considered in light of the culture of evaluation and impact assessment (Section 2.5.2).

2.5.1 Policy instruments in Europe: A global analysis

A wide range of instruments have emerged since the shift from the linear to the innovation systems paradigm. Governments make use of a flexible and evolving toolkit of instruments depending on the dynamics of national innovation systems and addressing bottlenecks in the system. ERAWATCH lists 814 instruments used in 27 countries. These instruments can be classified according to different dimensions. Direct measures, for instance, are targeted at a specific scientific or technological theme, discipline or sector, while indirect measures refer to all sorts of schemes that sustain and reduce the cost of RTDI investment. Financial measures, such as tax credits or funding venture capital, give monetary support, while non-financial measures are aimed at improving the framework conditions: the legal framework, increasing attractiveness of science among boys and girls at all levels of schooling, an attractive environment for high-quality researchers and research careers, raising public awareness and understanding of S&T, and so on. Supply-side policy measures are intended to provide a transfer to firms of the resources and capabilities needed for innovation, while demand-side policy measures seek to increase the demand for innovative goods and hence increase the incentive for firms to perform R&D.

In this section a global analysis of the R&D and innovation policies of 27 EU countries will be offered. The information used is based on the database of the European Inventory of Research and Innovation Policy Measures created - on behalf of the European Commission - by the ERAWATCH organisation. The database offers detailed information about 814 instruments that were operative in the period 2008-2009 in one of the 27 EU countries (see Table 2.2). The instruments were classified in 39 main priorities. In this section country information on the number of instruments will be given. In the case of the budgets, only the global data will be used. Although the data base offers country specific data for the RTDI budgets these data were subject of an internal revision and control made by specialists of the ERAWATCH network. These revised data are only available on global level. Therefore the budgets on country level can be considered to be not totally reliable.

Four policy fields are identified. The fields with the highest number of instruments are those focussed on the cooperation in R&D (especially public private cooperation) (101 instruments - 12.4%) followed by the long term strategic research policies (67 instruments - 8.2%); the instruments to promote business start-ups (65 - 8%); and the policies to promote research excellence (58 - 7.1%). While the four most important policy priorities in budgetary terms are the support of public research organisations; the direct support for business R&D; the support for risk capital and the support for R&D cooperation. Each of these policy fields has between 9 to 10% of the total budget.

In relation to the measurements focused on the stimulation of **private R&D investment** (related to Chapter 3 and marked wiith a salmon colour in the table), 163 instruments were identified (only taking into account those whose main priority is related to this type of instruments), representing 20% of the number of instruments and 21% of the total budget. 63 instruments provide direct and indirect support for business R&D and absorb 16% of the budget the 27 EU countries devoted to the RTDI policies. Almost 8% of the instruments are focussed on promotion of business R&D of which 6.3% implies direct support of business R&D by grants and loans and 1.5% of the instruments is indirect support to business R&D (tax incentives and guarantees). The other business R&D related instruments are focussed on venture capital (35 instruments with 9.4% of the budget) and business start-ups (65 instruments with 5.5% of the budget) absorbs together almost 15% of the budget and include almost 12.3% of all instruments. In the case of the direct support, four countries show a high number of instruments (Greece, Austria, Luxembourg and Belgium). The other 12.3% of instruments are focussed on the creation of new technology based firms (8%) and the availability of risk capital (4.3%). In this case Luxembourg, Portugal, the Czech Republic and France show a higher average number of instruments. The instruments dealing with the **private public linkages** or, in other words, with the analysis in Chapter 4, consist of the three instruments of 'section' 2.2 in (marked with a yellow 'shadow' in Table 2.2). As previously mentioned, the policies focussed on public private cooperation (code 2.2.3) consist of the highest number of instruments (101 -12.4%) and absorb 9.2% of the total funds for R&D and innovation policies. Moreover the 29 policy instruments focussed on technology transfer (code 2.2.2) absorb 1.5% of the funds (3.6% of the instruments). While the support infrastructure for technology transfer (code 2.2.1) includes only 12 instruments with a low budget (0.1%). Altogether the whole set of instruments to improve public private linkages absorbs 10.8% of the funds and includes 17.5% of the instruments. The green shadow of the table highlights the instruments related with Chapter 5; improving the **management of research institutions and universities**. In this case they include 48 instruments. That represent 5.9% of all instruments however they reflect 15.5% of the overall budget.

Overall the policy measures belonging to 'priority' 2.1 (106 instruments related with public research institutions and universities, including the support for R&D infrastructure) absorb over 19% of the total budget and include 13% of the 814 instruments. These instruments can be considered as part of Chapter 5 (green shadowed). 79 instruments (9.7%) are focused directly on the improvement of the management of research institutions and universities. Finland, Estonia, Sweden, Romania and the Netherlands show here a relatively high number of instruments. Another 142 instruments (17.4%) are aimed to the improvement of cooperation between the public research institutes and universities with the private enterprises (Chapter 4). Most of them (101) are aimed on the improvement of the public private cooperation. The number of instruments focussed on this objective is clearly above the average of 12.4% in the case of Belgium, Denmark, Germany and Ireland with respectively a percentage of 25, 31.4, 28.1 and 23.3%. Austria and Italy also have an above average number (16%). This means that this instrument is generally more frequently used in the case of the most advanced countries. The promotion of technology transfer also seems to be used more frequently in the most advanced countries especially in Belgium, France, the Netherlands, Spain and the United Kingdom. However, Bulgaria and Romania frequently foster these kinds of technology flows too. Moreover, 4 out of 39 policies priorities are focussed on the creation or improvement of human resources or human capital. This policy field includes 98 instruments: 24 focussed on the stimulation of PhDs; 22 on the recruitment of researchers and another 22 are mobility schemes. Although this policy field includes 12.3% of all instruments their role in budgetary terms is much more limited absorbing only 3.8% of the total funds for R&D and innovation policies.

The above mentioned percentages are based on the main priority mentioned by the ERAWATCH country experts. Some instruments have multiple objectives and therefore the data presented in this section offers just a first rough estimation of the importance of certain types of instruments in the policy mix.

Table 2.2: A comparison of type of policy instruments implemented in 27 EU countries based on the main priority of the instruments, period 2008-2009

Main policy priority	Share in R&D budget	Instruments	
		Number	%
1.1.1 Strategy policy documents (official documents, policy consultation papers, green or white papers, Operational Programmes of Structural Funds)	0.0%	4	0.5%
1.1.2 Activities of official advisory and consultative forum	0.0%	2	0.3%
1.1.3 Policy Advisory services (technology foresight, scoreboard type activities, cluster mapping, sectoral studies of innovation)	0.1%	6	0.7%
1.2.1 Strategic Research policies (long-term research agendas)	5.4%	67	8.2%
1.2.2 Innovation strategies	0.5%	5	0.6%
1.3.1 Cluster framework policies	6.9%	37	4.6%
1.3.2 Horizontal measures in support of financing	6.9%	21	2.6%
1.3.3 Other horizontal policies (ex. society-driven innovation)	0.2%	8	1.0%
2.1.1 Policy measures concerning excellence, relevance and management of research in Universities	3.8%	58	7.1%
2.1.2 Public Research Organisations	10.0%	21	2.6%
2.1.3 Research and Technology Organisation (private non-profit)	0.1%	2	0.3%
2.1.4 Research Infrastructures	5.3%	25	3.1%
2.2.1 Support infrastructure (transfer offices, training of support staff)	0.1%	12	1.5%
2.2.2 Knowledge Transfer (contract research, licenses, research and IPR issues in public/academic/non-profit institutes)	1.5%	29	3.6%
2.2.3 R&D cooperation (joint projects, PPP with research institutes)	9.2%	101	12.4%
2.3.1 Direct support of business R&D (grants and loans)	9.7%	51	6.3%
2.3.2 Indirect support to business R&D (tax incentives and guarantees)	6.3%	12	1.5%
3.1.1 Awareness creation and science education	0.1%	13	1.6%
3.1.2 Relation between teaching and research	0.0%	4	0.5%
3.1.3 Stimulation of PhDs	1.2%	24	3.0%
3.2.1 Recruitment of researchers (e.g. fiscal incentives)	1.4%	18	2.2%
3.2.2 Career development (e.g. long-term contracts for university researchers)	0.62%	13	1.6%
3.2.3 Mobility of researchers (e.g. brain-gain, transferability of rights)	0.4%	22	2.7%
3.3.1 Job training (LLL) of researchers and other personnel involved in innovation	1.0%	8	1.0%
3.3.2 Recruitment of skilled personnel in enterprises	0.4%	14	1.7%
4.1.1 Support to sectoral innovation in manufacturing	2.0%	23	2.8%
4.1.2 Support to innovation in services	0.5%	8	1.0%
4.2.1 Support to innovation management and advisory services	3.0%	33	4.1%
4.2.2 Support to organisational innovation incl. e-business, new forms of work organisations, etc	5.6%	14	1.7%
4.2.3 Support to technology transfer between firms	1.7%	12	1.5%
4.3.1 Support to innovative start-ups incl. gazelles	5.5%	65	8.0%
4.3.2 Support to risk capital	9.4%	35	4.3%

5.1.1 Support to the creation of favourable innovation climate (ex. roadshows, awareness campaigns)	0.0%	11	1.4%
5.1.2 Innovation prizes incl. design prizes	0.0%	8	1.0%
5.2.1 Fiscal incentives in support of the diffusion of innovative technologies, products and services	1.1%	11	1.4%
5.2.2 Support and guidelines on innovative Green Public Procurement (GPP)	0.0%	1	0.1%
5.3.1 Measures to raise awareness and provide general information on IPR	0.0%	3	0.4%
5.3.2 Consultancy and financial incentives to the use of IPR	0.1%	12	1.5%
5.3.3 Support to the innovative use of standards	0.0%	1	0.1%
No answer	0.0%		0.0%
Total general	100%	814	100%

Source: own elaboration based on the ERAWATCH European Inventory of Research and Innovation Policy Measures. In green the instruments related with Chapter 5, in salmon those related with Chapter 3 and in yellow those related with Chapter 4.

2.5.2 RTDI policies versus the culture of evaluation and impact assessment

This section addresses the evaluation, culture in the EU countries. The main source of information is the **European Inventory of Research and Innovation Policy Measure** created by the ERAWATCH organisation that includes broad information (templates) of 814 instruments of 27 countries. This database – facilitated by the ERAWATCH organisation - includes three questions about evaluation studies. The first one asks whether an ex-ante evaluation was carried out. The second one asks if a mid-term or on-going evaluation was carried out during the implementation of the instrument and the third one is about the ex post evaluation. This last option implies an impact assessment and permits one to identify – theoretically - whether the instrument achieved the foreseen goals and which aspects were problematic. Although in this section a global overview will be offered, a broader analysis will be carried out in relation to the ex-post evaluation while this is the only moment when a real impact assessment can be carried out systematically. Especially in the case of the ex-ante evaluation, the final outcome of the policy can differ substantially. As noted above, the focus of this project is on evaluation in terms of an ex-post study which will be carried out after the implementation of the instruments with enough delay in time to assure that the full impact of the instrument can be measured. Therefore, attention in this section is concentrated mainly on the instruments which were the subject of ex-post evaluation/impact assessment.

2.5.2.1 Country differences in evaluation and impact assessment

Table 2.3 shows the main results obtained from the ERAWATCH database. It can be observed that 55.8% of the 814 instruments were not evaluated at all. These instruments were not assessed before, during or after their implementation. In fact, 25.7% of the instruments were analysed before the implementation and for 31%, they were carried out a mid-term or following up evaluation. An ex-post evaluation was done for only almost 19% of the instruments. In other words, an evaluation of the real impact of the instruments was carried out for only one fifth of the policies.

With regards to country differences. If we look to the general percentage of instruments which were not assessed at all we can highlight a group of 7 countries in which more than 75% of the instruments were never evaluated (Hungary, Ireland, Romania, Spain, Malta the Czech Republic and Cyprus). The most active countries are, surprisingly, Lithuania and Bulgaria (they evaluated respectively 87 and 76% of their instruments). These countries are followed directly by 'wealthy' countries such as Germany, Austria, Denmark and Finland. The presence of Lithuania in this group depends largely on the fact that they carried out an ex-

ante evaluation for 78% of the instruments; yet, surprisingly, this country shows no ex- post evaluations.

Taking into account the ex-post IA only, it can be observed that only 19% of the instruments were assessed. In this case Denmark, Germany, Bulgaria and Finland are the most active countries which carried out an impact assessment in 47-59% of their instruments. They are followed by Estonia and Latvia, which evaluated the impact for 36-39% of their instrument and Italy, Luxembourg and the Slovak Republic, which did so for almost 30% of their instruments. In all other countries the ERAWATCH database shows that less than 20% of the instruments are evaluated ex-post.

Table 2.3: Evaluation of the policy instruments: A quantitative assessment at country level, period 2008-2009

	Number of instruments	At least % Ex-ante	At least % Following up	At least % Ex-post	Not evaluated at all
Austria	48	14.6%	64.6%	10.4%	31.3%
Belgium	28	3.6%	39.3%	0.0%[4]	57.1%
Bulgaria	17	47.1%	64.7%	52.9%	23.5%
Cyprus	18	0.0%	0.0%	0.0%	100.0%
Czech Republic	21	0.0%	4.8%	0.0%	95.2%
Denmark	35	60.0%	68.6%	57.1%	31.4%
Estonia	18	27.8%	33.3%	38.9%	61.1%
Finland	42	38.1%	54.8%	47.6%	38.1%
France	44	6.8%	27.3%	11.4%	63.6%
Germany	39	38.5%	51.3%	59.0%	28.2%
Greece	16	43.8%	18.8%	6.3%	56.3%
Hungary	51	17.6%	3.9%	2.0%	76.5%
Iceland	NA	NA	NA	NA	NA
Ireland	30	6.7%	13.3%	13.3%	76.7%
Italy	24	20.8%	20.8%	29.2%	62.5%
Latvia	28	57.1%	42.9%	35.7%	39.3%
Lithuania	32	78.1%	12.5%	0.0%	12.5%
Luxembourg	14	14.3%	50.0%	28.6%	50.0%
Malta	25	8.0%	4.0%	4.0%	92.0%
Netherlands	35	5.7%	51.4%	14.3%	45.7%
Poland	39	33.3%	2.6%	2.6%	66.7%
Portugal	45	42.2%	26.7%	0.0%	42.2%
Romania	10	20.0%	10.0%	10.0%	80.0%
Slovak Republic	10	30.0%	40.0%	30.0%	60.0%
Slovenia	20	15.0%	40.0%	20.0%	50.0%
Turkey	NA	NA	NA	NA	NA
Spain	47	14.9%	17.0%	14.9%	80.9%
Sweden	28	32.1%	25.0%	17.9%	57.1%

[4] In the case of Belgium the data are not complete and a large number of ex-post assessments do exist. But they are mainly carried out at regional level.

United Kingdom	50	14.0%	32.0%	20.0%	56.0%
Total general	769	24.7%	31.2%	19.9%	55.8%

Source: own elaboration based on the ERAWATCH European Inventory of Research and Innovation Policy Measures. The last three columns are based on the country profile included in the ERAWATCH website.

Based on the qualitative data of the ERAWATCH-website, Patrick Eparvier argues that evaluation of R&D and innovation polices has developed strongly among European Union Member States. However, it seems to have become a standard practice in only some countries. He classified the European countries in four groups based on the existing evaluation culture (Eparvier, 2009).[5]

- A first group consists of **leading countries** in the evaluation, referring to those countries that now have a well-established culture of evaluation (Austria, Denmark, Finland, Germany, Ireland, the Netherlands, Sweden and the United Kingdom). In these countries, systematic evaluations are carried out to evaluate programmes and institutions;
- A second group gathers together **countries that have strongly reinforced evaluation practices**, structures and culture (Belgium, Czech Republic, Estonia, France, Portugal and Slovenia). These countries have started recently to systematise evaluation of programmes and of institutions;
- A third group is composed of **countries that have recently established or that are about to set up evaluation practices**, structures and culture (Bulgaria, Italy, Luxembourg, Malta, Romania and Slovakia). Two of these countries started with evaluation of the whole research system (Bulgaria and Slovakia);
- A fourth group brings together **countries that do carry out evaluations but not on a systematic basis** (Cyprus, Greece, Hungary, Latvia, Lithuania, Poland and Spain).

Table 2.4: The ex-post evaluation/assessment culture: a qualitative versus quantitative assessment

Share of instruments evaluated ex post	**Qualitative assessment of the evaluation culture included in the ERAWATCH country profiles published in the web site**		
	Low evaluation culture (Turkey*)	Frequent but not systematic evaluation	Systematic or well established evaluation culture
Less than 10% (Cyprus*)	Czech Republic, Lithuania, Portugal, Hungary, Poland, Malta, Greece	Belgium	
Between 10 and 30%	Luxembourg Spain Italy	Romania, France, Ireland, Sweden, Slovenia	The Netherlands, Austria, United Kingdom
Between 30 and 40%		Slovak Republic, Latvia, Estonia	
Over 45%	Bulgaria		Finland, Denmark, Germany

*Source: Own elaboration based on the former tables. The order of the countries is related to the percentage of ex post evaluated instruments (from low to high). *No qualitative assessment was obtained for Cyprus and no statistical data was available for Turkey.*

[5] Taken from ERAWATCH Research Inventory Report: overview across EU countries (Updated 18/5/2009) http://cordis.europa.eu/erawatch.

It can be observed that the analysis based on the criteria of the country experts included in the country profiles offered by ERAWATCH do not correspond exactly with the results of the data base of policy instruments also provided by ERAWATCH (Table 2.3). For example, Ireland is considered by the country expert as a country with a well-developed evaluation culture while the qualitative data includes this country is included in the intermediate group of countries with a frequent but not systematic evaluation culture. This indicates the lack of reliable/comparable information on impact assessment and evaluation.

The quote above from the ERAWATCH overview report for all EU countries offers information about the global culture of evaluation taken into account ex-ante, ongoing and ex-post evaluation of instruments and the assessment of the national innovation systems. However in this study the impact evaluation – carried out sufficient time after the instruments implementation - is considered to be the most important way of carrying out policy evaluation. Therefore, Table 2.5 was elaborated. This table shows the relationship between the percentage of instruments which was evaluated ex-post with the qualitative assessment made by the country correspondents.

The data reveal some aspects which do not correspond to the information included in the country profiles offered by ERAWATCH in their website. The ERAWATCH country profiles offer a general description of the evaluation culture in relation to the countries' RTDI policies. However, this general opinion does not always coincide with the revealed evaluation behaviour based on the data on instrument level. In general, the percentage of ex-post evaluated instruments coincides with the qualitative assessments. However, two clear exceptions can be observed. The first is the Belgian case where the country profile insinuates a more or less well developed evaluation culture, but the templates of the instruments indicates an absence of ex-post evaluation. The second case is Bulgaria, which has a high percentage of ex-post evaluated instruments; however, the qualitative assessment talks about a low evaluation culture. In the case of the Netherlands, Austria and the United Kingdom, the qualitative assessment reveals a systematic well established evaluation culture, but the database shows that only 10 to 30% of the instruments are evaluated.

As a final remark, it has to be stated that the information on the existence of evaluation studies is not always clear or easy to find. It has to be taken into account that evaluation studies belong to the so-called 'grey literature', which means that a number of instruments were probably evaluated but these studies were never published. Moreover, the changes in the names of the instruments could imply that it is difficult to match the instruments with certain evaluation studies in the past. Therefore, the number of evaluated instruments is probably underestimated. Also, it is important to note that ERAWATCH does not include the quality issue of the studies. However, from the perspective of this report, this does affect the general conclusions of this section. The evaluation of the policy instruments in most countries is an ad hoc activity and only a few countries carry out such studies in a systematic way.

2.5.2.2 Evaluation intensity by type of instruments[6]

In this subsection, the evaluation intensity (defined as the percentage of instruments evaluated **ex-post**) is analysed. From Table 2.5 it can be highlighted that the most evaluated type of instruments are those aimed at the improvement of the excellence in universities and public research organisations followed directly by the long term strategic research policies with an evaluation intensity (EI) of respectively 48 and 45%. In six other R&D policy fields the EI is above 30%, as with the instruments for supporting public research organisations, the support infrastructures (like technology transfer offices); the mobility of researchers; and tax incentives. On the bottom of the list a broad number of policies apparently which have never been evaluated, such as the support for innovation management and advisory support for technology transfer between firms and the recruitment of skilled personnel in enterprises.

[6] Although the tables contain the data of all the types of instruments, this sub section only refers to those type policies which involve at least exist 10 instruments. If the number is below this minimum the percentages are very sensitive for small changes.

Table 2.5: Evaluation of the policy instruments: A comparison of type of policy instruments based on the main priority of the instruments, period 2008-2009

Main policy priority	Total general	At least % Ex-ante	At least % Follow up	At least % Ex-post	Not evaluated
1.1.1 Strategy policy documents	4	0.0%	25.0%	0.0%	75.0%
1.1.2 Activities of official advisory and consultative forum	2	0.0%	0.0%	0.0%	100.0%
1.1.3 Policy Advisory services	6	33.3%	16.7%	33.3%	33.3%
1.2.1 Strategic Research policies	67	44.8%	59.7%	44.8%	29.9%
1.2.2 Innovation strategies	5	20.0%	0.0%	0.0%	80.0%
1.3.1 Cluster framework policies	37	32.4%	16.2%	16.2%	54.1%
1.3.2 Horizontal measures in support of financing	21	38.1%	19.0%	28.6%	38.1%
1.3.3 Other horizontal policies	8	37.5%	0.0%	12.5%	50.0%
2.1.1 Policy measures concerning excellence, relevance and management of research in Universities	58	44.8%	48.3%	48.3%	39.7%
2.1.2 Public Research Organisations	21	33.3%	38.1%	38.1%	57.1%
2.1.3 Research and Technology Organisation	2	0.0%	100.0%	0.0%	0.0%
2.1.4 Research Infrastructures	25	28.0%	8.0%	4.0%	68.0%
2.2.1 Support infrastructure	12	8.3%	50.0%	25.0%	50.0%
2.2.2 Knowledge Transfer	29	24.1%	34.5%	13.8%	51.7%
2.2.3 R&D cooperation	101	30.7%	26.7%	23.8%	52.5%
2.3.1 Direct support of business R&D	51	31.4%	31.4%	15.7%	51.0%
2.3.2 Indirect support to business R&D	12	25.0%	16.7%	25.0%	66.7%
3.1.1 Awareness creation and science education	13	38.5%	38.5%	23.1%	38.5%
3.1.2 Relation between teaching and research	4	0.0%	0.0%	0.0%	100.0%
3.1.3 Stimulation of PhDs	24	25.0%	25.0%	20.8%	66.7%
3.2.1 Recruitment of researchers	18	16.7%	11.1%	16.7%	83.3%
3.2.2 Career development	13	23.1%	46.2%	23.1%	53.8%
3.2.3 Mobility of researchers	22	36.4%	31.8%	27.3%	59.1%
3.3.1 Job training (LLL) of researchers and other personnel involved in innovation	8	12.5%	25.0%	25.0%	62.5%
3.3.2 Recruitment of skilled personnel in enterprises	14	21.4%	7.1%	0.0%	71.4%
4.1.1 Support to sectoral innovation in manufacturing	23	13.0%	8.7%	4.3%	82.6%
4.1.2 Support to innovation in services	8	0.0%	0.0%	0.0%	100.0%
4.2.1 Support to innovation management and advisory services	33	18.2%	27.3%	0.0%	57.6%
4.2.2 Support to organisational innovation incl. e-business, new forms of work organisations, etc	14	21.4%	21.4%	7.1%	57.1%
4.2.3 Support to technology transfer between firms	12	66.7%	25.0%	0.0%	16.7%
4.3.1 Support to innovative start-ups incl. gazelles	65	15.4%	21.5%	9.2%	63.1%
4.3.2 Support to risk capital	35	8.6%	28.6%	14.3%	57.1%
5.1.1 Support to the creation of favourable innovation climate	11	36.4%	18.2%	9.1%	45.5%
5.1.2 Innovation prizes incl. design prizes	8	0.0%	0.0%	0.0%	100.0%
5.2.1 Fiscal incentives in support of the diffusion of innovative technologies, products and services	11	0.0%	9.1%	9.1%	81.8%

5.2.2 Support and guidelines on innovative Green Public Procurement	1	0.0%	100.0%	0.0%	0.0%
5.3.1 Measures to raise awareness and provide general info. On IPR	3	0.0%	0.0%	0.0%	100.0%
5.3.2 Consultancy and financial incentives to the use of IPR	12	8.3%	33.3%	8.3%	58.3%
5.3.3 Support to the innovative use of standards	1	0.0%	0.0%	0.0%	100.0%
Total	814	27.1%	28.4%	19.9%	55.0%

Source: own elaboration based on the ERAWATCH European Inventory of Research and Innovation Policy Measures.

As previously noted, the evaluation studies belong to the so called 'grey literature' which means that probably a number of instruments were evaluated, but these studies have never been published. Moreover, the changes in the names of the instruments could imply that it is difficult to match the instruments with certain evaluation studies in the past. Therefore, the number of evaluated instruments is probably underestimated.

When analysing the instruments that are subject of the CIA4OPM project, it can be highlighted that those aimed on the direct or indirect promotion of private R&D investments (Chapter 3) are evaluated frequently. In the case of indirect support for R&D, 44% of the instruments were evaluated at a certain moment (ex-ante, during the implementation or ex-post) while 25% of the instruments were valuated ex-post. While in the case of the direct support, almost 50% were evaluated at a certain moment and almost 16% were evaluated ex-post. Almost 43% of the instruments focussed on risk capital and almost 37% of the measures aimed at the creation of new technology based firms were evaluated. In the case of the ex-post evaluation these percentages were respectively 14.3% and 9.2%.

In the case of three types of instruments whose main priority is related to science-industry relationships or linkages (Chapter 4) it can be observed that almost 50% of them were evaluated ex-ante, ex-post or during the implementation. Looking to the ex-post evaluations, the percentages differ for each of them. In the case of the instruments focussed on public private R&D cooperation and measures considered as the support infrastructure for public private linkages, around 24-25% of the instruments were evaluated ex-post; while in the case of the instrument to foster knowledge transfer this percentage was almost 14%.

The instruments related to public research organisation and universities (Chapter 5) were frequently evaluated. Almost 60% of policies concerning excellence, relevance and management of R&D in universities were evaluated at a particular moment while 48% of them were evaluated ex-post. In the case of the policies oriented to the public research organisations, these percentages are respectively 43% and 38%. In the case of the policies towards the public research infrastructures almost no ex-post or on-going evaluation studies were carried out, yet in 28% of the cases an ex-ante evaluation study was done.

To conclude, it can be observed that in the case of evaluation culture, almost 50% of the three types of instruments focused on science-industry relationships or linkages were evaluated ex-ante, ex-post or during the implementation. Looking to the ex-post evaluation, the percentages differ between the three types of instruments. In the case of the instruments focused on the public private R&D cooperation and the measures considered as the support infrastructure for public private linkages around 24-25% of the instruments was evaluated ex-post while in the case of the instrument to foster knowledge transfer this percentage was almost 14%.

2.5.3 The use of impact assessment for public funding of RTDI in Europe and its role in policy design

Table 2.6 provides an overview of the planning of IA in the policy cycle and of recent and planned changes in the use of IA in RTDI policy making.

Table 2.6: Increased use of planning of impact assessment in the RTDI policy

Extent of planning of IA in the policy cycle for policy measures funding RTDI		
Not/seldom	Occasional - ad hoc	Systematic
Bulgaria Estonia Malta Spain Turkey Iceland	Austria (for funding not oriented at universities) Belgium France Sweden (Not VINNOVA - Focused at scientific impact)	Austria (Legal Basis for universities)* Czech Republic (for institutional support for research - focused at scientific impact) Sweden (VINNOVA – focused at impact in terms of sustainable development)

*Source: Questionnaire on impact assessment for public funding of RTDI, see Annex 2.1.Note: in each of the countries having experience in impact assessment the results of these exercises are used mainly for the design of new policy measures or for the improvement of existing ones. *The systemic planning of impact assessment of Austrian universities is indicated in Austrian law, but de facto not reality until now.*

In **Austria**, evaluation (including to a varying degree, aspects of IA) of RTDI policies and institutions became a big issue in recent years. Since 2002/2003, a sharp increase of evaluations of RTDI policy measures and respective institutions is observable. Between 2002 and 2006, more than 60 evaluations were conducted in Austria. Main reasons for this rise of evaluations were (1) an increasing amount of research funding programs and (2) a process of 'agencification' (clear division of tasks between ministries and agencies in implementing R&D funding programs). A CREST (current ERAC) Report stated in 2008 that Austria has one of the most advanced 'evaluation cultures (concerning RTDI policies)' in Europe. Furthermore, the 'Platform Research & Technology Policy Evaluation' plays an important role in 'evaluation issues'. It should also be mentioned that, once a year, an 'Austrian Report on Research and Technology', indicating the current status of RTDI policy in Austria (measured in various indicators), is published by the ministries responsible for RTDI policies. On a legal basis, according to the University Act 2002, universities have to develop a quality management system for themselves. In the framework of this QMS, universities shall conduct evaluations of their performance. Furthermore, universities have to provide performance reports on a regular basis. According to legal RTD-directives in Austria, a written concept for evaluation is now a precondition for the set-up of respective R&D funding programs/ measures. Besides the legal basis, the 'Platform Research & Technology Policy Evaluation' (founded in 1996 as an informal cooperation) was re-founded in 2006 as a 'society' (=legal form). The mission of the platform is to encourage more, better and more transparent evaluations for an optimal strategic planning of RTDI-policy in Austria and to develop a culture of evaluation together with decision-makers in the field of Austrian technology and research policy. All Austrian ministries responsible for RTDI policies are members of that platform. The platform published 'standards for the evaluation of Austrian RTDI policies'. The platform offers room for an exchange of experiences in conducting evaluations and IA, but it has no overall coordinating function. Other IA exercises occur on an ad hoc basis. Time period and frequency of evaluations depend on the evaluated programs/institutions and the ministries that are responsible for the respective policy measures. Although there is a 'Platform Research & Technology Policy Evaluation', it has no coordinating function in this respect. So, to sum up, there is no overall systematic planning and coordination of evaluation activities. Rather, they occur on an ad-hoc basis. In Austria, one can observe a trend towards more 'systemic' evaluations, taking into account the context of a program/ institution or trying to measure the performance of certain (regional, sectoral, national...) 'systems' on an aggregated level. In Austria, this trend resulted in a comprehensive 'evaluation of government funding in RTDI from a systems perspective' in 2008/09. Examples of where IA exercises influenced policy design can be found in the evaluation of the RTDI funding institutions 'FFF' and 'FWF'. These exercises contributed to a comprehensive re-design and re-organisation of the Austrian funding institutions; and an evaluation of the Austrian Competence Centres program resulting for example in a re-design of that program.

Box 2.7: Impact assessment terminology in Austria

The term 'evaluation' as used in Austria (very often) includes to a varying degree certain aspects of Impact Assessment. However, clear ex-post assessments of impacts of programs or initiatives remain relatively low until now. The term "Impact Assessment" itself is in Austria used only when referring to ex ante measures. Instead, the terms "Impact evaluation" or Impact analysis" are used more often for ex-post measures.

In **Belgium**, for about a decade, IA exercises of public funding for RTDI occur on an ad hoc basis, mainly depending on the government level and on the level of the ministerial department/agency. Examples of ad hoc impact assessment studies at the federal level (Belgian Science Policy Office – BELSPO) are the socio-economic assessment of public funding for research for the space program, as well as the socio-economic impact of research performed in the federal cultural and scientific institutions. In the Walloon Region, a biannual assessment of the Marshall Plan (a plan for the realization of the most promising development activities: the implementation of the 'pôles de compétences'; reduction of the fiscal pressure on enterprises; stimulation of the creation of activities; stimulation of research and innovation; development of competences for the labour market) takes place. Other exercises include an assessment of the R&D support the Walloon Region received from the PROMETHEE programme (MERIT and ADE, 2004), and for the 'pôles de compétitivité', BIOWIN (health sciences makes a mid-term review of its main R&D projects (KEYMARKER and NEOFOR). More recently, Article 123 of the decree of July 3rd 2008 related to the support of research, development and innovation in the Walloon Region foresees the 'mise en place' of indicators to evaluate the support to research (DG06). In the Flemish Region, there have been assessments of the socio-economic impact of the renowned Institute for Micro-Electronics (IMEC), as well as on behavioural additionality of subsidies to business R&D. In sum, in Belgium there is a tendency for an increased use of IA of public measures for RTDI. However, this continues to be on an ad hoc base and there is little communication between governments/departments. This, despite the need for considering R&D policy measures in a broader RTDI policy context. A good example of this is the introduction - by the federal government - of fiscal measures towards R&D personnel (in private enterprises, in public research organisations and universities, and involved in private public cooperation in R&D) and the many initiatives at the level of the regions in terms of R&D subsidies which envisage - at least to some extent - similar outcomes/impacts. From this perspective, there is a need for the assessment of the impacts of different policy measures at the same time (i.e. related to the policy mix for RTDI).

In **Bulgaria,** IA exercises and culture is underdeveloped. Few policy measures are shaped following evaluation and impact assessment cycles. There is a lack of regulatory framework, even though the Ministry of Education and Science has adopted internal regulation on the evaluation of national research-performing institutions, research - funding organizations and policy instruments, namely programmes. Since 2005, evaluation with elements of IA is undertaken for the National Science Fund programmes. These evaluations are foreseen approximately every 3 to 5 years. However, it should be noted that there are plans for forward implementation of impact assessment for policy measure aimed at RTDI, however there is still no decision on this issue.

Since 2008 in the **Czech Republic**, there has been an annual assessment of all institutions (private and public) asking for institutional support of their R&D activities. This relates to a completely new amendment of the ACT No. 130/2002 Coll. on the Support of Research and Development from Public Funds and on the Amendment to Some Related Acts (the Act on the Support of Research and Development) announced as Act. no 211/2009 Coll. (http://www.vyzkum.cz/storage/att/DAAC9EBA287D1EA902A9412CA341452F/211_2009_EN.pdf. Concerning institutional support, this Act further deepens the principle declared by the Research and Development and Innovation Council of the Government. According to this principle any R&D organization, irrespectively of its public/private status, is entitled to receive institutional support from the state R&D budget on the basis of the excellence of the R&D results, which the organization achieved in a specified time window. The funding principle is defined by the following sentences:

'Institutional support shall be provided by the grantor to research organisations on the basis of an assessment of the results already achieved, in order that their share of the total amount

of institutional support for research organisations from the State budget for a given year reflects their share of the value of results achieved by all research organisations over the past 5 years on the basis of an assessment carried out each year by the Council for Research, Development and Innovation.'

The main change (compared to the previous legislation) consists in the distribution of the institutional support for R&D from governmental resources. The size of the institutional support is directly derived (according to the new methodology) from the 'value' of the R&D results (articles, books, scientific reports, patents, licences, functional preliminary prototype etc.). The grantor may adjust the level of support to reflect a more detailed assessment that uses internationally recognised methods, which, together with the results of the more detailed assessment and the rules regulating support, it will publish before the support is provided. The grantor shall also take into account the level of indirect support that has been provided to the research organisation in previous years in the form of tax relief, in the institutional support provided.

In the case of **Estonia,** the approach to any policy-making and assessment of its impact has to be viewed in the context of a small country. This means, for instance, that technology development is in fact often carried out by means of the so-called technology transfer, as local contributions to on-site technology development is limited because of market capacities and existing competencies. The same issues remain important when analysing the transitional economy background, which calls for structural changes that become even more important in the current recession. Therefore, any assessment of the effects of R&D and innovation policies in Estonia is problematised by several difficulties. Until now, attempts to assess the impacts of these policies have mostly been made in the course of ex-ante evaluations and studies. A common methodology has certainly not been developed yet and apparently it has not been considered to be a priority to date. However, the experiences gained during the R&D and innovation policy assessment have turned out to be extremely labour-intensive, which also require high competencies from the involved officials and policy makers.

In **France** there is an increasing pressure to develop and improve evaluations and impact assessment of RTDI policies. IA is starting to be planned at the policy cycle. More knowledge is required regarding weaknesses and the specific questions which impact assessment methodologies are supposed to address in the national evaluation system. It also seems that the effective practice of IA (i.e. methodologies used, period and time of the request) do not always correspond to the real needs of policy making in the country. Over the last few years, an assessment took place of the technology transfer from public research and science, from an economic perspective. An assessment was also made of the fiscal measures to stimulate business R&D expenditures; and studies were undertaken for the assessment of policy measures targeting the facilitation of private-public partnerships. These exercises involved a broad audience of policy makers (politicians), government officials, auditors and financial authorities, as well as those directly supported by the RTDI policy measures. In these assessments attention was paid to the design of the programme/measure, the programme management, as well at the broader policy design.

Box 2.8: Impact assessment of the French R&D tax credit: a cumulative process

In France, there is an incremental process involved in evaluating the R&D tax credit (Credit d'impôt de recherché or CIR) which has existed since 1983.

So far, impact evaluations have focused on input additionality (raising R&D budgets), which has proved a difficult task. In 2005-2006, surveys were conducted through a questionnaire and interviews of companies. This was after a major reform in 2004, which had enlarged the CIR. These surveys asked questions on input additionality, but also on behavioural additionality (type of research projects for example). The latter exercise resulted in a change in the design and day-to-day management of the measure.

In 2006-2007, an econometric study was performed based on the fiscal declarations of companies and the national R&D survey. This study, which used a matching method, concluded that the tax credit does increase R&D spending by companies.

In 2008, after a second major enlargement of the tax credit, there was another survey which also included questions on the use of other R&D incentives by companies. In 2009 a survey was directed at French and foreign multinationals with questions on their R&D locations and the

impact of CIR on the attractiveness of France for R&D activities. In 2010 the first impact evaluation of the recent reforms of CIR was launched. The methodology is a structural model of investment in R&D and its econometric testing. Between 2005 and 2010, impact evaluation of Cir have thus evolved substantially: (i) a more systematic planning of evaluations after nearly 20 years of non-evaluation; (ii) results of evaluation studies have been developed in reports to the Parliament (2006, 2007, 2009, 2010); (ii) the evolution of the content of the evaluation through different methods and questions. Although the focus remains on input additionality, behavioural additionality is being considered. Output additionality still appears to be very challenging from a methodological perspective and may be considered once input and behavioural additionality have been thoroughly established for the period after 2008.

This case is one of gradual evolution towards thorough impact assessment. It shows that there is learning in the practice of IA, both on the side of policy makers and on the side of those in charge of the impact studies. Learning depends on sufficient investment and adequate governance, including competent and open steering committees. The data issue is also very serious: if individual data and often administrative or fiscal data are not available, IA is much more difficult. As IA aims at improved evaluation of a policy instrument, it has to deal with the policy mix, which in turn implies access to more data.

In **Iceland**, IA has been used to a limited extent in policy making related to RTDI, yet in the proposed plan of the Science and Technology Policy Council for 2009 to 2012, IA on the competitive funds and the Strategic Programmes is an important issue. RANNIS, which operates the competitive RTDI funds, is initiating plans which are aimed at the policy cycle for policy measures funding RTDI. There is only one example, from 2005, of an attempt to conduct impact assessment of RTDI in Iceland, which deals with the execution and outcome of a strategic programme in information technology and environment (1999-2004). The report of this exercise, which is only available in Icelandic, included assessment of socio-economic impacts. Since then two Strategic Programmes have been initiated, one on nanotechnology and postgenomics (2006 to 2010) and one on Centres for Excellence and Research Clusters (2009 to 2015), which have taken full account of the results of the 2005 study.

Box 2.9: Impact Assessment of the Technology Development Fund at RANNIS - Iceland

The Technology Development Fund has been operated since 2004 under the auspices of the Ministry of Industry Energy and Tourism and is run by RANNIS. The main objective of the Fund is to support research and development activities, which aim at innovation in Icelandic business and industry. In 2009, the budget for the Fund amounts to 690 million Icelandic krona which equals approximately 4.5 million EUR. Until now the Fund has not been subject to an impact assessment. RANNIS intends to use the opportunity provided by the OMC-net to conduct an impact assessment of the Fund. Roughly, one can identify three steps in the workplan for an IA:

1. Prestudy: In the prestudy the project is defined and its relevance is identified in relation to the societal objectives that the Fund should fulfil. The Fund's main objective is then analyzed by using impact logic assessment. At the same time it is important to define the criteria which will be used for assessment. It is also necessary to examine and analyze available data and a timeplan for the project should be established.

2. Project: In the project phase, the IA would be undertaken in all or a selection of businesses/public research organizations/universities which were awarded grants from the Fund since 1994 and had completed their projects no later than 2008. The number of projects in question is approximately 30-60. The IA project would deal with the following aspects: (i) analysis of available data on the projects, progress reports, interim reports and final reports; (ii) questionnaire administered to project managers; (iii) interviews with representatives of the businesses who were awarded grants; (iv) results, conclusion and recommendations.

3. Packeting and communication: As regards packeting and communication, this step would deal with the dissemination of the results and recommendations to the scientific community, industry, policy makers and the public at large. In this process, lessons would be drawn from the results with the aim of improving and strengthening the operation of the Fund.

Malta has limited experience in IA and evaluation exercises of its programmes. However, an IA and evaluation of the National Programme for Research and Innovation is planned.

In **Spain**, IA of public funding for RTDI is not planned at the policy cycle for policy measures funding RTDI. Ministries need a department explicitly dedicated to Evaluation/Assessment/Prospective. Trained people in this area are in considerable demand.

In **Sweden**, the use of the results of impact assessment exercises for the design of implementation of new policy measures depends on the agencies (e.g. VINNOVA's program development is intended to have influence on policy making). However, there is a growing demand from policy level, and in the future, more funding bodies will face demands of performing impact assessment.

Box 2.10: VINNOVA's view on the context in which evidence is used to make policy

VINNOVA's starting point is the question: what to achieve and how to achieve it? This is dealt with in a hierarchical context starting from the overarching policy, the operationalisation of a policy in a programme, calls within a program (agency level), and specific plans translated into projects.

VINNOVA's overarching policy objective is 'sustainable growth'. To reach this objective VINNOVA develops programmes. No decision on any program in VINNOVA is taken without presenting an impact logic assessment.

The impact logic assessment is completed alongside policy makers but communication of all the objectives does not always take place. Moreover, there is not always full understanding and views sometimes tend not to be completely in line. VINNOVA works on this point and there is increased communication (seminar in Spring 2009 for first time) with policy makers. However, this process still tends to depend on how the people at the ministry are steered by their politicians.

The planning of decisions for programmes or assessments at VINNOVA is mixed and includes:

- agreements between industry and government (related e.g. to the economic dip making companies approach government with requests about ideas to develop their sector) which VINNOVA as an agency, implements;
- strategic research areas decided by government (e.g. money given to universities which undertake impact logic assessments). In this case VINNOVA looks at evaluation and impact analysis;
- annual instructions from the government for the next budget year activities related to VINNOVA's mission in terms of sustainable growth. From this, VINNOVA creates programs to reach overarching goals. VINNOVA is involved in different – dispersed - policy areas, encouraging learning and understanding of the system;
- different impact analyses e.g. related to the growth of companies having benefited from seed funding programs or the impact of research put into traffic safety measures;
- aside from impact logic assessment (formulating objectives and assumptions) in each programme, attention is paid to monitoring (of the resources used by the system – of the properties, developments and mobility of the actors involved– of the conduct in terms of whether actors do what they are supposed to do in the projects – goal fulfilment) and evaluation (mostly at end or mid-term of the project a revision takes place to determine whether the goals were reached or what is needed to put the activities back on track).

Compared to VINNOVA, other funding agencies in Sweden leave evaluation or assessment to the scientific community (evaluation and assessment mostly in terms of publications). This attitude is closely related in the different mission these agencies have compared to VINNOVA. They are more oriented to scientific output. However, there is also a tendency for other administrations/funding agencies to look more at the positive results.

In **Turkey**, IA of public funding for RTDI took place only once, applied in the World Bank funded project, ''Industrial Technology Project (1999-2006)'. The exercise has been carried out with the guidance of the World Bank and has not become part of the policy cycle for any policy measure. The assessment resulted in the design of the 'Commercialisation of R&D Support Program'. Only TTGV has an experience in impact assessment in Turkey. Besides this, evaluation studies for TUBITAK programs are started in the second half of 2009. Funding programs of TUBITAK covers a wide range of triggering mechanisms in a policy mix approach to increase the quantity and quality of RD investments. Working groups for evaluation studies

are formed focusing on four different programs which can be considered in the following lines of the policy mix: (i) promoting entrepreneurship and technological or innovation-driven research; (ii) promoting curiosity-driven academic research to sustain innovation; (iii) sustaining the development of human resources for science and technology; and (iv) enhancing international S&T cooperation**.** Surveys are being prepared and target/comparison groups are selected for some of the programs to be evaluated. However, no further results have been obtained at this point.

2.6 Characteristics of impact assessment of RTDI policies

The focus of Section 2.6 is on policy measures addressing three common challenges for National Innovation Systems in most European countries: i.e. (i) low R&D investments and the need to increase the overall R&D spending (especially in the private sector); (ii) a need for improvement of the interactions between industry and science actors; and (iii) a better governance of research and innovation in public research organisations. Therefore, the set of policy actions related to these objectives fall into three broad policy clusters: the promotion of R&D performed in the private business sector; a strengthening of the science base and improvement of governance and coordination issues in the public sector, and leveraging the results of the public sector research by industry (linking the private and public sector R&D). The focus of this section is on existing experiences in the field of impact assessment.

In order to collect this information, a survey has been set-up among the 15 partners involved in the OMC-net project. Each of the partners has made a selection of the most important studies related to IA which have been ordered by government institutions (policy makers, ministries, agencies) in his country since the year 2000, and related to the three broad policy clusters highlighted above. The questionnaire is presented in Annex 2.1. It has been designed in order to achieve the maximum synergy possible with other works already done in the area, mainly with the Inno-Policy Trendchart repository of European policy measures and Inno-Appraisal Repository of European Evaluation Studies.

The Table 2.7 provides an overview of the 21 studies under investigation. It has to be noted that none of these studies has been completely internally conducted by the government institution which has ordered the study. On the contrary, over 90% of the studies are entirely subcontracted (mainly to universities, research institutions and consultants). Also, it can be argued that these exercises are sometimes at the borderline between ex-post evaluation and ex-post impact assessment.

Table 2.7: Overview of IA exercises in the field of public funding for RTDI

Country	Impact assessment study
Austria	IP Rights at Austrian Universities: Evaluation of the uni:invent programme
Austria	Evaluation of the Austrian Industrial Research Promotion Fund (FFF) - Impact Analysis
Belgium	Impact of the Federal Scientific Institutions on the economic, scientific, social and cultural development in Belgium
Belgium	VRWB research: impact analysis of fiscal stimuli on R&D expenditures in Flanders
Belgium	The impact of public R&D funding in Flanders
Belgium	A look into the Black Box: What difference do IWT R&D grants make for their clients
Belgium	Making the difference: The evaluation of 'Behavioural Additionality" of R&D subsidies.
Bulgaria	Peer-review of the national R&D system under the OMC forth cycle
Bulgaria	Evaluation of the National Science foundation (NSF)
France	PREDIT 3: National research and innovation programme in terrestrial transports
France	Evaluation of PREBAT (Research and exploitation of energy in buildings - 2005-2009)

France	Impact study SRC 2006 / impact of French research and technology organisations (RTO's)
France	Report on the valorisation of research
France	Evaluation of the first phase (2006-2008) of the policy on competitiveness clusters (pôles de compétitivité)
France	Competitiveness clusters (pôles de compétitivité), what can we expect?
France	Which articulation between PRES, RTRA and competitiveness clusters (pôles de compétitivité)
France	Information report on the economic incidences of an augmentation of research expenditures in Europe
France	Impact of the research tax credit on the funding of private R&D: an econometric evaluation
Spain	Impact Assessment of the FP6 in the Spanish R&D public system
Spain	Impact of R&D on the Industry
Turkey	An Assessment of the Industrial Technology Project

Source: Questionnaire on impact assessment for public funding of RTDI, see Annex 2.1.

Based on these exercises, attention will be paid to three main aspects of impact assessment exercises: the field of study ('the impact of what, on what') - Section 2.6.1; methodology, data collection, and indicators - Section 2.6.2; and the usefulness for policy making - Section 2.6.3.

2.6.1 Field of study ('the impact of what, on what')

A classification according to the three aforementioned policy clusters reveals that close to half of the 21 studies mainly focus on the enhancement of the amount and quality of private RTDI investment. Eight exercises mainly target the improvement of the cooperation between public research institutes and private enterprises, and three focus on the improvement of the governance of public research institutions and universities. It is interesting to note that the focus on policy clusters is not mutually exclusive since respectively 5; 6; and 8 of the studies have as a secondary objective the enhancement of private RTDI; the enhancement of industry-science cooperation; and the improvement and governance of public research.

Table 2.8: Impact measurement in IA analyses of public funding of RTDI

Impact	Measured (in % of the number of studies)
Economic	86%
Scientific	48%
Societal (including environmental)	29%
Technological	24%

Source: Questionnaire on impact assessment for public funding of RTDI, see Annex 2.1.

The - not mutually exclusive - objects of the impact assessment exercises contain institutions (10); projects (4); programmes (9); policy measures (6); and - an actor of - the national innovation system (2). Most of the exercises analyse impacts at the micro- (13) and/or macro-level (13). Eight studies consider impacts at the meso-level. Four types of impacts (scientific, technological, economic, and societal) were considered. Economic impacts were most prominent, followed by scientific impacts. In less than one third of the cases, broader societal impacts were investigated. The latter can be closely related to the fact that only two

out of the 21 studies had a broader societal impact as initial objective. More specifically, public funding in these cases was focused on 'Encouraging the creation of transportation systems that would be economically and socially more effective, safer, more energy saving, and finally more respectful of man and environmentally-friendly' and 'Highly decreasing the average consumption of existing building as well as their contribution to greenhouse effect and build new buildings consuming four time less than current buildings'.

2.6.2 Methodology, data collection, and indicators

2.6.2.1 Methodology

Technical issues concerning (the development of new) methodology and indicators are not the focal point of this report. There are two main reasons for this. First, the member organisations of the OMC-net project generally have more practical policy roles than academic roles, and therefore a more thorough understanding of the realities of policy making. Second, previous studies (OECD, 2009) seem to have focused on methodology and techniques for performing evaluations and impact assessments and the results of that work should not be duplicated but integrated in the recommendations of the present project.

This approach recognises that insights into the use (good practices) and possibilities for harmonization in terms of methodologies and indicators for impact assessment are crucial elements required to promote IA at the level of policy makers, and to stimulate them to make more use of IA in the policy making process. It is from the latter perspective that this report analyses indicators and methodologies for impact assessment.

The results of the questionnaire on the use of IA at case study level (see Annex 2.1) reveal that over 40% of the exercises are not based on previously designed methodologies. Moreover, in close to 80% of the cases these methodologies have not been used for other IA exercises of the same policy measure (this can be related either to the fact that the methodology was not considered appropriate or to the fact that no other impact assessment exercises have been performed). This highlights the case sensitivity of the methodologies. However, nearly all of the respondents to the questionnaire indicate that the methodology is or can be used in an international context.

The focus of the studies mainly concerns the consequences or results of the measure (Outputs, Outcomes and Impacts), and to verify whether the goals of the measure were achieved. Besides these topics, considerable attention is also paid to additionality (output, input, and behavioural). Programme or project implementation efficiency as well as policy/strategy development are covered in less than one third of the exercises. This seems to indicate that IA exercises are most often not considered as part of a broader integrated process using impact assessment as a tool for policy making (see Section 2.3.2 and 2.3.3).

Table 2.9: Topics covered in IA exercises of public funding for RTDI

Outcomes	86%
Goal Attainment/Effectiveness	62%
Output additionality	38%
Behavioural additionality	33%
Input additionality	33%
Policy/Strategy Development	29%
Value for Money/Return on Investment/Cost-Benefit Analysis	24%
Programme Implementation Efficiency	24%
Quality of outputs	24%
Internal consistency	14%
Coherence/Complementarity	14%

External consistency	5%
Project implementation Efficiency	5%
Gender issues	5%

Source: Questionnaire on impact assessment for public funding of RTDI, see Annex 2.1. Note: the answers are not mutually exclusive.

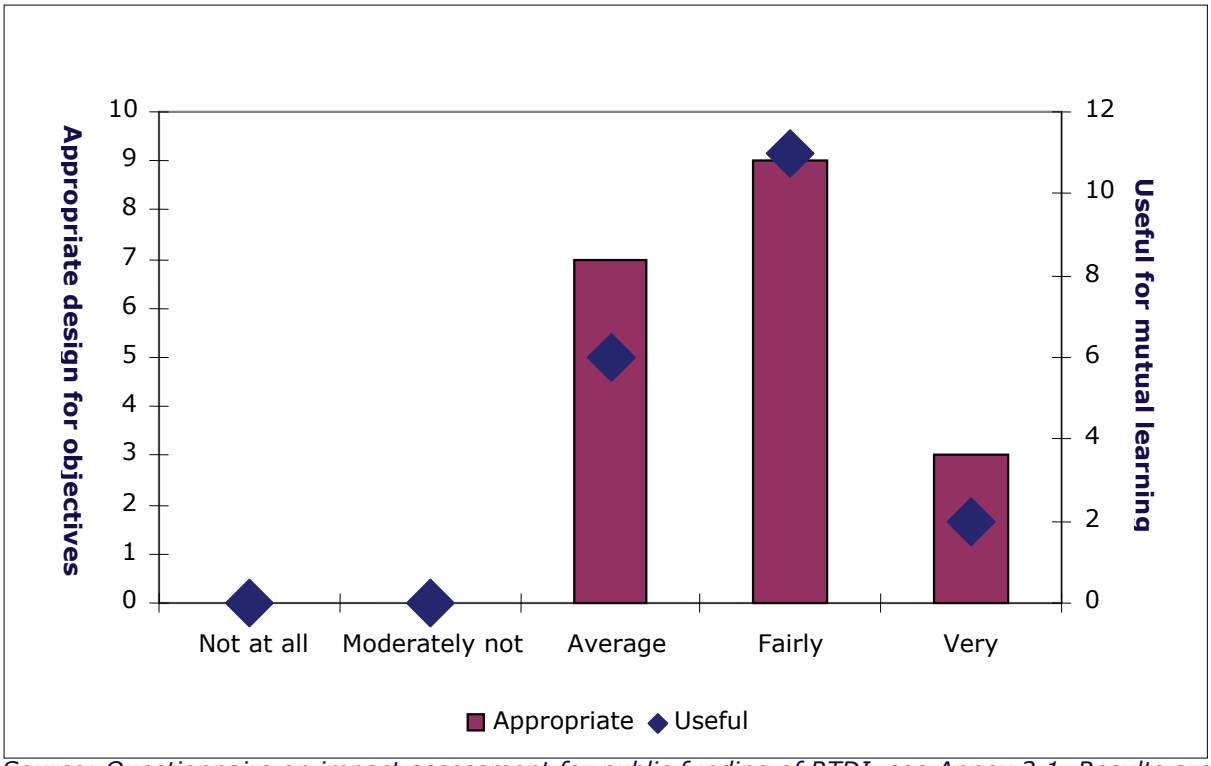
Box 2.11: Estonia: need for a methodology for impact assessment

The experience of R&D and innovation policy design in Estonia can be generally divided into two approaches. The market failure approach understands the main issue as being that of putting the existing R&D and technologies into practice. The innovation system approach regards innovations as a way the market participants seek market failures to gain profits thereof. The first of these entails elaborate modelling and detailed quantitative data and therefore a proper ex-ante assessment has never been carried out for such policy measures in Estonia. The second focuses on case analysis and qualitative empirical data, which has been put to use in ex-ante phase, when designing measures such as conducting doctoral studies in cooperation with companies, bringing in development workers from abroad etc. The synthesis of the two approaches intends to reveal the additionalities of the state interventions by combining the methods. It has been used in one major ex-post evaluation of financing of Estonian R&D programmes.

The main observations by academia about the attempts at IA of R&D and innovation policies in Estonia have been that the methods have not been sufficiently adapted to the small and transitional country framework; therefore the results and also the application of several previous assessments may be inaccurate. This is even more likely when one takes into account how dependent the policy makers and officials are on outside competencies. Therefore, the need for improvement in Estonia is seen to be twofold: adaptation of methodologies to local context and training officials in implementing them. At the same time, it has to be noted that in Estonia the IA is also viewed as a procedure to be developed on the horizontal level for strategic planning purposes, which could be used in several policy fields. The tasks are carried out by the Ministry of Finance and also by the State Chancellery of Estonia which is currently developing methods and reviewing the experience in impact analysis, for example. However, due to the lack of specific experience, most of the material gathered might be defined as being closer to evaluations than impact assessments.

Concerning the appropriateness of the design of the study and the chosen methodology related to the objectives of the IA and the nature of the policy measure it turns out that most of the studies can be considered average to fairly appropriate. Lack of experience and data and too much hypothesis underlying the relationship between RTDI funding and impacts are considered to be the main factor hampering the appropriateness of the design. A similar tenure pops-up in terms of estimated usefulness for mutual learning in these exercises. A problem in this respect is (modelling to account for) the complexity to measure net impacts. Although, it cannot be ignored that these responses may be biased because it may be difficult for institutions to criticise exercises they or other ministries/agencies have ordered.

Figure 2.3: Appropriateness of the design to measure objectives and usefulness for mutual learning on IA exercises of public funding of RTDI



Source: Questionnaire on impact assessment for public funding of RTDI, see Annex 2.1. Results are based on 19 responses provided by the 21 case studies.

Based on open-ended questions in the questionnaire (Annex 2.1), major methodological lessons learned from the impact assessment exercises include:

- awareness of the difficulty to measure (quantify and qualify) indirect economic and technological effects (not at least by the receivers of public funding for RTDI);
- the importance of considering different policy measures at the same time (policy mix);
- awareness of problems in terms of attribution (both to specific measures and to specific territories) and timing;
- lack of data to analyse and benchmark the impacts resulting in a lack of evidence-based conclusions;
- lack of experienced people in evaluation/impact assessment itself – especially for bridging between the science community and policy stakeholders.

These elements put forward in the questionnaire are very much in line with what has been presented in Sections 2.3 and 2.4.

2.6.2.2 Data collection

Descriptive case-study analysis and econometric analysis are the main methods for impact assessment exercises. Participant surveys, existing databases and interviews are the main ways to collect data. Over three quarters of the studies combine qualitative and quantitative approaches.

Table 2.10: Overview of data collection and data analysis methods for the assessment of public funding of RTDI

Data collection methods		Data analysis methods	
Existing Surveys/Databases	67%	Case study analysis	48%
Participant Surveys	62%	Descriptive statistics	48%
Interviews	52%	Econometric analysis	38%
Document Search	24%	Document Analysis	38%
Monitoring Data	19%	Input/output analysis	29%
Bibliometrics Search	19%	Counter-Factual Approach (quantitative/qualitative)	24%
Focus Groups/Workshops/Meetings	19%	Cost/Benefit Approach	24%
Non-participant Surveys	14%	Context Analysis	19%
Other methods	10%	Control Group Approach (quantitative/qualitative)	19%
Peer Reviews	10%	Before/After Group Comparison	10%

Source: Questionnaire on impact assessment for public funding of RTDI, see Annex 2.1. Note: the answers are not mutually exclusive. Bibliometrics refer to scientific references (for document search this is not necessary).

Box 2.12: VINNOVA's approach for gathering and handling data for impact analyses

A common problem for most projects is the fact that there is not enough thought given to preparing data for evaluation and impact at the start-up of programmes, particularly in relation to future actions. This is particularly important for evidence-based action. Although it is obvious that despite good initial planning of data collection, when measuring long term impacts, whatever you collect at the start and during projects will not be sufficient for the questions you want answered at the time of the evaluation/assessment.

In line with the position of IA in the broader process of evaluation, evidence needs to be collected relevant for follow-up procedures, evaluations, analyses and impact assessment. The main questions concern:

- properties of the applicants and project partners (legal entities, ownership, size of companies, business sector, geographical location);
- supply and consumption of resources (multiplication effects, roles of project partners);
- project performance (according to plan-time-money);
- fulfilment of goals and objectives (according to the impact logic).

VINNOVA has set-up a systematic system for data collection at programme level starting from the choice of data needed to be collected when the programme is set-up (e.g. data from applicants, project partners, and ongoing projects). Systematic follow-up is then completed in terms of data retrieval, data storage, and data processing.

The basis of the systematic data collection are formal reports with structured questions (base line report - midterm report - end of project report - after project report), input from the programme 'call' (project – participant) and external data (e.g. from 'Statistics Sweden': data on organisations). This results in a system of information supply and storage (related to resources, monitoring, outcomes, impacts) regrouping information from different databases within VINNOVA and external databases. This data is structured by data warehousing, standard reports, and statistical analyses and impact assessment exercises.

An example including indicators for different steps in impact logic can be found in 'The Research & Grow Programme' which aims at an enhancement of the education level of employees. At the end of the project, data was presented on the recruitment of new personnel with an academic background. In the long run, data was presented on how companies developed new products resulting in a better economic performance and growth in SMEs, creating more job opportunities in Sweden.

2.6.2.3 Indicators

Based on the results of the questionnaire, IA indicators were included only in one third of the cases at the set-up of the policy measure. Or in other words, in two-thirds of cases, indicators were only considered in the ex-post impact assessment study. Similarly, in about half of the cases existing indicators were used and in close to the other half of the cases indicators new to the institution were created. In only one case was entirely new indicators in the field of impact assessment created. In approximately 60% of cases, these indicators are publicly available.

Table 2.11: Appropriateness of indicators for impact measurement

Impact	Appropriateness of indicators for the measurement of impacts			Efficiency (in terms of information provided/ resources devoted)*
	Not appropriate	Sometimes appropriate	Appropriate	
Scientific	11%	33%	56%	2.57
Technological	0%	50%	50%	2.67
Economic	0%	27%	73%	2.86
Societal (incl. environmental)	17%	83%	0%	1.00

*Source: Questionnaire on impact assessment for public funding of RTDI, see Annex 2.1. Note: * Average efficiency: average based on a 5-point likert scale (not efficient = 0; moderately efficient = 1; average efficient =2; fairly efficient = 3; very efficient = 4).*

It is interesting to note that indicators are deemed appropriate to measure economic, scientific, and technological impacts respectively in 73%; 56%; and 50% of the cases. No indicators were found fully appropriate to measure societal impacts since the measurement indicators of societal impacts seem to be context specific and often related to other policy measures (e.g. the impact on society is due to research but also norms and legislation, i.e. the decrease of deaths due to accidents, and the decrease in greenhouse gas emissions). It can also be highlighted that in one out of six studies, indicators to measure scientific and societal impacts were found to be completely inappropriate. Not surprisingly, these findings resulted in a lower perceived efficiency of the indicators to measure societal impacts. Important shortcomings in terms of indicators are data availability (including the high number of potentially useful indicators and the possibility of making comparisons) and lack of appropriateness when adapting to specificities in terms of the actors benefiting from the public funding.

Box 2.13: Indicators for evidence-based policy making in Czech Republic

The main constituents of the system making it possible to operationalize the funding of public and private R&D in Czech Republic are:

1. Definition of categories of results. The definition is given in the list of results (i.e. outcomes of R&D activities not listed in the definition are not considered to be a 'result'. The most important examples included in the list of results are: scientific publication; patenting; utility and/or industrial design; certified technology, species, breed; prototype, functional pattern; special map; certified methodology; software; and research report containing classified information.

2. Database of results. The Czech Republic has had an Information Register of R&D results (IRR&D) since 2002. (Establishment of the Register is stipulated in the Act 130/2002 Coll.) Only the results which are included in this Register can be evaluated, i.e. converted into point scale.

3. A special method of result evaluation is proposed by the Commission for results evaluation, and the Act refers to it. The Method can vary from year to year according to the intentions of the Government (or rather of the Research and Development and Innovation Council of the Government). On using the IRR&D the Method automatically calculates the values of all registered results by converting into one dimensional point scale (the value of results thus determined by the number of points).

4. Fixing the financial value of one point: the points attributed to institutions are summed up for all results registered over the past five-year-period. For the given year, the total sum of the state budget appointed for institutional support of R&D is divided by the total number of points resulting in the financial value of one point.

5. Aggregated total value of points for each institution is computed (at this stage problems like co-authored articles, books, patents etc. are resolved).

6. Aggregated point values of points for each grantor are computed.

7. State budget for institutional support is distributed to the grantors according to item 6. They further distribute their institutional support to institutions according to item 5.

The research results are converted into one dimensional point scale. The methodology of results evaluation neglects differences between R&D fields, so it is doubted or even rejected by the main actors (particularly by the Academy of Sciences) and steps towards preparation of the new results assessment methodology were taken in the year 2009 (when the new Act was adopted).

Box 2.14: The experience of INRA (French National Institute for Agricultural Research) with social impact assessment of research

Experiences with social impact assessment of research

The generic missions of INRA were laid down in 1984 and gave INRA a complex status:

- the status of a mission-oriented research institution, combining the excellence of its disciplines and the need to take account of the purpose (relevance) of its research;
- the mission to generate training in, and through, research, to enable the dissemination of scientific culture and develop the science/society debate;
- the duty to contribute, through its expertise, to informed decision-making by public authorities and actors in society.

The missions thus defined for INRA also included a definition of the scope of its investigations. Restricted originally to 'agriculture and its related industries', they have gradually broadened in line with changes to different issues affecting society: since 2001 they have explicitly concerned 'agriculture, food and nutrition and the environment'. Since 2009, INRA has been assessed by the Agency for the Evaluation of Research and Higher Education. For this exercise, INRA produced a self-assessment report, presenting its strategy and the results obtained vis-a-vis its missions. But whilst INRA had organised the evaluation of its results to the benefit of research and higher education, it had not fully explored the evaluation of benefits to the economic sector, to the public sector and to other segments of the society.

Still, INRA has produced some work regarding socio-economic impact of its research. For example 'les chercheurs et l'innovation', published in 1998, presents the role of INRA in generating innovations and shaping the conditions for disseminating the results of its research in the agricultural sector.

Involvement in (planning) social impact assessment exercise

Further to its external evaluation, INRA decided in January 2010 to reinforce the evaluation of its socio-economic impact. The objective is to reflect on a methodology which does not put an excessive demand on resources, and to produce case-studies which illustrate the diverse roles of INRA in producing a variety of impacts for the benefit of a variety of actors. Details are yet to be approved by the statutory bodies, but progress and results would be expected by the end of INRA new contract for objectives (i.e. by 2014).

Important issues regarding IA methods

The complexity of the social impact assessment methods entails designing a methodology which is acceptable by scientific standards, and useful to decision makers. Because of the current pressure on public funds, the methodology must produce figures which will demonstrate the importance of the research for the economic sector, while at the same time demonstrate the importance of the process of productive interactions among the actors, hence attribution

challenges. It must be able to demonstrate results, and at the same time to be able to explain that most attempts at innovation, by definition, are risky and should 'fail'. If not, they are using safe, rather than unknown or truly innovative approaches, and a few key impacts by a minority of projects or participants may be much more meaningful than changes in mean (or average) scores.

2.6.3 Usefulness for policy making

In order to obtain a view on the usefulness of the IA exercise for policy making, a first element to consider is the involvement of policy makers in the user group of the impact assessment conclusions/report. Politicians and the programme management are only involved in fewer than half of all cases (Table 2.12). This seems to provide evidence that the policy cycle for impact assessment is not closed. These findings confirm the existence of a gap between policy formulation and implementation and by consequence, a deficiency in terms of the institutionalisation of lesson learning. Influencing policy and practice is one of the key objectives of ex-post evaluation and impact assessment. Also surprising is the low involvement of those directly or potentially supported by the measure.

When it comes to wider discussion of the analysis and recommendations, it turned out that in only approximately one third of the exercises, was this done alongside government, and in 43% of the cases it involved participants or stakeholders. This finding can be explained by the fact that close to one sixth of the exercises did not contain recommendations, half of the studies yielded recommendations targeted at the design or management of a programme/measure, close to half of the studies formulated recommendations for programme management, and 43% for broader policy design.

Table 2.12: Users involved in the impact assessment exercise

Policy Makers (Government officials)	95%
Programme Management	48%
Policy Analysts	48%
Those directly supported by the measure	43%
Policy Makers (politicians)	43%
Potential Users of the Policy Measure	33%
Auditors/Financial Authorities	14%
General Public	14%
External/International (co)sponsor of the measure	10%

Source: Questionnaire on impact assessment for public funding of RTDI, see Annex 2.1. Note: multiple users can be involved at the same time.

The main consequences of the study are a re-design or expansion of a policy measure. Surprisingly, 38% of the studies did not generate any consequences at all. The main reasons for this are:

- the informative characteristics of the study;
- the focus on methodological framework of the exercise – related to the fact that the policy measures were to new/recent to perform a real impact assessment study;
- no decision taken yet on the recommendations of the study or changes in budget resulting from the economic crisis hampering a re-design of measures/ programmes.

The influence and relation with other policy measures (e.g. in terms of re-design or merger) is also limited. This reveals the minimal attention given to the broader policy mix in impact assessment exercises.

Table 2.13: Recommendations and consequences of impact assessment exercises

Recommendations?	in % of number of studies
No	14%
Yes, targeted at the design of the programme/measure	52%
Yes, targeted at the programme management	48%
Yes, targeted at broader policy design	43%
Consequences?	
Termination of the measure	0%
Re-design of the measure	52%
Re-design of another measure	14%
Expansion of the measure	29%
Merger of measures	0%
No consequences	38%

Source: Questionnaire on impact assessment for public funding of RTDI, see Annex 2.1.

The non-systematic involvement of policy makers (politicians) and the absence of the broader policy context in IA can be related to the fact that less than half of the impact assessment exercises pay attention to 'policy impacts', i.e. investigation of the impact of research on how policy makers and policies act. As highlighted earlier, this impact can provide evidence which influences policy decisions and can enhance citizens' participation in scientific and technological decisions. Moreover, the measurement of policy impact is not systematic (i.e. case dependent) and indicators to do so seem to be missing and in the rare case where indicators are used they are frequently used in an inappropriate way to measure the impact on policy making.

2.7 Conclusions

Over the last decade more resources have been allocated to RTDI policies and evaluation (impact assessment) has been stepped up with some delay. There has been progress in methods for IA and, despite all that is said as regards indicators, more data is now available. In other words, there is both more demand for evaluation of policies which absorb increasing resources and more supply in terms of sophisticated methods, data, and experience.

Like ex-post evaluation in the 1990s, ex-post impact assessment is currently enjoying increased attention in Europe. Assessing the socio-economic impacts of public policy is becoming increasingly important as the changing role and position of government has resulted in a growing demand for evidence-based policies (OECD, 2007, p.4).

However, one of the main lessons of the mutual learning during this work is that different terminologies are used with regard to evaluation and impact assessment. The purpose of this Chapter was to explain the terminology used in this report and to set a common methodological approach to impact assessment, i.e. the logic model. Although the European Commission has a long tradition in this field, the understanding of evaluation and IA is seen to be far from harmonised across public administrations and agencies involved in evaluation in Europe.

Based on the insights and evidence presented on impact assessment practices in Europe, an increased use of impact assessment in policy making towards RTDI can also be noted. However in most countries, the planning of IA at the policy cycle still takes place on an ad hoc or exceptional basis. Moreover, in some countries it is administration or agency dependent. Also, despite the objectives of the 'Europe 2020' strategy, too little attention is still paid to the broader societal impacts of public funding for RTDI.

Several reasons can be suggested as to why impact assessment exercises of public funding for RTDI are not easy to undertake. First, even when considering only three clusters of RTDI policies (the enhancement of private RTDI; the enhancement of industry-science cooperation; and the improvement and governance of public research), most of the studies envisage different policy areas at the same time. Second, there seems to be a problem in finding appropriate indicators to measure the different impacts (scientific, technologic, economic, and societal) of public funding for RTDI. The appropriability of indicators seems to be case dependent and societal impacts are now seen to be particularly difficult to measure. This finding is probably - at least to some extent - related to the fact that only half of the projects considered indicators for IA at the set-up of the policy programme/measure. Therefore, progressing in the usage of 'appropriate' indicators for measuring the socio-economic impact helps to progress in the formulation of the 'model logic for intervention'. Moreover, this will enhance the usefulness of IA as a tool for policy makers, since policy making still largely is evidence-based.

However, major differences in evaluation exist among policy domains. Based on – more or less standardised information from - the ERAWATCH country reports, an overview has been provided of the existing policy measures in the field of RTDI. This overview clearly revealed the importance of the three policy clusters addressed throughout this report: funding for private RTDI, funding for industry-science linkages, and funding for public research (mainly universities). Together, these policy clusters account for over 50% of the R&D budget and 55% of the policy measures. For industry-science linkages (Chapter 4) almost 50% of the instruments were evaluated ex-ante, ex-post or during the implementation. Looking to the ex-post evaluation, the percentages differ according to the type of instrument. In the case of the instruments focussed on public private R&D cooperation and the measures considered as the support infrastructure for public private linkages, around one fourth of the instruments were evaluated ex-post; while in the case of the instrument to foster knowledge transfer this was about one out of six. For policy measures with regard to the funding of public research institutes (Chapter 5), close to three fifths of the measures are evaluated. For public funding of private RTDI (Chapter 3) - as it was for the industry-science related measures - important differences can be noted between direct (mainly subsidies) funding of which 50% of the measures are evaluated compared to indirect (mainly tax) support where close to two thirds of the measures are not evaluated. For the latter, it should be noted that the - in many countries - more recent introduction of these measure could explain this lower rate of evaluation.

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Chapter 3: Governance and usefulness of impact assessments

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3.1 Introduction

The extent to which society and the national economy benefit from research, technological development and innovation (RTDI) activities is an issue of increasing interest for the funding policy makers or programme managers. In the literature review of this report it is stated that the question, 'What socio-economic impacts and benefits result from publicly funded RTDI?' is the one which most funding agencies or policy makers are placing high on their strategic agenda. The drive to answer this question is related to evidence-based policy making which is supported by monitoring, audit and evaluation activities. Impact assessment is the focus of our project as one of several methods of evaluation in the lifetime of a policy cycle. IA can be ex-ante or ex-post and in this project we are dealing with ex-post impact assessments. Essentially, ex-post impact assessment is defined here as a kind of evaluation which focuses particularly on the broad, longer term impacts of public interventions (see Chapter 2 – Figure 2.2).

The theoretical and empirical economic literature on the importance of research and development (R&D) and innovation and on the economic benefits of innovative activities is vast. Through innovative products, private sector R&D reflects the efforts of a firm to increase its performance and competitiveness. Economic variables and incentives determine technological progress, i.e. knowledge is produced by R&D investment and it is used as a production factor in the production of knowledge, providing that there are economic incentives to do so (Grossman-Helpman Model 1991). Furthermore, it is widely accepted that, in the absence of policy intervention, the social rate of return on R&D expenditure exceeds the private rate, leading to a socially sub-optimal rate of investment in R&D (Guellec and Pottlesberge, 1997).

Public R&D programmes primarily aim at increasing R&D investment of public and private sectors. As it is stated in Chapter 2, public R&D funding has mostly been justified through market and systemic failures. Due to market failures and under-investment in R&D and innovation activities, most countries are spending significant amounts of public funds. The current practice of public R&D programmes and initiatives tend to follow diverging objectives, resulting in different design features. Tax incentives, direct funding, co-operation arrangements between firms, research institutes and universities, and loan guarantees are the main channels of public support for the private sector. Nevertheless, there is one principle objective common to almost all R&D programmes in place, which is the level of R&D investment of private sector that is input additionality.

Considerable effort has been devoted to the evaluation of efficiency and additionality of public subsidies for R&D. The demand for impact assessment of public R&D programmes can be seen as one element in the move towards a knowledge-based society, since such evaluations help us to understand the links between knowledge creation (R&D), knowledge exploitation (innovation) and wealth (productivity, employment).

The CIA4OPM project aims to increase the usefulness of IA in the context of RTDI policy formulation to increase private R&D investment. Thus, the project strives to make sense of impact assessment for policy making and to provide a useful framework for facilitating communication between policy makers and different stakeholders[8] in the policy cycle.

[7] The study is coordinated and managed by Technology Development Foundation of Turkey (TTGV) with the consultation of Dr. Abdullah Gok Research Assistant at Manchester Institute of Innovation Research, The University of Manchester. There are nine partners including TTGV involved in the case studies. The list of partners is provided in Appendix 3.1.

[8] By 'stakeholders' we refer to all those who have an interest in the impact assessment. This can include, for instance: those being evaluated (programme participants and managers), and those who might expect to be evaluated in future exercises;

Impact assessment is designed to improve the quality of information available to decision-makers. Typically, decisions made in the 'policy cycle' are identification of the best way of tackling a problem; choice of the appropriate policy instrument, design of the instrument and evaluation of the performance of the instrument. In each phase of the policy cycle, IA provides information to help make better decisions. The different stages of the policy cycle are underpinned by the various evidence-based policy-making activities as mentioned in the previous Chapter. The evaluation process consists of ex-post evaluation and ex-post impact assessment. The policy formulation process is supported by ex-ante evaluation or impact assessment and the policy implementation process is supported by monitoring and interim evaluation. Through full feedback effects and learning from monitoring, interim evaluation, ex-post evaluation and ex-post impact assessment, the policy cycle assumes the full closure of the cycle.

IAs can be of use in two different ways. Firstly, they can be a source of legitimacy for political decision-making. Secondly, impact assessments can be useful as a policy learning tool which provides feedback on operational, policy and system level. These two uses of IAs have to be related since legitimacy should flow from the efficiency of public policies.

The closure of the policy cycle depends, first and foremost, on the usefulness of the evaluation product, which is determined by a variety of factors. By deriving lessons for the governance of impact assessments, this project focuses on the latter type of usefulness.

In recent years there has been a high level of interest in evidence-based policy making and on evaluation through EU funded projects such as Smart Innovation – Supporting the Monitoring and Evaluation of Innovation Programmes, INNO-Appraisal, NONIE and ImpLore. Our project is intended to complement these studies. The main objective of this study is to create policy learning among partners and to contribute to better design and governance of IA.

The following second section is a literature survey of the types and governance factors of usefulness of evaluations and impact assessments of RTDI policies and programmes.

The third section covers the methodology used for the study. The case study approach analysing the governance of usefulness factors of impact assessments and the self-assessment approach used for improving the added-value of an IA are explained. The design of case study method and selection of real-life cases from different countries and the process itself are described.

Case study evidences related to the IA methodologies and indicators are presented under the fourth section, with a reference to similar EU funded project reports.

The fifth section is the case study synthesis part. Case studies are analysed using numerous usefulness factors such as scope, timing, programme objectives; policy-maker or programme manager's expectations and engagement, trust and compliance of all stakeholders, operational learning and feedback, the information presented as results and the dissemination of the results.

An outline of the self-assessment approach and ways to increase the added value of an impact assessment is provided in the sixth section. This section is a stand-alone section with its own literature survey, the methodology employed with a conclusion of main lessons for future impact assessments.

The seventh section lists some derived policy recommendations to point out how to improve usefulness of IA in policy practice.

Finally, the last section is devoted to the conclusion where the achievement of the study for the partners and for the target audience are summarised. A move towards improving the capability and willingness of policy practitioners to engage systematically in IA is also highlighted.

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possible users of those results concerning efficiency and value-for money; possible users of the results concerning particular directions for RTDI, for instance research and technology communities; possible users of more general results about RTDI including managers in firms; political figures and policy makers; media can become stakeholder (Smart Innovation: A practical guide to evaluating innovation programmes, January 2006).

The appendix includes list of partners involved in the study, the case study tools and ten case study summaries.

3.2 Usefulness of evaluations: a tour d'horizon

The usefulness of evaluations in general and impact assessments in particular has always been an important issue in the mainstream evaluation literature. There have been many different classifications and definitions of the usefulness of IAs. Similarly, many different terms including usefulness, utilisation, utility and use have been used almost interchangeably with little or no nuances.

According to Alkin (2004), evaluations (or impact assessments in particular) are considered to provide two functions. Firstly, evaluations provide information for **accountability and control**. This information clarifies if a programme is given reasonable and appropriate goals, whether these goals were expected to be achieved with reasonable and appropriate processes and finally, if the envisaged goals were actually achieved. This use of evaluation is widely associated with the issue of political justification and has been more useful to decision makers who would like to have more substantiated information for their decisions or simply a political tool to back their decisions. Secondly, evaluations or IAs can have a **social inquiry** function. Here, the usefulness of evaluations does not necessarily stem from the political value of its final judgement; rather, the learning opportunities which the evaluation/IA provides for all the stakeholders involved is stressed. In other words, evaluations provide usefulness in terms of explaining the processes with which the programme works and provides operational, policy and system impact learning.

Alkin (2004) categorises evaluation theories in three main branches. The first branch is concerned with **methods**, in which evaluation scholars such as Cronbach (1983), Rossi (Rossi et al., 2004) and Campbell (Shadish et al., 2002) focus on the issues of methodological perfection such as generalisability by eliminating threats to validity. This branch is generally criticised for defining evaluation or IA as a purely technical and scientific matter and neglecting social nature of evaluation. According to evaluators associated with this view, the role of the evaluator is to stay out of any governance mechanism and ideally design, conduct and report evaluation on their own. This perspective is closely related with the accountability function of evaluations. An opposite view in evaluation theory is the branch of **valuing** in which the role of evaluator is to provide his/her experience and thus add value to evaluation. According to this view associated with evaluation scholars such as Scriven (2003) and Guba and Lincoln (2003), the focus of the evaluation is not the perfection of the methodology it employs but the experience and value judgement of the evaluator and other stakeholders in the process. The third main branch of evaluation theory concerns with the **use** of evaluations which is linked with the social inquiry function of evaluations as described above. This stream which is widely popularised by scholars like Stufflebeam (Stufflebeam and Shinkfield, 2007) and Patton (2007) focuses on the use of evaluations. Alkin calls them 'decision oriented theorists' (2004).

Stufflebeam (Stufflebeam and Shinkfield, 2007) argues that one of the four compulsory and crucial features of an evaluation is utility. He strongly emphasizes that all the stakeholders should be involved in the process and the evaluator should ensure that his/her questions are comprehensively answered. Patton (2007) in his Utilisation Focused Evaluation (UFE) model argues that the use of evaluation depends on core mix of people who can learn from the evaluations. Therefore, he suggests that any evaluation should start by identifying this 'primary intended users' and it should include user involvement in the definition of core questions, methodology, and analysis and dissemination policy.

Rossi and his colleagues (Rossi et al., 2004) argue that an impact assessment can be used for three different purposes. Firstly, one can talk about a **persuasive utility** of an impact assessment which provides a political justification and argumentation. In this case, impact assessments are used to defend or refute a political position. Secondly, one can talk about a **direct or instrumental utility** of IAs when they are used for specific issues by policy makers and other stakeholders. Finally, IAs can have a **conceptual utility** which influences thinking about issues in a general way. While the first one is more related with the accountability and control roots of evaluation, the second and third ones are linked more closely with the social inquiry function of evaluation as discussed above.

The issue of usefulness of impact assessments is very complex in the field of RTDI policy. As many authors and practitioners of IA, Miles and Cunningham (2006) argue that it is often very difficult to create real experiments in RTDI programmes in which random control groups can be used for impact assessments. This is mostly due to the fact that i) the number of beneficiaries of a RTDI programme is much lower than for example in the field of educational policy, ii) the beneficiaries are mostly unique in terms of their characters, iii) often the government intervention is complex compared to other policy areas as it involves multiple and sometimes conflicting policy objectives and iv) most of the impacts in STI policy are long-term and indirect and thus rather difficult to measure. Therefore, causality is often very hard to establish.

Both the mainstream evaluation literature and the sub-literature on the evaluation and impact assessment of RTDI policies and programmes are in agreement that there could be two horizontal types of usefulness of evaluations; the product and the process use. The first one is the **product use of impact** linked to the result or findings of the IA. Inspired by IKED/VINNOVA (2004), Miles and Cunningham (2006) outline that the following three types of information should be included so that the product of an impact assessment can be useful:

- **Operational Learning: information the IA produces on the effectiveness of design, management and implementation of the measure and the IA itself.** In this case, evaluation is used as a management tool and by this information, programme management can learn lessons as to how to (re)design, manage and implement their programmes. The extent, quality and relevance of this information for a programme it assesses define an impact assessment's usefulness;
- **Policy Feedback: information the IA produces on the achievement of objectives of the measure.** This kind of information provides the policy-maker with an assessment of programme's achievements compared to its objectives. It also helps policy-makers to decide to act on their programmes (e.g. to continue, stop, extend, etc.) or help them to test their initial assumption about the failure that the programme is to remedy. The extent, quality and relevance of the information regarding policy feedback for a programme it assesses also define an impact assessment's usefulness;
- **System Impact: information the IA produces on the broader impacts of the measure.** Impact assessment should include this particular kind of information which constitutes insights as to how the programme in question complements a range of other programmes; how it fits into the broader innovation system; how it affects actors other than its beneficiaries and how it creates wider social, environmental, economic and technological impacts. Once again, the extent, quality and relevance of this information are factors contributing to the usefulness of an IA.

Miles and Cunningham (2006) claim that there is a law of diminishing returns for the afore-mentioned functions provided by an impact assessment. In a useful IA, there needs to be a certain level of information about these issues. By trying to find additional information, lots of efforts and money would be spent with less result. Another factor that critically affects the usefulness of an IA is **the way an impact assessment presents its information** relevant to operational learning, policy feedback and system impact. It should present its information in an understandable, justifiable and interpretable way. Finally, the **scope** of an impact assessment is also a factor for its usefulness.

The second type of usefulness an IA could provide is related to its **process use**. Here, the focus is not about the product of an impact assessment or the information it provides, but the usefulness an IA created as it was underway is also considered (Forss et al., 2002). This second category of usefulness is very well established in the literature of mainstream evaluation of social policies as the above described use branch of evaluation theory puts a special emphasis on the process use (Cousins, 2007; Patton, 1998; Patton, 2007). The first factor in this category relates to the **timing** of an impact assessment. Rossi et al. (2004) claim that results must be timely and available when needed, in order to maximise the usefulness of an IA. According to Miles and Cunningham (2006) the clearer and more verifiable **objectives of a programme**, the more useful its impact assessment. They also draw attention to **policy-maker and/or programme manager's expectations** as an important factor for the process use of an impact assessment. Miles and Cunningham (2006)

claim that the more the clients are informed, the more useful the IA. Similarly, according to Rossi et al. (2004) evaluators must understand the cognitive styles of policymakers.

A related factor is **policy-maker and/or programme manager's engagement** during the course of an IA for its usefulness. Their engagement allows them to learn to learn; to develop professional networks; to create shared understandings; to strengthen the programme and to boost morale (Forss et al., 2002). The usefulness of impact assessment also concerns wider stakeholder involvement, other than policy-makers and programme managers. Therefore, **trust and compliance of all stakeholders** is a factor for usefulness. Stufflebeam and Shinkfield (2007:71) argue that 'stakeholder involvement enhances use of evaluation findings'. This factor, along with the previous two (policy-maker and/or programme manager's expectations and engagement), create a tautology, as the more they are established the more the usefulness and the more the usefulness, the more they are established. The final process factor is related to the **dissemination**. Rossi et al. (2004) claim that dissemination allows to widen the usefulness of an impact assessment and utilisation and dissemination plans should be part of the IA design.

All in all, the usefulness of IAs in the field of STI is decided by a number of product and process factors. However, it should be noted that impact assessments are only one component of policy learning which is essentially a complex political process and depends on many other factors. On the other hand, this does not invalidate the importance of a set of lessons which can be learned in order to increase the usefulness of IAs through effective governance. Governance in this process is a keyword, as the question 'how to govern the process of evaluation/impact assessment so that the usefulness is maximised?' is yet to be studied, particularly in the field of STI.

3.3 Methodology

The primary goal of this CIA4OPM project is to increase the usefulness of impact assessments in the context of RTDI policy formulation and to provide a useful framework to facilitate communication between policy makers and stakeholders. In this Chapter we explore the following research question to increase the usefulness of impact assessments with a **case study** and a **self-assessment approach** (see Figure 3.1 for the flow chart):

'How to govern the process and product of the impact assessment so that the usefulness is maximised?'

The ***case study approach*** focused on the IA governance experiences of policy makers, programme managers and/or evaluators. The subject of the case study was to identify 'good' and 'bad' governance practices for each impact assessment (IA) case to improve its usefulness. Considerable efforts were devoted to sharing experiences at project management meetings and mapping different IA governance approaches.

The case study approach followed the following five stages:

(1) Case study design
- case study content defined
- case study tools developed

(2) Case study selection

(3) Case studies conducted through report reviews and interviews

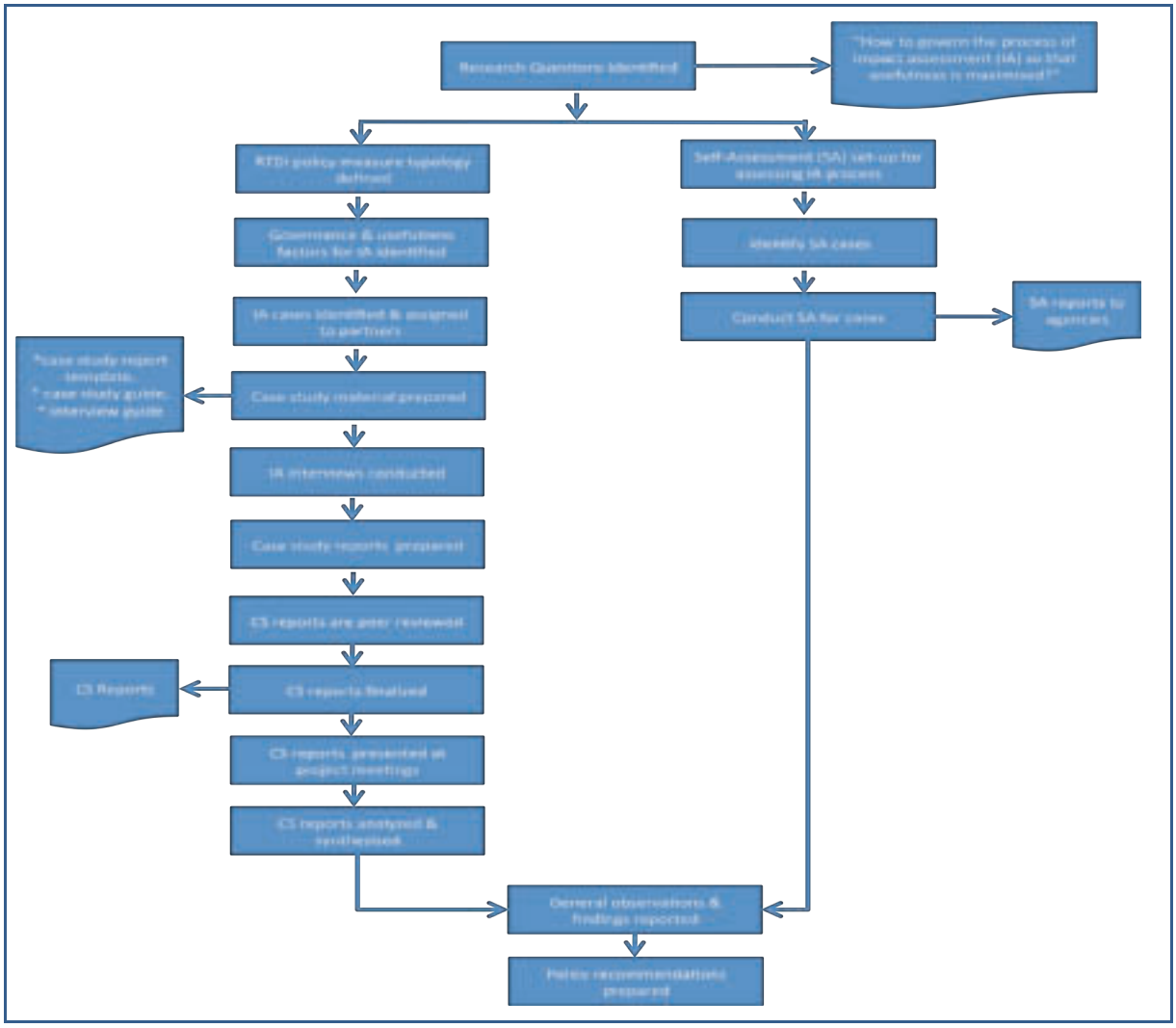
(4) Case study evidences analysed, and

(5) Recommendations, conclusions and implications developed.

The ***self-assessment approach*** was implemented to complement and contribute to the case study evidence. The focus of the self-assessment approach improves the added value of the impact assessment. It is not about assessment of the impact assessment results or the methodology used. It is about assessment of the process of deciding, designing, carrying out and utilising IAs for improving programme execution and policy design. 'TAFTIE smart agency

self-assessment approach' is utilised for this study. The approach is based on evidence and lessons from three case studies to formulate some policy messages to increase the IA usefulness. Details of the approach and the implementation process are explained under Section 6.

Figure 3.1: Methodology Flow Chart



3.3.1 Case study content

Impact assessments can provide two kinds of usefulness. First, they can be a source of legitimacy for political decision making. Secondly, IAs can be useful as a policy learning tool which provides feedback to operational, policy and system levels. The CIA4OPM project focuses on this latter type of usefulness by deriving lessons for the governance of impact assessments. However, in terms of for gaining insight into whole scope of the problem, legitimacy was also explored.

The study gained legitimacy in terms of exploring the overall impact and additionality of public support on innovation activities of the firms in the Czech Republic. It analyzed data from three consecutive Community innovation surveys. The effects of public support on innovation inputs, outputs and behavior of the firms were analyzed. Public support had significant stimulatory effect on total innovation expenses of the firms and particularly on the expenses of their in-house R&D. Public support also increased the rate of the firms' collaboration with other actors of innovation system, namely (most of all) with the universities. This support also enhanced firms' registration of industrial designs, and innovation of goods and processes.

However, most of these positive effects were only transient and disappeared after termination of the support.

For the latter type of usefulness, which is the main content of this Chapter - through ten selected real-life case studies - the issue of the governance of IAs in relation to the 'product' and 'process' factors are analysed to identify how each factor is managed to increase the usefulness. The critical usefulness product and process factors which are selectively drawn from experience and the literature discussed above are the following:

Product Factors

- Scope of the IA: the definition of the requirements to complete the IA successfully and the definition of products to be delivered
- Operational Learning: information the IA produces on the effectiveness of design, management and implementation of the measure and the IA itself
- Policy Feedback: information produced by the IA on the achievement of objectives of the measure (extent, quality, relevance)
- System Impact: information the IA produces on the broader impacts of the measure
- The way the IA presents that information (understandable, justifiable, interpretable)

Process Factors

- Timing of the IA with respect to the life-cycle of the programme and the timing of various stages of the IA in question
- Programme objectives
- Policy-maker's /programme manager's expectations from the IA
- Policy-maker's /programme manager's engagement in the IA process
- Trust and compliance of all stakeholders in the IA process
- Dissemination of the IA results

3.3.2 Case study tools

Case studies were conducted to understand how the process and product factors have been managed in order to ensure high degree of usefulness concerning public policies to improve the quality and quantity of private RTDI investments. Case studies were carried out using primary (interviews with various stakeholders of IA) and secondary sources (the IA reports itself, other research, etc.) with the help of guidelines and templates.

Case study process is designed with the following case study tools (Appendix 3.2):

- Case Study Interview Guide with the questions to be explored in interviews;
- Case Study Guide to harmonise individual case studies;
- Case Study Report Template with a suggested format and structure of the case study report, gives an overview of the issues to be discussed in case studies.

3.3.3 Selection of case studies

We began this study by defining a 'Typology of Policy Measures' to derive lessons about IA studies of different policy contexts as regards their governance and usefulness. This will provide an opportunity for utilisation and policy learning for all partners. For the purpose of analysing impact assessments, 'modalities of operation or support'[9] was decided to be the most appropriate typology to distinguish different kinds of effects for several reasons. First of all, modalities attribute is the most obvious and easiest one to differentiate. At the same time, modalities give the most information about the measure on their own. Finally, for the purpose

[9] Modality of operation or support is concerned with how measures are implemented, whether through the provision of direct financial and/or structural support, and through the generation and/or transfer of knowledge.

of analysing impact assessments, modalities are the most appropriate typology to distinguish different kinds of effects ex-post and ex-ante.

The aim of the project is not to devise a comprehensive typology of measures, but to use it to derive lessons about the IA studies of different types of policy measures. Consequently, a policy measure typology capturing the interest of all the partners and providing an opportunity for utilisation and policy learning for the whole project team gains precedence over other methodological considerations. Therefore, the following typology on the basis of policy measure modalities is agreed on:

- R&D and Innovation Funds;
- R&D and Innovation Tax Incentives;
- Non-Financial R&D and innovation Supports (Networks and Clusters Support).

A total of ten IA studies covering the typology mentioned above, are identified from different partner countries. The information collected at the beginning of the project through the survey (see Chapter 2) was also referred during the case study selection process. The identified cases of impact assessments are assigned to partners on a voluntary basis to analyze if and how the IAs are managed to increase the usefulness. Some case studies are assigned to different country partners to create mutual learning. The list of IA exercises and the assignments are shown in Table 3.1. The below table covers also the RANNIS Case which is an impact assessment exercise conducted during the project with feedback from partners in the project and others.

Table 3.1: Case Study List

Measure Type	IA Title	Programme Owner	Case Study Author	Referred as (in the text)
A. RDI Funds	A look into the Black Box: What difference do IWT R&D grants make for their clients?	IWT	TTGV	Flemish 1st IWT Case
	Industrial Technology Project &Technology Development Projects Support Programme	TTGV	TTGV	Turkish TTGV Case
	Making the difference: The Evaluation of Behavioural Additionality of R&D Subsidies	IWT	EWI	Flemish 2nd IWT Case
	Impact Assessment of the Programme Innovation in the Czech Republic	Czech Ministry of Industry and	TCASCR	Czech TCASCR Case
	Evaluation of the Austrian Industrial Research Promotion Fund (FFF)	Ministry for Transport, Innovation and Technology	TUBITAK	Austrian FFF Case
	Impacts on Industry from Research Institutes	Spanish Ministry of Science & Innovation	FECYT	Spanish FEDIT Case
	Impact Assessment of the RANNIS Technology Development Fund	RANNIS	RANNIS	Iceland RANNIS Case
B. RDI Fiscal Incentives	Evaluation of the French Research Tax Credit	MESR	MESR	French MESR Case

	Impact Analysis of Fiscal Stimuli on R&D Investment in Flanders	BELSPO	BELSPO +TTGV	Flemish BELSPO Case
C. Networks, Clusters and Transfer	Competitiveness Clusters Policy in France	ANR	ANR	French Cluster Case
Exemplary study of impact assessment and additionality	Effect of public support on innovation activity of the Czech firms to gain insight and to prove legitimacy of the policy	TCASCR		Czech Exemplary Study

3.3.4 Conducting case studies

The selected IA cases were conducted through the following task plan with the process flow chart shown by Figure 3.1:

- IA case interviews conducted by assigned partners with the following groups were undertaken either face-to-face or over the phone. At least one of the following groups of people was interviewed. Where possible, the other groups were also interviewed:
  - policy-makers (those who make the policy decisions)
  - programme managers (those who run the programme)
  - evaluators
  - people from other public bodies who have participated in the IA process and have a considerable interest;
- Case study reports are prepared by assigned partners with the use of interviews and related documents;
- Case studies are presented at the project management meeting by each partner for the mutual learning;
- Case study reports synthesis is drafted and presented at the project meeting;
- General observations and policy recommendations are drafted and presented at the project meeting and at the Brussels Conference in December 2010.

3.4 Case study evidence

We studied ten impact assessment cases from six different country practices to learn how they managed the product and process factors which are discussed above, to increase usefulness. Austria, Belgium, Czech Republic, France, Iceland, Spain and Turkey serve as country cases. The case study analysis is mainly based on the individual case study reports prepared by assigned project partners who include direct opinions of the programme managers, policy makers or evaluators. Besides, the final reports of INNO-Appraisal and the ImpLore project are also referred to in the analysis.

Findings from the case study reports showed that there is no one single methodology to measure the impacts of an R&D policy. It takes a variety of methods to answer different types of research questions which means the choice of methodology is dependent upon the purpose of evaluation or impact assessment and its intended use. It can be concluded that a mix of both qualitative and quantitative methodologies is applied in most countries, which allows for cross-checking the robustness of conclusions about the impacts assessed. See also the box below showing similar findings of ImpLore project.

According to the case study reports, depending on the assessed programme, investigated indicators are either related to outputs (for example, number of projects, private investment complementing public money, number of people involved in R&D projects), outcomes of funded R&D projects (for example, publications, patents, new products changes, changes in

the behaviour of participants such as establishing of sustainable networks) and impacts both on the side of beneficiaries (for example, changes in economic performance, increase in the number of employees) as on the side of third parties (for example, level of productivity in a sector, socio-economic impacts). Some of the case studies also measure programme management efficiency, such as how well a programme was administered; how high the compliance costs of beneficiaries were; how well the programme objectives and priorities were communicated to the target group; how programme progress was measured and transferred into a learning process; how capable the programme management was to detect and address emerging problems, etc.

Box 3.1: Similar Findings of ImpLore Project

Source: *Report to Lot 2 of European Commission Tender ENTR/04/96, 'Analysing and Evaluating the Impact on Innovation of Publicly-Funded Research Programmes' ImpLore Final Report, April 2009*

A total of 46 evaluation reports were compiled for the analysis of impact assessment methodologies, covering 17 different countries. 34 evaluations refer to R&D programmes run by EU member states, i.e. these programmes are covered in the ImpLore database. 12 evaluation reports refer to R&D programmes in third countries (USA, Australia, New Zealand, Switzerland, Norway, and Canada).

Methodologies used in evaluation studies:

	Qualitative methodologies					Quantitative methodologies				
	Interviews / Peer Review	Case studies	Logic chart analysis	Network analysis	Desk research	analysis of monitoring data	Control group approach	Survey of beneficiaries	Econometric modelling	Cost benefit analysis
Australia	□				□			□	□	
Austria	□	□	□	□	□	□		□		
Belgium	□					□		□		
Canada	□		□		□	□		□		
Denmark	□	□						□		
Estonia	□				□					
Finland	□	□			□	□		□	□	
France	□				□			□		
Germany	□	□			□	□	□	□		
Hungary						□				
Ireland	□				□			□		
New Zealand	□							□		
Norway	□	□			□					
Sweden	□	□			□			□		
Switzerland	□	□	□		□			□		
UK		□			□	□		□		□
USA	□				□	□			□	□

Source: Analysis of evaluation studies.

Our analysis of evaluation reports demonstrated that a mix of both qualitative and quantitative methodologies is applied in most countries:

- *Interviews, desk research, document analysis and surveys* are frequently used evaluation methodologies in almost every country analysed. Desk research and document analysis can be seen as tools to gain basic information about the R&D programme and its context. By carrying out a survey, statistical data is obtained quickly and the views of the programme's

participants can be captured easily. Interviewing programme managers or people that are related to the programme itself helps to generate a broader picture of the setting and context. Those methods are easy to apply and the evaluation team is supported with the basic information of the programme in a very comprehensive manner;

- The methodological approach of *case studies* can be found more frequently in countries with an advanced evaluation culture such as the Scandinavian countries, Austria, Germany, UK etc. Though this qualitative method is very time and cost consuming, it provides a detailed insight into on-going processes;
- *Logic chart and (social) network analysis* are considered relatively experimental. The logic chart approach is a common tool in Austrian evaluation studies, for example (see Zinöcker et al., 2005). In the 1970s, it was firstly introduced in evaluation studies in the USA. If the programme's rationale is adequately applied, design and achievement of intended results can easily be identified and communicated to the stakeholders;
- Network analysis is a useful tool to analyse the impact of R&D policies in order to assess the openness of networks to new members. By revealing linkages among researchers and organisations, communication flows are exemplified in order to show how (tacit) knowledge is disseminated. Nevertheless, network diagrams only show relationships in specific point of time, so repeating the analysis after a time interval is necessary to identify changes in the network over time. Thus cost and time restraints can be limiting factors in the use of network analysis. (Feller and Ruegg, 2003);
- Applying a *control group approach* is a very difficult undertaking. In our analysis, this methodology was only found in a German study. The *cost-benefit analysis and econometric modelling* needed a comprehensive framework of data regarding funded projects and participating enterprises for the evaluation of the US Advanced Technology Programme (ATP). Although these approaches are useful to assess impacts they are not easy to apply as the necessary framework needs to be drawn up when the R&D programme starts its activities. Thus, data requirements need to be defined in advance which is not common in practice when designing or implementing a publicly-funded programme.

Our main objective for the case study analysis is to explore the governance of the impact assessment process and its products by focusing on usefulness. The following case study synthesis section will be giving insights on this main issue.

Case Study summaries are given in Appendix 3.3, and hence detailed reports and case study material can be retrieved from the CIA4OPM project website.

3.5 Case study synthesis

In this section of the report we will be discussing the product and process factors influencing the usefulness of an IA. Those factors are defined in the literature survey section above, 'Usefulness of Evaluations: A Tour D'Horizon'. Each factor will be analyzed and synthesised in turn through case study practices. The product and process factors will be analysed under separate headings although they are not actually mutually exclusive and have complementary affects. They are grouped only for analytical purposes.

3.5.1 Governance of the product factors of an impact assessment

The product use of impact assessments is defined as the product use which is linked to the results or findings of the IA. The results or findings of the IA studies can be useful or utilized if it includes information related to operational learning, policy feedback and system impact. The findings of the IA studies refer to the evaluation or research questions, in other words to the definition of the scope. The way in which the findings are presented also affects the usefulness of impact assessments. All these product-related factors will be analysed and discussed through the use of case practices in the following sections.

3.5.1.1 Definition of scope

The scope of an IA is an important factor for its usefulness. Miles and Cunningham (2006) claim that there is a law of diminishing returns for the information provided by an impact

assessment. The level of information about the issues in an IA study should be well balanced to increase its usefulness. After passing a threshold, the extra information regarding the impact assessment decreases the usefulness, i.e. the cost benefit ratio of an impact assessment.

The scope should be well-balanced in order to maximise usefulness. It is recommended that one tries as far as possible to translate objectives into measurable indicators, while at the same time not losing track of important aspects that are difficult to measure.

The size, scope and scale of the IAs planned should be proportionate to the size, complexity, risk and innovation of the project, with relevant resource allocation (time and funding) identified within the impact assessment plan. Leeuv and Vaessen (2009) claim that evaluating the impact of policies with their own settings and levels require appropriate methodological responses. In this respect there are two major issues to be discussed: the impact of what and the impact on what. These two key issues point at a key challenge in impact assessment.

The Case Studies also highlighted the issues mentioned above.

In the Spanish FEDIT Case, there is an important trade-off between the scope of the information IA seeks and the depth/quality of this information. This IA designed a very elaborate and academically rigorous questionnaire investigating a range of impacts. However, since it is very lengthy and not very easy to understand, the response rate was quite low. Eventually, this had a negative impact on usefulness.

In the Czech TCASCR Case, IA explored different issues (different sub-programmes) with a view to comparing them easily. However, as the response rates were different for these components, comparison was not as effective as expected. Similarly, various issues with the definition of innovation and different regions within the country caused problems which limited usefulness. It's significant to note that this impact assessment was an obligation from the beginning since the implementation agency (OPIE) was financed jointly from EU and the Czech public sources. Nevertheless, there was not a clear definition of the innovation potential at the beginning and the evaluators had to provide their own definition.

An important implication arising out of the Flemish 1st IWT Case was about the insufficient governance of the scope. As the IA focused on a very narrow but elaborate definition of additionality and consequently invested a lot of time, effort and money in developing a quantitative methodology which proved to be very hard to implement, the IA missed more strategic issues. Therefore, this case study illustrates again the tension between being comprehensive and methodologically sophisticated.

The Austrian FFF Case was successful in terms of balancing this tension. It had a wide scope since it covered both the institutional set-up as well as the funding measures themselves so that a broad mix of qualitative and quantitative approaches and methods were employed. The scope and the methodology were explicitly defined by the terms of reference.

The French MESR Case is based on statistical data and it is also very in broad scope but with individual administrative data which allowed the econometric analysis to be completed. It considered all the firms involved and, depending on the methodology, also involved those firms which are not currently using the scheme but could do so.

In the Turkish TTGV Case, we can conclude that having clear indicators at the design phase instead of having a wide scope is an important issue for isolating the effect of a policy instrument on a firm's performance. Control groups should be set more carefully to have balanced scope in line with the selected indicators.

3.5.1.2 Information useful for operational learning

An impact assessment exercise should provide information related to operational learning to be useful. This way, IA could be a management feedback tool to improve the effectiveness, efficiency and quality of policy intervention. Lessons are sought on how organisations (ministries, agencies, etc.) can improve in designing, managing and implementing programmes, while the evaluation process itself may be improved in the future through lessons learned in the present evaluation (Miles and Cunningham 2006, adapted from VINNOVA, 2004).

Operational learning can be maintained if management and implementation of the programme is included in the scope or objectives of the IA. Surveys are very often important tools for operational learning. The Austrian FFF Case included a survey to get some idea on how the customers evaluate the workings of the FFF. For that purpose a questionnaire was prepared as a result of an intensive cooperation of the project team and of the FFF. The findings from the survey are reported, synthesised and fed directly into the government's bill of 2004. Similar good practice can be found in the French MESR Case:

> *'The results on the positive impact of the "Impact assessment studies on the French research tax credit (CIR): 2005-09" were used to decide the 2008 radical reform in favour of a simplification and extension of the scheme. Surveys underlined a number of design and management issues with a couple of specific and relevant questions. Answers to the first two surveys underlined the complexity of the scheme so that one major objective of the next year was to simplify the scheme by basing it only on the volume of spending that firms declare.'*

However, the survey should be designed with a smaller, simpler and more precise questionnaire to facilitate the companies' participation and to address the problem of the attribution and additionality of impacts. The Spanish FEDIT Case is an example of this issue. Besides, as is mentioned in the Czech TCASCAR Case, structured interviews with the managers of the most important firms participating in the support programme should have been included:

> *'During the third phase of the study which was gathering information through surveys, the response rate came out to be low (16%), therefore generalization was very limited. One of the reasons for this low response rate could be that the questionnaire was too complex and, therefore, the people who received the questionnaire in the companies were not experts on IA and they had limited knowledge with the impacts and the attribution and additionality of them. '*

If management and implementation of the programme is not a subject of the IA, no operational learning can take place. The Czech TCASCR Case and Flemish BELSPO Case are not very good practices for the operational learning factor even if there is still learning from the IA process itself:

> *'Management and implementation of the programme was not a subject of the Czech TCASCR Case. Therefore the IA study does not contain any information about it and there is no operational learning for management of the support programme. However, the results of the study offer the possibility of operational learning for the IA itself as such: much more time would be needed for thorough evaluation; the questionnaire could have been improved to contain questions related to the programme management; structured interviews with the managers of the most important firms participating in the support programme should have been included besides surveys.'*

> *'The operational learning from the Flemish BELSPO Case was limited mainly due to the underestimation of the difficulties of R&D data collection, data limitations in terms of time series and reliability. The outcomes of the project were mainly focused on monitoring and an – inconclusive – theoretical framework for evaluation of the policy measure. Although the Research Policy Council was disappointed with outcomes, it recognizes that the exercise has been useful as a baseline measurement for follow-up inquiries; provided interesting insights concerning data needs, methodological approach, policy mix, timing, and stakeholder involvement. '*

The owners of the programme or the evaluations may not be the same agencies as those managing the final budget or having political responsibility. However, participation of all related stakeholders in the IA process or keeping the political context inclusive is a very important factor for operational learning. In the Turkish TTGV Case, the programme management agency had also participated in the IA study which created a lot of operational learning: the 'impact logic' concept has since been used by TTGV for developing other programmes. Another example of operational learning from the same case was that the behavioural additionality concept affected TTGV's selection process for project proposals. The model and the attitude of the experts in TTGV improved explicitly.

In the Iceland RANNIS Case, extensive interviews with project owners and stakeholders provided useful data on the strengths and weaknesses of the RANNIS TDF Fund. Thus, the IA manifested the need for improving data processing and indexing, from the beginning of the application procedure until the fund goes of the company, in order to facilitate the understanding of its overall economic impact. RANNIS as an organization was also fully engaged in the IA process which provided for a very valuable learning experience for the organization as a whole.

On the contrary the operational learning from the Flemish BELSPO Case was limited because of the limited level of participation:

> *'The fiscal measures are federal responsibilities and the IA has been ordered by a regional minister and without inclusion of the programme manager (Ministry of Finance). Moreover, the Minister left before the end of the study and her successor was far less interested in the IA exercise because the emerging financial and economic crisis marginalized the debates on regionalisation (of fiscal measures for R&D).'*

The learning process as regards evaluation can be strengthened through systematic international comparisons which can be named as 'learning from others' or 'using benchmarking to identify and implement best practice'. Benchmarking can be seen as a tool for evaluation and for continuous improvement. But of course, it is not sufficient to copy practices from other organisations. Best practices have to be evaluated and adjusted to the needs of the benchmarking organisation (OECD, International Benchmarking, 1997). The Spanish FEDIT Case shows that review of several international studies that identify and assess the impacts from programmes that could have common elements or links with the objective of the project, helps to compile and compare different methodologies, results, lessons learnt, problems and recommendations and contributes to the development of a new methodology. Similar to the Spanish FEDIT Case, The Turkish TTGV Case Study also points out that the design that has been developed in the IA activity was used in other World Bank programmes in developing countries:

> *'Foreign IA studies of fiscal incentives to increase R&D activities have been considered to design the French MESR Case, but such comparisons prove difficult. There is a need for the development of an analysis framework, which would be based on a consensus on the outcome variables to be studied and on the choice of the relevant evaluation methods.'*

Operational learning is not a one-time issue. There is a learning process in every IA study itself. This is the case for any type of study or methodology. As a result, a similar study, like an econometric IA, may be conducted every couple of years or so. Moreover, different methods may have to be applied, either because the scheme has changed or because new and more precise evaluation techniques become available. The French MESR Case notes this issue with the following statement:

> *'The French MESR Case Study explains complementarities of the series of IA studies and the learning process underway for the evaluation of the fiscal scheme. In the case of CIR, this has been made necessary as now most firms conducting R&D in France do use the scheme, which makes the simple matching techniques less relevant. As a consequence, in 2010, a structural model has been developed to estimate the impact of CIR on the cost of R&D incurred by firms.'*

The learning process can be stimulated if there is an open discussion group for all the actors and/or a neutral expert committee in the IA process, for adapting the methodological framework if necessary, for example:

> *'The scope of the Flemish 1st IWT Case study was narrow but a very useful methodology was developed so that this study can be seen as a preparatory work for a former study. The second IA study hence produced a lot of operational learning for IWT; they understood the importance of behavioural additionality created at the company level, they learned what kind of additionalities it should look for and how they can be measured, they installed a follow-up system, started to change the project assessment system to include the additionality criterion in addition to scientific and economic value and they applied the additionality concept for all other IWT*

programmes. This type of operational learning was secured with the feedback of the pilot study and through involvement of IWT in the whole process with three external experts.'

3.5.1.3 Information useful for policy feedback

Policy feedback is the 'traditional' idea in which evaluation or IA is used to communicate and utilise the outcome and impacts of policy measures and programmes. The major purpose of outcome and impact measurement is to see whether the programme objectives have been achieved. IA not only contributes to the design of future programmes or helps policy-makers to decide to act on their programmes, but it also allows policy makers to test their initial assumptions about the identified bottlenecks and market or system failures which prompted the policy intervention in the first place (Miles and Cunningham 2006, adapted from VINNOVA, 2004). The extent, quality and relevance of the information also define an impact assessment's usefulness.

Policy learning which is incorporated as feedback to the policy cycle is defined as gaining insights and drawing conclusions on insights and data gained during the evaluation and its interpretation, in light of the policy goals and existing institutional frameworks, which then leads to change in assessment, skills, and behaviour of policy makers. Policy makers learn about the scheme they are responsible for through evaluation and can also refine the design of IA studies based on their evaluation experience. So if an IA is conceived as an ongoing process and if policy makers are involved in the exercise, policy makers can plan to examine issues of learning. Otherwise an evaluation or impact assessment remains merely an administrative process and there will be no learning at all.

Close interaction of the IA conducting agency or company with the policy-making authority improves policy learning. The Austrian FFF Case gives good practice advice on this issue:

'With the advice of the technology and research council and because of the close interaction between IA and policy making, there was a reform on the existing funding structures.'

Our critical reflection on the process and interviews support the lessons learned, such as: clear performance contracts between the ministries and agencies in terms of objectives and how and when they are measured; ministries having some analytic capability to support their policy needs and the involvement of evaluators into discussions with stakeholders do help for feedback into policy formulation and implementation.

Usefulness of evaluation or impact assessment is improved through programme management involvement in the IA process - clear and relevant communication of the policy feedback. The Turkish TTGV Case shows that the final report provided useful feedback on the achievement of objectives of the programme:

'The IA report demonstrates the programme design and system weaknesses explicitly. As a result of good interpretation of the final report and the learning process, TTGV launched new complementary programmes for R&D funding such as the Support Programme for Commercialisation of R&D Results.'

In the Iceland RANNIS Case, the results of the IA exercise revealed a possible lack of complimentary funds to facilitate more innovation results for the companies near to the market. Policy feedback of an IA should be reported to the relevant interested authorities in order to be useful. The objective of the Spanish FEDIT Case was defined as to stress the importance and role of the Technology Centres in the national R&D system. The study is commissioned and financed by FEDIT but the results were sent to the policy makers and programme managers in the Spanish Ministry for Science and to the government, in order to illustrate the impact and the necessity of developing new policies to increase these impacts. A reverse practice is found in the Flemish BELSPO Case:

'The study results were presented to the regional government, while the jurisdiction of fiscal policy is at the federal level. Despite the involvement of a broad range of actors in the steering committee of the project - the programme manager of the fiscal measures, the Ministry of Finance, has not been involved in the project and has not

been informed on the outcomes of the project. This certainly hampered potential policy impacts of the study.'

Formulation of the policy recommendations of the IA study determines the quality and relevance of the information regarding policy feedback for a programme which defines an impact assessment's usefulness. Background and expertise of the evaluator directly affects the quality of the policy feedback formulation. The development of terms of reference also affects the policy feedback produced by the IA exercise. If there are some weaknesses in these respects, involvement of an expert steering committee from the beginning of the IA study would ultimately have added value for effective policy formulation:

'For the Flemish BELSPO Case, both the Research Policy Council and the evaluator were not experts in either impact assessment or evaluation exercises. The evaluators have not been involved in the formulation of the policy recommendations formulated by the Flemish Research Council to the Minister. This is related to the fact that no policy objective requirements were formulated towards the evaluators when writing the ToR. Besides the evaluator had an academic background and fiscal expertise in the private enterprise sector, but was less specialised in policy programme evaluations and policy making. His task was defined as an evaluation in terms of the purposes and measurement of additionality of a broad range of fiscal measures. Therefore, the involvement of an expert committee at the set-up of the project could have steered the project towards a better balance between the practical/policy recommendations as expected by the Research Council and the more theoretical approach followed by the university team that conducted the study.'

Intelligent and contextualised impact assessments start with a context and gap analysis and this potentially enables a better understanding about what the programme does and does not do, and if there are other gaps which need a policy response even if the objective of IA does not explicitly refer to this. There are two similar cases illustrating this finding:

'Achievement of objectives of the support programme was only the accessory goal of the Czech TCASCAR Case. Nevertheless, the IA study contains sufficient information on it. The information presented by the IA on the achievement of objectives of the measure was used for improvement of the next round of the Operational Programme Industry and Enterprise (OPIE). Because the programme "Innovation" did not support private R&D and the IA suggested that such support would be needed, the new programme "Potential" has been started within the framework of OPIE.'

'The main contribution of the Flemish 1st IWT Case was legitimating IWT activities in terms of R&D subsidies, and there was no intention for recommendations in terms of redesign or adaptation of the policy measure of R&D subsidies. The latter one wasn't the primary objective of the exercise. However, the segmentation between large firms and SMEs revealed that for large enterprises fiscal measures for R&D (personnel) are more important for influencing R&D decisions. Based on these findings, a proposal to the Flemish government has been formulated to reflect on the introduction of tax incentives. This also helped to put fiscal measures for R&D on the policy agenda of the federal government.'

A developed culture of evaluation is an integral part of a strategically-oriented research and technology policy that continues to learn. A good evaluation culture is both a pre-requisite for and a consequence of good policy. The first step is awareness, which can facilitate data collection and exchanges. Another step involves the development of resources and competences within the administration and the agencies. Having standard methods and approaches to evaluation contributes to the development of a culture of evaluation in the country. The Austrian FFF Case and the French MESR Case are good practices for developing standards and a platform for policy intervention evaluations:

'The FFF applies the standards of the Austrian Platform for the Evaluation of Research and Technology. International peer-review was the main instrument. The writing of the ToR was supported by an international expert and the tender process followed European public procurement rules using a two stage procedure. An international

consortium with appropriate experience and expertise conducted the exercise with many key contributions from the FFF side.'

'For the first three impact assessment studies, the Ministry of Higher Education and Research (MESR) designed the ToR, and the surveys and econometric analysis were conducted externally. The other following studies were internalized by the MESR. This choice was based on the experience of the first two surveys and of the allocation of more internal resources for impact assessment.'

3.5.1.4 Information useful for system impact

The primary goal in an IA is an attempt to identify the challenges and appropriate effective and efficient policy instruments and measures to be used in the future as well as the foreseeable required changes in the system which covers the socio-economic, political and environmental contexts with the diversity of key actors and organisations.

Definition of the scope is important for creation of information regarding the impact system. A strategic and longer term perspective would be more useful to understand how actors can work together in the innovation system and additionality can be seen more as a bridging concept to determine this. On the other hand, the involvement of stakeholders early in the exercise can limit these problems. The Austrian FFF Case is an example of good practice and The Flemish 1st IWT Case one of bad practice for system impact, illustrating the importance of definition of scope and involvement of stakeholders:

'The Austrian FFF Case was undertaken between May 2003 and February 2004 and represented the first comprehensive evaluation of the FFF institution since its establishment in 1967. The study was carried out to an internationally high standard by an international consortium and combined the work of professional evaluators from within Austria and abroad with reviews obtained from international peers. These bodies not only analysed the structure, working practices and strategic direction of the two organizations but in their consideration of the impacts and positioning they also included large sections of the national system for science and innovation. The results of the IA gave important information on the condition and the organisation of the overall system for supporting research in Austria. The results were implemented and have also been taken into account in the reorganisation of the funding system.'

'IWT was the only stakeholder so there was no proof of the usefulness of the study at that moment for policy and society. The scope of the exercise was too focused on additionality so it was a logical consequence that the scope could not outreach this limited theoretical framework defined in this particular IA. Stakeholder engagement outside IWT was only focused at by the end of the project. The exercise was successful in presenting the behavioural additionality and role of IWT but missed having a view on some strategic issues of behaviour additionality and broader innovation system recommendations.'

Not only the definition of the scope but also, a clear and agreed definition of the programme objective is important to gain useful information for the broader impacts. In the Czech TCASCAR Case, evaluation of impact of the programme on 'innovation potential' of regions represented considerable difficulties because there was not a clear definition of the innovation potential from the beginning of the programme:

'The evaluators had to provide their own definition and it has been developed subsequently, after the end of the programme. Due to this lack of planning, there were data missing in some important areas, because these were not collected during the programme. Consequently, it was difficult to detect changes of innovation potential of regions and it was even more difficult to assign these changes to the support programme. This is one of the weakest points of the whole IA study: the evaluators could not prove that the observed improvements of innovation potential of firms and regions were indeed caused by the support programme (and only by it).'

The impact of a given policy also depends on complementary or contradictory policies which target the same actors or a relevant section of the innovation eco-system. The IA study should try to take full account of the policy mix even if this is always somewhat challenging.

At the least, policy makers should attempt to think in systemic terms as much as possible. It would be good to d*evelop a 'meta-analysis framework'* by types of policies with appropriate databases and an *'evaluation mix'* to have more useful IA results if the aim is to determine the system impacts. The framework is predicated on the view that any assessment of the scientific impact of an intervention should be part of the broader assessment of its societal and economic impact (Report of ESF, 2009). Two case studies highlighting the importance of broader policy mix for governance of the system impact are given below:

> *'For the French MESR Case the 2008 survey showed that companies often use several R&D support schemes. As a result, the IA of each scheme in relation with the others and more broadly to assess the policy mix in favour of support to business R&D is included in the studies underway: the IA of the tax fiscal scheme and the IA of the cluster policy (pôles de compétitivité). Besides, efforts are underway to generate adequate descriptive statistics on the use of different schemes by firms.'*

> *'The outputs of the Flemish BELSPO Case will be incorporated in an evaluation study to assess impacts of R&D tax credit measures. The exercise contributed to system thinking because it was the first study paying attention to the broader fiscal and subsidy policy mix and thus it influences others for including and considering the broader policy mix in evaluation exercises. It also emphasized the need for a database including fiscal and other R&D incentives.'*

3.5.1.5 Presentation of information in the product

The usefulness or the utility of the IA will be improved if the impact assessment report presents information relevant to operational, policy and system level learning in an understandable, justifiable and interpretable way. The result of the INNO-Appraisal Report indicates that IAs are more useful if the appraisals are published in hard copy; if the reports are published in English and if well documented and referenced information sources are used in the report. The format of the report such as the length, structure and the presentation format also influence the dissemination and usefulness.

The Turkish TTGV Case illustrates good practice for the final report presentation. The related final report includes detailed information on the data analysis methodology which is then referred to in later academic articles. The report is published in both hard copy and available on the website. The report is well documented and published in English.

How the report performs in terms of presentation criteria depends on its audience. The output report of the Flemish BELSPO case is an example of bad practice for this issue. The report was only in Dutch and even if the information in the report is presented in a clear way, the econometric analysis and the literature review were written in a very academic style. There are two good practices for this issue as the following:

> *'The Czech TCASCR Case presents information clearly and understandable and has 7 parts: introduction, theoretical and conceptual framework for the study of innovation potential of regions, applied methods, evaluation of focus and extent of the realized projects results of the supported projects, evaluation of the contribution of implemented innovations to the growth of competiveness of the supported firms, evaluation of impacts of the programme on innovation potential of regions and conclusions. The final report is available in the Czech and English languages.'*

> *'The Flemish IWT Case produced an understandable and interpretable report. It presents information on data collection and data analysis methods and interprets results explicitly. This is secured through involvement of external experts having expertise in the impact assessment and additionality concepts. The report is in English and is publicly available. This work is also integrated in international cooperation with other agencies and study departments in the framework of TAFTIE (the European network of innovation agencies) and OECD-TIP (the think-tank of OECD on new policy concepts in technology and innovation policy). Number of papers has been commissioned and published by IWT to establish a state of the art conceptual and measurement level for the new approach of behavioural additionality and to open the*

> *"black box" of firm decision making and innovation management under influence of subsidies which have increased the added value of the information that IA produced.'*

3.5.2 Governance of the process factors of an impact assessment

The usefulness of an impact assessment is also created during the process it conducts. The management or governance of the IA process covers factors defined in the literature survey part of the report, such as: timing of the IA; objectives of the programme; policy maker's or programme manager's expectations and engagement during the IA; trust and compliance of all stakeholders and dissemination of the findings. These process factors will be analysed and discussed with the use of case practices below.

3.5.2.1 Utilisation of policy-makers and programme managers' expectations from the IA and their engagement in the IA process

Miles and Cunningham (2006) draw attention to policy-makers'/programme managers' expectations as an important factor for the process value of an IA. Miles and Cunningham (2006) claim that the more the clients are informed, the more useful is an impact assessment. Similarly, according to Rossi et al. (2004), evaluators must understand the cognitive styles of policymakers. A related factor is policy-maker's/programme manager's engagement during the course of an IA for it to be useful. Their engagement allows them to learn to learn, to develop professional networks, to create shared understandings, to strengthen the programme and to boost morale (Forss et al., 2002).

The usefulness of IAs increased if the evaluation process delivered some degree of policy learning. Based on this premise, strong links between the IA process and policy makers should be set. Policy maker's/programme manager's expectations and their engagement in the process lead to better policy learning. Policy makers might consider impact studies to be a useful learning tool. Because of the retrospective nature of IA, learning for the evaluated measure might be limited, but the evaluations could be of use for the design of other programmes or general policy formulation. Policy makers are correlated with policy feedback and system impact; on the other hand, programme managers are correlated with operational learning as also stated in the INNO APPRAISAL Project Final Report (2010).

Within that context, some highlights emerged from the Case Studies:

The Flemish BELSPO Case illustrates the mismatch between the expectations of the programme management and the perception of the evaluators:

> *'Both the Research Policy Council and the Call winner (a university team together with external consultants) were not experts in impact assessment and evaluation exercises. This resulted in an unclear project with on the one hand the Research Council expecting clear policy recommendations and on the other hand a research team more oriented towards econometric modelling. The university team largely underestimated the data collection/availability problems. This resulted in a disappointment of the Research Policy Council with regard to the outcomes of the project which were mainly focused on monitoring and an – inconclusive – theoretical framework for evaluation of the policy measure.'*

The French MESR Case shows that usefulness increases through a combination of a series of IAs together. An IA is often followed by other IA or some IAs would cover more than one measure. The French MESR Case shows that collaboration between various government departments is important to utilise maximum levels of experience. The case also illustrates the two effects in this kind of situations:

> *'A learning effect on the way to conduct impact assessment, the questions to be tackled and methodologies and; a cumulative effect by which the result of one study are more useful in combination with the results of previous studies.'*

The French MESR Case concludes that IA should be considered an ongoing process rather than a one-off venture. This is a prerequisite to increasing usefulness by emphasising learning issues and opportunities. Also, governance of IA should allow for external discussion and not

be conceived as an internal/management issue only. This statement can also be applied to the Turkish TTGV Case.

The Iceland RANNIS Case showed that the programme management participated fully in the IA process: in other words, they were all involved in writing the term of reference and the overall design of the IA. Also involved in the process were external experts, including an international expert with experience in IA. This illustrates a good picture of stakeholder engagement in the process. On the other hand, it is noted that the IA of RANNIS started with the Self-Assessment of the TDF programme. The TAFTIE self-assessment tool was used in this process and some of the major stakeholders were interviewed on this TDF programme (refer to the Section 6 for the self-assessment approach). It is concluded that this process helped increase stakeholder engagement and improve the way of thinking on the IA process in terms of effectiveness:

> *'The result of the self-assessment showed how an agency can improve its effectiveness, and it should reveal and illustrate how an assessed programme adds value that exceeds the benefits of simply distributing public funds'.*

External discussion is required to guarantee the quality of the method and results and it is important for interpreting the results correctly and making sure that learning really is taken into account.

Both the stakeholders' involvement in the IA process and their expectations should be managed, since fulfilment of expectations will improve usefulness, as it is shown in the Czech TCASCR Case below:

> *'Three groups of stakeholders were involved in the impact assessment: the Ministry of Industry and Trade, which was responsible for the support measure and its IA, the implementing agency Czechinvest and the Monitoring Committee of the umbrella programme OPIE. Main expectations of the Ministry of Industry and Trade from the IA were satisfied. They wanted to know what effects the programme Innovation had on the innovation potential of regions. Another expectation was to gain knowledge for improvement and optimization of the future rounds of the programme. Both these goals were fulfilled. According to the evaluator, the main reason for the IA study was fulfilment of the obligatory condition, because all support programmes which use EU funds had to be evaluated. Besides this responsibility, the programme managers expected to gain some knowledge about the impacts on regional development, which could be used in further work. At present, regional aspects are considered very important across the whole EU.'*

3.5.2.2 Trust and compliance of all stakeholders in the IA process

Increasing the usefulness of an evaluation is realised by gaining the trust and compliance of all stakeholders. The implication is that stakeholders will then feel more involved in the process and will be inclined to impart more useful and meaningful information. Miles and Cunningham state that such compliance can be achieved effectively, and that implicit or explicit resistance to the evaluation process may be minimised through demonstrating the utility of the evaluation process to stakeholders.

Leeuv and Vaessen (2009) claim that increasing the rigour (and hence 'quality') of an evaluation, obtaining the compliance and trust of stakeholders, improving the transparency of methodologies (assuming an informed audience of policy makers is present), and taking the (clear and measurable) policy objectives as yardstick for the evaluation are the factors which maximise the usefulness of IAs. The Flemish BELSPO Case shows that the IA should engage all possible stakeholders and gain their trust. It is also clear that it is not possible to focus on the engagement of certain stakeholders and ignore others. In this particular case, the Minister who was the patron of this IA had to resign and because the programme manager was not included in the process from the beginning, and the resignation of the minister decreased the usefulness of the IA dramatically:

> *'Therefore, a main shortcoming of the exercise is that - despite the involvement of a broad range of actors in the steering committee of the project - the programme manager of the fiscal measures, the Ministry of Finance, has not been involved in the*

> *project and has not been informed on the outcomes of the project. This certainly hampered the implementation of recommendations and other potential impacts of the study.'*

The Flemish 1st IWT Case illustrates the importance of the involvement of external stakeholders. Stakeholder engagement outside IWT was only focused on the end of the project. Therefore, the IA was not useful in providing a view on strategic additionality and broader innovation system recommendations. The IA only focused on the issues critical to the agency itself.

As a result of this case study, it is noted that establishing a steering committee formed by all the stakeholders (including policy makers [minister], other public administrations, and the business enterprise sector) would be necessary for providing usefulness. It is also useful to engage them in the process as early as possible. At the start of the IA study, all the stakeholders should be involved. An open discussion group of all the actors and/or a neutral expert committee can be very useful in a variety of situations, such as adapting the methodological framework if necessary. That way, a learning process can be stimulated while executing the study. Involvement of stakeholder during the preparation of the tender process is important. Regarding the Flemish IWT Study:

> *'If the experts of the Steering Committee had been involved in the project proposal and/or if the proposal had been externally evaluated by an expert in evaluation or impact assessment (and familiar with S&T databases), attention could have been paid to these more specific topics at the set-up of the project.'*

When the participants find the IA useful and important, most of them take part in all meetings. Having the same members of the steering committee for the next run of IA increases participants' willingness.

In the French Competitiveness Poles Case Study and FFF Case Study it is concluded that establishing steering committee is not always the only solution to the trust and compliance issue. A steering committee could be a source of tension and debate on fundamental issues such as the objectives, the IA process and the composition of the panel of interviewees.

In the Turkish TTGV Case Study: as the IA was one of the first of this sort in Turkey, it was perceived to be an audit study, which in turn decreased the compliance of stakeholders. To overcome this, the agency organised frequent meetings, issued documents describing the IA and its potential benefits. Similarly, they designed and implemented a number of questionnaires to understand stakeholders' expectations in various stages.

3.5.2.3 Timing

Timing is one of the most important process factors, and it is the key to capturing most of the impacts. This factor comprises not only the timing of the IA study within the life-cycle of the programme but also the timing of various stages of the IA study itself. Moreover, another dimension of time is the time horizon for the impact to materialise. Rossi et al. (2004) claim that results must be timely and available when needed in order to increase the usefulness which an IA can provide.

The case studies referred to tried to illustrate the way the timing of IA study is managed in order to maximise the usefulness. Nevertheless, we understand that it is not always possible to govern the timing because of some extrinsic effects, which in turn decreases the usefulness of the IA study.

In the Austrian FFF case, the problems during the procurement phase led to a delay in the IA study, causing the policy makers to reach a decision without seeing the results of the IA:

> *'The evaluation should have taken place before the political decision-making process was launched, but because of procurement troubles, which delayed the IA, this process had already started when the IA had just begun. Closer interaction of agencies carrying out IA and policy-making is needed.'*

Similarly, the Spanish FEDIT case study claims that there were also delays because of the chosen methodology and of the problems in managing several stakeholders together.

Moreover, it is stated that the time interval for the data collection period should be longer or that the data collection process should have started before the programme execution in order to increase usefulness.

According to the French Cluster case, the IA study took place one year after the first phase of the programme and two years before the second phase. It was considered to be sufficient to assess some of the potential outcomes of the policy on the research institutions and other actors. Still, the managers were aware that most of the impacts of the policy would materialise in the long run. Meanwhile, this timing also increased awareness of the governmental actors on IA and facilitated to the increase in their contribution to further IA studies.

In the French MESR case, although the research tax credit scheme had been introduced in early 1980, it was only after 2004 that a decision was made to measure the impact of the programme. The case study is related to the five IA studies carried on between 2005 and 2009, during the execution of the programme. It a good example which demonstrates that the IA is an ongoing process and that it takes a long time period for different impacts to occur.

The IA study of the Flemish 1st IWT case was completed in a year and the timing was appropriate to gain proper results. But for the Flemish 2nd IWT case, which was completed in eight months, the timing was found to be late.

The Czech TCASCR case is a good example of the importance of timing. The programme ran between 2004 and 2008. As the cost of the IA was included in the programme budget, it had to begin shortly after the programme ended (August 2008). Some of the preliminary impacts were measured, but since the timing was too early, most of the impacts were immature and this limited the usefulness of the IA study:

> *'Some of the impacts of the support programme could have hardly occurred at that time and certainly could not have influenced the macroeconomic situation of regions.'*

In the Turkish TTGV case, it is stated that the timing of IA study was planned at the design phase of the programme. The study was conducted at three stages during the lifecycle of the programme and enabled programme managers to see the impact throughout the whole programme. Still, it was recommended in the case study that a fourth IA study, 3 years after the completion of the project, would provide more useful results.

The Flemish BELSPO case demonstrates the importance of timing on data collection. Although the timing was suitable to learn about the effect of measures on the private sector, the time interval was not appropriate for the econometric analysis to be complete. According to the case study, the IA should have been done two years later but it was impossible due to political reasons.

3.5.2.4 Programme objectives

The way the programme objectives for the IA study are utilised has effects on the usefulness of the study. According to Miles and Cunningham (2006), the clearer and verifiable the objectives of a programme, the more useful its IA. Moreover, Cunningham and Gok (2009) state that setting clear, verifiable and measurable objectives will increase the usefulness of the IA study through explicitly linking the programme objectives with the results of the study. From here onwards, we will try to illustrate this relationship by providing examples from the case studies.

In most of the case studies, the programme objectives were clearly mentioned. Although several case studies provided some information on the programme objectives, they mostly dealt with the objectives of the evaluation itself. Therefore, it was not easy to grasp the effect of the programme objectives on the IA study.

In the Austrian FFF case, there was no information regarding the programme objectives. But it is mentioned that the objectives of the evaluation were not set out very clearly. Therefore, there was a need for a performance contract between the stakeholders on the terms and conditions of the IA study:

> *'Clear performance contracts between the ministries and agencies in terms of objectives and how and when they are measured, should be established.'*

According to the Spanish FEDIT case, the success of the technology centres (TC) programme was measured by - although did not clearly define - the competitive improvement of companies and their contribution to the economic development. But the objectives of the IA study were clear and said to be fully achieved:

> *'The objectives defined at the beginning of the project were achieved: A new assessment methodology was elaborated to evaluate the activities of the R&D agents; the participation of the TCs in the Spanish R&D system was also assessed; and the main impacts of the TCs were identified, both at macro (fostering the private R&D investments and contribute to the Spanish economic growth) and micro level (increase of turnover, profit and R&D expenditure; increasing product innovations; new production technologies and process; etc.).'*

In the French Cluster case, some of the programme objectives referred to were territorial development, competitiveness, scientific excellence and land development, none of which was clearly defined in the study. For the evaluation, it is understood that there have been some debates on the objectives of the IA study defined in the tender document. The actors of the steering committee had some discussions on the objectives and tried to introduce some measures to increase the usefulness of the study:

> *'As far as their objectives are concerned, cluster policies still show vagueness. [...] the competitiveness clusters policy results from the combination of different types of public policies: research and innovation policy, industrial policy – including sometimes sectoral policies, and territorial development.'*

According to the Flemish 1st IWT case, there was a consensus among shareholders about the objectives of the programme. Each actor agreed that economic growth was the most important objective and would result in more socially desirable consequences. On the other hand, the objective of the evaluation was to measure the additionality (input, output, and mainly behavioural) and the importance of the agency for economy and society. These objectives were later understood to be insufficient to capture the socio-economic impact:

> *'All programmes have as objectives 'economic growth'. At the time of the study there was a consensus that economic growth would result in more socially desirable consequences. Recently – and under influence of the financial crisis - the subsidies have been more explicitly oriented towards societal important objectives as for example the green economy.'*

In the Flemish 2nd IWT case, the objective of the 'R&D projects of companies' programme is to create the highest additionality for technological innovation in Flemish companies; and the stated objective of the 'SME-support programmes' is to stimulate and support SMEs to innovate. On the other side, the objective of the IA study was defined as to evaluate the behavioural additionality. It is stated in the study that the programme objectives regarding additionality were vague and should have been made clearer in the design phase of the programme. This may have had an adverse effect on the usefulness of the study.

In the Czech TCASCR case, it is claimed that the programme objectives selected for evaluation were not relevant and defined vaguely. This definitely decreased the usefulness of IA study. Furthermore, an interesting point in the case was that there was a gap between what programme owners thought they had defined and what the evaluators found after the assessment:

> *'Evaluation did not always select the relevant programme objectives for the IA. The sponsor asked for evaluation of R&D activities, which were not supported in the programme Innovation. Moreover, the main evaluation objective - impact of the programme on innovation potential of regions - has been only vaguely defined. The evaluators had to provide their own definition of the innovation potential when starting the impact assessment. Due to this, some of the monitoring indicators were missing and some were not as useful as they could have been, if planned for evaluation of innovation potential before the start of the programme. In the view of the Ministry of*

> *Industry and Trade there were not any difficulties caused by unclear programme objectives. They think that the objectives of the programme Innovation were clear enough.'*

The Turkish TTGV case is a good example of the importance of the programme objectives. The programme objectives were clearly defined in the design phase. It is mentioned in the study that the programme aimed to stimulate R&D activities within more companies and to support sustainable R&D capacity building. The details of the IA study were also decided in the design phase. Therefore, the objectives were found to be clear and appropriate for the IA study, increasing the usefulness of the evaluation.

For the Flemish BELSPO case, the main objective of the programme was clearly defined as to reach 3% GERD/GDP Lisbon target. Yet in this case, the IA study objectives were defined too narrowly and missed some important underlying factors to be assessed:

> *'The selected programme objectives were reduced to the measurement of input additionality in terms of increased R&D investment. This [ ] ignored important underlying phenomena such as FDI in R&D, number of firms active in R&D, and mobility of high skilled human resources.'*

According to the Iceland RANNIS case, the programme objectives were set clearly before the IA study. This case shows illustrates the importance of the defining the TOR of the IA study clearly by taking into consideration the programme objectives.

3.5.2.5 Dissemination of the IA results

Management of the dissemination of the IA results also has an effect on the usefulness of the IA study relative to the responsible agencies. Rossi et al. (2004) claim that dissemination allows us to widen the usefulness of an impact assessment and that utilisation and dissemination plans should be a part of the IA design.

Most of the cases deal with dissemination activities and mention their positive effect on the usefulness of the study. Here, it should be noted that although dissemination activity is important, the content and the format of the disseminated documents is of greater value.

In the Austrian FFF case, the results of the IA study were publicly presented in a report. This led to some discussions among stakeholders in different areas. Similarly, in the Spanish FEDIT case, the results were shared with policy makers, programme managers and all of the TC partners. The results were also made public through the website:

> *'One of the objectives of this study was to stress the importance and role of the TCs in the R&D system. Therefore, the results of this study were sent to the policy makers and programme managers in the Spanish ministry for Science and to the government in order to show that the impact derived from the R&D activities carried out in the TCs and the necessity to develop new policies to increase these impacts.*
>
> *It was also sent to all the TCs partners and uploaded on the FEDIT website.*
>
> *In the academic field, there have been collaborations with other studies or projects (like CIA4OPM).'*

The French MESR IA study results were presented in the reports to the Parliament in two different years. Moreover, the press was also interested in the results and some news was published regarding the study. These all increased the usefulness of the IA study through involvement of the policy makers and related stakeholders:

> *'The results of all these studies have been presented in Reports to the Parliament on CIR and more specifically, the 2008 and 2010 reports.'*
>
> *'IA results are published on the CIR pages of the Ministry of Higher Education and Research's website and included in official reports on the CIR. Some results have been mentioned in the press.'*

> *'The publication of IA results in reports to the Parliament also contributes to the good governance of the process and the involvement of the administration and stakeholders.'*

The results of the Flemish 1st IWT IA study were sent to participating companies. Since there was no proper feedback mechanism, the comments from companies were not taken into account. The results were also presented to policy makers but according to the case study, their dissemination in Flemish was limited. The outputs of the study led to establishment of a task force within TAFTIE and the OECD, but did not have much influence on the policy makers at the international level. All this decreased the usefulness of the study. The results of the Flemish 2nd IWT IA study was published as a policy brief and sent to related ministries.

In the Czech TCASCR case, it is mentioned that dissemination was done extensively. A detailed report was prepared for the related ministry. A summary of the report was also presented to the programme monitoring committee. Another version of the report was published on the website. Moreover, an article about the IA study and its results was prepared and published in a journal.

The Turkish TTGV case illustrates the importance of an active dissemination policy. According to the study, a report on the IA study was shared with all agencies at each stage, a workshop was organised and the final report was also sent to the firms that took part in the study, which increased the usefulness of the IA by creating a higher level of awareness among stakeholders involved:

> *'Dissemination of the results was one of the most important steps for the usefulness of the IA study. At each stage, a detailed report on the IA study was prepared and shared with all related agencies. A workshop was organised to discuss the results and obtain feedback. The final report was also sent to the firms that took part in the study. These activities definitely increased the usefulness of the IA.'*

For the Flemish BELSPO case, the main output was also a report which was submitted to the Flemish Research Council. The Council prepared an executive summary of the report for the related ministry, adding some comments on the drawbacks and weaknesses of the IA study. Because of these aforementioned drawbacks, the results of the study were not disseminated, thus limiting the usefulness of the study.

According to the Iceland RANNIS case, there are plans to disseminate the results through a conference to the related industries, academics, policy makers and other public bodies. The results of the conference will be utilized to improve the activities of the fund.

3.6 Improving added-value of impact assessments

As impact assessment is one of the stages of the policy cycle where an agency can **add value,** so evaluations and IAs should provide evidence of the value added of the agency. The way impact assessment is performed can be improved at an agency level to increase usefulness or utilisation by policy makers.

The desired outcome of self-assessment is to provide a set of proposals which will improve the added value of the IA in a given programme. The objective of the self-assessment is to assess how program evaluations and impact assessments are used to improve the programme outcomes and the delivered values of agency activities. This would make the programme more effective and improve the design of future policy initiatives and RDTI programmes.

Our aim in this section was to carry out **self-assessment approach** for three IA cases, to derive general observations and findings, complement the other case study analysis by those findings and to formulate some common policy messages to increase the IA usefulness. One positive feature of the self-assessment tool was that it provided a common framework for a discussion of the agency activities related with IA and the way these activities were carried out. Another important feature was that it helped to make tacit activities and associated effects explicit. For the self-assessment exercise we have applied the "TAFTIE Smart Agency Self-Assessment" approach.

Before going into details of the approach and the implementation process we will now provide some information from the literature regarding the concepts of additionality and agency effectiveness.

3.6.1 From additionality towards effectiveness

For some time, the research literature has been postulating that the system-perspective on innovation processes calls for measures to stimulate RTDI designed as public-private partnerships rather than as support mechanisms (e.g. Georghiou, 2002). As such, the idea that in order to foster innovation there should be more than a simple distribution of public money is not new.

The concept of additionality has been widely used by government policy makers and administrators in justifying and rationalising public support for RTDI. However, the role of an agency as system-internal actor actively seeking to add value at company and innovation system level has not yet found sufficient attention in the evaluation context.

Added value has two complementary parts. The first is called efficiency, i.e. how much more efficiently can the same policy impact be achieved by delivering the set of policy measures via an agency as opposed to alternative means of policy delivery? The second one is effectiveness, i.e. how much bigger is the impact of the set of policy measures when delivered via an agency as opposed to alternative means of policy delivery? (Romanainen, 2006).

Evaluations traditionally treat agencies as pure distribution channels of government money, thereby abstracting any contribution (negative or positive) that the agency or the government activities might have had on the performance measured at the firm or system level. In real life, agencies are highly present in the system and they interact with the actors of the system during many phases of a policy cycle (Narfelt & Wildberger, 2006).

The ability to add value to clients and innovation systems is perhaps the most important way an agency can assess its effectiveness and justify its existence. But how does an agency know that it is creating this added value and how does an agency become aware of how to improve its ability to add value to clients and innovation systems? This is where the Self-Assessment Approach comes in handy.

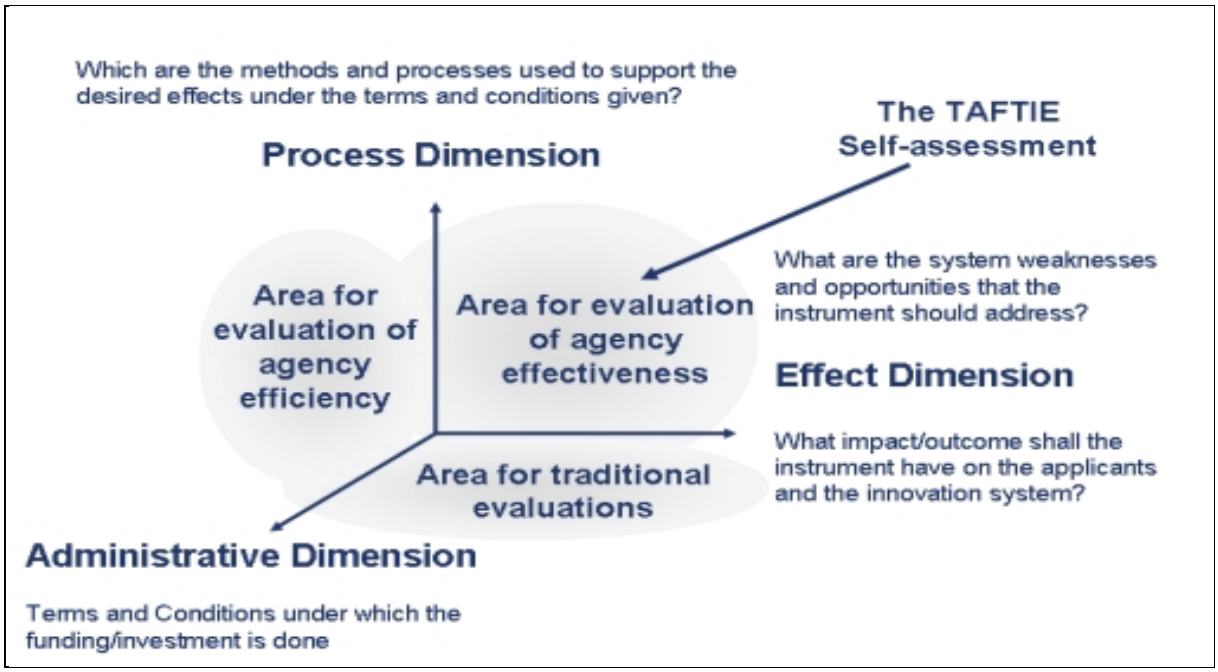
The presented assessment approach provides a powerful link between the concept of additionality and the operational development supported by a Total Quality Management (TQM) approach. Viewing additionality as the outcome of an agency's value-add strategies extends the quality systems of an agency to its market. The approach views agencies as innovation system investors' who look for return in terms of outcomes and impacts on society, industry and research. Starting with the issue, 'Does the agency bring any added value with the funding?' (i.e. how 'smart' is the agency's money?') and extending that issue to the strategies, operations and processes of an agency, the self-assessment approach complements and improves the traditional business and customer-oriented approaches of quality systems in the context of government funding.

3.6.2 TAFTIE Smart Agency Self-Assessment Approach

The background of smart agency self-assessment approach lies in a four year TAFTIE task force on the subject of 'Additionality'. The task force has developed a self-assessment approach and process for assessing the added value that a research and innovation funding agency provides for its clients and to help an agency to assess its effectiveness. The self-assessment approach and its associated process have been developed by programme managers and evaluators at TAFTIE agencies in a number of different countries.

The self-assessment approach is basically a structured dialogue learning process where colleagues support colleagues. The assessment process is led by a facilitator who organises the process itself; interviews programme managers or policy makers, gives feedback and documents the results. TAFTIE approach is illustrated in the figure below (www.smartagency.net).

Figure 3.2: The TAFTIE Self-Assessment Approach

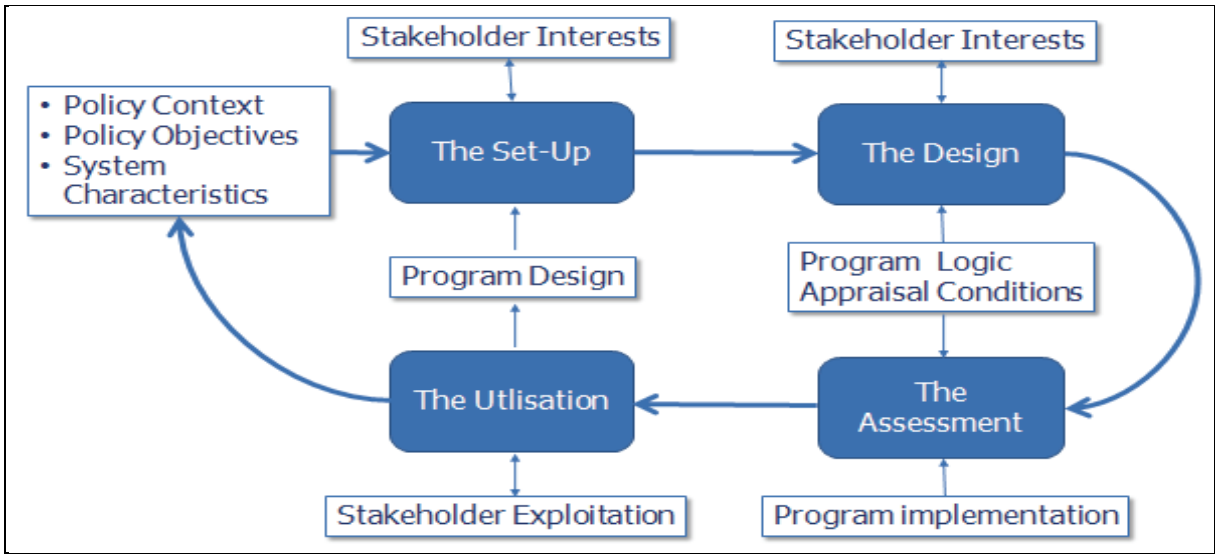


Source: www.SmartAgency.net

3.6.3 The self-assessment reference model and the scope

The self-assessment approach is based on the following reference model of impact assessments consisting of four sub-processes: *the set-up*, in which the specifications for the IA is defined taking into consideration the policy objectives, the policy context and the relevant innovation system characteristics; *the design*, in which the IA approach is defined; *the assessment*, which comprises carrying out the actual impact assessment study and *the utilisation*, which includes packing the results in reports, seminars, articles etc, communicating and disseminating the results.

Figure 3.3: Reference Model for Impact Assessments



Source: Kjell-Håkan Närfelt, Närfelt Consulting/VINNOVA

The focus of the self-assessment was not the IA methodology or the IA results, its focus was the impact assessment process. The scope of self-assessment exercise for our study is defined as the following:

- Assess how programme evaluations/impact assessments are used to improve programme design and implementation.
- Assessing the set-up of an impact assessment – its objectives and their relation to:
  - Policy Context
  - System Characteristics
  - Stakeholder Interests
  - Programme Design
- Assess the role impact logic plays in the evaluation processes.
- Assess the added value created in the process of setting up, designing and dissemination or utilization of the IA results.

An important hypothesis in the TAFTIE Smart Agency approach is that the value adding opportunities occur in the interaction with stakeholders. In the case of impact assessment, the main sources are found in the Set-up, the Design and the Utilisation phases. Therefore, the self-assessment exercise focused on these phases and developed a hypothesis to examine the contribution of agency effectiveness to the impact assessment results and the added value that impact assessment can bring to programmes. This hypothesis stated that: '*The source of value adding activities is found in the interaction with stakeholders*'. This developed hypothesis was then tested through the use of TAFTIE Self-Assessment (SA) Approach for the selected IA cases.

3.6.4 The self-assessment cases

Self-assessment cases are selected based on the agency situation for implementing impact assessment. Accordingly three cases were selected; one at pre-design phase, one at ex-ante and the other at ex-post phase. The self-assessment case list is illustrated below in Table 3.2. The cases were conducted at the agency premises by facilitation of Kiell-Håkan Närfelt, VINNOVA (Case study contributions can be found in Appendix 3.4 below).

Table 3.2: Self-Assessment Case Study List

Agency Name	Programme Name	Phase of IA
RANNIS, Iceland	Technology Development Fund	Pre-design situation
TTGV, Turkey	Technology Development Programme	Ex-post situation
BELSPO, Belgium	Tax incentive scheme	Ex-ante situation

The Self-Assessment exercises started with a presentation of the approach to the members of the programme team for all of the three cases. After having attended a presentation about the programme and its objectives, instruments and basic activities, the meeting continued with an intense dialogue on the objectives and impact logic of the programme, and the IA process or its design phase. The focus of the self-assessment was not the impact assessment methodology or its results – its focus was the impact assessment process.

The dialogue part was followed by a summary session and the assessment ended with a review and reflection session. The results of the assessment were twofold: one set of observations and recommendations were directed to the programme team and the second result was a set of generalisation of the results for the CIA4OPM project.

The first self-assessment case study, the *Technology Development Fund at* **RANNIS,** Iceland, was assessed using the Smart Agency approach. The programme did not have an impact assessment process in place to assess. The Smart Agency approach was therefore used to help the programme team initiate and design an evaluation and impact assessment process for the programme. The assessment exercise started with an intense dialogue on the objectives and the impact logic of the programme, and their role in designing an evaluation and IA process. The assessment at RANNIS demonstrated that even if you do not have a defined or at least tentatively defined process for IA in place, the assessment methodology can initiate thoughts, ideas, and generate suggestions which will lead to a successful process design. Important areas to cover using this dialogue-review-suggestions-technique in preparing for an impact assessment process design were: understanding ***the programme culture*** and underlying philosophy of the agency regarding the value adding activities; the ***linkage between policy goals-programme objectives-agency objectives*** and its implication on an impact logic and indicators and metrics for that logic; the appraisal conditions of the programme and its refinement in/linkage to proposal selection criteria and ***reporting/monitoring activities*** program evaluation and monitoring activities and its use and (planned) ***utilization*** in the impact assessment process; ***stakeholder interaction*** and alignment on objectives, indicators and other programme supporting results. As this self-assessment exercise was in the pre-design situation for RANNIS, the lessons learnt from this exercise were applied directly into the design of the IA of its Technology Development Fund.

The study at **BELSPO**, Belgium, was an ex-ante set-up of a self-assessment for *Tax Credits* for researchers. Since 2003, the Belgian Federal Government has set up a fiscal scheme for advance payment partial exemption in favour of researchers. Reaching the 3% R&D objective set by the European Council was the primary objective of this tax measure. The Federal Science Council has played a major role in the implementation of the measure. This measure was supposed to increase the number of researchers at universities, scientific institutions and in the private sector through better salaries; to attract foreign R&D investments in Belgium and lead to an expansion of the group of firms investing in R&D. However, important stakeholders who have not been included in the set-up of the policy measure are the regional governments. No effort has been made to verify the degree of complementarity between tax incentives at the federal level and policy measures towards R&D at the Regions/Communities level. BELSPO has taken the initiative to set-up a Steering Committee (including the Ministry of Finance, and the Federal Planning Bureau, representatives from the enterprise and university, as well as a representative of the Federal Minister responsible for Science Policy) to assess social-economic impacts of the R&D tax credit measures. BELSPO has determined its objectives as: to define indicators which will allow evaluation of additionality; to gain a better design of the scheme itself, integrate it more effectively in the Belgium policy mix and to coordinate R&D initiatives at the federal level.

It was recommended at the reflections session of the self-assessment study that to ***align different objectives*** for carrying out an evaluation and ***determine the scope of the evaluation*** were essential. The idea on the ex-ante IA process was to involve stakeholders through a steering group, involve external experts for design of the evaluation, write a proposal for call for tender and select a research team to do the evaluation. At the time of the self-assessment case study there was no ***utilisation plan*** for the IA results whereas the importance of including such a plan that is aligned with the objectives of the evaluation was highlighted. Other important recommendations of the SA exercise were to ***integrate design of scheme with design of evaluation*** through ***coordination of several stakeholders***; to make the IA ***a process managed*** by BELSPO, not only a tender design and research team selection process; to ***establish a logic model*** for the tax scheme including its relation to the regional subsidy schemes; to make an ***ex-ante evaluation of the logic model*** using external experts and to use the 'approved' logic model to select indicators.

The third self-assessment case study was done at **TTGV** Turkey, which is an example of using the Smart Agency approach after an IA had been undertaken while the assessment at RANNIS offered an example of using the approach before the design had been carried out. SA at TTGV was conducted for the *Technology Development Programme* (TDP) impact assessment where TDP is a soft loan based scheme that was launched and designed by the World Bank in 1991, aimed at strengthening the competitiveness of Turkish industry through an increased R&D activity and R&D performance. The World Bank already included at launch ***a planned impact assessment study*** to be based on pre-defined (at the design of the programme) input,

output and impact indicators. Impact assessment study was part of the World Bank programme design and set-up – no real impact assessment process was established. This implies that impact assessment is ***a justification event***, not part of a learning process. Three IA studies were conducted by an academic consultant; one in 1999 to get a reference point, a mid-term study in 2003 and an end-of-term study in 2006. The consultant took the program design (the indicators) as an input and carried out an IA according to the requirements stated in the TDP. The impact assessment study performed was the first at TTGV and first in Turkey. Original ***rationale of the programme was well-defined*** in terms of policy objectives, policy context and innovation system characteristics, but there was ***no explicit program or impact logic***. TTGV's focus was on an efficient process for processing applications, deciding on funding, reimbursement of expenses and on monitoring project execution. Hence, ***impact assessment and the funding process are not integrated***. They were two separate processes, one driven by applications and progress reports (funding process) and the other one driven by a questionnaire. There was ***little stakeholder involvement*** except for the design of the questionnaire where programme partners were involved in the design work. Utilisation of IA results was done only by sending out the reports and through publishing reports on a web site.

General '*observations'* from three self-assessment cases are listed as the following:

- impact assessments and project funding are handled as two separated 'worlds', for example: impact assessments are about data, indicators and evaluation methods and funding is about processing applications, paying out money and monitoring projects;
- agency performance is not taken as a part of the evaluation or IA;
- there is a lack of evaluation and assessment-driven operational learning processes;
- there is low level of stakeholder involvement;
- there is a lack of good understanding and definition of the programme objectives and their relation to the policy objectives and an unclear operationalization of the objectives in impact logic and indicators.

3.6.5 The self-assessment case recommendations

The self-assessment approach focused on how an impact assessment is decided, set-up, carried out and utilised in order to meet its usefulness. As was mentioned above, the self-assessment process is not an alternative or substitute for impact assessment, it is complementary. The aim of the self-assessment is to improve the skills of the agency in performing IA, in other words 'the added value' of the IA.

This section summarises the results of the three self-assessment exercises in terms of generalised '*recommendations'* for increasing the usefulness of IAs.

SA Recommendation 1: View impact assessments as a process, not as an event in the programme life cycle and an integral part of learning process.

Most impact assessments are still treated as external programme events which are carried out by external evaluators. Impact assessment should be a managed process even if it is carried out externally. The setting-up of the IA, the procurement process, the dissemination and utilisation process should be managed by the agency. If the results of the impact assessments are to be treated as 'fuel' for a learning process and effectiveness is an objective, then evaluations and IAs have to be integrated in the programme operations, i.e. considered during programme design and implementation stages. An IA should be viewed as a process which runs in parallel to the other processes of the programme life cycle. The impact logic and the appraisal condition should direct the selection of indicators, definitions of data collection requirements and the design of reporting templates. *This issue was also referred under governance of product factor related with operational learning.*

SA Recommendation 2: Consider the context of the programme implementation in setting up and designing impact assessments.

Impacts should be viewed as the result of a policy mix. Hence, when carrying out an IA, the set up and design should not only consider a specific programme design, but also the policy implementation context, i.e. how the policy mix is implemented through the related initiatives of other actors in the policy delivery system (other programmes, new framework conditions etc). If possible, the desired long term impacts of specific target groups (e.g. SMEs) or innovation systems should be defined through indicators which are common to all programmes in the policy mix. This can also minimize data collection and maximize analyzing efforts since programmes share data and metrics on long term impacts.

SA Recommendation 3: Introduce 'effect reporting' as a complement to 'progress reporting'.

Data collection is usually focused on project progress and project results. However, the most important effects of the funding occur in the context of the projects. Hence, this recommendation is to introduce effect reporting to the line management of the funded project. Through the effect report, the line management informs the agency on the effects of the project on the organization. Such reporting should be carried out at least annually and continue 3-4 years after the project ends. A further recommendation is that one carries out the effect reporting through site visits and interviews after programme completion.

SA Recommendation 4: Take impact assessment as a social process, involve stakeholders in the whole process and understand their expectations.

A critical factor for a successful programme evaluation and IA process is the involvement of stakeholders: evaluations and impact assessments are not 'scientifically based algorithms' that return objective answers to posed questions. An evaluation is much more a social process as any other business operation. Evaluations could be used to align interests and improve the operations of each stakeholder. Thus, it is important to understand the stakeholders' expectations, needs, issues and concerns when designing IAs.

SA Recommendation 5: Evaluation of agency effectiveness. Agency efficiency should be considered during the design phase.

Traditional evaluation and impact assessment approaches view the government/agency only as an input of funding and a cost of administration. Hence, agency performance is considered as a component in the efficiency measurement but no effectiveness measure is defined. The agencies have to state how they will support the key actors so that they will be able to reach the programme objectives. These statements constitute the agency objectives. Agency effectiveness and agency efficiency should be considered during the design phase; should be supported by data collection during monitoring; and should be evaluated during evaluations/impact assessments. In this way, a learning and performance management platform can be created, as it is required in order to form a true justification and performance improvement of agency operations.

3.7 Policy recommendations

The main objective of this study is to identify ways of improving the usefulness of impact assessment in the context of RTDI policy formulation and implementation. The study aimed specifically at analysing and synthesising appropriate governance strategies for designing an impact assessment process, managing the process and its products, identifying 'good' and 'bad' practices for each impact assessment usefulness factor. We explored the following research question: *'How to govern the process and product of the impact assessment so that its usefulness is maximised?'*

By conducting case studies, applying self-assessment approach, collecting experience of policy makers and programme managers through interviews and identifying good practices, the study intended to provide information and tips for policy makers and programme managers to improve usefulness of impact assessments. Moreover, we also aimed to create mutual learning among partners by mapping different impact assessments and sharing experiences at project management meetings.

In this section we will be discussing policy recommendations and conclusions obtained from key findings of the study. Our target audience is policy makers, programme managers and IA practitioners who would like to improve their impact assessment exercises' usefulness in order to achieve higher quality and quantity of private RTDI investments through policy measures. We grouped recommendations under three clusters. Recommendations related to the:

- Design of the impact assessment process;
- Learning process;
- Follow-up the impact assessment results.

3.7.1 Recommendations related to the design of the IA process

***Design Recommendation 1*:** Impact assessment should be taken into consideration from the beginning of programme/ policy development.

Evaluations and impact assessments have to be considered and integrated during programme design and programme implementation phases. An IA should be viewed as a process which runs in parallel with the other processes of the programme life cycle. Clear and agreed definition of the objectives of the programme to be assessed is also important in order to achieve useful impact assessment results at the end point.

Impact assessment exercises should be managed internally even if they are carried out externally. Setting-up of the IA, the procurement process, the dissemination and utilisation process should be managed by the agency.

***Design Recommendation 2*:** Timing and planning should be given high priority.

Timing is one of the most important process factors, which is the key to capturing all of the impacts. This not only relates to the timing of the IA study within the life-cycle of the programme but also the timing of various stages of the IA study itself. Moreover, another dimension of time is the time horizon for the impact to materialise. The time lag of effects differs from programme to programme. Innovation impacts typically take some time to become observable. In many fields of science and technology, several years may pass until one can determine whether a R&D activity funded under a programme has generated successful innovation and hence needs more time for systemic impacts (ImpLore).

The results of evaluations must be available when needed in order to increase usefulness. Nevertheless, it is not always possible to govern the timing because of some extrinsic effects.

Design Recommendation 3: The impact logic approach should be used as a core feature of an IA study.

Intelligent and contextualised impact assessments start with a context and gap analysis and this potentially helps to better understand what the programme does and does not do. The context in which the programme exists should be examined in enough detail so that its likely influences on the programme can be identified. The impact logic approach can be used as a core feature of impact assessment study as it visualises the rationale of a RTDI policy measure and establishes a connection with its activities and impacts. Therefore, a monitoring and IA plan which is linked to the programme's objectives, can be elaborated by using the impact logic analysis (ImpLore). Nevertheless, in order to understand the impact of a policy measure, a gap analysis would be required to determine the main differences between the 'as is' and the 'to be' situations; and then to define the resulting impacts of the policy measure.

Design Recommendation 4: Performance of the agency in running the programme (efficiency) should be part of impact assessment process.

Assessing effectiveness in terms of achieving programme objectives is the most important purpose of evaluations. Another important purpose is to improve programme management, i.e. assessing the efficiency of a programme (organisational aspects) and identifying areas for

improving the way a programme is implemented. Traditional evaluation and impact assessment approaches view the government/agency only as an input of funding and a cost of administration. However, agency performance should be considered to be a component in the efficiency measurement. The agencies have to state how they will support the key actors so that they will be able to achieve the programme objectives. These statements therefore constitute the agency objectives when related to programme objectives. Agency effectiveness and agency efficiency should be considered during the programme design phase, be supported by data collection during monitoring and be included in the scope and objectives of the IA.

If a self-assessment approach is applied during the IA exercise, impact assessment will be a managed process, not an external project and agency performance will be integrated. Consequently, the skills and effectiveness of the agency in performing IA, i.e. the added value of the IA, would be improved.

Design Recommendation 5: Methodology should be designed taking the scope into consideration.

The scope and level of analysis should be decided upon at an early stage. However, starting early to obtain good baseline or high-quality data will improve the usefulness of an IA. The level of information about the issues in an impact assessment study should be well balanced to increase its usefulness. After a threshold, the extra information regarding the impact assessment decreases its usefulness. It is recommended that one translates objectives into measurable indicators as far as possible while not losing track of important aspects which are difficult to measure.

There is no single method which is best in all cases, and some methods might be better for some specific cases. It may take a variety of methods to answer different types of evaluation or impact questions. For IAs, quantitative methods are usually preferable when possible, and qualitative methods should be used to evaluate those issues for which quantification is not feasible or practical (NONIE). On the other hand, if an IA has a wide scope, it would be better to use a broad mix of qualitative and quantitative methodology. Thus, it can be assumed that a mix of methods allows for cross-checking the robustness of conclusions about the impacts assessed (ImpLore).

***Design Recommendation 6*:** The Terms of Reference should be considered as an integral part of IA.

Evaluation and IA studies are usually commissioned on the basis of a Terms of Reference (ToR). In a ToR, the background to the study is described, including its motivation, the objectives of the study, the type of expertise required, its scope, duration etc. The ToR provides clear guidance on the roles, resources and responsibilities of the evaluation or impact assessment contract managers, evaluators or reviewers, and steering, programme management and/or advisory groups. A high quality ToR which is acceptable to all the key stakeholders is necessary for a high quality IA. It is important to get the ToR right, and that adequate consultation and discussion contributes to a shared understanding and consensus of what goes into the ToR.

***Design Recommendation 7*:** Assess the impact assessment process ex-ante and ex-post.

The self-assessment of the IA can be done ex-ante or ex-post depending on its objective; doing it ex-ante can improve the design and set-up of an IA process, doing it ex-post helps to learn how to improve IA in a similar situation in the future. The aim of the self-assessment is to improve the skills of the agency in performing IAs. The outcome of the self-assessment is a set of proposals that can improve 'the added value' of the IA.

3.7.2 Recommendations related to the learning process

Learning Recommendation 1: Impact assessment should be conceived as a continuous process.

An IA is a learning process and should be conceived as a continuous one. One IA should follow the next. There is a cumulative learning effect, meaning that the result of one study is more useful in combination with the results of previous studies.

A cumulating learning effect or a developed culture of evaluation is an integral part of a strategically oriented research and technology policy. The first step is creating awareness; the next step involves the development of resources and competences within the administration and the agencies. Having standard methods and approaches also contributes to the development of a culture of evaluation in the country more generally.

Learning Recommendation 2: Stakeholders should be involved from the set-up and design phase of the impact assessment.

The usefulness of impact assessments should also concern stakeholders other than policy-makers and programme managers since stakeholders are most likely to be aware of upcoming trends, challenges or attributing programme characteristics for beneficiaries' innovation performance characteristics. However, strong stakeholder involvement can have its shortcomings, particularly if the stakeholder groups are not well balanced and if there is a lack of trust.

It is also recommended that policy makers or commissioners also to involve evaluation experts as early as possible in the intervention design phase in order to be able to design high-quality impact assessments.

The greater the trust and compliance from all stakeholders, the more useful the results of an IA. If stakeholders are involved from the beginning in creating transparent objectives, scope and methodologies, they will feel that they are part of the process. A steering committee formed by all stakeholders would be a good solution for their engagement and compliance.

Since IA should be an on-going or a continuous process, the consistent participation of the same stakeholders at every level is crucial for increase learning.

Learning Recommendation 3: Both the programme manager and the policy maker (representative of the policy) should be involved in the impact assessment exercise.

Limited participation might limit the operational learning. Participation of all related stakeholders - mainly the programme manager and the policy maker - in the IA process is an important factor for operational learning. Policy makers learn about the scheme they are responsible for of through an IA process which then refines their design of future IAs and interventions. Programme management involvement in the exercise, if providing clear communication of the policy feedback, improves utilisation of IA results. Both their involvement and engagement in the process as well as their expectations about what can be learned from the evaluation should be clarified and managed.

Learning Recommendation 4: The learning process is strengthened through more systematic international comparisons.

The learning process regarding evaluation can be strengthened through international benchmarking which opens up the opportunity for mutual learning. A review of several international studies which identify and assess the impacts from programmes that could have common elements or links with the objective of the project helps to compile and compare different methodologies, results, lessons learnt, problems and recommendations and contributes to the development of a new methodology. While learning from others, external, country-specific factors should be taken into consideration as well.

Besides international comparison, impact assessments which involve stakeholders through consultation processes or discussion panels tend to show a better performance in terms of learning and usefulness. Thus, an IA process should not be conceived as an internal management issue only.

3.7.3 Recommendations related to follow-up of the IA results

Follow-up Recommendation 1: Formulation of context and recommendations in the report is important.

Useful impact assessment reports should include information on the effectiveness of the design, management, implementation and achievement of objectives of the measure, information on the effectiveness of the evaluation itself and information on the broader impacts of the measure. The language and format of the IA report is an important issue, and it should take note of the recipients' or audiences' profile.

Formulation of the policy recommendations of the impact assessment exercise determines the quality and relevance of the information regarding policy feedback. Since background and expertise of the evaluator directly affects the quality of the policy feedback formulation, this should be one of the selection criteria for evaluators. If there are some weaknesses in those, involvement of an expert steering committee from the beginning of the IA study will have an added value for a good policy formulation at the end.

Follow-up Recommendation 2: The closure of the policy cycle should be maintained by linking impact assessments to several decision points.

In order to establish an effective platform for utilization or usefulness, evaluation and impact assessments should be linked to decision points at policy, agency or programme level. Without this incentive, evaluations risk ending up as paper on a shelf. However, even if this linkage is established, an agency should involve itself in turning evaluation results into action. These actions should be carefully planned in order to support stakeholders (including beneficiaries) to exploit the results of evaluations and impact assessments.

Follow-up Recommendation 3: The better the impact assessment is disseminated, the more useful it is.

Policy feedback of an IA should be reported to the relevant and interested authorities. Management of the dissemination of the IA results has an effect on the usefulness of the IA study which requires utilisation and dissemination plans being part of the impact assessment design.

3.8 Conclusions

This study has broken new ground. As many handbooks and articles before, its aim is to improve usefulness of IA in policy practice. But this study is more likely to achieve this – or to contribute to this achievement – for two reasons: (1) because of its origin and the group that managed it and (2) because of its focus on governance of the impact assessment process itself.

Policy practitioners[10] in the driving seat – a new dimension of evaluation learning in Europe?

The most remarkable achievement is that the study was done in the first place. Policy practitioners from a 'variable geometry' of the six most interested countries from nine organisations have taken advantage of a European instrument, the OMC-Net, to reflect on practices of evaluation and impact assessment. This undertaking in itself is not a trivial matter. Nor can its potential meaning be exaggerated. There are four main reasons for this:

[10] The term 'policy practitioners' is used to include different kinds of public servants that influence and manage interventions and share the responsibility for them, ranging from agencies through to policy makers and politicians.

First, IA and evaluation more generally need intelligent policy practitioners (or intelligent costumers). The majority of evaluations are done through third parties. However, if policy practitioners at various levels do not know about the meaning of evaluation, of reflection, accountability, impact and the power of evidence and learning, if they see impact assessment as a legal requirement the results of which may be used to inform stakeholders ex post, then the major merit of evaluation is lost. The rich material in this study and the way in which the group has engaged demonstrates how far evaluation practice has come in the countries concerned, and it offers a plethora of entry points for improvements more broadly, and across Europe more generally.

Second, an intelligent costumer cannot and should not mean that policy practitioners are reduced to being the clients of evaluation studies done by third parties, but must commit to the process in order to gain a sound understanding of the limits and options of evaluation. Third parties will be essential for most IAs. They can deliver the scientific rigour of often complex methodologies which administrations can rarely provide internally, in terms of the breadth and depth necessary. More importantly, however, they deliver the 'distance' required to gain a fresh and unbiased analysis, and to engage all stakeholders needed, depending of the purpose of an assessment. Policy practitioners have to engage in the process of IA in a cyclical and systematic way, beyond defining the need for having one in the first place. This study makes this very clear, and this fact cannot be underestimated. This OMC-Net report and its group interaction should enable a move towards sustainable improving the capability and willingness of policy practitioners to engage systematically in impact assessment.

This leads to the third, most pragmatic potential of the OMC-Net: it can be a potential nucleus for institutionalised capacity building across interested countries in Europe, driven from the bottom up, by the understanding that IA is key for modern policy making and needs constant discourse and development. This is supported by the fact that the exchange on methods, benefits and limits has been achieved across Europe, not as a Commission study, but by a diverse and varied group. This 'bottom up' approach is far more likely to inspire lessons which are learnt and implemented and will spill over to other countries. The conference in Brussels held to discuss the report of WP 3 and other evaluation approaches was a clear indicator of this potential spill over, far more powerful than Commission studies on their own. This means that after having compiled this report and formulated recommendations the story is over but begins once more.

This report complements stock taking and analysis recently completed in the field of innovation policy (INNO-Appraisal) and recently begun in the area of innovation policy through structural funds (DG Region). This report and group is a new and additional reference for policy practitioners, stemming from their own experience and sharing their own lessons. From this evidence base, the practitioner community should now take off to new heights, i.e. the institutionalisation of a learning opportunity structure of policy practitioners and evaluation practitioners alike. We all know the one working example in Europe which has elevated and modernised not only evaluation, but RTDI policy more broadly (Austrian Platform Research & Technology Policy). It is time to move on, and to establish a cross-national discourse structure that combines evaluation and policy practitioners. Such an effort is crucial and more timely than ever, as policy not only becomes increasingly complex, but the expectation to deliver 'more for less' in times of austerity render evidence based and interactive learning indispensible.

Governance

A second key asset of this study is the focus on governance. Governance in this study is, it appears, implicitly defined as the management of the process and product of IA to which all key stakeholders contribute and comply. We can broaden this perspective and highlight the role sound impact assessment – well governed, plays for the overall governance of RTDI policy.

Governance in public policy - following the well-established definition of the grande dame of political science, Renate Mayntz - refers to:

'...all forms to co-ordinate action within a given arena through establishing and implementing binding rules (implicit and explicit) and instruments. It takes into account the specific constitutional role and administrative function of state actors, but departs from top down

"steering" and sets up more interaction within arenas to establish commonly accepted rules and induce actions.'

In this understanding, IA is an *essential part of the governance of RTDI policy* which not only enables policy learning and adaptation, but increases compliance of all involved. It supports those with the final responsibility to activate target groups and allows target groups – and other stakeholders – to influence design and implementation. The main concrete lessons of the report's findings are clearly the combination of process and product, of the social organisation and time sequence of evaluation as well as the methods used, the shape of the output produced and the ways in which output of evaluations is communicated. Modern RTDI policy which aspires to support and influence the actions of stakeholders in their ever evolving contexts cannot do without an interactive, discursive approach. Intervention logics and benefit will have to improve and change over time, and IA can provide the basis for this – if done interactively. The *process* of impact assessment and its *product* - alongside other techniques of strategic intelligence and discourse management - are thus key ingredients for the overall governance of RTDI policy.

Therefore, to focus on the processes of the IA itself in this study is a major step forward. This is not to say that there is one clear model for this process organisation. Governance arrangements in RTDI policy - and thus in IA - are context specific and will themselves have to evolve over time. The major principles for process and product as defined in this report do not need repetition here; they go in the right direction. Rather, it is important to understand that the product of impact assessment will never deliver exactly what we want out of it - it can only shed light on key developments and establish some measure of attribution to the policy intervention. The more important it then becomes to establish the adequate interactive processes.

The benefits of IAs grow with the fit of the processes and rules that govern it, and these need to follow the function of the intervention. They should not be defined solely by the interest of the strongest policy practitioners in the process, nor should they maximise participation and inclusion of 'all stakeholders'. Rather, the breadth and forms of engagement, the sequence of interactive steps, and the division of labour for an impact assessment will always depend on the nature and ambition of the intervention (i.e. the intervention shift it seeks), the very purpose of a given assessment exercise; the heterogeneity of the target group; the relevance of the intervention for stakeholders beyond the target group; the interdependence of the measure with other policy measures and context conditions, which brings us back to the intelligent policy practitioner. To design and support governance in that way necessitates careful consideration and an understanding of the methodological and interaction needs at stake. Moreover, the drivers of the process need to avoid instrumentalisation of their roles as governance shapers, i.e. through instrumental gate keeping or dissemination of results and the like.

To sum up

This report delivers a considerable number of insights about techniques and principles and offers a range of useful recommendations. However, it can contribute to a more fundamental shift if (1) we understand it as the seed for establishing new discourse structures on IA across Europe which (2) centre around the importance of sound processes of impact assessment which increase their usefulness in the overall governance of RTDI policy - which is what this study was all about.

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Chapter 4: Context and transferability of impact assessment: experiences and lessons from policies for science-industry relationships

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4.1 Introduction, outline and basic concepts

During the last twenty years the call for 'value for money' in research policy is increasing. Nowadays – especially in the context of the economic crisis - 'commercial results' are required, in the case of publicly scientific research. Therefore, Science-Industry Relationships (SIRE) play an important role in the growth and competitiveness of economies. This Chapter offers an analysis of the concept and importance of such relationships, followed by a review of its critical success factors. In this 'value for money' culture the evaluation of policies is required to improve their future design. The main aim of this study is to analyse the shortcomings and best practices of IAs in order to generate a learning process which enables the improvement of future policy evaluations. A meta evaluation of 32 impact assessment exercises is carried out in this Chapter to support the arguments presented. The evaluation studies analysed instruments which promoted the cooperation between scientific organisations and firms and those policies which promoted technology transfer based on the role of technology centres as well as cluster policies.

The performance of a national economy in terms of innovation and productivity is strongly influenced by the intensity of co-operation between the scientific community and the production sector. A smooth and well-developed link between science and industry is thus crucial to ensure a well-functioning innovation system that fosters the creation of competitive advantage through quicker diffusion and application of new scientific findings. In this context, science-industry relationships (SIRE) have received increasing attention in the literature[12] especially in that concerning innovation systems[13] and the triple Helix Model.[14] Both are based on the interactive model of technological change and underpin –in this context- the importance of SIREs, and refer to the multiple reciprocal relationships among institutional sectors (public, private and academic) (see also Box 4.1).

In fact, there exists an increased political pressure on universities to intensify their 'third role' through industry involvement and to contribute actively towards economic development. However, technology transfer (TT) and science-industry links are not new. What is new in the last two decades is the institutionalization of university-industry linkages through the direct involvement of the university and the design of a broad number of new SIRE related policies (Geuna/Muscio, 2009). These new trends are reflected in the increasing diversification, scale and complexity of universities' activities and the systematic way in which most countries organise SIREs on institutional level. The strengthened relationships between universities and industry, as well as the commercial use of scientific results have been the subject of intense policy debates, particularly since the 1970s. This new approach

[11] The Chapter was coordinated by Joost Heijs. Contributions by Mikel Buesa and Andrés Barge Gil. The Chapter is a summary of three working papers ('An inventory of obstacles, challenges, weaknesses of the innovation system and of the objectives and trends of R&D and innovation policies and their evaluation in selected European countries', Heijs, J (Coordinator); Baanante, I. and Moya, E. (2010); 'Critical success factors of science – industry relationships and best practices for the evaluation of the policies to promote such relationships' Heijs, J (Coordinator); Baanante, I. and Moya, E. (2011) and 'The role of technology centres for science industrial relationships' Buesa, M.; Barge. A. (coordinators) Heijs, J.; Baanante, I. y Moya, E. (2011); www.cia4opm.com. For the work behind this chapter we have to thank many people. The table 4.2 about the role of science in technology centres is based on the opinion of experts (policy makers, directors of technology centres, presidents of the associations of such centres and evaluators of such centres) from Belgium, Czech Republic, Iceland, Turkey and Spain. The Meta-evaluation of 32 impact assessment studies is a collective effort done by several project partners. Their names can be observed in the annex 4.3 of this Chapter. Moreover all project partners reviewed the chapter and offered valuable comments. However, the errors which remain are full responsibility of the authors.

[12] OECD, 2002; Geuna/Muscio, 2009.

[13] See also the work of Dosi, 1982; Kline and Rosenberg, 1986; Dosi/Freeman/Nelson/Silverberg, 1988 and Malerba/Orsenigo, 1996

[14] Etzkovitz/Leydesdorf, 1997; Etzkowitz et al. 2000.

led to the emergence of a new type of "entrepreneurial" universities (Clark 1998; Etzkowitz et al. 2000; Jacob et al. 2003).

Science-industry relationships are complex and encompass a broad range of activities. They can be defined as: all mechanisms, channels of interaction between the scientific world and the production sector aimed at the dissemination or transfer of scientific findings to the production sector and/or aimed to generate feedback from the production sector to the scientific world. Science-industry relationships come in several forms and their relationship is difficult to understand, since they often involve different kinds of actors and take a variety of different forms. There is not one single setting of SIREs which one can identify as the ideal model for all circumstances, regions or countries; and the setting of SIREs usually has to be adapted to the national context. The increasing importance and growth of SIRE and the related 'third activity' of universities has to be understood as a result of the simultaneous influence of a wide array of factors of different natures. Evidently, the most important are decreasing budgets[15] and the related demand of economic justification of public expenditures (value for money) (Geuna, 1998, pp. 5–6). A second reason is the increasing understanding of the technological changes required to encourage a countries' competitiveness and the role of university research as a way to promote local knowledge spill-over's and to stimulate regional economic growth and competiveness (Jaffe, 1989; Breschi and Lissoni, 2001). In the context of cognitive factors, the enhanced inter-disciplinarity of applied sciences and the emergence of new key or multi-purpose science based technologies (like bio and nanotechnology, computer science, molecular biology and material science) in combination with the more general growing scientific and technical content of all types of industrial production should be highlighted (Bercovitz/Feldman 2006).

Table 4.1: Evaluation of the policy instruments: A comparison of type of policy instruments based on the main priority of the instruments

Main policy priority	Number of instruments	At least % Ex ante	At least % Following up	At least % Ex post	Never evaluated
1 Support infrastructure (transfer offices, training of support staff)	12	8.3%	50.0%	25.0%	50.0%
2 Knowledge Transfer (contract research, licences, research and IPR issues in public/academic/non-profit institutes)	29	24.1%	34.5%	13.8%	51.7%
3 R&D cooperation (joint projects, PPP with research institutes)	101	30.7%	26.7%	23.8%	52.5%
Total	814	27.1%	28.4%	19.9%	55.9%

Source: Heijs et al. (2010)

Whilst economies around the world look for more responsible investments and an increase in 'value for money', there is a growing perception regarding the importance for governments to invest in scientific research for long term increased competitiveness and economic growth.[16] This 'value for money' approach is not only required from universities but also from policy makers in the case of their R&D and innovation policies. To ensure better efficiency and effectiveness, a growing number of such policies are evaluated. In the early 1980s the United States and Germany were pioneers in these kind of studies. Nowadays, most countries carry out evaluation studies. When analysing the culture of

[15] Initially the lack of funds was caused by the financial crisis of the 1970s and 80s. Later, restrictions on public expenditures to meet the 'Maastricht Criteria' for joining the European Common Currency (EURO) put pressure on the 'value for money' approach (Geuna, 2003). The current financial crisis is again putting pressure on public funds available for R&D.

[16] Such efforts are broadly recognized, even at European level and R&D is at the centre of the Lisbon Strategy - recently renewed in the so-called 'Europe 2020' strategy http://ec.europa.eu/research/innovation-union/pdf/innovation-union-communication_en.pdf

evaluation in Europe it can be stated that in a sample of 814 policy instruments which promote R&D and innovation in 27 different European countries[17] almost 44 percent were evaluated and 20 percent were evaluated ex-post.[18] On the other hand, 56% of the instruments were not evaluated at all (see table 4.1). Therefore, the real impact was evaluated for only one of each five instruments. The ERA-watch database includes 142 instruments directly related to science-industry links, classified in three types of research policy priorities (see table 4.1) and the percentage of those instruments which were not evaluated is somewhat below average (50.2%). The first one is support for infrastructures for technology transfer (intermediates and promoters) and the second instrument is support for public private cooperation (PPC). Around 24-25% of both types of instruments were evaluated ex-post. The third group refers to the other support measures focussed on knowledge transfer (excluding PPC). And only 14% percent of them were evaluated ex-post.

The overall aim of this Chapter is to identify best practices and methodologies to assess the impact of policy instruments, in particular, those oriented towards science-industry relationships. Such relationships are based on a broad set of technology and knowledge transfer mechanisms between public research institutes and private enterprises. The analysis focuses mainly on two specific types of policy measures: support measures for cooperation between public and private agents and support measures for technology centres as a node for transfer of scientific research to the production sector. The outcome of the study and the recommendations for the design of policy evaluations and policy measures are based on several complementary activities:

(1) Literature review on critical success factors of science-industry relationships;

(2) Literature review on best practices of policy making and policy evaluation;

(3) Exchanging experiences and best practices in the different partner countries for the use and methodology of IA of policies;

(4) Meta-analysis of 32 evaluation studies that analyse the impact of policies which promote the Public Private R&D cooperation and the role of technology centres.

The main objective of this meta-analysis and the literature review is the identification of the best practices from two perspectives: on the one hand, identifying the best and most accurate methods and research questions which should be analysed in evaluation studies by carrying out a benchmark of the usefulness of the used indicators and methodologies. On the other hand, to identify the success factors required for the effective implementation of existing policies and improvement of institutional settings generating policy recommendations in the field of policy design for science-industry links which will increase their efficiency and effectiveness (value for money). It should be highlighted that this exercise was carried out not only to learn how to evaluate, but also how make use of the lessons obtained from those evaluations. In fact, this meta-evaluation generated a mutual learning process and offers recommendations for the policy evaluators and policy makers.

The Chapter consists of four main sections. This first offers a general introduction to the topic and section 4.2 defines the concept of science-industry relationships and discusses the role of science for the production sector, national competitiveness and the comparative advantages of private enterprises participating in such relationships. Section 4.3 offers a literature review on the basic determinants (obstacles and facilitators) of science-industry relationships and an overview of the critical success factors of SIRE oriented towards cooperative projects and technology centres. Section 4.4 offers the results of the meta-evaluation based on the review of 32 evaluation studies, which shed light on the aspects analysed, the critical success factors which were involved and which could possibly be adopted as a best practice in the case of impact assessment. The final section offers the conclusions and some final remarks about the study.

[17] Based on data from the ERAWATCH database 'European Inventory of Research and Innovation Policy Measures'.

[18] First of all we like to thank the ERA-watch organisation for their cooperation providing us the data set. On the other side the percentages indicated in this section has to be considered as only a raw estimation. The evaluation studies belong to the so called "grey literature" which means that several studies exist that never were published. Therefore the data should be interpreted with caution. For more details see chapter 2.5.2 of this report and *: Heijs et al. (2010)*- www.cia4opm.com.

4.2 Basic concepts: definition of science-industry linkages

4.2.1 A taxonomy of science-industry relationships

This section offers a short review of the importance of science for the production sector followed by a taxonomy of science-industry relationships. Only a small proportion of enterprises gain competitive advantage by exploiting the commercial potential of basic R&D results and new scientific findings (OECD, 2002):[19]

'Industry's demand for scientific knowledge, and thus the enterprises' demand for interaction with public science institutions, depends heavily upon the specialisation of enterprises and sectors, on certain types of products, markets and associated stages of product life cycles' (OECD, 2002).

Although there is a trend towards knowledge-based economies, the vast majority of enterprises derive their competitive advantage from non-scientific factors such as: close market contacts; client-oriented (incremental) innovations; rapid adoption of new technologies previously introduced by other enterprises; flexible production and marketing strategies in niche markets; or the acquisition of input factors (labour, capital, initial products) at favourable prices in factor and good markets. Despite this, there is currently no doubt about the importance of scientific outcomes for economic development. However, the exact influence of science as an input for the production sector and enterprise is difficult to quantify – one reason being that the impact is often indirect and difficult to trace. The differences of the importance of scientific results for certain sectors or technological fields have been demonstrated through several studies.[20] Meyer-Krahmer and Schmoch (1998) and Marsili and Verspagen (2002) showed that science-based regimes with important knowledge bases are the life sciences and physical science, typified by a high level of technological opportunity, intense R&D activities and direct links with academic research. Good examples of these are the pharmaceutical industry, biotechnology and nanotechnology. The main inputs of such sectors are scientific results and due to the great number of science related opportunities for innovation they have a broad range of diversified science-industry relationships. Klevorick et al. (1995) provide a classification of fields of university research according to their relevance for firms. Computer sciences, material sciences and mechanical engineering rank at the top. On the other hand, geology, physics and mathematics score very low. However, in certain fields many of the spillovers may well be indirect. For instance, fundamental research in physics, probably of little use for firms, is beneficial for mechanical engineering, which is itself very relevant for the production sector.

Box 4.1: Some relevant comments and aspects of the theory of technological change: Codified versus tacit knowledge, learning and the linear and interactive model[21]

One of the most important aspects of the theory of technological change is the specific characteristics of a good called 'technology'. An important distinction has to be made between explicit or codified information and tacit knowledge (Polanyi, 1967). Codified information is the part of science and technology which can be expressed and explained (codified) in standardised pieces of explicit data which flow between university and industry in the form of patents, scientific articles, books, and so on. Furthermore, one aspect of new technologies can be considered to be tacit knowledge. New knowledge - developed in the inventor's head - requires codification, but this is not always possible or may be too costly or undesirable (secrecy to assure appropiability); therefore part of the new knowledge will remain tacit. The individual's insights and skills which form tacit knowledge in human resources, which are gained through personal experience, are hard or impossible to articulate or transfer (Kogut and Zander, 1993; Nelson and Winter, 1982; Nonaka, 1994; Polanyi, 1967), Simonin, 1999a). Technology and scientific results are normally a combination of both tacit and codified aspects which can be

[19] The work of Arundal/Geuna (2004) showed that only 17% of firms indicate that science is the most important source for innovation and only 2 of the 16 analysed sectors consider science to be the most important source.
[20] See, among others, Klevorick et al. 1995; Meyer-Krahmer/Schmoch, 1998; Marsili and Verspagen 2002; Arundal/Geuna, 2004.
[21] This box offers a short introduction about this subject for a broader discussion see Rothwell, 1983; Pavitt, 1984; Kline and Rosenberg, 1986; Dosi/Freeman/Nelson/Silverberg, 1988; Malerba/Orsenigo, 1996.

considered to be complementary. People with tacit knowledge are often in a better position to understand and to make use of codified information, especially if a large amount of codified knowledge is needed and used in complementary form with other sources. A good example is the use of a language. The rules are based on a very large number of grammatical and phonetic rules. However, the understanding and use of a language also requires tacit knowledge about a country's culture and history.

Even more difficult is the ability to understand jokes or culturally-specific expressions. With this example it has to be made clear that even codified information is not always easy to transfer and in the case of tacit knowledge, the technology transfer is even more complicated. A firm's tacit knowledge is not easily communicated and shared, as it is often considered highly confidential and deeply rooted in action (competition) and in an individual's involvement within a specific context (Nonaka, 1994). Tacit knowledge is embodied in people and the transfer is based on personal face to face contacts or working together (e.g. the apprenticeships of craftsman). It is the knowledge obtained by the accumulation of professional experience (learning by doing) and the continuous face to face interaction with experts (Lundvall, 1992). In certain research fields and especially in the case of SIREs, tacit knowledge is very important, primarily in multi-disciplinary research projects focussed on new inventions and technological progress based on combinations of knowledge from different disciplines. A good example of this (Bekker and Verspagen, 2006) is aeronautical engineering. In this field of technology the engineer has to have knowledge regarding physics, mechanical engineering, material technology, electro technical engineering, aerodynamics, etc. At the end 'new technology is a complex mix of codified data and poorly defined "know-how" '(Mowery and Rosenberg, 1989, p. 7).

The distinction between codified information and tacit knowledge is the basis for the models of technological change. Until the early 1980s the technology policy of most developed countries – especially the finance of scientific research and the promotion of SIRE- was based on the *linear model.* This model views R&D as an isolated activity performed in research centres without the direct influence of market considerations. Innovation is considered to be a linear, sequential process occurring in isolated stages, beginning with basic research and extending through to the introduction of an innovation-based product onto the market. Under this model, technology transfer – based on codified information - is supposed to take place automatically and without significant costs or delays through the mechanism of the 'invisible hand': technology is viewed as codified information converted in an arrow-like public good which can be transferred immediately and for free. The linear model virtually neglects factors such as the influence of institutions, strategic and competitive behaviour of other firms or countries, or factors related to demand and education. Policies based on the linear model are aimed at the generation of innovation, for example through the establishment of research centres and support for basic research on new key technologies.

An alternative model gained ground in the nineties and fuelled radical changes in the design of technology policies is the *interactive model,* based on the notion of continuous interaction and feedback between different actors and between the different stages throughout the innovation process – from basic research to industrial development, commercialisation, and introduction onto the market. While the linear model only highlights the activities of a firm's R&D department, the interactive model stresses the tacit and accumulative character of knowledge and the firm's technological capabilities and entrepreneurial attitude. Innovation management is considered to be an integrated, strategic corporate activity in which the entire firm is involved. Technology transfer is regarded as expensive and difficult, while understanding new technologies (tacit knowledge) is seen as time-consuming. This model implies that support for basic research and the generation of new technologies is not sufficient, and that R&D policies should promote technology transfer, the SIREs and the improvement of innovation capabilities (learning) within enterprises.

Cooperation in the form of science-industry links is very important, due to the specific characteristics of technology being an intangible good with tacit aspects (see box 4.1). The outcome of academic research becomes publicly available if it is published in scientific journals, the technical descriptions of patents etc. Such publications imply that the knowledge is codified by the researchers. However, not all relevant aspects of knowledge can be codified and some relevant aspects are often excluded or remain undisclosed (whether intentionally or not). Tacit knowledge is necessary to fully understand the scientific idea and without this knowledge its diffusion is not easy, and the new emerging scientific disciplines (with smaller

numbers of experts and low levels of codification and standardisation) are heavily based on tacit elements which are difficult to codify. In such fields the knowledge transfer is more difficult and cooperation is based on personal contacts, with face to face interactions and geographical proximity often being required. The optimum commercial use of academic results is clearly limited without direct interaction with industry to transfer the tacit knowledge. This means that many enterprises are unable to use academic knowledge. This argument is of direct relevance the live debate as to whether scientific results are a 'public good' accessible for everybody or whether they remain a 'private good'.

The private character of knowledge implies that due to its tacit aspects, it is partially accessible to only a small group of agents with a very specific high technological capability and well established SIREs. Moreover, basic or scientific R&D and the SIREs are important because they create technological capabilities which increase the potential efficiency of other forms of research (applied and experimental R&D). Private firms may have almost no incentives to carry out basic research (Nelson, 1959), because normally there is a high level of uncertainty and related risks associated with such research, and this is coupled with the fact that there is usually a significant delay before the scientific results are transformed into marketable products. However, despite the fact that basic research does not lead to an immediate financial return, there are several determining factors for private firms to undertake basic research, especially in high tech industries which depend heavily upon basic research capability (Rosenberg, 1990). Basic research might give firms 'an access ticket to the academic community, where they can pick up useful ideas and knowledge' (Pavitt, 1993); provide the human capital with the capacity to solve complex technological problems; and create tacit research skills, techniques, and instrumentation. Moreover, complex links and complementarities exist between basic research and applied research. Basic research enables firms to better understand how and where to conduct applied research and the outcome of such applied research cannot be properly evaluated without a sufficient capability in basic research (Rosenberg, 1990). To conclude, the existence of internal basic research capabilities in a firm will enhance the efficiency with which other types of research are conducted and upgrade firm specific advantages by widening and deepening their scope, especially in the case of SIREs.[22]

Nowadays there are several different examples/models of science-industry relationships. In this report a classification is proposed based on four principal technology transfer mechanisms (see Box 4.2):

- Direct S-I mechanisms based on the use of scientific results in the applied research (focussed on the commercialisation of the scientific results);
- S-I mechanisms based on training, schooling and mobility of human capital;
- Informal mechanisms of science-industry relationships;
- Intermediary mechanisms to promote or facilitate SIRE (including the legal setting and the institutional promotion).

As observed in Box 4.2, a broad number of different channels, modes and forms of science-industry relationships can be identified. The empirical study carried out in this Chapter analyses only those channels which imply the **execution of science-based applied research directly focussed on the commercialisation of the scientific results**. The two main instruments in this field - with a long standing tradition of policy involvement - are the support of cooperative R&D projects between scientific (public) R&D organisations and enterprises and the creation and promotion of technology centres. Therefore, the meta-analysis of the evaluation studies –reflected in the second part of this chapter - is limited to those two specific instruments. This means that a broad number of SI linkages are not directly analysed or only analysed in an indirect form. In other words, they only are included if they are part of the impact of the cooperative project or of the activities of technology centres.

[22] Rosenberg [1990] Pavitt [1993]

Box 4.2: Channels of science-industrial relationships: a taxonomy

1 Execution of applied research focussed on the commercialisation of the scientific results

1.1 Subcontracting or cooperation in R&D projects
1.1.1 Contract research based on projects
1.1.2 Cooperative projects financed by the private enterprises
1.1.3 Cooperative projects financed with public funds
1.1.4 Research sponsored by industry
1.1.5 PhD thesis related research oriented to applied problems (including supervision)

1.2 Contracting R&D related consultancy or services
1.2.1 Transfer or know-how of experts
1.2.2 Tests, measurement and technological services
1.2.3 Access to facilities and equipment (to scientific and technological infrastructure)
1.2.4 Subcontracting of prototypes

1.3 Independent applied (science-based) research organisations
1.3.1 Technology centres or institutes (also do activities for 4.2.1.)
1.3.2 Private or public foundations or other organisations of applied research

2 Training, schooling and mobility of human capital mobility

2.1 Human Capital: schooling and training
2.1.1 Schooling of graduate students
2.1.2 Schooling of PhD and master students
2.1.3 Masters for professionals (life-long learning)
2.1.4 Provision of specific ad hoc courses for professionals contracted directly by firms or sectoral organisations (life-long learning)

2.2 Capital: mobility of researchers and students
2.2.1 Mobility of researchers from public knowledge institutes to industry
2.2.2 Mobility of researchers from industry to public knowledge institutes
2.2.3 Academic spin-of enterprises as a specific form of mobility
2.2.4 Researchers who work simultaneously in the public and private sector
2.2.5 Young graduates of the university that start to work in the production sector
2.2.6 Knowledge exchange during the joint use of the S&T infrastructure by public and private researchers
2.2.7 Temporarily exchange of personnel
2.2.8 Trainees and their supervision

3 Informal and/or indirect science-industry relationships

3.1 Assistance of researchers in conferences, workshops, seminars or expositions etc…
3.2 Co-publications
3.3 Analysis of academic publications and patents by enterprises
3.4 Informal contacts between researchers and entrepreneurs
3.5 Cooperation in education

4 The intermediary mechanisms (incl. legal setting and institutional promotion)

4.1 The intermediary mechanisms: institutional promotion for the direct interaction
4.1.1 Scientific parks; technology parks and science and technology parks
4.1.2 Cluster policies and networks that promote indirectly the interaction between science and industry
4.1.3 Joint laboratories access of the S&T infrastructure to firms
4.1.4 Incubators
4.1.5 Promotion of academic spin offs and fund for seed or risk capital
4.1.6 Computer and internet based networks

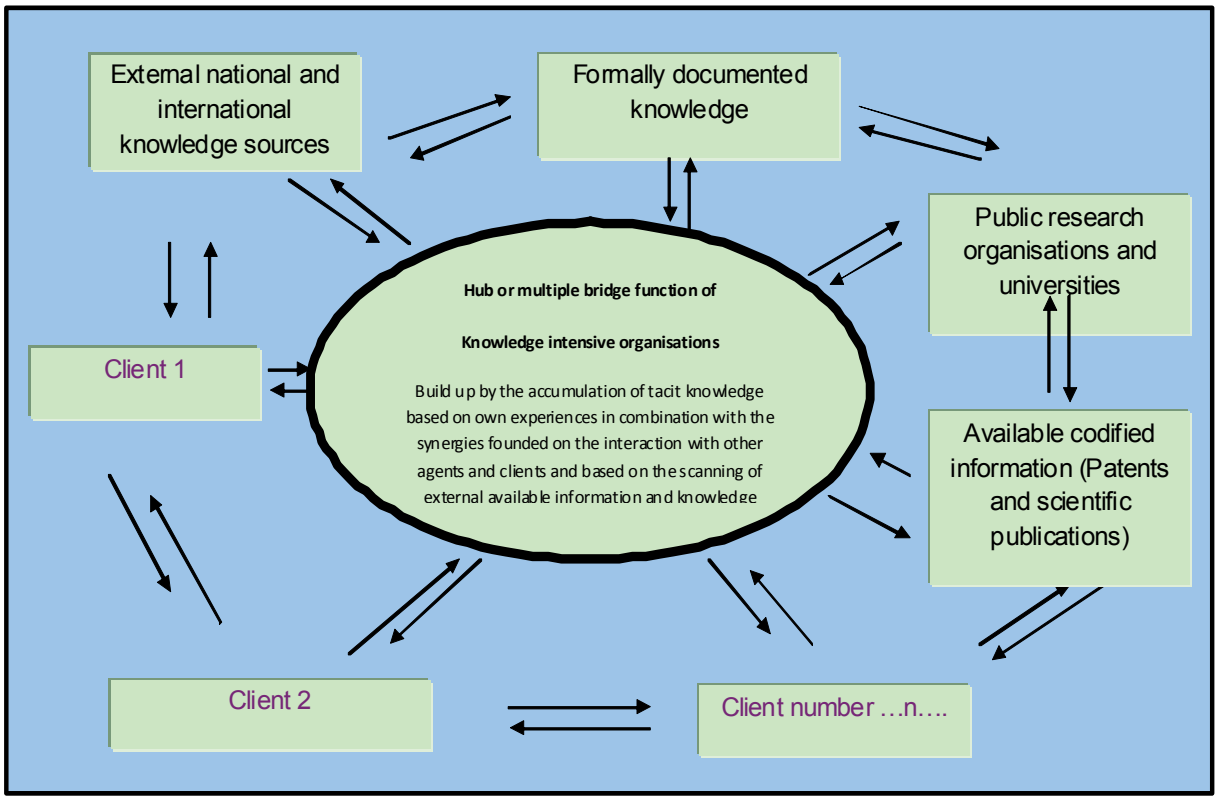
4.2 The intermediary mechanisms: direct institutional support for technology and knowledge transfer

4.2.1 Technology transfer organisations
4.2.2 Centre for University Industry Collaboration
4.2.3 Independent commercialisation enterprises or agencies
4.2.4 Information brokers or points
4.2.5 Intermediaries at the level of industry association and other private organisations

4.3 The intermediary mechanisms: the legal setting
4.3.1 Law of Intellectual Property Rights (IPR)
4.3.2 Regulation of the licences of IPR
4.3.3 Regulation on mobility of researchers or contract research

The first three mechanisms include instruments that imply direct technology and knowledge transfer, while the fourth mechanism refers to the intermediate institutional, organisational and legal setting in which such transfer is embedded. In fact, the aspects included in this fourth mechanism are not direct technology and knowledge transfers but refer to the intermediate mechanisms or instruments which facilitate or promote such transfer. Each of the four principal mechanisms has one or two sub levels. The first sub-level includes several generic types or channels of technology transfer and the second sub-level includes the specific modes or instruments of each of the generic types of technology transfer. At the lowest level, a broad range of instruments is mentioned, but the list is possibly not exhaustive.

Figure 4.1: Knowledge intensive organizations (KIO) as a knowledge hub



4.2.2 Technology centres as specific agents in the field of technology transfer and science-industry relationships

The meta-evaluation of the IA studies in section 3 includes technology centres as a specific SIRE. Therefore, this Chapter will briefly explain the role of such centres as a bridge between the scientific community and the production sector. The organisations with specific tasks in the field of technology transfer play an important role in the innovation systems as a

producer, facilitator, carrier and source of innovation (Muller and Zenker 2001, Den Hertog 2000):

'They increase the rate of innovation in industry by developing and helping implement new technology platforms, enabling companies and other producers to go beyond the limits of their internal technological capabilities, bringing both new and existing knowledge to bear by solving problems in the context of application' (Arnold et al, 2010).

These organisations can be divided in two groups. Firstly **the intermediates and promoters of technology transfer** such as technology transfer offices/centres; information offices; training offices; and the technology, science or science and technology parks. The intermediate organisations are not involved in the actual transfer of technologies but they do have a facilitating role as promoters to increase the level of SIREs tackling several market failures, such as transaction costs and information asymmetries. On the one hand, such organisations offer support in terms of partner searches and 'matching', negotiating contracts, and building mutual trust. While on the other hand they (should) play an active role in the distribution of information regarding technological capabilities and the tacit knowledge which exists in universities and PRO. Despite the existence of a broad number of such intermediary organisations, their impact or effectiveness in promoting SIRE is not clear and in some cases, nonexistent (OECD, 2002). The second group – the subject of this section - includes those **knowledge intensive organizations (KIO)** directly involved in technology and knowledge transfer (i.e. PRO, HEI, technology centres or private consultancy firms and engineering companies). The KIO directly involved in technology and knowledge transfer are not only *generators* of ideas and technology (technology push), but they are also learning and problem-solving partners of companies and public institutions. For many companies, KIOs are partners who help them learn to manage or handle new technologies through specific expertise which they might have. They should not be considered merely external technology suppliers but they are partners with strong links to universities and public research organisations and with close proximity to market knowledge for applied R&D, knowledge based services and consultancies.

Box 4.3: Technology centres: a definition

Technology centres play central and multiple roles, not least in the innovation system. Technology centres or institutes are found in the majority of developed countries and usually show a strong regional focus (Arnold, Rush, et al. 1998), but have tended to be ignored somewhat by the economics literature (Nuñez et al, 2009). Technology centres are a particularly heterogeneous group of organisations, having a broad and diversified set or functions, historical background and legal setting. From a functional point of view, three broad types of categories of industry-oriented research institutes (technology centres) can be distinguished (Arnold et al, 2010). The first type are the so called 'Centres of Excellence[23]', operating on the technological frontiers in technological fields with an important role in the overall production sector (key technologies and/or leading sectors) or in new emerging technologies or sectors. Such centres often work for the most outstanding and innovative firms. A second type is the 'normal' technology centre which carries out R&D and develops incremental innovation within or near to the technological frontier. This work is often carried out in cooperation with the (innovative) firms of a region in order to diffuse new technologies and to modernise the production sector. While the third type of technology centres are the services-based institutes, generally focusing in their early years on measurement, testing and certification, they tend to move 'upstream' into research (Arnold et al, 2010). The first two categories tend to have an emphasis on research in their portfolios, while the last is based on specialised knowledge-based services.

However, these three activities are often carried out by the same institute as they are actually complementary. Moreover, the characteristics of a technology centre can change over time. Therefore it is difficult to offer a generally accepted definition which satisfies all specific situations or particularities. The UK Association of Independent Research and Technology Organisations (AIRTO) describes its members as being *'market-led, problem oriented, businesses and organisations serving all facets of technology transfer and innovation,* ***and who secure their own ongoing existence and growth through success in this market place****'.* Nuñez et all define technology centres or institutes as being 'non-profit innovation and

[23] Longstanding examples are the SINTEF in Norway (since 1950) or the Fraunhofer Society in Germany (since 1973).

technology organisations, which perform a wide range of technological activities oriented to enhance competitiveness of firms' (Nuñez et al, 2009).

In this study a more practical approach is adopted. Although each type of technology centres perhaps requires a different focus for its evaluation, in our meta-evaluation the evaluation studies of all types of institutes were analysed: all studies can offer some methodological recommendations of best practices of evaluation.

Table 4.2: Importance of science in the technology centres: experts' opinions

Question	Belgium	Czech Republic	Spain	Spain*	Turkey	Iceland	Average
Do the technology centres (TCs) in your country have a (strong) science base?	4.3	3.5	3.5	3.2	2.7	2.7	**3.3**
Do the TCs have cooperative projects with universities?	3.7	1.5	3.7	3.7	2.3	3.7	**3.1**
Are the TCs integrated in universities or public research organisations?	2.7	4.5	1.8	2.2	4.0	2.0	**2.9**
Do researchers of universities and PRO work on a part-time basis in TCs?	2.3	3.5	1.7	2.4	2.7	3.7	**2.7**
Do the researchers in the TCs direct or supervise PhD Theses?	2.7	2.5	2.8	2.7	1.7	3.3	**2.6**
Do researchers in TCs work on a part time basis in universities and PRO?	2.0	3.5	1.7	2.2	2.0	2.7	**2.4**
Does the staff at TCs (director or directors of departments or units) include researchers in the universities?	2.0	3.5	1.5	2.3	1.7	2.3	**2.2**

Note: Scale from a minimum of one point (not important) to a maximum of 5 points (very important) [24]

When analysing in this section the theoretical role of technology centres as a main mechanism of SIRE, an important question came up: what is the role of science in technology centres? Or, in other words, do technology centres transfer scientific knowledge to the production sectors? Therefore, we carried out a survey to analyse the role of science in technology centres as an intermediate for scientific knowledge transfer. Several experts[25] from six CIA4OPM countries offered their view about the importance of science in the technology centres. As observed in table 4.2, in most countries the importance of science is generally valued as being important (for around 3 points out of 5). Except in the case of Belgium, the average value was much higher (4.3 points), probably due to the higher innovative levels in that country. In the case of Spain, the results were collected through a survey answered by 48 directors of the 87 contacted technology centres.

As can be observed in the Table, the data provided by the centres is generally very similar to the opinions of the experts. Looking at the way in which the SIRE activities evolve in the technology centres, a broad heterogeneity can be observed (See Table 4.2). First of all, the maximum or minimum valuation differs broadly when comparing the same mechanisms to different countries. The same mechanism is considered much more 'import-oriented' in certain countries than in others. Moreover, for each mechanism the trend (the group of countries that

[24] Data based on a survey to country experts carried out by the CIA4OPM partners of the correspondent countries. (*) results based on the answers of 48 directors of technology centres (Population 87). The maximum value for each aspect is highlighted by a salmon shade and the minimum score by a blue shade.

[25] The surveys were sent to three types of experts: the director or head of the associations of technology centres policy makers in the field of technology centres and S&T infrastructures and researchers that evaluated technology centres. Each point was evaluated by a minimum of one point (not very important) to a maximum of 5 points (very important).

consider them important or not important at all) also differs. From the other perspective – comparing countries - the arrangement of importance of the different channels is also heterogeneous. In the case of the Czech Republic, integration in universities is very important but it is observed that there are less cooperative projects with universities. In fact, this country considers most channels to be important or very important (with an average above 2.5 points for five of the six mechanisms). On the other hand, in the Spanish case, cooperation with universities is the most important mechanism, while at the same time most of the other mechanisms evaluated are considered less important (with an average of below 2.5 for four of the six mechanisms).

The effects of the KIO have to be analysed in two contexts**.** On the one hand, the simple fact that the existence or creation of a KIO in the region has a push effect on the size and quality of the overall knowledge intensive based service sector in the region. The KIO can outsource part of its activities and therefore increases the regional demand in their own sector. Moreover, its activities may increase the demand of qualified employment and human resources. On the other hand, the activities of a KIO may have a positive effect because they generate spillovers and/or externalities by the introduction of new innovations in the region; the creation of spin-offs; and are a source of supply of new employees for qualified human capital for the labour market (by specific training programmes and the mobility of their researchers). Moreover they create new or activate latent demand for knowledge-based services in firms of the regions (by marketing and reputation) and are a focus of attraction for R&D related investments for national and foreign firms, new technology based firms or academic spinoffs. Perhaps the most important role of the KIO is their position as a **hub for the exchange of best practices** (see figure 4.1).The KIO accumulates a broad pool of knowledge and experiences through their interaction with a broad number of clients and agents (firms or other innovative organisations) available for local firms or other clients. This 'accumulation' of knowledge is completed by either their internal basic and applied R&D activities as well as the accumulation of external knowledge (by screening all kinds of sources of knowledge from outside the regional or national innovation system).

The KIO also have a role or 'hub' position in the case of science-industry relationships. The KIO role is often seen as an intermediary between the technological (or scientific) supply and demand in a given market. They can provide objective information to their clients about their position and technical level. Moreover, they play a role in the alignment of needs and demand of their clients with the existing technological possibilities. This implies that firms can avail themselves of better and faster advantage of new technologies. Another important role of technology centres and other KIOs is the creation of a critical mass and division of labour in R&D by the creation of complementary R&D and innovation capabilities and services as well as the technical infrastructural equipment and installations accessible to their clients. This creates a critical mass and scale advantages which are especially important for small and medium sized firms.

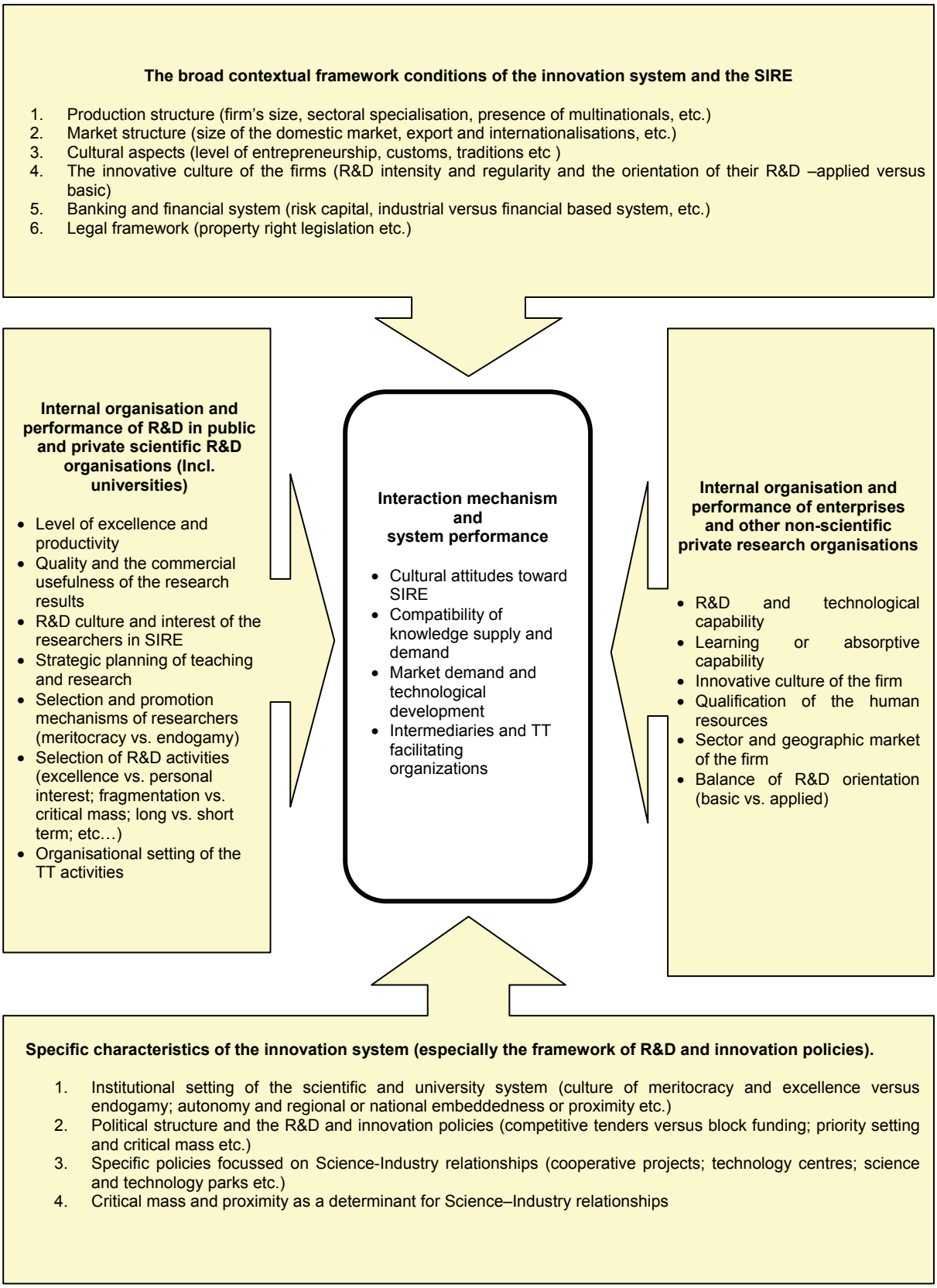
In conclusion, technology centres and other **Knowledge Intensive Organisations** can be considered a bridge or a hub between different agents of the innovation chain and between basic R&D and business applications as well as a catalyst of the technological potential of a region (including science-industry relationships), reflected in their multiple roles for the creation of a favourable context within region.

In short, KIOs and technology centres act as:

- Attractors and generators of talent and human resources;
- Suppliers of scientific knowledge or results not just technologies;
- Increasing the stock of formal codified information and tacit knowledge - know how;
- Increasing stock of contacts and potential cooperation partners - networking and know how;
- Provider of S&T infrastructures and large R&D installations (institution-building);
- Facilitating learning at various levels;
- Contributing to local governance and learning region strategies;

- Have a 'bridging' role to create networks, to integrate the agents of the NIS and to diffuse best practices and the most recent technologies.

Figure 4.2: Critical success factors of the science and industry relationships (SIRE)



4.3 Critical success factors (CSF) for science-industry relationships

One way of identifying the main critical success factors for science-industy relationships is a thorough literature review. Figure 4.2 groups the main Critical Success Factors (CSF) for science-industry relationships (SIREs) in five broad components or clusters, as follows: 1) the overall broad contextual framework conditions which impose constraints on innovation and production and consequently on SIRE; 2) specific characteristics of the innovation system (especially the framework of R&D and innovation policies); 3) internal organisation and performance of enterprises and other non-scientific private research organisations; 4) internal organisation and performance of R&D in public and private scientific R&D organisations (incl. universities); and 5) interaction mechanism and system performance. An in-depth analysis of the different aspects of critical success factors identified in figure 4.2 is beyond the scope of this chapter,[26] so this report is therefore limited to the most important aspects which have a direct influence on SIRE.

4.3.1 The broad contextual framework conditions of the innovation system and the SIRE

Broad contextual framework conditions determine a large component of the innovative behaviour and performance of enterprises and scientific organizations limiting and or facilitating R&D and innovation in each of the agents and of the technology transfer between public and private organizations. One of the most important determinants is ***the production and market structure,*** especially the size of the firms and the sectoral specialisation which often places constraints on the innovative system and consequently the SIREs. The dominance of small and medium sized enterprises (SMES) could limit the scope and resources of an innovation system and impede if from reaching a critical mass, thus making the creation of SIRE more difficult. Multinational firms or large domestic firms may encourage the interaction between SMEs, universities and public R&D organisations (PRO) and foster the creation of clusters. The lack of large and/or multinational firms thus impedes the creation of clusters based on public private cooperation and SIRE. In peripheral regions this role can be taken up by technology centres and research units of PROs or HEIs. However, this is only possible if such centres have a dynamic entrepreneurial culture.

Another aspect for the production sector (overlapping with the innovation system) is the intensity and regularity of firms' R&D activities. Again, this aspect is directly dependant on the size of firms and the location of headquarters or R&D centres of multinational enterprises. The specialisation of the production structure towards high tech and/or science-based industrial sectors facilitates SIRE. However, regions with low technological levels in R&D and science can also play an important role in contributing towards their development. The ***market structure*** and especially the export behaviour of the firms have a positive impact on innovation and SIREs. Firstly, exporting firms have to compete on the technological frontier in combination with 'low' prices which obliges them to innovate in product or processes. Large domestic markets or access to international ones creates the advantages of scale. Secondly, in countries with high levels of GDP per capita the demand for technological advanced products could have a positive impact on the R&D of the domestic production sector. The pressure from high-tech demanding domestic markets or market pressures in international markets encourages firms to compete on the technological frontier and this requires smooth and well established SIREs.

Culture is also an important aspect of the broad contextual framework which has a direct influence on economic behaviour and innovation (Beugelsdijk, 2007). Herbig and Dunphy (1998) stated that existing cultural conditions determine whether, when, how and in what form new innovations will be adopted. Also, that innovations created along the same lines already laid down in the culture have a much greater possibility of being accepted. Another important cultural aspect is the level of entrepreneurship in a society which could have a direct influence on innovation. Entrepreneurs are considered of major importance for

[26] For a more extended version of this section see Heijs et al. (2011).

economic development (Baumol, 1993) and innovation (Schumpeter, 1939). One of the main problems for SIREs is the lack of entrepreneurship of scientists. The question is how to create an entrepreneurial university - not only for creating spin-offs but also for other forms of SIREs.

4.3.2 Specific characteristics of the innovation system and policies

Several specific characteristics of the innovation system may have a direct impact on science-industry relationships. The most outstanding ones highlighted in this section are: the institutional and legal setting of the scientific and university system; the concepts of critical mass and geographical proximity; the policy framework in the field of R&D and innovation; the organisational setting of technology transfer (R&D doing organisations directly involved in technology transfer and intermediary organisations).

The institutional setting - particularly the legal framework[27] and organisation of the scientific and academic system - often determines the level at which the institution is open to science- industry relationships. One of the main aspects of the setting that directly affects the SIRE is the autonomy of the universities or PROs – especially the use or abuse of this autonomy- and the way they obtain finance. ***The finance model*** of universities and PROs varies broadly between countries. In some countries universities are autonomous, isolated organisations which are financed by block funding and do not render responsibilities about how they spend their budgets. The scientific organisations decide unilaterally which new studies or scientific disciplines have to be introduced and in which fields or technologies they invest. In this case, academic autonomy could be used to defend the personal interest of the researchers (corporative behaviour) above the general interest of society as a whole. In other countries the policy makers require 'value for money' and scientific organisations have to focus their activities on the overall interest of society as a whole. In those countries there exists a strong government influence on the distribution of funds committed to scientific research. In the last decade most countries introduced competitive funding schemes through which different public agents compete for funds based on criteria of excellence and of economic or societal usefulness of the expected outcomes. A related question to this aspect is the way in which entrepreneurs influence the decision-making process of universities in the case of: (1) the design of the relevant faculty study plans; (2) the creation of new departments or careers or (3) the priority setting for future public research investments.

Another aspect is the **legal status of researchers** (civil servants versus private contractors) and **the selection and promotion mechanisms for researchers**. Both aspects depend on the culture of meritocracy and excellence versus endogamy and the orientation of the research to overall societal interest. In some countries, salaries are prefixed and HEI or PROs are unable to increase their pay-outs to researchers to be more attractive to the best talented researchers. Or only a very small part of the salaries are based on the quantity and quality of the researchers' performance. Moreover, in most countries it is very common that the promotion mechanism for researchers does not include criteria which reward the results of applied research or the interaction with the production sector. This implies a lack of incentive to create science-industry linkages or creation of the 'entrepreneurial university'. One must highlight, however, that in several countries, governments do try to overcome this obstacle by an increase of support for SIREs to promote these relationships

Two important aspects of the national innovation system that could influence the success of knowledge and technology transfer and SIRE are the **critical mass** (Azzone and Maccarrone, 1997) **and geographical proximity** (Boschma, 2005)**.** The critical mass is a success factor for economic development and competitiveness and this aspect is even more important in the case of innovation, due to the indivisibility and scale advantages of R&D. Scientific research activities are highly concentrated.[28] The existence of a 'critical mass' offers several advantages, such as: (1) creates improved opportunities for cost saving labour division (or specialisation); (2) creates better opportunities for interdisciplinary research and (3) creates a pole of attraction for the best talents and leading innovative firms. The critical mass could create virtuous circles of growth and feedback (retro-alimentation), augmenting continuously

[27] In Spain contracts between industry and universities were forbidden until 1983, for example.
[28] Only eight of the 219 European regions (EU-25) spend more than 25% of the R%D expenditures, 31 one do spend 50% of the total amount.

its own critical mass. The critical mass is also fundamental for science–industry linkages because it facilitates the division of labour in basic and applied R&D. The existence of a large demand or market of R&D accompanied by the division of labour facilitates the specialisation which consequently permits the creation of excellence and the reduction of the costs and risks for R&D related services, due to the full use of complementary R&D production capacity and the joint use of large R&D infrastructure. The concept of **geographical proximity (versus distance)** plays an important role to the success of SIREs. Such proximity is important in the case of SIREs due to the tacit character of scientific results whose transfer requires a face to face contact and apprenticeship, which limits knowledge spillover to local agents. In fact, the literature studying the channels of knowledge transfer between universities and firms showed that spillovers are locally concentrated (Mansfield, 1995; Jaffe, 1989). Moreover, proximity facilitates the establishment and coordination of technology transfer (Feldman, 1994; Carrincazeaux et al, 2001) since the organisation of informal meetings is simplified (Breschi y Lissoni, 2001; Audretsch/Stephan, 1996) and the ability to easily convening informal meetings creates mutual trust, friendship and respect (Boschma, 2005).

The design of R&D and innovation policies has a direct effect on science-industry relationships. New policies to promote scientific research identified in the study include a selection criteria base oriented to ensure the 'value for money' principle and to contribute towards the creation of 'entrepreneurial universities'. In fact, a broad number of new instruments were introduced to support the commercialisation of basic R&D and to promote the cooperation between the scientific community and the production sector. Furthermore, a broad number of instruments – not directly focussed on SIRE - include selection criteria reoriented to promote public private cooperation and the commercial application of scientific results. In other words, support measures not directly focussed on SIRE do implicitly promote such S-I linkages by the adjustment of the selection procedures and criteria. An important aspect of the political setting of R&D and innovation policies is **the finance model** for universities and public research organisations. This model drifts away **from direct block funding to competitive tenders** (see box 4.4 for the potential (dis)advantages of both models) based on criteria of excellence and usefulness for the economy or society as a whole.

This new financing model was introduced to promote the increase in market driven distribution for basic R&D funding and therefore has an important impact on the role of SIREs. Box 4.4 shows the potential advantages and disadvantages of the new model based on competitive grants (Echeverría, 1998 p.11). The most important advantage is the increase of research effectiveness and efficiency. This model orients the resources to the most productive scientists based on their merits and productivity (increase of effectiveness). The improvement of efficiency is reached by reducing, among other things, the duplication of R&D activities, reduction of the direct costs via competition or of the underutilization of R&D infrastructures. Moreover, this type of competitive finance obliges the HEI and Public Research Organisation (PRO) to take into account the usefulness of their activities. The most important disadvantage of competitive funding is the possible bias in the selection of projects to short term objectives. Whilst it is perceived that short-term funding schemes lead to quicker scientific results (and consequently quicker commercialisation) this could lead to the research agenda to moving away from an ultimate long-term objective, thus moving away from future new scientific results useful for the production sector. Therefore, it is recommended that short-term funding schemes should be accompanied with a long-term plan with clear aims and objectives. A combined model of financing is recommended although the decisions on the priority setting and orientation of the long term basic research should be made based on a consensus between the different agents and the government.

Box 4.4: Potential Advantages and Disadvantages of Competitive Grants Systems

Advantages	Disadvantages
Increases research **effectiveness** by directing resources to the most productive scientists, by merit (improves quality and accountability of research)	**Limited nature of funding** (funds only operation costs, lack of support to core budget salaries and maintenance of research facilities)
Increases research **efficiency** by reducing: direct costs via competition and co financing	**Short term funding**, lack of support for medium- to long-term research agenda

schemes, duplication of efforts, lack of accountability of research resources, underutilization of infrastructure by providing operating resources	**Low institutionalization**, lack of support to human capital development and to new research infrastructure
Promotes the identification of and consensus on national research **priorities**	Higher funding **uncertainty** could affect long-term projects and reduce confidence of research staff
Increases **flexibility** to focus on newly emerging national/regional priority issues	**High transaction costs** from grant seeking, proposal writing and implementation reports, less time for research
Promotes a **goal-oriented** and demand-driven national research system	Reduces research **flexibility** to focus on additional (not open for competition) issues when researchers discover new research opportunities
More **diversification of funding** by involving scientists from outside traditional organizations, promotes 'system'	**Higher risks** involved when research consortia involves less-well-known organizations
Strengthens **links** among national, regional, and international public and private research organizations, promotes 'spill-ins'	**Low sustainability** of funding when national constituency is weak and external funding sources dry up (unless it is an endowment)
Merit review process provides expert feedback to researchers' proposals and objectivity of the competitive process, **improving research quality**	Needs a **minimum market size**, a research system with a minimum number of competitors (larger countries probable best suited)
Induces **institutional change** in the national innovation system, separating research policy, funding and implementation	May be **biased to strong research organizations**, increasing 'equity issue' due to lack of competitive capacity of poorer/smaller organizations
May mobilize **additional funding**	Legal, financial, administrative and technical **costs of setting up and administrating**
	Possibility of '**rent-seeking**' in the process of allocating resources to research

Source: Echeverría, 1998 p.11 (with some small minor changes).

4.3.3 The micro level performance of the enterprises

Enterprises are engaged in SIREs or cooperate with technology centres to gain access to new complementary knowledge and resources not internally available (such as large scale R&D infrastructures or external R&D capabilities or skills). This implies that SIRE contributes directly towards the amplification of their internal technological frontier and a reduction of the costs for in-house R&D. However, not all firms have the same opportunities to take advantage of SIREs. Canton et al (2005) indicate three main difficulties related with the knowledge transfer from scientific organisations to the production sector. A first obstacle could be firms´ financial capacity to finance R&D. The lack of venture capital in Europe is considered to be a crucial obstacle to putting into practice scientific findings and thereby increase the competitiveness of European firms.

A second difficulty identified by Canton et al is the resistance of firms to adapt new technologies, due to the possible subsequent shift in power within management circles, the potential loss of employment, together with the resistance of labour unions. This normally happens when there is a lack of a dynamic entrepreneurial culture (see also section 4.2.2). The most important determinant to ensure the smooth transfer of scientific results into commercially-oriented applied research is probably the **absorptive or learning capacity** (Teece, 1985). Cohen and Levinthal (1989, p. 569) define such capacity as 'the ability to exploit outside knowledge of a more intermediate sort, such as basic research findings, that provide the basis for subsequent R&D'. Such capacity is especially important in the case of tacit knowledge – like scientific findings. Such capability depends on the accumulation of experiences in the past based on the firm's own R&D efforts and on the education, experience and talent of their human resources. The absorptive capability is also an important determinant for the success of SIRES. Firstly, since scientific research organisations are the

main suppliers of cutting-edge research, expanding scientific frontiers and the most prestigious universities are important sources of novel tacit knowledge. Canton et al (2005) argue that 'academic research, whether basic and largely uncodified or applied and codified in the form of patents, represents only the raw material from which commercially competitive technological innovations are constructed' (Von Hippel, 1998; Dasgupta and David, 1994). If the industry is not sufficiently advanced to utilise the research (in terms of absorptive capacity) the scientific findings can be of little public value.

4.3.4 The micro level performance of the universities and public research organizations

4.3.4.1 Culture, self-perception and autonomy as determinants of the micro level performance

The specific characteristics and micro level performance of universities and scientific research organisations have a direct influence on the intensity, quality and level of success of science-industry relationships. Universities and scientific organisations are often considered to be both barriers (see for example Box 4.5) and facilitators for knowledge transfer and the commercialisation of scientific results. In this section, five aspects of micro behaviour are analysed below, and most of them are interrelated: (1) the self-perception about their primary mission; (2) the commercial and social usefulness of their research results; (3) the excellence and quality of their research; (4) the planning and priority setting of publicly financed scientific research; and (5) the institutional and cultural setting of the scientific community.

Box 4.5: Some quotes on SIRES by R&D managers in Swedish firms[29]

- 'Our problems are very practical and do not often fulfil the academic requirements in terms of scientific relevance as imposed by the universities'
- 'It is difficult or impossible for universities to keep the results of our collaboration confidential, so we are forced to limit collaboration to areas that are "nice to know" and we are not able to work jointly on truly strategic areas'
- 'Students do not have any understanding of our business-reality so their start-up time before really adding any value to our business is too long'
- 'Academic researchers often lack the project management skills to act as reliable partners in a business-context '
- 'What we need is to get a few solid answers to one clearly defined problem, but academic research more often aims at developing a long list of additional questions – as interesting spin-offs from the originally defined problem'

Taken from the Vinnova Project on the Entrepreneurial University Sigvald Harryson

The scientific community generally has a **self-perception (1)** about their primary mission, based on independent basic reach in combination with a culture of openness and free access of publicly funded R&D results. They have a historical traditional view of science as an independent objective activity carried out in the 'ivory tower' and commercial activities are outside the scope of a self-respecting academic scientist. This view directly affects **the commercial and social usefulness of the scientific results (2).** It is important that basic R&D projects have to be oriented to those scientific areas that are of interest to the production sector. While the outcome has to be of a high level of excellence, however, not all countries measure the **excellence and quality of the academic research (3)** systematically. Moreover, success in the market depends on the fact that research projects have to be carried out: within a pre-established time frame; with a high level of efficiency to ensure that cost are kept at low levels (to ensure prices acceptable in the future markets); and the results have to be kept confidential. Prioritizing the commercial usefulness of research results is not only a technical question but also a question of timing, costs and confidentiality.

[29] Akzo Nobel, Bang & Olufsen, ICEpower, Gambro, SCA, Swisscom, Telia Sonera, Tetra Pak.

These are attributes which often contrast – as will be discussed below - with the interest and culture reflected in the micro behaviour of academic scientists. The fourth aspect which implies constraints for SIREs is **the priority setting and the long term planning for research activities (4)**.

Firstly, all public funds have to support those scientific fields whose potential outcome is interesting for future commercial applications or social needs. Secondly, the distribution has to avoid the dispersion and fragmentation of those R&D efforts which ensure a sufficient critical mass that allows for the advantages of scale. The allocation of funds for public research is frequently the result of historically determined factors and the lack of original policy making ideas implies continuity of this historical context. Such inertia is common practice in many countries (Canton et al, 2005) but this may be sub-optimal and could impede the reinforcement of investments in new emerging technological fields. However, the prevalence of commercial usefulness of basic R&D and the promotion of short-term applied research should be combined with the strategic planning of research towards long-term basic or fundamental research objectives (see also the next section).

The last group of barriers or problems which limit science-industry relationships are related to the **institutional and cultural setting of the scientific community (5)** including its organisations and the individual researchers. Probably the most important stumbling block is **the formal and informal reward structure for scientists in the public research sector** which is clearly oriented to scientific outputs while the commercialization of research results and cooperation with industry is not recognized in the appraisal of the researchers' activity. Canton et al (2005) argues that scientific recognition is based on a culture of 'publish or perish' and its reward structure does not encourage activities to bring science to the market. One of the most common aspects of the cultural differences between firms and scientists is the level of openness**.** The **'norm of disclosure'** from the scientific community is in contradiction with the **'norm of secrecy'** common to the market and private enterprises (Dasgupta and David, 1994). Scientists have to publish to promote themselves while firms prefer not to publish their research results (or at least parts of it) to appropriate and commercialise the results in a temporally monopoly.

Another important barrier for the conversion of scientific results into commercial products is **the lack entrepreneurial spirit by academic scientists.** Good entrepreneurial culture implies that the researcher understands and identifies possible commercial applications. This lack of entrepreneurship is related to a researcher's self-perception as having independent academic objectives whereby commercial activities are outside one's scope. Moreover, on an individual level a number of researchers consider applied research to be a rather boring and remote activity, far removed from the original abstract idea (Thursby/Thursby, 2000). Moreover, even if scientists were aware of market opportunities, they could lack the required qualifications to run the whole process of commercialisation and protection of their innovations. Other factors of the cultural and institutional setting worth a mention relate to **the laws of ethics and standards** imposed, either by a firm, organisation or the national government. Such laws lay the rules on the limits permissible on scientific research. Ethical standards are often contained in a 'code of ethics' and normally restrict research. Research which interferes with the human body often features prominently in such codes (whether they are written or unwritten).

4.3.4.2 Organisation management of the technology transfer activities HEI, PROs and technology centres

Schmoch (2000) offers an analysis of the critical success factors (CSF) of the technology transfer activities of the main scientific and applied research centres in Germany by analysing the best practices of technology transfer in their major research institutions[30] and technology transfer units ('Intermediaries'). The CSF mentioned by Schmoch can be split into two groups. The first indicates the CSF of the internal performance and organisation of the in-house research activities to ensure a satisfying technology transfer in both the short and long term. In fact, these aspects are similar to the concepts of the strategic management literature. The scientific organisation could be compared with those firms that are looking not only for the

[30] Universities, Max Planck Society, Fraunhofer Society, Helmholtz Association

current 'sale' of knowledge but also to their future markets in the medium to long term. Therefore they have to analyse their portfolio of products (knowledge) by strategic audits and secure future 'business' by strategic long term R&D planning and investments. They should carry out a realistic assessment of existing competencies and capacities in order to adjust and reorient their strategies to new scientific and technological trends. Such strategic audits should include a broad range of external experts from science and industry who should design a clear framework regarding the future integration of scientific and industrial demand and requirements. This discussion is similar as the one about the funding model (block versus competitive funding) for public R&D (see also section 4.2.3.3)

The second type of CSF is the organisational setting of transfer activities. How to put our products or knowledge on the market and which distribution channels are the most effective and efficient? In the case of the balance between long term strategic R&D and short term applied R&D, the joint public/private institutional set-up is already mentioned. Another organisational aspect mentioned by Schmoch (2000) is the decentralisation of the transfer responsibility. The separation of the central knowledge transfer department and the scientific department could have negative effects for technology and knowledge transfer. The responsibility should be assigned to the departments and researchers for transfer in combination with the establishment of incentive structures for transfer. This does not mean that external technology transfer units in support of the scientific departments are not necessary. In fact, some of the transfer activities could or should be externalised – albeit with direct involvement of the scientific department - especially those related to direct market oriented exploitation (development of prototypes, experimental production etc.). Such externalisation is important because these activities require special skills which often go beyond the competencies of scientific researchers and could also raise some legal problems. However, as already mentioned, such externalisation should be combined with a close institutional linkage of the external units to central institute and its scientific departments which are aware of the potential and the limits of the novel technologies and their commercialisation.

4.4 A meta-evaluation in search for the best practices for evaluation studies

4.4.1 Overview

This section is the central part of the Chapter in which the results of the meta-evaluation will be presented. An in depth analysis will be given of the IA in the context of science-industry relationships. It will also identify those aspects which are more frequently evaluated as well as highlight the main shortcomings of the IA studies. The success of an evaluation is highly dependent on the use of good methodology to evaluate R&D and innovation policies which can enable the generation of policy recommendations and best practices. However, at the same time, a good evaluation analyses the lessons to be learnt through the identification of good practices and critical success factors. Evaluation studies are an important learning mechanism. Very often, the conclusions and lessons of an ex-post evaluation of any instrument is used as the primary input for future ex-ante evaluation for new instruments (or the adjustments of existing instruments) This should be the normal process of the policy cycles based on the continuous improvement of instruments. As previously mentioned, the outcome of this study in the form of recommendations for the design of policy evaluations and policy measures, is based on several complementary activities:

(1) Literature review on critical success factors of science industrial relationships (See section 4.2);

(2) Literature review on best practices of policy making and policy evaluation (see chapter 2.5.1);

(3) Exchanging experiences and best practices of the R&D and innovation policy agencies of the different partner countries of this project for the use and methodology of impact assessment of policies;

(4) Meta-analysis of 32 evaluation studies which analyse the impact of Public Private R&D cooperation policies and the support and impact of technology centres.

In recent years there has been an increase in the commissioning of studies to analyse SIRE by national governments and international organisations. Furthermore, there exist a broad number of policy instruments to promote such linkages and their impact was evaluated. Therefore, this study includes a thorough review of a broad set of publications (evaluation studies), not only including those IAs carried out in the partner countries of this project but also taking into account the conclusions and recommendations offered by studies completed in other countries.

In order to ensure that the meta-analysis is as exhaustive as possible, the study included an evaluation of an array of instruments, using a well-defined methodological approach that generates a learning process, so the maximum number of studies was included. The problem is that evaluation studies belong to 'grey literature' which is sometimes difficult to detect or identify and is not always publicly available. Therefore, it was decided that all existing studies in the partner countries would be analysed and complemented by IA from carried out in other European countries. In fact, all the studies which were identified as useful were included. The identification of studies was based on: the knowledge of the involved policy agencies of the network; the studies available in the web page of INNOAPPARAISAL[31] and of the ERA watch organisation; the web site of some specific policy agencies with a large tradition in evaluation studies; a specific search with relevant key words in 'Google'. The case studies revised for this meta-evaluation included all identified studies, although this does not mean that they are totally representative for the overall situation. In fact this study does not pursue representativeness to illustrate what is done on average, rather, the main best practices were identified. The methodology used to collect data included gathering all evaluation studies carried out by the partner countries in the project, and a search for more studies outside the participating countries (and not just limited to European countries) by analysing their particular web sites.

Box 4.6: Selection of handbooks and other publications that offer a broad overview and methodological approach to evaluation studies for R&D and innovation policies

- EC, 2002;, RTD Evaluation Toolbox - Assessing the Socio-Economic Impact of RTD-Policies, *IPTS Technical Report Series,* EUR 20382, Seville, IPTS (Institute for Prospective Technological Studies) and Vienna, Joanneum Research Institute of Technology and Regional Policy. http://epub.jrc.es/docs/EUR-20382-EN.pdf
- EC, *2008;* Establishing a set of indicators for measuring the impact of R&D policies" *BEFORE: Benchmarking and Foresight for Regions of Europe (EC, 2008)* www.ibs.ee/publication/BEFORE%20Indicators%20Study%20Final.pdf
- EC, 2006; Research with an impact. Evaluation practises in public research organisations. Lähteenmäki-Smith, Kaisa, Hyytinen, Kirsi, Kutinlahti, Pirjo & Konttinen, Jari. Espoo 2006. VTT Tiedotteita .www.vtt.fi/inf/pdf/tiedotteet/2006/T2336.pdf
- EC, 2006; SMART INNOVATION – Supporting the Monitoring and Evaluation of Innovation Programmes (DG Enterprise and Industry 2006) ftp://ftp.cordis.europa.eu/pub/innovation-policy/studies/sar1_smartinnovation_master2.pdf
- European Policy Evaluation Consortium (EPEC) 2005, Study on the Use of Evaluation Results in the Commission Final report Dossier n°1: Synthesis report and Annexes EPEC 31 May 2005 (Paris: Technopolis France, Bastiaan de Laat (Director)[32] http://ec.europa.eu/dgs/secretariat_general/evaluation/docs/eval_results_comm_2005_en.pdf
- Frechtling, Joy & Laure Sharp (eds.) (1997) User-Friendly Handbook for Mixed Method Evaluations, Washington: National Science Foundation (Directorate for Education and Human Resources, Division of Research, Evaluation and Communication) available at: http://www.ehr.nsf.gov/EHR/REC/pubs/NSF97-153/start.htm
- OECD (1997a), Policy Evaluation in Innovation and Technology: Towards Best Practices

[31] http://www.proinno-europe.eu/page/inno-appraisal

[32] This review of the use of evaluation in EC policies and programmes covers a wide range of policy fields, and only touches on innovation policies incidentally. Nevertheless, it contains a great deal of evidence about the use of evaluations in the policy process of the EC, and draws valuable lessons – based on careful study of various users of evaluations – that are relevant to the innovation policy field.

Paris, OECD.
www.oecd.org/document/23/0,3343,en_2649_34451_1822359_119681_1_1_1,00.html

- OECD (1997b) The Evaluation Of Scientific Research: Selected Experiences Paris, OCDE/GD[33] www.oecd.org/dataoecd/9/26/2754549.pdf
- TAFTIE (1997), ed Jari Romanainen TAFTIE Guidelines on Performance Indicators for Evaluation and Monitoring The TAFTIE Evaluation Network 1997, published at the Madrid Annual meeting 20th November 1997. www.taftie.org/Files/WORD/reportindicators.doc
- United Way of America (2002) Outcome Measurement: What And Why? An overview available at http://national.unitedway.org/outcomes/files/TPsOMWhatandWhy.pdf
- Technopolis, Georgia Institute of Technology and University of Sydney (2001), An international review of methods to measure relative effectiveness of technology policy instruments, Report published July 2001 http://www.technopolis-group.com/resources/downloads/reports/261_EZ_Final_010723.pdf
- Ruegg, Rosalie & Feller, Irwin (eds.) (2003) A Toolkit for Evaluating Public R&D Investment - Models, Methods, and Findings from ATP's First Decade Washington: NIST; July 2003 available at: http://www.atp.nist.gov/eao/gcr03-857/contents.htm

The objective of the review is to obtain valuable information about the shortcomings and the possible solutions and to offer a critical view on the quality and the appropriateness of evaluation studies in Europe. It is not intended to provide a comprehensive and complete manual for practitioners of evaluation studies, because such manuals already exist (see box 4.6). As already mentioned, a meta-evaluation of 32 evaluation studies was undertaken to identify what is evaluated in IA exercises and which aspects are outside of the scope for most of those assessments studies.

4.4.2 The meta-evaluation: the matrix approach to evaluate assessment studies

The methodological approach used in this project is a meta-evaluation or benchmarking of the identified evaluation studies in order to detect the best practices, the most appropriate indicators and the most relevant methods. The meta-evaluation is based on a matrix approach used to generate a learning process based on a comparison of existing evaluation studies. Before explaining the matrix approach some critical comments about the use and credibility of indicators will be offered, giving specific attention to international comparability, the methodological difficulties in measuring additionality and the concept's level of relative success and goal achievement in the case of R&D policies.

The empirical study carried out in this section basically analysed the policies that involved **undertaking science-based applied research directly focussed on the commercialisation of scientific results**. The two main instruments in this field - with a long standing tradition of policy involvement - are the support of cooperative R&D projects between scientific (public) R&D organisations and enterprises and the creation and promotion of technology centres. Therefore, the meta-analysis of the evaluation studies – reflected in the second part of this section - is limited to those two specific instruments.

A **standardised matrix-based approach** was used to create a quantitative inventory about (see figure 4.3): the type of instruments; the characteristics of the evaluation study; the indicators analysed; and policy recommendations. The use of the standardised matrix-based templates does not mean that the meta-analysis was limited only to a quantitative inventory of the percentage of studies that analysed certain characteristics or aspects and that used specific methodologies. A combined approach was followed in which the matrix model also included a qualitative review about the quality and usefulness of the existing studies to derive recommendations on the level of policy making and on the level of policy evaluations. Therefore, qualitative information was collected on the success factors and good practices included in the conclusions, the executive summaries and the section on the policy recommendations of each study.

[33] Report offers an overview of country experiences in the evaluation of basic research, but contains considerable insight into evaluation cultures in different countries, problems of quantitative and qualitative approaches, and other relevant topics.

Figure 4.3: Meta-analysis of evaluation studies. A matrix approach

Characteristics of the instrument (Matrix 1)
- Main objectives of the instruments
- Complementary secondary objectives
- Type of support (subventions, loans, …)
- Technological or sectoral focus versus horizontal support

Main character of the evaluation study (Matrix 2)

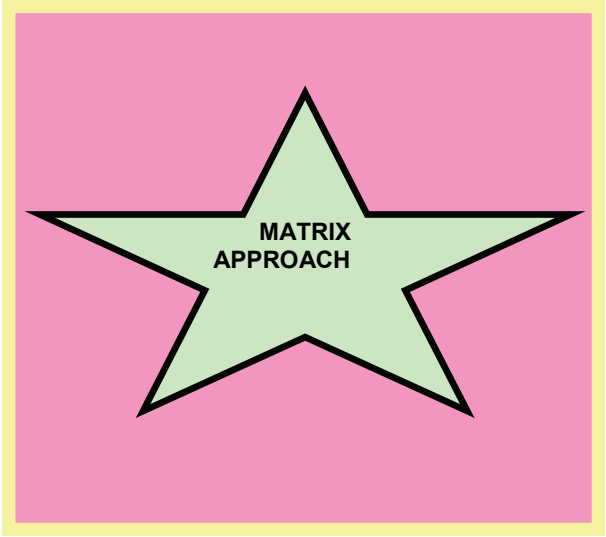
2.1.- Research questions or evaluation mission
- Who contracted the study
- Research question of the study
- Justification of the policies
- Improvement of the policy and its implementation
- Thresholds that hamper the impact or implementations

(Matrix 2) Main character of the evaluation study
2.2. General overview of the analysed aspects

- Type of activities partners
- Specific motives for cooperation
- Administrative aspects of the implementation
- Basic results of the supported project

(Matrix 2) Main character of the evaluation study

2.3. Type of evaluation data and methodological analysis
- Type of information (survey, official data....)
- Inclusion of a control group of not supported firms
- Cause – effect analysis versus inventory approach
- Creation of a profile of firms with a higher/lower impact level



(Matrix 4) Obstacles or barriers that influence or limit the effectiveness of the instrument (success factors)

4.1. Obstacles related with the project and partners
- Cooperation motives
- Obstacles during the cooperation
- Motives to not cooperate of not supported firms

4.2. Administrative efficiency and efficacy
- Implicit and explicit selection criteria
- Complexity and costs of the tenders and applications

Indicators on Additionality (Matrix 3)

3.1. Financial and behavioural additional
3.2. Technological and commercial additional
3.3. Motives/obstacles for cooperation
3.4. Broad social economic impacts in the sector, innovation system or society as a whole

(Matrix 5) Control variables on firm level for the econometric treatment to analyse the impact (Cause effect analyses and the profile elaboration) (Size, sector, innovative behaviour, export etc.

Matrix 6.1. Policy recommendations

Matrix 6.2. Recommendations for future policy evaluations

Matrix 6.3. Critical success factors

Main characteristics of the instrument and the methodology of the evaluation study
Indicators of the impact (additionality) and methodology of cause-effect analysis
Impact facilitating or obstructing aspects and success factors and recommendations

Table 4.3: Main characteristics of the evaluated instruments (Matrix 1)

Specific characteristics of the instruments	Total general	Cooperation	Cooperation & technology centres	Technology centres
Type of support				
Subventions	84.4%	71.4%	100.0%	90.0%
Low interest credits	9.4%	28.6%	16.7%	0.0%
Tax advantages	6.3%	0.0%	16.7%	10.0%
Type of support instrument				
Direct state support for specific projects designed and selected by the state	25.0%	21.4%	33.3%	20.0%
Support for a limited number of proposals of all technological fields or sectors	56.3%	71.4%	66.7%	20.0%
Support for a limited number of proposals in specific fields or sectors	21.9%	14.3%	16.7%	40.0%
General support for all firms (no selection mechanism exists like in the case of tax reductions	18.8%	14.3%	0.0%	20.0%
Number of evaluation studies revised	32[34]	14	6	10

Note: The sums of the columns are generally higher than 100% because some instruments offer more than one types of support. In the case of type of support for cooperation, two evaluation studies did not reveal the type of support.

The basic structure of the matrixes to analyse the evaluation studies or IAs for both types of instruments (public private cooperative projects) and the promotion of scientific research transfer in technology centres are reflected in figure 4.3. In fact, six basic types of matrixes were used. The first one recollects the basic data of the instrument that is evaluated (matrix 1). The second matrix analyses the main characteristics of the evaluation study. This matrix analyses which research questions are defined or, in other words, what is the evaluation mission. This matrix consists of two parts: the first part analyses which research questions were evaluated (2.1); the second part analyses which kind of data and methodologies are used (matrixes 2.2 and 2.3). The third group of matrixes analyses the type indicators which are used to measure the impact and/or the additionality of the impact. Matrix 3 revises the indicators for the financial, commercial technical impact of the project and its influence on firms' behaviour. In fact, matrix 3.1 analyses the financial and behavioural additionality in the form of learning; matrix 3.2 evaluates the technological and commercial additionality and matrix 3.3 studies the indicators to evaluate the impact on the cooperation (augment, motives and obstacles for cooperation (3.3). Moreover, these matrixes review the way in which the evaluation studies analyse the profile of firms with a higher or lower level of impact (simple frequencies or contingency tables versus econometric modelling). Matrix 3 also analyses in what form the broad social economic impacts the sector, innovation system or society (matrix 3.4). The way evaluation studies analyse the obstacles or barriers which influence or limit the effectiveness of the instrument are reviewed by matrix 4. In fact this matrix explores how and whether the administrative efficiency and efficacy were evaluated. Matrix 5 looks at the way evaluation studies used control variables on firm level for the econometric treatment to analyse the impact (cause - effect analyses and the elaborations of profile by size, sector, innovative behaviour, export efforts etc).

Matrixes 1 to 5 are actually a quantification of the percentage of evaluation studies which analysed certain pre-established subjects and/or indicators. A sixth matrix is added for more qualitative information about the policy implication and best practices for evaluation. Matrix 6.1 analyses the policy recommendations included in the reports; matrix 6.2 explores whether the studies identify recommendations (shortcomings) for future policy evaluations; and matrix 6.3 analyses whether there are critical success factors for evaluation.

[34] In the following tables the total number of studies is 32 because two evaluation studies analysed cluster policies and are only included in the column of total.

In conclusion, the meta-evaluation analysed which methods and indicators are used to evaluate what kind of research questions and which topics are not or rarely evaluated. The conclusions which are presented in this section are based on the outcome of this meta-evaluation and on the qualitative comments based on the broad experience of the partners of the project. It should not be forgotten that the partners which were involved in the project were policy agencies or organisations involved directly in the evaluation and implementation of the R&D and innovation policies.

In total, 32 evaluation studies were reviewed of which 14 analysed instruments are oriented towards public private cooperation, 10 studies evaluated the role of technology centres and 6 instruments promote simultaneously public private cooperation and the role of technology institutes. Moreover, two of the reviewed studies evaluated cluster policies. Most instruments (84% - see matrix 1 – table 4.3) offered support in the form of subsidies for a limited number of proposals which can be applied to all types of technological fields or sectors. The policies were generally not used to promote certain sectors or technological fields but were horizontal in character. In fact, such policies led the priority setting to the market or firms which present proposals in the most promising sectors or fields.

4.4.3 Revision of the research questions, the samples used and methodologies

4.4.3.1 Research questions

The matrix 2.1 (table 4.3) shows that the vast majority of the studies analysed (over 90%) include in their research question (at least theoretically) an analysis of the impact in the form of additionality. However, as will be explained below (section 4.4.4.3), most of the studies do not really evaluate this aspect directly. A high number of studies (almost 70%) include the justification of the measurement as a main research question. Improvement of the implementation and policy mix (69%) and the efficiency of implementation (63%) are also frequently included as one of the research questions in evaluation studies. Half of the studies analyse how to improve the implementation process and half analyse what the future strategy would be. The efficiency of the policy implementation is somewhat less frequently analysed in the case of the evaluations of technology centres (50%) as opposed to studies that analysed instruments to promote public private cooperation (65%).

Table 4.4: Methodological aspects: typical R&D evaluation questions or evaluated aspects (Matrix 2.1)

Which research questions are evaluated:	Total general	Cooperation	Cooperation & technology centres	Technology centres
Justification of the policy	68.8%	78.6%	33.3%	70.0%
Impact in form of additionality	90.6%	85.7%	100.0%	90.0%
Efficiency of the implementation	62.5%	64.3%	66.7%	50.0%
Improvement of the implementation and the policy mix	68.8%	71.4%	66.7%	60.0%
Process Improvement: How can we do it better?	50.0%	35.7%	66.7%	50.0%
Strategy: What should we do next?	50.0%	35.7%	66.7%	50.0%
Others …….	21.9%	14.3%	16.7%	40.0%
Thresholds that hamper the impact or implementation	37.5%	28.6%	66.7%	20.0%
Lack of transparency	15.6%	14.3%	16.7%	0.0%
The implicit requirements (Project definition. Etc…)	15.6%	0.0%	50.0%	20.0%
Implicit selection criteria	15.6%	7.1%	33.3%	0.0%
Others	6.3%	7.1%	16.7%	0.0%
Number of evaluation studies revised	32	14	6	10

4.4.3.2 Evaluation of critical success factors and obstacles

Section 4.3 analysed the best practices and critical success factors (CSF) for science-industry relationships. Moreover, it identified the main obstacles, barriers and facilitators of the overall framework for S-I linkages. Some obstacles are evident and do not require a specific analysis, while others are detected in studies not directly focussed on the evaluation of R&D and innovation policies, such as the studies based on the European Innovation Surveys. However other, often tacit, aspects are not easy to detect. In this case, the evaluation studies which assess the impact of the policies focussed on public private cooperation or the promotion of technology centres should have an important role. First of all, the firms and other agents involved in such policies accumulated specific experience which allows them to identify and describe the obstacles and best practices. Moreover, a combination of questionnaires and in-depth interviews could offer a more qualified overview of this aspect and possible policy measures. The following issues could or should be analysed in the evaluation studies:[35]

- What are the success factors or facilitators for cooperation projects and how could they be overcome?
- What were the main obstacles related with the partners (enterprises) and how could they be overcome?
- What were the main obstacles related with the partners (HEI, PRO or TC) and how could they be overcome?
- What were the main obstacles related with the overall framework on national and/or regional level and how could they be overcome?
- What were the main obstacles related directly with the policy instruments and how could they be overcome?
- Could additional policy measures facilitate a better development of the public private cooperation and the role of technology centres?

These issues are not included in the methodological approaches presented in the policy evaluation handbooks (mentioned in section 4.4.1; Box 4.6) or in other existing evaluation studies. The meta-evaluation in this chapter also shows that such critical success factors and the thresholds and obstacles which hamper impact (and could be the reason for failure of the instruments) are not frequently analysed by most impact assessment studies. Only one third of studies analyse the thresholds and obstacles which hamper impact. The absence of such analyses can be considered to be an important shortcoming because its inclusion would identify why the instrument does not have the expected impact and, consequently, it could offer some hints about how the individual instrument or the policy mix to promote SIREs could be improved. Section 4.3 showed that a theoretically well-developed set of instruments or policy mix could fail in the promotion of SIRES due to some specific barriers in the overall innovation system. Such barriers could include a failing institutional setting for the innovation system, the cultural background or innovative capability of the researchers, or other factors. Therefore, an ideal evaluation study should include in its analysis whether the policy instruments genuinely promote the creation or accomplishment of those critical factors.

Recommendation

- Evaluation studies should (i) include an analysis of the critical success factors in science-industry relationships to identify why the instrument does not have the expected impact and (ii) consequently gain some further information about the individual instrument or the policy mix in order to determine how SIREs could be improved (case studies 7, 11, 14 and 30)

4.4.3.3 An overview of the methodology used in the studies evaluated

Matrix 2.2 (table 4.5) shows that the most commonly used methodology for evaluation studies are questionnaires sent to enterprises or other involved agents. Such surveys were

[35] These are general questions which were discussed in detail in the second report of Work Package 4.

used in 69% of the total reviewed evaluation studies, followed by interviews with stakeholders (59%) and the realisation of case studies (41%). Several studies used a combination of these complementary methods using two (10 studies) or three (11 studies) complementary methodological approaches. The surveys sent to the supported firms allow for a more qualitative approach, but in this case they were based on the subjective opinions of the manager or owner of the firm. The case studies, interviews with stakeholders and the peer reviews by experts offer the possibility of creating a more in-depth qualitative analysis of the impact and problems in the implementation of the policy instruments. But in this case the outcome also depends on the opinion of the interviewed experts.

Econometric analysis of existing databases is achieved by a low number of evaluation studies (less than 20%). Such analysis offers the possibility of comparing, objectively, quantitative aspects of the possible impacts and additionality. The use of existing databases could be generalized to increase the number of evaluation studies and improve their quality (see below). However they have to be considered as complementary to the surveys and in-depth interviews which can create specific tacit aspects or problems. The optimal evaluation would make use of both possibilities, combining the subjective opinions of enterprises or other agents with the more objective facts of the data. Moreover, both could be used to control the findings of the other.

Recommendation

- The evaluation studies should use a combination of complementary approaches. Combining a more systematic quantitative approach (surveys) with interviews to obtain qualitative in- depth information (case studies 10, 11, and 30)
- After using surveys in a variety of ways to obtain the opinion of firms, also an 'independent' external database should be used. This database should include supported and non-supported firms and needs to offer the possibility of objectively analysing the relationship between support and innovative behaviour (case studies 1, 10, 11 and 30)

The optimal evaluation would make use of both possibilities, thus combining the opinions of enterprises or other agents with the objective data.

Table 4.5: Methodological aspects: methodology and/or information used (%) (Matrix 2.2)

Which kind of data and methodologies are used	Total general	Cooperation	Cooperation & technology centres	Technology centres
Specific questionnaire-based survey	68.8%	78.6%	100.0%	30.0%
Interviews with stakeholders	59.4%	50.0%	100.0%	40.0%
Case studies	40.6%	35.7%	33.3%	40.0%
Official statistics (R&D, patents)	37.5%	28.6%	66.7%	40.0%
Peer review by experts	25.0%	21.4%	0.0%	50.0%
Econometric exploitation of existing data	18.8%	14.3%	33.3%	20.0%
Bibliometric Data	9.4%	7.1%	0.0%	20.0%
Others	21.9%	14.3%	0.0%	50.0%
Number of evaluation studies revised	32	14	6	10

Today, European countries carry out innovation surveys (like the European Innovation Survey) which could be used for evaluation studies by using some advanced or novel econometric models. The use of such existing data bases is one of the cheapest and most effective ways to carry out evaluation studies. First of all because they are normally developed by the government or other (semi) public organisations and therefore its use or access could be easy and free of charge. Secondly, there is already some literature on how to carry out such studies. Over the last decade, a broad number of methods and models have been developed and, although there are still no standardised procedures, the cost of researchers carrying out such studies is relatively low. A case in point exists in Spain where

two data bases with micro firm level data are available.[36] Both data bases offer panel data for a certain group of firms during a period of several years. The access to those databases generated a broad number of evaluation studies carried out spontaneously by researchers and PhD students. The only problem is that such publicly available data bases do not include the names of the firms and this makes it difficult to match up firms which received support of certain specific instruments. These problems can be partially solved, especially if the evaluation study is carried out in cooperation with the public policy agencies. In this case the researchers can possibly make use of micro data in the offices of the national institutes of statistics. Theoretically, it is possible to add firm level data on the participation in specific support schemes.

The use of such databases only allows analysis of the impact of a limited number of aspects. It enables evaluation of the distribution of support by presenting a profile of the supported firms in relation to the firms that were discriminated against due to the explicit or implicit selection criteria or by the bias in the application of such criteria. Furthermore, it permits the user to analyse certain forms of additionality. Financial additionality is the most frequently analysed aspect, but in recent years the additionality in R&D results[37] or R&D behaviour[38] are also analysed. Therefore, governments and policy agencies should foster the availability of such data bases and the performance of evaluation studies among others by creating specific PhD scholarships. This does not mean that other methods are redundant, since the more qualitative aspects have to be analysed by specific surveys, interviews or case studies.

Another recommendation would be the review and use of already existing information and databases obtained in evaluation studies carried out in recent years. In general, several evaluation studies were carried out with a limited budget and timeframe in which the evaluators had to present their final report. These reports are usually very descriptive, based on contingency tables combined with qualitative data obtained in interviews and case studies. Several organisations involved in impact assessments and in public agencies that carried out or contracted such studies have existing data bases which are under used and could serve for broader in depth studies. Most agencies, especially within the financial constraints of the current economic crisis, do not have funds to contract more in depth studies. However, PhD students and researchers in public research organisations and universities could be interested in making use of those databases to deepen their existing studies. Such studies become more relevant if the data can be combined with administrative data of the policy agencies or with data of the European Innovation Surveys.

Recommendation

- Public administrations should make existing data bases on innovation (like the CIS survey) publicly available in order to promote their use for evaluation studies by advanced or novel econometric models (case studies 3, 5 and 30)
- The already available information and databases obtained in previous evaluation studies are used in a sub-optimal way. Their more intensive use and reinterpretation with econometric models by academic researchers or PhD students would generate an overall improvement in the quality of evaluation studies

Both options are considered to be 'cheap' ways to carry out evaluation studies.

36 On one side the Spanish Foundation for Science and Technology (FECYT) in cooperation with the Spanish National Institute for Statistics offers a limited sample of micro data of the European Innovation Survey. It is a sample of the total group of included firms. On the other side is the Business Strategy Survey' produced by the SEPI Foundation.
37 Herera and Nieto, 2010
38 Czartnitzky and Fier, 2002; and Herrera, 2008

4.4.4 Scope of the study, complexity of the statistical treatment and measurement of additionality

4.4.4.1 Scope of the study

An important aspect of evaluation studies is the depth and scope of the analysis. Taking into account that most studies include the justification of the policy as a research question (matrix 2.1, table 4.4) it would be especially important to analyse the additionality of the effects or the impact. In other words, it would be useful to identify whether support generated an extra increase of R&D activities and additional innovative results which would not exist without support. Table 4.6 (Matrix 2.3) reflects two specific aspects of the methodology related to the scope and complexity of the study. It shows that most of the evaluation studies (69%) only analyse the supported firms, which means that the impact and collateral effects on the unsupported enterprises is rarely evaluated. This practice is more evident in the case of studies which evaluate the policies focussed at technology centres, because their role as a hub implies that the experiences obtained can have a spillover effect to other clients. Moreover, most studies (75%) do not offer in-depth analysis about the type of firms with higher or lower level of impact or additionality. In other words, they offer no profile for the type of firms where the impact is less important. Such analysis would, firstly, explore in which way such firms have specific needs or thresholds which may require other types of policies or complementary specific support; and secondly such profiles could be a useful instrument taken into account during project selection.

Table 4.6: Methodological aspects: sample and the complexity of the statistical treatment (Matrix 2.3)

Evaluations studies that assess:	Total general	Cooperation	Cooperation & technology centres	Technology centres
Characteristics of the sample (which firms are included in the sample)				
Only supported firms (organisations)	68.8%	64.3%	66.7%	90.0%
Also unsupported firms	31.3%	35.7%	33.3%	10.0%
The way of statistical data processing				
1. A mere inventory of the results and effects.	59.4%	78.6%	33.3%	60.0%
2. A basic descriptive comparison of the impact by a few basic variables (contingency tables which compare by size, R&D intensity, etc…)	62.5%	50.0%	83.3%	60.0%
3. In depth analysis of the causal relationships using econometric methods or models	25.0%	28.6%	33.3%	20.0%
Number of evaluation studies revised	32	14	6	10

Recommendation

- Evaluation studies should make a complex profile of the firms with higher or lower levels of impact (case studies 7, 8, 11, 29 and 30)
- Evaluation studies should include administrative data for supported projects and firms (case studies 3, 4, 7, 8, 11, 29, and 30)
- Evaluation studies should analyse the causes of the lower impact level (case studies 11 and 30)

Such analysis would, firstly, explore in which way such firms have specific needs or thresholds which may require other types of policies or complementary specific support;

and secondly, this information could be taken into account at the project selection stage. Moreover, it would avoid errors based on apparent relationships observed in the simple correlation between two variables but that are caused by a third variable.

In relation to the first point – the limited scope of the assessment - one may argue that evaluation studies analyse the impact within the supported firms while the impact on other firms or society as a whole is only analysed in a few cases. This is an important shortcoming because the comparison of the supported and non-supported firms could be important to find out whether additionality exists. This brings us to a second important shortcoming: most studies only offer a basic analysis of the impact, as it is limited to a description of the results of the supported project. Such a description does not analyse the role of the policy to obtain such results, which brings us back again to the role of additionality in the evaluation studies and impact assessments.

Recommendation

- The evaluation studies should also include the unsupported firms in their analysis (case studies 3, 7, 8, 28, 29, and 30)

The comparison of the supported and non-supported firms could be important to find out whether additionality exists.

4.4.4.2 Additionality: a theoretical and methodological review

Theoretically, it could be argued that the evaluation of innovation policies should be based on an examination of the level of goal achievement of the ultimate objective; a net increase in social welfare. However, it is difficult to determine in which ways R&D policies fulfil this objective. One of the reasons for this is the lack of a comprehensive theory of technological change and economic development which includes the role of the State (Nelson and Winter, 1982; Nelson, 1984; Heijs, 2003), or a macroeconomic growth model that incorporates the contribution of innovation policies (Capron, 1992; Buesa/Heijs, 2007). Thus, the majority of evaluations have been undertaken at a microeconomic level, studying the effects of subsidies on firms who receive them, without taking into account their impact on other firms, on the production system in general, or on social welfare (Meyer-Krahmer, 1989; Heijs, 2003; Heijs/Buesa, 2007). In this context, the issue as to whether 'additionality is a central factor' has to be considered when undertaking an evaluation study. However, a broad number of aspects interact in cause-effect relationships between public support and the innovative activities in firms. Thus, most evaluation studies simplify their analysis applying implicitly the following arguments (Heijs, 2003):

(1) Expenditures in R&D generates a positive effect on economic growth and social welfare;

(2) Public support for R&D and innovation generates 'additional' private R&D investments;

(3) Consequently, public support has a positive effect on economic growth and social welfare.

The first assumption has been proved in a number of studies which have demonstrated the importance of R&D and technological progress for development, profits of firms (Mansfield, 1968; Griliches and Lichtenberg, 1984); and for economic growth in general (Clark et al., 1983; Fagerberg, 1994). With regard to the second assumption, results from empirical studies generally indicate that additionality exists.[39] However, some studies also indicate the opposite.[40] As such, the empirical literature is not totally conclusive.

Many of the studies analysed in our meta-evaluation were supposed to have analysed additionality, but most of them merely indicated its existence in an abstract way, based on

[39] A positive effect of public R&D expenditure on private R&D investment was found in the studies by Griliches (1979); Levy and Terleckyj (1983); Mansfield (1984); Scott (1984); Switzer (1984); Antonelli (1989); Diamond (1998); Klette and Moen (1998); Busom (2000); Czarnitzki and Fier (2002); and Almus and Czarnitszky (2003) Herrera, 2008; Buesa/Heijs 2007.

[40] The studies of Carmichael (1981); Griliches (1986); Lichtenberg (1987); Toivanen and Niinen (1988) and Wallsten (2000) indicate that public investment does not induce greater R&D expenditure.

the opinion of supported firms or experts, and none of them tried to quantify the increase in R&D expenditure.

In relation to accomplishing the second premise in our meta-evaluation, this showed that most studies only analysed the supported firms. The method to measure the additionality of the registered impacts and results of the supported projects is generally based on surveys which reflect a qualitative indication based on the subjective opinion of managers or owners of the firms that received public funds. The problem is that they could be prone to suggest the existence of additionality to offer reassurance that the support scheme will be maintained in the future. Therefore, other authors do argue for the need for more sophisticated analysis based on econometric models to measure the 'contra factual situation' (Heijs, 2003; Herrera, 2008). In other words: what happens to firms which did receive support when compared with the development of the R&D activities of similar or equal unsupported firms?

Once completion of the second premise has been evaluated, attention has to be oriented to fulfilling the third premise: public support has a positive effect on economic growth and social welfare. This third assumption is the most difficult to prove, because it would involve an extremely complex methodology (see below). The third premise would only be true if the total costs and benefits were quantified, and even then, the results could be misleading. The argument based on the three premises suggests that financial additionality seems to be a necessary condition although it is not sufficient to justify technology policy. Necessary because the lack of additional investments implies that public support is weak and that public funds are replaced by private investments (substitute or free riding effect). Not sufficient because, in spite of the existence of additionality and confirmation of the second premise, if the increase in social welfare is lower than the costs, then the net social welfare increase will be negative. Financial additionality, therefore, has to be completed with high levels of externalities, which implies that a substantial part of the production system can take advantage of the support given to one or more individual firms. However the difficulties in quantifying the financial additionality and/or to carry out a complete cost-benefit analysis in terms of social welfare imply that we have to look for supplementary indirect arguments to justify public support. To conclude, even supposing that the first two premises are correct, the effects of State support on economic growth and social welfare depends on the exact costs and benefits of the policy.

The meta-evaluation showed that the evaluation studies only analyse the second premise partially and the third one is evaluated by none of the studies. In fact, almost all evaluation studies – and not only the ones which were revised in the meta evaluation of this project- take for granted the validity of the first premise and analysed qualitatively that of the second. Most of the studies indicate the existence of additionality because the supported firms did mention – through questionnaires and/or interviews - their existence.[41] Once they confirmed the fulfilment of the first two premises the studies conclude implicitly (and without any critical discussion), that the third one will automatically be true due to a kind of 'invisible hand', similar to neoclassical models. However, no studies were detected which tried to contrast or control with empirical data the fulfilment of this third premise.

In the following paragraphs some remarks will be made regarding the necessity and difficulties of analysing fulfilment of the 2nd and 3rd premises. When discussing the methodological problems about the concept of additionality, one must bear in mind two important questions. First, how can we define and measure additionality? And second, up to what point is additionality necessary and sufficient to justify public policies on R&D? In relation to the first question, additionality can be defined as: *'something that is obtained due to public intervention, that shouldn't exist without it and that responds basically to the incentive effects of the public policies' (*Georghiou, 1994). The problem here is how to translate such a definition into a measurable concept, workable in the practice of evaluation studies. In fact, evaluation studies should analyse the impact with the counterfactual situation in which no support exists. However, as will be discussed below, it is almost impossible to establish a virtual situation - the non-existence of R&D policies[42]- and compare it with the real

[41] Only a few studies (not included in this meta-evaluation) tried to quantify the additionality. See among others Busom, 2000; Capron 1992; van Pottelsbergh, 1997; Guellec and van Pottelsberg, 2003.

[42] In experiments such as the testing of new medicines, a control group is established by excluding them from the use of a new drug (or giving a fake drug -placebo). In the case of R&D policies, such exclusion is impossible because it contravenes the rules of equal opportunity. Therefore a control group can be established through articifial means only (by economic modelling).

situation. An increase in R&D expenditure would have to be additional, in the sense that the innovative activities generated would not have taken place without public support. Such comparison is not free from methodological problems. In fact the literature mentions two main problems when analysing the contra factual situation. Firstly, the lack of control over the process of the subsidy distribution directly related with the second problem: the identification and establishment of the appropriated control group (a sample of similar firms that did not receive support). The importance given to these two aspects is a reaction to recent concerns expressed in econometric literature about the problems of 'endogeneity' and 'sample selection bias' which evaluation needs to face.

In the case of the endogeneity, it could be argued that the level of a firms' participation in aid programmes is determined by the government's decision to award support, and, implicitly, by the firms' decision to participate. This situation converts public funding into an endogenous variable which needs to be explained. If this is not the case, its inclusion in a regression model could give rise to inconsistent estimations (Busom, 2000).[43] If this were added, the possibility of distortions in the selection process (sample selection bias) arising from government pressure to select successful firms could be created. This could also be the case for the skill developed among some firms in attracting a significant number of subsidies (Lerner, 1999; Wallsten, 2000; Heijs, 2003). Thus, this indicates that it is not sufficient to control the problem of endogeneity, but that it is also necessary to isolate the policy effect of other possible causes which could explain an autonomous evolution of R&D expenditure (Arvanitis, 2002). Given that the distribution of subsidies is non-random, the potential outcome of a lack of policy – counterfactual state – cannot be estimated simply as a simple average of its value in the firms that do not receive subsidies. According to Wallsten (2000), although a positive correlation between subsidy and private R&D can be established using econometric regression models, it is not possible to determine whether subsidies boost private R&D spending, or if those firms which spend most on R&D are those which receive subsidies (sample selection bias). The distribution process is not a random process because the most innovative and active firms have more possibilities to obtain support. Independent of the method used, researchers agree that in estimating the causal effect of innovation subsidies it is crucial to compare the effect of the policy with a situation where there is no such policy operating (Papaconstinantinou and Polt, 1997). To conclude, estimating the additionality effect could confirm the second premise: public support for R&D and innovation generates 'additional' private R&D investments. Such estimation requires that the observable differences between the two groups of firms has to be controlled in order to ensure that the potential outcome is the result of the policy intervention and not a spurious bias of the background differences between the control group and the firms which obtained support.

As already mentioned, to accomplish the 3rd premise, financial additionality has to be completed with a high level of externalities - available for the production system as a whole - which are a necessary condition to ensure a transfer of social benefits to the rest of the production structure. Therefore, a broader concept of additionality – based on evolutionary theory - is required. Buiseret et al (1995) distinguish four types of additionality: financial, behavioural, technical and commercial. The last two forms reflect the extra output such as technical or commercial results which are generated by public intervention. Such extra output, of course, can only exist if a large number of projects yield good technological results, which are converted in commercial products introduced into the market. The failure of a high number of projects, however, cannot be considered directly to be a problem because innovation is a high-risk activity.

A last methodological remark can be highlighted in relation to the importance of the concept of additionality to justify R&D policies. Additionality can be seen as necessary, although not sufficient to justify public intervention because the additional increase of social welfare generated by public interventions should be higher than the costs of the policies. However, an important problem is that the existence of additionality (e.g. the increase of private R&D investments) does not always correspond with the prime objective of some technology policy instruments. Some of them are more focussed on promoting co-operation and the

[43] Recent studies addressing these problems have incorporated control groups into their models, and equations which explain firms' participation in aid programmes [Lerner, (1999); Busom, (2000); Wallsten, (2000); Acosta and Modrego, (2001); Arvanitis et al., (2002); Czarnitski and Fier, (2002); Almus and Czarnitski, (2003); Duguet, (2003)].

development of certain new specific technologies. Moreover, there could exist wider benefits (e.g. externalities) of public support on R&D, which outweigh the costs of free-riding (even if those benefits are difficult to measure precisely) and which would provide a good reason for tolerating free-riding. For example, the introduction of new technologies; maintaining high tech employment; providing an incubator for new high tech firms, etc.

Recommendation

- Evaluation studies should carry out a more complex and complete analysis of the different forms of additionality (case studies 7, 8, 11, 29 and 30)
- The evaluation studies should include an analysis of the complementary impact of other instruments (policy mix) (Case study 11)

4.4.4.3 Measurement of financial, technical, commercial and behavioural additionality

As already mentioned in the former sub-section, almost all evaluation studies – and not only the ones that were revised in the meta-evaluation of this project - take for granted the accomplishment of the first premise. They went on to analyse the accomplishment of the second premise qualitatively, based on the opinions mentioned in the surveys answered by the enterprises which received support. The impact of a firm in the form of financial additionality is analysed in almost 69% of the studies. However, in most studies it is only based on a descriptive inventory approach. The evaluation of behavioural additionality defined as the impact in form of learning effects or – in other words - the increase of technological capabilities and knowledge base, is also analysed frequently (in 66% of the studies). A second form of behavioural additionality is the increase in the cooperative attitude or culture. This aspect is analysed in 50% of the studies (see table 4.8, matrix 3.2). As can be expected, this percentage is higher in the case of those studies which evaluate instruments focussed on the promotion of the cooperation between agents of the innovation system. The motives and obstacles for cooperation are analysed by respectively 65.6 and 62.5 of the studies. The motives not to cooperate are less frequently analysed which is logical, taking into account that only 42% of the studies analysed the not supported firms, which are just the ones which could shine some light on this issue. Moreover the technological and commercial results are analysed by around 60% of the studies and the goal achievement of technological and commercial aims were evaluated by 40-60% of the studies.

Although here the term 'additionality' is used it has to be highlighted that most evaluation studies analyse the impact of the supported project without a clear analysis of the way in which the outcome could have been generated without public support. In other words, they do not analyse if the results of the projects are additional to the counterfactual state in which no support was given. Another important shortcoming is based on the fact that a large number of studies do not analyse the profile of the firms with a higher – lower impact (lack of profiling) or analyse the differences only for some basic variables based on contingency tables (lack of complex profiling). The problem is not only that most studies only analyse the supported firms (which implies that the additionality is not easy to evaluate) but also that the statistical treatment of the results in the supported enterprises can clearly be improved.

Table 4.7: The evaluation of financial and behavioural additionality (Matrix 3.1)

Evaluation studies that assess:		Total general	Cooperation	Cooperation & technology centres	Technology centres
Financial additionality		**68.8**	**78.6**	**100**	**40.0**
Quantitative data set	Inventory approach	37.5%	50.0%	33.3%	20.0%
	Descriptive comparison	9.4%	0.0%	16.7%	20.0%
	Analysis of causal relationship	3.1%	7.1%	0.0%	0.0%
Qualitative survey	Inventory approach	40.6%	42.9%	83.3%	10.0%
	Descriptive comparison	25.0%	21.4%	50.0%	20.0%
	Analysis causal relation	9.4%	14.3%	16.7%	0.0%

Elaboration of a profiles of firms with a higher or lower level of additionality	34.4%	28.6%	50.0%	20.0%
Behaviour additionality (learning)	**65.6%**	**57.5%**	**66.7%**	**70.0%**
Learning impact on the supported firm	43,8%	35.7%	33.3%	70.0%
Learning impact on the cooperation partner	40.6%	21.4%	66.7%	40.0%
Organisational learning	37.5%	28.6%	33.3%	60.0%
The study carried out a profiles	31.3%	35.7%	33.3%	30.0%
Number of evaluation studies revised	32	14	6	10

Table 4.8: The technical and commercial results and/or impact (Matrix 3.2)

Evaluation studies that assess:	Total general	Cooperation	Cooperation & technology centres	Technology centres
Technical results	62.5%	50.0%	100.0%	70.0%
Commercial results	53.1%	57.1%	83.3%	40.0%
Level of goal achievement	59.4%	42.9%	83.3%	60.0%
Technological goal achievement	46.9%	28.6%	83.3%	40.0%
Commercial goal achievement	34.4%	35.7%	66.7%	20.0%
The study carried out a profiles	12.5%	14.3%	33.3%	0.0%
Number of evaluation studies revised	32	14	6	10

Table 4.9: The augment of cooperation as a form of behavioural additionality (Matrix 3.3 and 4.1)

Evaluation studies that assess:	Total general	Cooperation	Cooperation & technology centres	Technology centres
Increase in the cooperative culture (Matrix 3.3)	**50.0%**	**64.3%**	**50.0%**	**40.0%**
Previous experience (before getting support) in cooperation	34.4%	28.6%	50.0%	40.0%
The study carried out a profiles	28.1%	35.7%	50.0%	10.0%
Motives for cooperation with PRO/UNI (Matrix 4.1)	**65.6%**	**57.1%**	**66.7%**	**70.0%**
Motives related with technology aspects	50.0%	42.9%	66.7%	40.0%
Motives related with economic aspects	46.9%	50.0%	50.0%	30.0%
Image making (reputation – quality stamp)	31.3%	14.3%	50.0%	30.0%
Reduction of the technical or commercial risks	25.0%	28.6%	33.3%	20.0%
Others	15.6%	7.1%	33.3%	20.0%
Obstacles during the cooperation (Matrix 4.1)	**62.5%**	**50.0%**	**83.3%**	**60.0%**
Lack of accessibility of the PRO/UNI	18.8%	7.1%	33.3%	10.0%
Lack of knowledge in PRO/UNI	12.5%	7.1%	16.7%	0.0%
Others	12.5%	21.4%	16.7%	0.0%
Motives to not cooperate with PRO/UNI	28.1%	28.6%	33.3%	10.0%
Lack of accessibility of the PRO/UNI	18.8%	7.1%	33.3%	10.0%
Lack of knowledge in PRO/UNI	12.5%	7.1%	16.7%	0.0%
Others	12.5%	21.4%	16.7%	0.0%
Number of evaluation studies revised	32	14	6	10

The tables 4.7 to 4.9 (referring to matrixes 3.1 to 3.3) show that around 12-34% of the evaluation studies offer a profile of the firms with a lower or higher impact. However, in the case of financial additionality, only a minority of the revised evaluation studies (between 3-9%) realise an in-depth analysis of the profiles and the causal relationships based on econometric models. Most profiles are based on a basic description for some specific variables presenting contingency tables comparing the impact by differences in size, R&D efforts, sector etc. Such contingency tables can erroneously indicate that certain types of firms may apparently have higher/lower impact. For example, the conclusion that smaller firms have a lower impact level could be explained by to the fact that they could belong more frequently to low tech sectors which generally have a lower impact. The use of econometric models for profiling the type of firms with a higher/lower impact could overcome this type of bias. A second major shortcoming mentioned earlier is the fact that a low number of studies use econometric instruments to analyze causal relationships between the impact in relation to the firms' innovative behaviour or characteristics and to make a profile of the firms with a higher or lower level of impact. In short, the evaluation studies have a lack of profiling and should use advanced econometric instruments to improve both the description of firms with a lower impact (lack of profiling) and analysing the causes of such low levels of impact (lack of complex profiling).

A third main shortcoming is the lack of analysis of the interaction between the different forms of additionality. The argument based on the three premises mentioned earlier suggests that financial additionality seems to be a necessary condition, although it is not sufficient to justify technology policy. Therefore, it can be argued that the broader concept - related to the notion of externalities - is more than justified due to the difficulties in measuring financial additionality and the necessity to create externalities. The technical and commercial results could outweigh the costs of free-riding (or the lack of financial additionality) which means that they also offer some elements to justify technology policy. To ensure technical and commercial additionality - or 'externalities' - the supported project must be technically 'successful' and the newly developed technologies should be introduced into the market. This implies that the firms will obtain good technological results and thus open up to new markets and/or improve their competitive position in existing markets. Another indirect form of generating externalities could be through cost reduction or the improvement of the profitability of the firms' activities. Behavioural additionality can also exist in the case of unsuccessful R&D projects. This type of additionality includes the learning process (or improvement of the technological capabilities), the increase of co-operative attitudes and the improvement of the innovative culture, which are considered as important forms of (non-financial) additionalities.

In view of the impossibility of quantifying such additionalities, IAs require not only an analysis of the different forms of impact but also an analysis of how the different forms of impact and/or additionalities are inter-related. Only two of the studies analysed for this meta-evaluation carried out such an analysis, but they offer contradictory results. One study argued that the free-rider firms (those supported firms in which the subsidy did not generate financial additionality) clearly had lower levels of non-financial additionalities (case study 3: Heijs, 2000). However, the other study did not detect differences between the level of financial and non-financial additionalities of free-rider firms versus those which showed financial additionality (case study 4, Heijs/Buesa, 2007).

To conclude, almost no studies analyse the correlation and overlap between the impact variables (use of combined variables) but that could be considered to be an important aspect of the IA.

Recommendation

- Evaluation studies should analyse the interaction and overlap between the different forms of additionality, together with complex profiling (case studies 3 and 4)

4.4.5 Evaluation of the main administrative efficiency and efficacy

As observed in table 4.10 (matrix 2.1) almost 70% of the evaluation studies included - as specific research questions - the notion of improvement in the implementation and the policy

mix; and 37.5% of the studies aimed to analyse the thresholds which hamper the impact or implementation of the policies. However, matrix 4 shows us that only 47% of the revised studies really evaluated the administrative efficiency and efficacy of the instruments. This apparent contradiction means that the improvement of the instruments and their implementation is included as an objective in the research questions. However, in the studies they are probably only analysed implicitly and not as a specific topic with direct questions. In other words, the outcome of the studies can offer indirect hints about the improvement of the implementation but more direct questions might be better for the assessment of such research questions.

Table 4.10 Administrative efficiency and efficacy (Matrix 4.2)

Evaluation studies that assess:	Total general	Cooperation	Cooperation & technology centres	Technology centres
Administrative efficiency and efficacy	**46.9%**	**35.7%**	**66.7%**	**40.0%**
Implicit selection criteria (selection criteria used by the agency but not explicitly mentioned)	37.5%	28.6%	50.0%	30.0%
Explicit selection criteria (clearly mentioned by the funding agency)	28.1%	21.4%	50.0%	10.0%
Complexity of the application forms	34.4%	35.7%	50.0%	10.0%
Economic and time costs of the application process	21.9%	21.4%	66.7%	0.0%
Number of evaluation studies revised	32	14	6	10

Recommendation

- Evaluation studies should put more emphasis on the evaluation of administrative efficiency and efficacy (case studies 5, 9, 10, 18, 19).

4.4.6 Other shortcomings of the evaluation studies

This section deals with other shortcomings and recommendations beyond those highlighted above for future IA studies and for the policy design. The recommendations and conclusions mentioned in the section are mainly based on the results of matrix six. As mentioned above, the first five matrixes are a quantification of the subjects analysed and the methodology and indicators used in the studies. However, a sixth matrix was also added to gain more qualitative information about the policy implications and best practices for evaluation. In a nutshell, the following aspects are mentioned directly in the evaluation reports as: policy recommendations (Matrix 6.1); recommendations (shortcomings) for future policy evaluations (6.2); and critical success factors for the evaluation (6.3).[44] The main aim of the evaluation studies is to offer some justification of the policies and to offer recommendations in relation to the implementation of the policies in the future. Therefore, establishing recommendations for methodological aspects in order to improve the quality and usefulness of evaluation studies is a minor aspect and is often derived from problems detected during the evaluation. Most methodological remarks included in the case studies are related to the data sets and critical comments on the reliability of the outcomes of their own impact assessments. This section distinguishes two types of methodological remarks. Section 4.4.6.1 discusses the recommendations related to the aspect that should be included in evaluation studies but were not analysed. The second group analyses the recommendations about the improvement of the methodology and implementation of the impact assessments (section 4.4.6.2). Moreover,

[44] The results of these matrixes –based on qualitative comments and suggestions- are not reflected in any table and will be summarised briefly in this section.

several general remarks included in those qualitative matrixes did generate or confirm the recommendations already mentioned in the grey boxes (see the references to the case studies in the boxes).

4.4.6.1 Aspects or research questions not included in the evaluation studies

In relation to the elements which were not analysed in the evaluation studies, a first important aspect is the absence of a comprehensive analysis of the impact of the policies on the innovation systems. In other words, the impact on the fulfilment of the critical success factors, the solution of the possible barriers for science-industry relationships and systemic failures mentioned briefly in section 4.3 of this chapter. Evaluation studies can and should play an important role in the assessment of the failures and obstacles in innovation systems. The enterprises and agents which receive support for cooperation are the very same organisations which have broad experience and can therefore offer very useful and qualified information about barriers and obstacles. They can also provide some input regarding improved implementation and possible additional policy measurements. A complementary approach is recommended. As a first step, surveys can be used to offer an exploratory approach asking for specific obstacles in prefixed answers and simultaneously offering the opportunity to give qualitative information based on an open question. The findings obtained by this procedure could be analysed in depth by following up interviews with enterprises or experts (e.g. with associations of firms). It is true that some of the failures are analysed by the European innovation surveys and other studies but the sample of firms that receive support for public private cooperation often have more experience and therefore a more qualified opinion. The existence of such obstacles could make it more difficult or impede the successful implementation of certain policy instruments and therefore should become an integral part of the evaluation studies. Therefore, in a third step new analysis should be introduced which measures the level of impact (additionality) of the supported projects against the significance of the obstacles. In other words: do firms that consider certain obstacles more important have a lower impact?

A second factor mentioned by some of the reviewers of the 32 evaluation studies is the lack of analysis of the role of the evaluated policy instruments in the policy mix. In this case, the evaluation studies could take into account the complementarities of the instruments and interaction effects. Some studies did include several instruments in their analysis because they were similar or directly related instruments and/or were implemented by the same agency. But none of the studies tackle the role of the evaluated instruments in the broader policy mix.[45]

The lack of analysis of broader long term social and economic impacts was also mentioned several times. Matrix 3.4 specifically analysed the way in which such impact was measured. In a strict sense none of the evaluation studies did analyse long term impact. Firstly, because the IAs were carried out during the policy implementation stage or a few years later. Secondly, the assessment of long-term impact is almost impossible or even totally impossible due to the fact that policies are just one small aspect within the overall economic context, especially in the case of one specific policy instrument. For example, the social economic impact generated solely by one specific instrument (that promotes cooperation in R&D) cannot be clearly isolated from the overall impact of the complete mix of R&D and innovation policies. This is due to the fact that several of those instruments normally foster cooperation and, moreover, other instruments of the policy mix pursue and/or have similar impacts. Most social and economic changes are also the result of other incentives such as the (inter)national market circumstances, the overall economic development (crisis, emerging sectors etc.), or other non R&D based economic policies (like the monetary policy, liberalisation of the markets, etc.). Isolating the impact of the R&D and innovation policies (or a specific instrument) from other incentives and explanatory factors is very complex and therefore the measurement of long term social economic impact is almost impossible. Moreover, such a process would be very costly in time and requires high additional budgeting.

Almost no studies analyse the correlation and overlap between the impact variables or use combined impact variables. An analysis of the correlation and overlap between the impact

[45] Except in the case study 32 where they asked experts about the role of the instrument in the policy mix and if there exist alternative instruments that could be used to obtain support for the same or similar projects or R&D activities.

variables would allow a more detailed analysis of the type of firms which show a high level of impact expressed simultaneously in several aspects. This makes it possible to classify the type of firms in several classes depending on the type, intensity and combination of impacts. The identification of those firms with a low impact could offer recommendations to adjust the policy instrument and or the selection procedures. Another aspect mentioned by some of the reviewers is the lack of the use and construction of 'multiplicators' to quantify the impact and value of the government contribution. In other words, how much social welfare or economic growth is created with the investment of one Euro?

Recommendation

- Evaluation studies should analyse the impact on the fulfilment of the critical success factors, the solution of the possible barriers for science industrial relationships and systemic failures (case studies 7 and 30)

The existence of such obstacles could make it more difficult or impede the successful implementation of certain policy instruments and therefore should be an integral part of the evaluation studies.

4.4.6.2 Methodological and organisational recommendations to improve the policy evaluation and impact assessments

Perhaps one of the most important recommendations for the evaluation of policies mentioned in several IA studies of the meta-evaluation, is the fact that such evaluations should start in the phase of policy design and policy implementation. The policies should define the quantifiable objectives and temporal horizon during the policy design process and should also pay ex-ante attention to the specific information needs of for future evaluation studies. In fact, most of the methodological comments mentioned in the reviewed evaluation studies engage with the problems involved in developing the appropriate data set required to evaluate the impact. Several studies mentioned the importance of good, continuous information management starting from the beginning of the implementation, to ensure and improve an optimum data set necessary for the evaluation. The launching agency should take into account from the outset the required (administrative) data needed for future evaluations. In other words, implement a system of continuous data collection for follow-up studies and the measurement of effects. Moreover, in some of the studies they mentioned the low use of existing administrative data (i.e. social security data) or statistics which are publicly available. Another issue about the use of data and information mentioned in some evaluation studies is good practice based on combined use of quantitative data bases, qualitative surveys and in depth interviews which offers – as already argued in section 4.4 - complementary data on the impact and obstacles.

Two methodological hints are given for the implementation of evaluation studies. First of all, evaluators have to design questionnaires which are 'to the point' and avoid the use of very extensive time consuming surveys which diminish the response rate. A second methodological remark related to the implementation of evaluation studies is about the optimum time span between the termination of the policy implementation and the moment of the evaluation study. Policy makers want to carry out evaluation studies as soon as possible because the ex-post evaluation offers 'ex ante' information for the design of new policies or the adjustment of the evaluated instrument. Simultaneously, the impact of policy instruments is neither direct nor immediate. Particularly in the case of policies that promote science-industry relationships, the policy impact can delay in time. Science based R&D projects normally require a longer time span to convert the results in products into the market than in the case of innovation and other 'near to the market' projects. The correct timing of the evaluation study is an important aspect especially in the case of the measurement of the impact of science-based projects.

Recommendation (see also chapter 3)

- Evaluation studies should start in the policy phase defining quantifiable objectives and

temporal horizon and develop the appropriated data set right from the outset of the implementation (case studies 7, 16)

- Evaluators have to design succinct questionnaires and avoid the use of very extensive time consuming surveys that diminish the response rate (case study 11)
- The correct timing of the evaluation study is an important aspect especially when measuring the impact of science-based projects (case study 7, 8)
- Clear objectives made explicit during the design of the instrument are important for a good evaluation study (case 10)
- When carrying out a survey, the choice of respondent is important to ensure optimal replies. The person who responds needs to be aware of the impact and the overall context of the technology centre (case study 11).

4.5 Conclusions

In this last section some final remarks about the meta-evaluation will be made. As mentioned, the aim of this study was not to write a comprehensive and complete manual for practitioners of evaluation studies, because such manuals already exist. However in this part of the CIA4OPM project, a revision of 32 evaluation studies was made to find – implicitly - in which ways the guidelines for good practices in evaluation studies were followed. Our meta-evaluation showed which aspects were evaluated in the IA exercises and which aspects were excluded or were outside of the scope of the evaluation studies. The objective of the review was to obtain valuable information regarding short-comings, to offer possible solutions for the improvement of the design of future evaluation studies and to provide a critical view on the quality and appropriateness of evaluation studies in Europe.

This meta-evaluation offers a first general approximation and some general conclusions. It did not enter into details about which specific indicators were used to measure financial or behavioural additionality, for example, or what the (dis)advantages of those indicators might be. While this is an important and relevant question it was beyond the scope of this study. In future, a more detailed review could be undertaken in order to analyse the credibility and (dis)advantages of certain indicators. This is one aspect not discussed in most of the guides for evaluation studies.

As already mentioned, the meta-evaluation included all identified studies, but this does not mean that they are totally representative for the overall situation. Regardless, we believe that the findings do represent a significant part of the real picture and offer a general indication as to how evaluation studies are carried out, and the nature of their main shortcomings. Moreover, we did not pursue a representative sample that shows what is done on average in the assignment studies. Rather, we looked for best practices and for methodological recommendations to improve future assessment studies.

4.6 References

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Chapter 5: Impact assessment and performance-based funding of universities

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5.1 Introduction

With their diverse functions and tasks - be they tertiary education, conducting research, the transfer and dissemination of knowledge or other roles - universities constitute one of the main pillars of OECD country/region's innovation systems and are of strong relevance for the so-called 'knowledge-based economy' (see e.g. the Lisbon Agenda, the European Research Area Vision and in the Europe 2020 strategy). Universities are seen to have key roles in leveraging economic growth potential through their interlinked roles in education, research and innovation (European Commission 2003, 2005, 2006, 2007).

In many European and OECD countries, universities are the main providers of long-term (basic) research activities, which are generally riskier (in scientific terms) than those of private firms and less focused on commercialization; they contribute significantly to the extension of the knowledge base and constitute (together with public research institutions) a complementary part of the private R&D sector in the innovation system.

Given their major importance for a country, the policy level has to consider carefully their appropriate governance and funding. Particularly in recent years, universities are therefore faced with increased attention from the policy level but also from the general public. There are mainly two reasons for this:

1. Universities are largely publicly funded. In a period with increasingly scarce public funds, the effectiveness and efficiency of the use of these public funds is of utmost importance. By undertaking evaluations and introducing performance-based funding systems, the policy level strives for increased accountability;

2. The particular relevance of scientific research for long term impact on the innovation potential and social welfare: while the higher education sectors accounts for roughly one quarter of total R&D activities, it is responsible for more than half of the expenditure in basic research in Europe (see Figure 5.1 below).

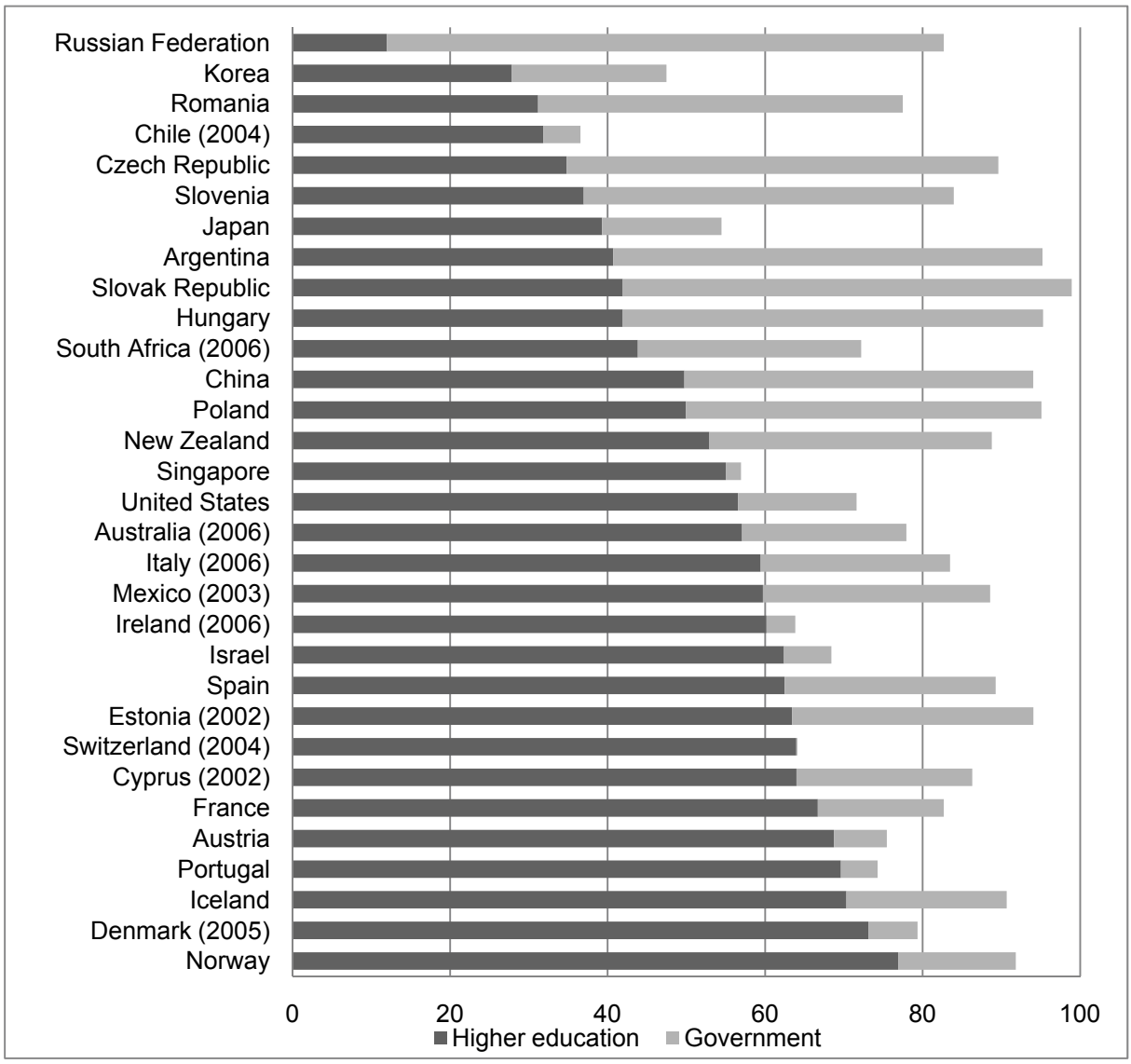
In order to make the universities of the European Union more competitive, the EU Member States (and also other countries) have launched a series of activities. Some common trends that can be identified are:

- An increasing institutional autonomy and accountability of universities;
- The use of performance contracts in order to justify spending of block grants for research and to guarantee strategic orientation meets societal and political targets;
- The promotion of (national) and university based centres of excellence (e.g. German initiative for excellence in research);
- Initiatives to foster collaboration with business enterprises;
- Changing funding models.

(Austrian Federal Ministry of Science and Research, 2009)

[46] Contributions by Eric Hauet, Edgar Moya, Stijn Eeckhaut, Thorsteinn Gunnarsson, Lucie Vavrikova, Özlem Dogan, Nikolay Mateev and Peter Teirlinck.

Figure 5.1: Basic research performed in the public sector (by Higher Education Institutions (HEI) or by other public research institutions), 2007



Source: OECD, Research & Development Database 2009

A major trend concerning funding models seems to be a reduction of institutional block funding to universities on the one hand, and **the introduction of performance-based funding systems** and increased use of **research grants** on the other (ERAWATCH NETWORK ASBL 2008). Performance-based funding as a policy instrument for the governance of universities is a relatively new instrument in most countries. The only country which has been using such an approach for longer period is the United Kingdom (UK) (since 1986). In this context, the assessment of university-based research has been high on the political agenda.

5.1.1 Methodology, approach and research questions

The overall aim of this chapter is to discuss and reflect on the use and implementation of performance-based funding systems/schemes for universities, particularly the (policy) rationales behind them, their success factors and their limitations.

Our approach, therefore, is to analyse the topic of performance-based funding from the perspective of the policy level, contributing to the question of how the policy level could

implement and use performance-based funding systems in a more effective way. This chapter and its conclusions/recommendations are based on several complementary activities:

(1) Literature review on the performance-based funding of universities and the assessment of university-based research;

(2) Analyses of research assessment exercises which are already used by the policy level in performance-based funding systems for funding universities;[47]

(3) Exchange of experiences and critical discussions by the different partner countries in respective workshops.

Our approach regarding the reflection on performance-based funding schemes for universities is to focus on three central research questions:

1. Why are performance-based funding schemes introduced by the policy level for the funding of universities? What are the rationales behind this?

2. Have the performance-based research funding (PBRF) schemes currently in use been 'successful', or to be more precise: are they considered as having met the expectations of the policy level? This is a crucial question for the policy level in general, especially as nearly every country intends to increase its share in performance-based funding (or to introduce such a system). And which factors have made it a success?

3. What are the limitations and remaining problems of performance-based funding schemes currently in use and what does this imply when setting-up and implementing PBRF-schemes?

The analysis of the diverse research assessment exercises/performance-based research funding schemes and their related in–depth discussions during the workshops and a conference (Madrid, 27th May 2010; Vienna, 30th September and 1st October 2010, Brussels, 8th December 2010) will form the basis for tackling these research questions, to be supported by the findings of the literature review.

Concerning the definition of a 'university', it has to be mentioned that despite the developments towards a European Research Area (ERA) and a European Higher Education Area (EHEA), national higher education systems and research systems are still characterised by large heterogeneity. Different types of higher education institutions exist, and the roles of public research institutions other than public universities also differ. For example, art schools are considered universities in some countries whilst being considered non-university higher education institutions in others. This also implies that there exists no common definition of what a university is, particularly which types of higher education institutions cannot be considered universities (Bonaccorsi et al 2010). In this chapter the institutions of interest are universities. For the purpose of this chapter they are understood to be characterised by performing at least research and teaching activities.

Another topic which is of major interest when discussing the use of performance-based funding approaches (but one which will not be extensively tackled in this chapter) is that of choosing the 'right' indicators for those approaches. It shall be noted that basic reflections on this topic can be found in section 5.3.

5.1.2 The selection of performance-based funding schemes

Within the project, 'relevant' research assessment exercises/ performance-based funding schemes were identified, analysed and then discussed in detail. Research assessment exercises were considered to be 'relevant' when they were already in use in performance-based funding schemes (and therefore linked to concrete funding decisions) and when there was enough information available. As a matter of fact, the chosen schemes correspond to a high degree with the participating countries (the cases from Austria, Czech Republic, Spain/ Madrid, France and Iceland). This is mainly related to the fact that such a focus enables us to collect in-depth information and to go beyond the available literature on these assessment exercises. In addition, two further schemes (from Germany and the UK) have been added to

[47] It has to be noted that in addition, seven research assessment exercises that are not (directly) linked to concrete funding decisions have been analysed within the framework of this project. Their analysis is not reflected in this Chapter, as it is about the performance-based funding of universities.

the list of analyzed cases. Their selection was mainly based on the related work of an Expert Group of the European Commission which also identified a number of interesting research assessment exercises (European Commission 2010). See Table 5.1 for the list of analysed cases.

Table 5.1: List of analyzed cases

Nr	*Policy Measure*	*Country*
1	Formula-Based Funding of Universities	Austria
2	Excellence Initiative	Germany
3	Performance-relating contracts between the Ministry of Culture and Education and Universities concerning the funding of teaching and research activities	Iceland
4	Financing Model of the Public Universities in the Madrid Region	Spain
5	Research Assessment Exercise (RAE)	United Kingdom
6	Performance-based funding of universities / Research Evaluation of universities and their units by AERES	France
7	Methodology for R&D results assessment	Czech Republic

Our approach, therefore, was to begin with an in-depth analysis of the identified cases based on a (newly created) template, followed by a discussion of the findings in two workshops in Madrid (Austrian, Czech and French case) and in Vienna (UK case) and as well in the CIA4OPM conference (German case). For the two cases which are not represented by a country in the CIA4OPM project, experts were been invited (Andre de Campos (CENTRIM, University of Brighton) for the UK case, Ulrike Eickhoff (DFG) for the German case). Due to the information available, emphasis will be put on the French and Czech cases.

The work on performance-related financing for R&D is often limited by lack of available information regarding the methods applied by each country. The work of this project benefited from the exchange of inside information on multiple systems (Austria, France, Czech Republic etc.)

5.1.3 Guide to this chapter

This chapter consists of four main sections. This first offers a general introduction to the topic and section 5.2 provides basic information on the objectives and tasks of universities to outline the context of performance-based funding systems. Section 5.3 discusses the three research questions as outlined above, based on the analysed research assessment exercises, the discussions during the workshops and the literature review. The final section offers some conclusions and some recommendations for the policy level.

5.2 The three missions of universities

Apart from education, scientific research has always been one of the main tasks of universities. However, the expectations universities face – particularly with respect to the role they play in a national innovation system – have undergone continuous and substantial changes which have transformed how they are seen and understood today.

In addition to the education of elites, fundamental research was increasingly seen as one of the main tasks of universities from an innovation perspective, particularly since World War II, because knowledge generated by this type of research was found to be a critical input for the development of new technologies. Nuclear energy and space exploration were typical technologies on the agenda at that time (this was characterised by 'traditional', mission-led research and innovation policy (see Gassler et al. 2006)). Due to appropriability constraints of results from fundamental research, (public) universities and public research organisations received the majority of public funds for fundamental research. The fact that knowledge does not only encompass information that can be codified but also has a strong tacit component, this subsequently leads to the need for (research departments of) enterprises to co-operate closely with academic research units in order to have the absorptive capacity required to

make use of research results generated by academics (Cohen and Levinthal 1990). From a university perspective, this led to the requirement to engage with industry, the so-called 'third mission', which was subsequently enhanced by other forms of direct engagement with society (e.g. participation in the public debate, communication of research results to a broader public, contribution to societal questions etc.).

Other reasons for the growing importance of the 'third mission' of universities are the following (interrelated) factors: decreasing budgets generated a culture of 'value for money' (economic justification of the public expenditures) in universities; the understanding of the role of technological change and respective science-industry linkages for countries' competitive position increased; university research was (and is) seen as a way to promote local knowledge spillovers; and the growing interdisciplinarity of the applied sciences and the emergence of some key or multi-purpose science based technologies (Bercovitz and Feldman 2006; Breschi and Lissoni, 2001; Geuna, 1998).

The third mission of universities results in a recent[48] trend to promote the 'entrepreneurial universities'[49] which should be open to science-industry relationships and which shall aim at increasing their share of external funding. Main reasons for the openness of the 'entrepreneurial university' to the private sector are the following, for example (for more details see chapter 4 above):

- The autonomy of the universities;
- The finance model of the universities ('value for money' vs 'scientific freedom');
- The legal status of researchers (civil servants versus private contracts) and the selection and promotion mechanisms for researchers.

There is some agreement on the potential positive impact of the third mission of universities, and science-industry linkages on economic growth generally. However, some possible negative and unintended effects also have to be taken into account (Heijs et al., 2010):

The commercialisation of knowledge could lead to more secrecy and less disclosure (because stronger links with business could reduce the free publication and disclosure of academic output);

An excessive entrepreneurial approach of an university could have a negative impact on the investment on basic research (whose payback period is far ahead in the future and has an apparently low level of short term commercial interest);

Negative effects on the behaviour of public researchers and universities (like less attention to teaching and other responsibilities) could occur.

Box 5.1: Trade-offs associated with university-industry relationships

Benefits	Drawbacks
• Additional revenues for university	• Negative impact for culture of open science (Nelson, 2001)
• More rapid technological diffusion	• Negative impact on students/adviser relations
• Choices regarding technological emphasis	• Could reduce quality and quantity of basic research (Louis at al. 2001; Siegel at al. 2003)
• Positive effects on curriculum	• Negative effects on curriculum
• Local/Regional economic development	• Could affect negatively the type of research questions addressed (Stephan, 2001)
• Two way-knowledge transfer	• Academics could spend less time on teaching and services (Stephan 2001)

Source: Heijs et al., 2010; adapted from Poyago et al., 2002.

[48] It has to be mentioned that the increasing relationships between universities and industry as well as the commercial use of scientific results have been the subject of intense policy debates especially since the 1970 (Heijs et al., 2010; Etzkowitz et al., 2000; Jacob et al., 2003).
[49] For the role of entrepreneurial universities for science-industry linkages see chapter 4.

Hence, modern universities are characterised by a set of different tasks, and, as noted above, these are often subsumed within the three missions of universities: education, research and the 'third' mission. Alternatively, these tasks can be categorized by three main functions: 'mass tertiary education' (with the bachelor degree as a central feature); 'professional specialized higher education and research' (with the professional masters as a central diploma, and 'problem solving research' as a central activity); and 'academic training and research' (with the Ph.D. as the central diploma and articles as the central output) (Laredo, 2007). Higher education institutions differ greatly in addressing these functions, and hence their profiles differ.

Differences in profile do not only reflect strategic choices of individual higher education institutions but – for public institutions – also their mandate: the role they are considered to play in the national higher education and research system. Countries with binary higher education systems (e.g. Austria, Finland, Germany, the Netherlands etc.) are typically characterized by different types of higher education institutions which have different legal mandates - and hence activity profiles.

In addition to differences between individual higher education institutions, many European higher education institutions are characterized by a large heterogeneity of departments and research groups with respect to their functional profile within the higher education institution. With respect to their role in the research system it is possible, for example, to distinguish between different types of groups: networkers, graduate teachers, frequently publishing scientists and high impact publishing scientists (and all of these groups play an important role) (Schmoch et al., 2010).

5.3 Review of performance-based funding schemes

As already outlined above, when looking at the governance of universities, many common trends can be observed in the recent years in various countries, mainly aiming at strengthening the accountability of public resources used and fostering excellence in research as well as the third mission of universities. Those common trends include, for example, the increasing institutional autonomy of universities and the use of performance contracts. But the major trend in this respect (which is interrelated with the other trends) involves changing funding models: institutional funding granted without any preconditions about performance on the one hand has decreased. However, performance-based funding systems and the use of competitive research grants increased to foster scientific excellence and allow for building up critical mass, by providing incentives for higher education institutions to orient its research and education activities towards the determinants of the funding system, have increased (ERAWATCH NETWORK ASBL 2008). Hence, this shift away from direct (non-perfomance-based) block funding to competitive schemes is driven by an orientation towards excellence and the usefulness of university-based research for the economy or society as a whole.

Performance-based funding can generally come in several distinct forms: performance-based bloc funding and competitive research funding via projects and research programs. Advantages and disadvantages for these differ, as illustrated in the box below (Leitner et al. 2007):

Box 5.2: Advantages and disadvantages of performance-based bloc funding and competitive research funding

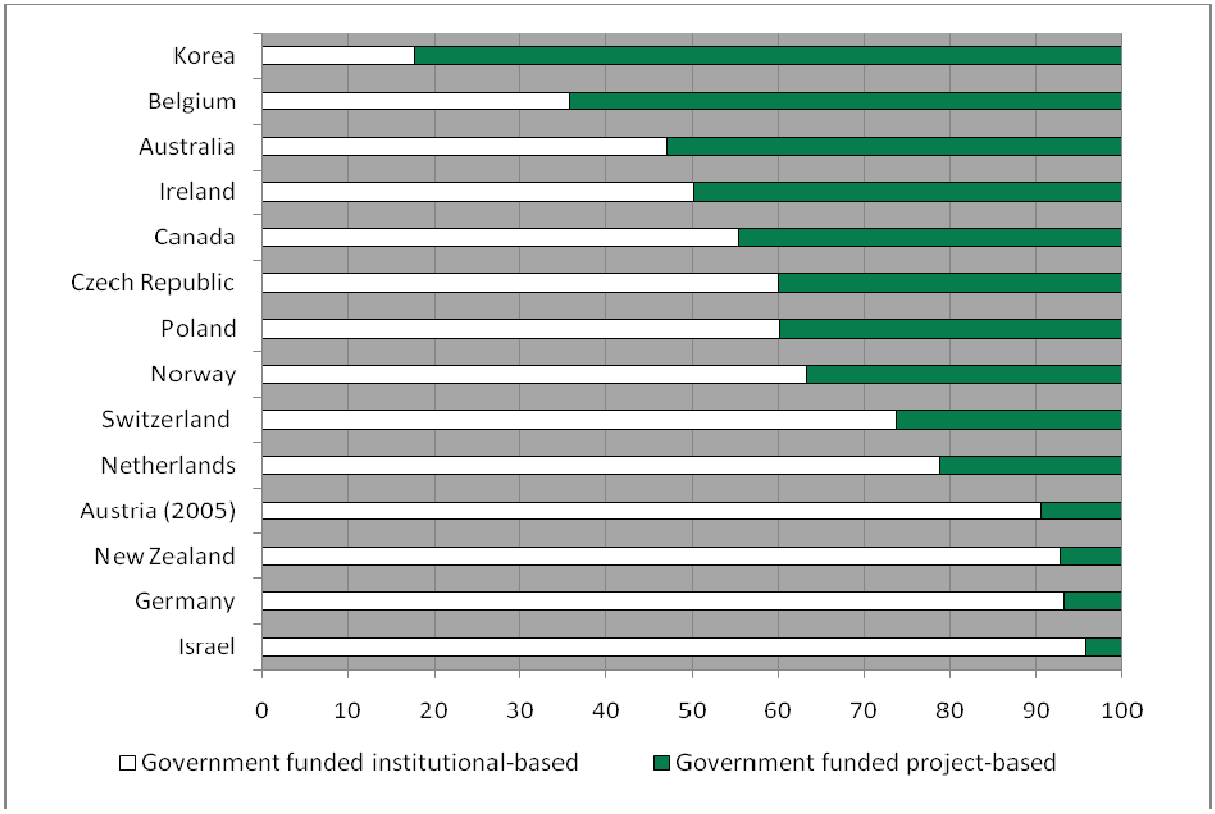
Indicator-led performance based institutional bloc funding	Competitive research funding via projects and research programs
+ output orientation	+ viewed as an effective method
+ performance can be rewarded	+ opportunity to prioritise themes and address new topics flexibly
+ incentive to complete research projects	+ diversification of funding sources enhances cooperation

+ allows planning of activities relatively well	+ feedback from reviewers allows learning
	+ accountability
- possibly short-sighted or wrong priority setting	- decreasing success rates due to increasing demand
- does not enhance interdisciplinary cooperation	- problem of supporting younger researchers adequately
- can lead to homogenisation of research approaches	- high administrative efforts for researchers
- limits incentives for risky projects and research strategies	- low incentives for risky and long-term oriented projects
- might lead to publication inflation	- risk to cooperate with unknown partners

Source: Leitner et al. 2007

However, although some common trends towards an increase of performance-based funding systems may be identified, the share of financing determined by such funding systems, the actual operationalization via measurement mechanisms used, and also the level of research grant funding throughout Europe and the OECD member countries, are quite diverse. The figure below shows that the level of research funding (which stems from so called third-level funding in terms of research grants and programmes) is quite different among OECD countries and EU Member States.[50]

Figure 5.2: Government funded R&D in higher education by type of funding in 2008



Source: OECD, Research & Development Database 2009.

[50] Data is available for a limited number of countries only, as this constitutes an experimental indicator of the OECD.

As in most OECD and EU member countries, the share of institutional-based funding for R&D is significantly above 50% of total R&D funds for universities. Hence, the questions regarding how to optimise the research performance of universities (provide mechanisms that maximise social value of universities) and respectively how to adequately measure the performance of university based research, are indeed crucial.

Figure 5.2 also illustrates that the circumstances for introducing performance-based funding schemes are quite diverse. Some countries, such as Austria and Germany, still rely heavily on directly institutional based funding schemes, whereas others already distribute a large share of the universities' budget via (competitive) project funding. This, in turn, means that for the first category of countries (mainly institutional funding) it is indeed an option to make use of performance-based funding schemes (within the institutional funding of universities) if they want to introduce competitive elements in their funding policies towards universities.

5.3.1 Information on the analysed cases

Before going on to discuss performance-based funding schemes for research, basic information on the analysed research assessments exercises (and the performance-based funding schemes in which they are in use) shall be given. In table 5.2, they are explained in a nutshell.

Table 5.2: The analysed research assessment exercises in a nutshell

Policy Measure	***In a nutshell***
Formula-Based Funding of Universities (AT)	20% of the institutional public university budget is defined to be spent according to the universities´ performance (measured by different indicators that are weighted differently and 'normalized' according to the universities´ previous performances and the performance of all universities by a specific mathematical model). The formula-based budget for Austrian public universities is used for the institution as a whole. Aside from research it also includes weighted indicators for the areas of education and social objectives *Regularity of implementation:* Due to the tri-annual budget system for public universities in Austria, the formula-based funding model is used every third year. The results are published to the universities, after the tri-annual budget is successfully established. *Institutional focus:* Universities *Areas addressed:* Education pillar of universities; R&D in universities; societal objectives of universities
Excellence Initiative for Universitiies (DE)	The aim of the German Initiative for Excellence is to strengthen cutting-edge research in German universities and to make German science and research more visible in the scientific community by 'identifying excellence' and allocating funding respectively. Thus, a competition was organized to select excellent projects within three lines of funding: Graduate Schools to promote young scientists and researchers; Clusters of Excellence to promote top-level research; Institutional Strategies on projects to promote top-level university research. The results of the initiative were based on the assessment of universities´ plans for the future (that had to be submitted by the applying universities) undertaken by an international expert panel in a two-stage process (pre-selection round; final selection round). *Regularity of implementation:* The first round of the German Excellence Initiative started in 2005, the second in 2006. The initiative went in its third round in 2010 (to be finished in autumn 2011) *Institutional focus:* Universities/ Higher Education Institutions (HEI) *Areas addressed:* Assessment of universities´ plans for the future. Foci of the assessments were e.g. the universities´ research performance and quality.

Performance relating contracts between the Ministry and Higher Education Institutions (ICL)	The Minister of Education, Science and Culture is authorized to negotiate contracts for the duration of 3-5 years at a time regarding financial contribution for teaching and research in Higher Education Institutions accredited by the Ministry. Such contracts are a prerequisite for a financial contribution to corresponding Higher Education Institution. The first such contract was concluded between the Ministry and the University of Iceland in 1999 where the student body was divided into seven tariff categories and the university received a contribution from the government for each full time student. There is, however, an upper limit on this contribution which is decided annually in the Government Budget. *Reference Period:* The previous year *Regularity of implementation:* Each university reports annually to the Ministry on the progress achieved along pre-defined indicators *Institutional focus:* Higher Education Institutions in Iceland
Financing Model of the Public Universities in the Madrid Region (ES)	The financing model of the Madrid Region University system is based on the principle that the funding allocated for university activities, included in the Regional Yearly Budget, determines the fixed number of university activities that could be financed with public expenses. A new analytic standard cost model, valid for all the Madrid Universities, has been implemented in order to value each type of university activities and, therefore, to set the total number of activities that will be covered by the regional government. The rest of the university activities should be financed with their own resources (competitive Spanish and European calls, through industry collaborations and partnerships etc). The model is based on the two main missions: teaching and research. The funds for education are basically based on the number of students, faculties and the type of studies (technical faculties that require materials and infrastructure versus social studies with lower costs) while the distribution of the funds for R&D between the universities will be based –at least partially- on criteria of excellence and productivity (Scientific recognition of the Researchers; Total amount of funds coming from public competitive calls (Regional, National, European); Training and Mobility; Scientific production results; Knowledge transfer results; Research results; a mathematical model is used to evaluate these indicators and their relative weights in the distribution of the available funding.). As a consequence of the model, the public universities of the region receive only block funding to cover the 85% of their current expenses. The 15% left is distributed according to the evaluation of the research achievement of each university related to the total research achievement of the universities of the region. *Regularity of implementation:* On a yearly basis *Institutional focus:* Universities in Madrid *Areas addressed:* Education and research activities
Research Assessment Exercise (UK)	Since 1986, the UK national funding bodies have evaluated the quality of research in publicly funded higher education institutions (HEIs) in England, Scotland, Wales and Northern Ireland through peer review and have used the results to inform the selective distribution of public funds. All HEI's are invited to provide information about their research activity in the form of a separate submission to each of 67 subjects (units of assessments or UOAs). For each submission, HEIs provide data about research activity undertaken from 2001 to 2007 (in the case of the 2008 RAE). A panel of experts for each UOA assesses submissions during 2008 and awards a quality profile to each: this profile assesses the proportions of research activity in the submission that was judged by the panel to meet each of five quality levels. The quality profiles that result from the assessment are used as a basis for public funding allocation to HEIs. Due to the heavy administrative burden, the RAE will be replaced by the Research Excellence Framework (REF). The replacement shall be completed in 2014. The first proposal (announced in 2006) put forward by the Higher Education Funding Council for England (HEFCE) suggested a largely metrics-based system – utilising bibliometric approaches and indicators of external research income generated and number of research students for the sciences, engineering, technology and medicine, and light touch peer review informed by metrics for the arts, humanities, social sciences, mathematics and statistics.

	After extensive consultation, taking into account the scientific community's reservations about a purely metrics-based approach, the proposal for the REF was modified to focus on the three elements 'outputs', 'impact', 'environment', which together are considered to reflect the key characteristics of research excellence. (source: Arnold 2010) *Reference Period:* 1 January 2001 to 31 December 2007 (for the RAE 2008) *Regularity of implementation:* On a regular basis: 1989, 1992, 1996, 2001, 2008 *Areas addressed:* research performance
Performance based funding of universities / Research Evaluation of universities and their units by AERES (FR)	Since 2008, laws were introduced in France to strengthen university governance, to encourage collaborations with research institutions (and schools) by placing them in a more institutional level, to organize the catch in terms of resources available to universities, and submit them to increased performance requirements, both in terms of training missions and research missions. In terms of funding, things have changed significantly: in 2005, the ANR was created, whose mission is to launch calls for proposals. A consequence of its creation and increased resources allocated to 'competitive funds' by ANR is that the share of 'block funding' by the Ministry dedicated to research does not increase mainly because of the increase of funding of ANR. Plus, for the distribution of 'block funding', a new resource allocation formula was introduced in 2009 that is called 'SYMPA'. Its logic is very different from the previous used formula SAN REMO and it integrates research (less than 40% of the total); a general share of 20% is allocated in proportion to the general performance of higher education institutions. The respective contractual arrangements between the Ministry and the universities, which aim to align the strategic objectives of the state on the one hand and the (individual) institution on the other hand and that fixes ex-ante performance targets for the institution, focus on 4 and 5 years. The quality of dialogue contract, the ambition of the institution (university or school) and in the future, achieving (or not) the goals set jointly by the State and the institution for the period determines / will determine a 'bonus contract' (80 to 100 million € per year, 4% of the amount distributed both by the formula and contracts). This is less than what was spent in the previous contractual allocation of funding, but the institution is now totally free when using that money. In this context, the AERES is responsible for evaluating higher education and research organizations and institutions , research programmes and degrees of HEIs, Its mandate encompasses all universities and grandes écoles, at least for the evaluation of institutions and research. Universities and units are evaluated according to their performance in scientific terms (publication, international recruitment policy, number of patents, licenses, etc), partially also in economic and societal terms. According to Arnold (2010): AERES's approach typically consists of a self-evaluation and external peer review with site visit. The self-evaluation conducted by the research unit or research institution to be evaluated is a core element of each evaluation. It is given to external peers for preparation of their site visit. It also helps to make sure that recommendations take into account the institution's specificity. AERES activities are not linked to funding per se (such as in the Czech Republic or the UK), but the evaluations informs the ministry of higher education in the negotiations for the performance contracts. One specificity of AERES is that it provides support to both institutions (according to specifications that each contributes to define) and the State. This dual role has a strong advantage: AERES is an assessment tool for improving the performance of establishments by improving their culture/attention of /about evaluation (with analysis and recommendations provided in a public report for each evaluation) and brings information to the state and to entire society on the functioning of universities, schools of public research organizations. These two missions would also conflict in some cases but it is a minor problem so far. *Reference Period (of the research evaluations done by AERES):* The last four years *Regularity of implementation (of the research evaluations done by AERES):* All universities are evaluated every four years. Approximately a quarter of them are evaluated each calendar year. *Areas addressed (of the research evaluations done by AERES):* Performance in scientific terms (first), partially also in economic and societal terms.

Evaluation system of RTD results(CZ)	In the Czech Republic, the institutional funding of higher education institutions is based on the number of students and the characteristics of the study programme (educational purposes) and on R&D results (registered research outputs). The latter embodies the Methodology for R&D results assessment introduced for the first time in 2004. In recent years it has become the allocation system of this part of institutional funding**.** This system was imposed by the highest authority for R&D in the Czech Republic, the Council for Research, Development and Innovation. The methodology for R&D results assessment has been issued for each year until 2009, for 2010 and 2011, when the methodology remains stable. The methodology has two parts. The first one assesses R&D results of research institutions, while the second is focused on assessment of programmes terminated in a given year(s). The methodology's rationale is to recognise and to support research excellence. However, it is purely metrics-based quantitative system – institutions register their outputs as specified in the methodology to a common research information system, Each of the output type (an article in a scientific journal, a scientific book, a chapter in a scientific book, a paper in proceedings, a patent, a utility model, a pilot plant, a cultivar, a prototype, a certified methodology, software, a research report etc.) is described in detail and characterised by specific number of points. The budget allocated each year for this funding is divided by the sum of points collected and the value of point is derived. The period of 5 years back is considered for the evaluation in each year. Each provider receives appropriate funding as counted from the number of points collected for the programme they govern. Further to this, it is redistributed to the institutions that created the results. Provider could create its own methodology for reallocation. *Regularity of implementation:* On a yearly basis *Institutional focus:* Research organisations *Areas addressed:* Research performance

The analysed research assessment exercises highlight the diversity of the methodologies which are used for the performance-based funding of universities. Although every country is using a different approach, two general approaches to performance-based funding schemes can be identified: indicator-led funding schemes on the one hand and funding approaches that combine quantitative and qualitative evaluation methods on the other. As Table 5.3 shows, only two of the analysed research assessment exercises relate to the second category (UK and German case). The interesting thing is that those two are the most well-known and most discussed performance-based funding schemes.

Table 5.3: Information on the analyzed cases

Country	Pure, mechanistic indicator-led (funding) systems	Combined approaches including quantitative and qualitative evaluation methods	Relevance in terms of financing volume
AT	X		Low (20% of GUF)
DE		X	Low
ICL	X		Low and only from 2007 to 2009
ES (Madrid region)	X		15%
UK		X	High
Performance based funding of universities (FR)		X (Research / research team evaluation by AERES)	High
CZ	X (since 2009)		Depends on the university type and performance

Source: own illustration

Although the indicators used in performance-based funding schemes will not be discussed in this chapter, for the sake of completeness some information shall be given on the indicators used in analysed cases. Table 5.4 summarizes those indicators and shows that, although the policy level is increasingly interested in the third mission of universities, to date indicators for measuring the scientific impact of university-based research are mainly in use.

Table 5.4: Overview of the diverse first and second order indicators[51] used in the selected case studies/ policy measures

Scientific objectives	Economic objectives	Societal objectives	Educational objectives	
First Order Indicators: - *Publications* (total number, number per full-time equivalent, number of publications in high-ranked journals, …); - *Non-bibliographical outputs;* - *Number of awards & prizes;* - *Number of PhD graduates;* - *Public outreach* (e.g. visibility of researchers in the media) - *Keynotes at conferences;* **Second Order Indicators:** - *Citations* (H-Index; citations in high-ranked journals, …); - *Employability of PhD graduates;* *Journal Impact Factor*; - *End-user esteem* (e.g. % of funding from end-users; ability to attract external funding)	**First Order Indicators:** *End-user esteem* (e.g. ability to attract funding from industry); *Knowledge transfer & commercialization of IP* (income through patents, licences, start-ups)		**First Order Indicators:** *Number of PhD graduates;* *Employability of PhD graduates;* *Number of BSc & Master graduates;*	**Output / effect/ impact Indicators**
First Order Indicators: *Total R&D investment;* - *External funding* (total external research income, income per full-time equivalent, % of competitive grants won from selected sources; industry funding, …); - *Recruitment of PhD Students and academic staff;* - *Seminar & conference activity;*	**First Order Indicators:** *External funding* (industry funding, …)	**First Order Indicators:** *Charity income*	**First Order Indicators:** *Recruitment of PhD students;* *Number of PhD students;* *Number of BSc & Master students*	**Input/ process/ structural indicators**

[51] First order indicators are directly aiming at measuring research performance by focusing on measures of input, processes, structure, and or result. Second order indicators: are defined as easily to be established summarising indices, aiming at offering simple measures for effect. (e.g. the journal impact factor or the h-index). Third order indicators: are above mentioned qualitative performance measures stemming from peer review assessments and panel assessments which are transferred into i.e. ratings (Hansen 2010).

Invited keynotes; *- International visiting research appointments;* *- Research active staff / Number of research producers ;* *- Number of PhD students;* *- Research collaborations;* **Third Order Indicators:** *Reputation*				

5.3.2 Rationales for (introducing) performance-based funding schemes

Most performance-based funding schemes in Europe have been introduced since 2000. The main rationales which gave rise to the introduction of performance-based funding schemes and an increased use of research/IA exercises for university based research are quite evident: Due to the large amounts of public funding and an overall increased level of public R&D spending in the last decade, questions referring to the accountability of university actions and 'value for money' gained considerable importance. This holds true, as in many European countries universities have recently gained considerable autonomy regarding the internal allocation of resources while at the same time remaining dependent upon government resources to a large extent.

As university-based research forms a key element of every national innovation system, there is also clear political interest that funds should flow to institutions where 'performance' is manifest. This is mainly intended to raise the quality in research. As Herbst (2007) puts it – 'performing' institutions should receive more income than lesser performing institutions, which would provide performers (and performing researchers) with a competitive edge and would stimulate less performing institutions to perform better. Hence, 'performance-based management' has become quite common as regards public R&D investments (from which follows the general trend of New Public Management). The intent behind this movement is to measure what results are brought about by institutions and to better report on the use of those funds (Mayne, 2010). In addition, performance-based funding aims to give more money to activities which produce desired results and less to those that do not. Rewarding performance through performance- based funding changes therefore the focus in funding from inputs to outputs.

The orientation towards `performance' will also contribute to an increase of the effectiveness and efficiency of university-based research. It orients the resources to the most productive scientists, based on their merits and productivity (increase of effectiveness). The improvement of efficiency is reached e.g. by reducing, among other things, the duplication of R&D activities, and reduction of the direct costs via competition or from the under-utilization of R&D infrastructures. Moreover, this type of competitive finance obliges universities to take into account the usefulness of their activities and develop clear strategies in order to secure their funding in the middle and long run.

Box 5.3: What is 'performance'?

Due to the variety of tasks and the differentiation regarding existing types of universities, there is no unitary concept of performance to hand. Rather, performance must be viewed as information about achievements of varying significance to different stakeholders (Bouckaert and Halligan, 2008). In order to circumvent this substantial problem, the focus of performance measurement is very often on organizational performance: performance is viewed as activity and results and as creating societal value through knowledge production (Hansen, 2010).

Although there is a widespread belief that research and research performance can be measured, the assessment practices and methods at hand provide evidence that measuring research performance is a very challenging task. First of all, it has to be taken into account that the production process of knowledge has many facets and the ultimate outputs, outcomes and

impacts of research activities cannot be measured directly as the benefits come in a variety of forms. Martin and Salter (1996), for instance, classify seven relatively distinct 'exploitation channels' of university research:

- increasing the stock of useful knowledge both codified (publications) and tacit (skills, know-how and experience);
- training skilled graduates on whom firms heavily depend on to make innovations;
- development of new scientific instrumentation and methodologies which are often also useful in context beyond which they have been developed;
- forming networks and stimulating social interaction. Researchers are part of the 'invisible college' of peers, which provides a platform for researchers from the industry and a forum from which firms access expertise;
- increasing the capacity for technological problem-solving on which firms rely to solve complex technological challenges which require often combining technologies;
- creating new firms as spin-offs to exploit research results from basic research;
- provision of social knowledge for example in cases of social sciences providing basis for public policy or the impact of the humanities on 'creative industries'.

The rationales for the introduction of performance-based funding schemes are based on the respective objectives set by the policy level and by the belief that the introduced policy instruments are the adequate way (from the political point of view) to achieve those objectives. When looking at the cases analysed, the above mentioned findings are validated as they all focus more or less on the same interrelate targets (explained above): accountability, value for money and funding of 'performing' researchers/research units/ universities. But when looking into the concrete policy objectives of the analysed cases, various divergences can be observed:

- The funding model for the universities of the Madrid region, for example, aims at generating an incentive for productivity and quality by assigning more money to the most productive researchers. And in general, the three main principles for the financing of universities that have been identified by all Spanish administrations (national & regional) are the following: equity financing, results oriented financing and efficiency of the system;
- The Austrian formula based funding system wants to provide an objective mechanism for distributing public funding, introducing transparency and comparability simultaneously, whilst taking into account the diversity of universities. It also wants to ensure that the (relative) performance of universities is reflected in their funding;
- By contrast, the RAE in the UK aims primarily at producing quality profiles for research units to have a national and international comparison of the impact and quality of the research conducted in the UK, thereby on the one hand increasing the quality of the research and, on the other hand, supporting the UK funding bodies to make 'informed' funding decisions;
- This is similar to what AERES is doing in France: it wants to provide the State (and institutions) with an impartial tool for making its strategic decisions (allocating funds and human resources; accrediting programmes and units). In addition, it wants to provide students and other stakeholders with useful information;
- The rationales of the 'SYMPA'-formula used for the performance-based funding of universities in France are to equilibrate the endowments between higher education institutions in order to reduce inequalities of means for each student and each 'producing researcher' and to support the catching up of Higher Education Institutions (HEI), encouraging them to increase their activity and performance;
- Distinct to these approaches is the German excellence initiative that, in line with its name, focuses primarily on establishing and supporting excellence in research (outlined in several objectives);
- The rationales of the Czech system are (1) to provide government, the parliament and the public with a comprehensive set of basic information on results of research institutions, (2) to create a system which shall be used for preparation of the amount

of institutional support of R&D, (3) to provide a 'good' management of state (public) resources, and (4) to support quality and excellence in research;

- In Iceland, the performance-related contracts are used by the Ministry to define – in line with the overall objectives for higher education institutions as defined by law - the concrete objectives of the individual universities in more details between the Ministry and individual universities. For example, in the contract between the Ministry and the University of Iceland (UI), the parties involved share the objectives to create the preconditions for UI to gain recognition as a premier higher education institution on a worldwide level. The future vision of UI is to become one of the 100 best universities in the world. There is a similar contract between the Ministry and University of Akureyri (UNAK) which has the shared objective of the parties to create preconditions for UNAK to gain recognition as a premier higher education institution on a worldwide level in specific fields of study.

These examples show that the interrelated targets of 'performance' and 'value for money' are reflected specifically in every case analysed as being primary objectives. The objective of introducing 'accountability' (in view of the financing of universities) is not a primary goal itself in all analysed cases - e.g. in the German excellence initiative and in the UK research assessment exercise. Some countries have formulated some additional goals that are related to the concrete political context - e.g. the Austrian formula-based funding but also the performance agreement in France which aims at recognizing the diversity of universities, different dynamics inside the system, collaboration and synergies within the system, the possibilities of progress etc.
One of the questions raised is whether performance-based funding of research is at the same time a tool for the State to improve resource allocation and also a tool for the institutions themselves to improve their functioning. These two objectives are complementary even if the conditions of the total functioning of the two objectives are not currently fully analysed. However there is a tendency that universities faced with performance based funding - depending on their degree of autonomy - hand on the incentives to academics, research groups, institutes or faculties.

5.3.3 Experiences with performance-based funding schemes in political terms

This section aims to analyse how these cases/performance-based funding schemes are perceived at the policy level - or to be more precise: whether they have met the respective expectations of the policy level.

This is THE crucial question for the policy level, as it states whether the chosen policy instruments were/are the appropriate ones and whether the policy level therefore is/was doing a 'good job'. In addition, this section highlights (wherever possible) why those cases have been considered '(un)successful' by the policy level. Background information and information regarding the context of the introduction of performance-based funding schemes will also be considered in some cases.

In the case of the **Austrian formula-based funding system**, the reactions of universities and their staff have been diverse since the introduction of the scheme – depending partly on the performance of 'their' university within the scheme. As the indicators used are very diverse (as are Austrian public universities), there is no clear winner or loser, but different universities excel on different levels. In addition, although a feasibility study was done before introducing the formula-based funding system and even though the principles of the universities had been involved, some criticism arose, especially regarding the methodology in use.

The system has not been changed up to now but it will be evaluated. This evaluation could result in an extension of the formula-based funding for one more period (2013-2015). However, it has to be mentioned that in the long run, formula-based funding will be replaced by a division of the university budgets for education and funding. Therefore, formula-based funding is more a kind of intermediate step on the way to different funding streams for universities.

What makes the formula-based funding system a 'success' for the policy level is that it introduced elements of performance-based funding of universities whilst – due to the specific calculation methodology (that puts the performance of a university in relation to its previous performance and the performance of all other universities) – at the same time not risking an unbalanced funding of universities (where e.g. one university gets much more grants than another one due to its 'performance').

Performance-based research funding in the Czech Republic[52] - which allocates the research part of the institutional funding to the universities and public research institutions - had a major impact on the behaviour of universities and research organisations in the Czech Republic. Perceptions of the system are ambivalent, but at least part of the policy level found it to have met the expectations as it provided a tool for allocating resources to research institutions in line with their 'performance'.

By putting an emphasis on specific output indicators, performance-based research funding has led to a pressure on producing publications and other outputs for academics in the Czech Republic. The rationale of the communication in research has changed too - instead of the freedom of the researcher to look for the most appropriate media to communicate research findings, direct connection of the points per output and funding can lead to consideration of the highest possible points being awarded.

Traditionally, there was high level of cooperation between Academy of Science and universities. Due to the necessity of detailed research results accountancy per every institution, the cooperation could stagnate, as every institution tries to get the most out of its researchers.

However, this system induced that that there is clear evidence of the research results produced from public funding. The money allocation bound with the evaluation has strong effects on completeness of the database and the quality of the records. Secondly, it certainly indicates those stakeholders to be leaders and those which need improvement in their research performance.

The Czech performance-based funding system is supported mainly by those who benefit from the system. On the contrary, there are also completely opposite points of views pointing out the common mechanistic approach that equals for example one excellent peer reviewed result to a number of possibly non-significant results with the questionable peer review, and where subject fields and research types are completely mixed. Institutional financing on the basis of outputs omit the vision and its completion as well as the necessary inputs which are not accounted for.

The main aim of the **German Initiative for Excellence** (IFE) was to strengthen research at German universities and to raise the international visibility of it. As the IFE resulted in a very strong competition (many more applications for funding than expected were submitted), it can be said that it had quite strong impacts on the German university landscape. It also meant a departure from a long-cherished belief that all universities are equal and hence should be treated equally.

Although the IFE is not a performance-based funding system per se, the experience of the IFE shows that it was a successful initiative for the policy level, as it provided strong incentives for the individual universities to think about their specialisation profile in terms of research and teaching activities. Hence, one of the main effects of the initiative was that the German universities started to think about their activity profile as a research institution and put forward in-house strategies for elaborating their mission/orientation. In this respect, the initiative did not only have a positive impact on successful applicants, but also on those who participated in the competition.

The IFE and the respective competition has definitely put more pressure on German universities to perform 'well' in scientific terms (articles, citations, external funding) in order to be able to receive funding in future rounds of the IFE. In doing so, the IFE strengthened the research area of universities (= which is a main political goal of the IFE), but partly at the expense of their teaching mission.

[52] A new complex system for funding of higher education institutions is currently being developed.

To be precise, it has to be said that from the perspective of an institution or university, the effects of the IFE are related to their concrete situation – whether they get funded or not by the initiative. One positive effect is that universities selected for funding within the IFE experienced a gain in (international) reputation, for example. However, it has to be said that it is now too early to draw significant conclusions on the (long-term) impacts of the IFE (an impact assessment of it is foreseen in 2016).

In general, as the IFE contributes to both of its main objectives, it was considered to be successful by the policy level for pursuing 'excellent research' in German Universities. However, it has to be noted that the introduction of the IFE caused quite some criticism in the academic arena. Critics pointed to that fact that it has negative impacts on the education mission of universities and that it favours those institutions that are already performing well in scientific terms. There was also critique on the indicators use (e.g. on the thus of a throughput indicator like third-party funding)

In addition, it has to be noted that outside of Germany, the reactions in the scientific community and the science policy community towards the IFE have been quite positive (e.g. in articles in the NY Times and in the Chronicle for Higher Education), arguing that the initiative strengthens the quality of German universities, because of its incorporated incentives to develop a strategy for the institutions' activities.

The **funding system of universities and schools in France** has been largely opened to performance criteria in France since 2008.[53] Until 2008, for the most part, universities were funded (1) through a specific mathematical formula (called 'SAN REMO') that did not consider research as a mission of universities which has increased inequality between institutions without regard to their performance in education; (2) through a contract for four years with each university, that did not provide all necessary global view on goals and objectives of universities and (3) through specific other measures (discretionary decisions of the State that could involve research or other topics). Performance in research was somehow taken into account, but in a way that was problematic, particularly because it was not harmonized. Moreover, it did not put the universities in positions of responsibility due to a lack of budgetary resources, which was due to the fact that the allocated funding left no room for any possibility of real redeployment at the university level and because the respective assessment teams were suspected having too much dependency and perhaps having too little attention to economic valorisation of research.

These mechanisms were found responsible for a deficit performance of French universities[54] as regards to their foreign counterparts, not only in terms of publications, but also in terms of economic valorisation of research.

Against this background, more performance-based funding schemes (SYMPA-formula, funding via ANR, evaluations by AERES, performance agreements between institutions and state) were introduced in France. These developments have been termed 'historic' because they are accompanied by a progressive increase in institutional autonomy recognized first to universities and to a lesser extent, to many other higher education institutions.

On the one hand, the creation of AERES succeeded in unifying and objectifying (for its public reports) all the evaluation criteria used in the research sector (universities and research institutions). From a methodological point of view, the creation of AERES has simplified many things: the assessment takes into account all data available (quantitative data available at a research team and qualitative data proceeding of self assessment by universities/institutions and after site visit by trained scientists in charge of evaluation) and is restored by a few simple marks, independent research discipline, and aggregated into a single final mark by AERES.

In addition, the new funding is beginning to bear fruit. It led to universities and schools being responsible for their strategy; to encourage/develop their scientific production (including schools); and to restructure their teams to eliminate weak research teams (universities). It has led universities to count their numbers of employees; to consider mechanisms for

[53] General background: a law for the organization of public finances ('LOLF') introduced in 2006 that is designed to provide more room for discretion to policymakers, including the parliament, in improving planning and assessment of the effectiveness public expenditure.

[54] The Shanghai university ranking was one of the first to alert the French authorities about the lack of visibility of French universities.

allocating internal resources; to be more aware of the need to perform; and to develop new management tools.

At the macro level, the share of French publications in the European total seems to be showing less or no further deterioration. This success is attributed by the Ministry to the new performance-based funding schemes in France.

In the **UK** national funding bodies have used **research assessment exercises (RAE)** to inform the selective distribution of public funds since 1986. The methodologies used have been constantly improved since then. The RAE aims at assessing the quality of the research conducted and at improving the quality of the research of universities and other higher education institutions by linking funding to this quality profile. According to a report published by the House of Commons Science and Technology Committee in April 2002, the RAE has had these intended positive effects. The committee stated that universities are stimulated to manage their research and RAE ensures that funds are targeted at areas of research excellence. The report also advised that a further RAE should be carried out.

The Higher Education Funding Council for England is currently working to develop new arrangements for the assessment and funding of research. The new arrangements – the Research Excellence Framework (REF) – will replace the RAE and will be completed in 2014. The REF will consist of a single unified framework for the funding and assessment of research across all subjects. It was initially intended to rely more on the use of quantitative indicators in the assessment of research quality than the present RAE system, while taking account of key differences between the different disciplines, in order to decrease excessive administrative costs associated with the RAE. This resulted in heavy criticism from the academic community (see. i.e. Arnold 2010).

In the following modification process, the REF was further elaborated. In March 2011, after the conduct of an impact pilot exercise, the four UK funding bodies decided upon the assessment modalities of the REF.[55]

Box 5.4: The assessment of university-based research in the UK REF

- In the REF there will be an explicit element to assess the 'impact' arising from excellent research, alongside the 'outputs' and 'environment' elements.
- The assessment of impact will be based on expert review of case studies submitted by higher education institutions. Case studies may include any social, economic or cultural impacts or benefit beyond academia which have taken place during the assessment period, and which were underpinned by excellent research produced by the submitting institution within a given timeframe. Submissions will also include information about how the unit has supported and enabled impact during the assessment period.
- A weighting of 25 per cent for impact would give due recognition to the economic and social benefits of excellent research. However, given that the impact assessment in the 2014 REF will still be developmental, the weighting of impact in the first exercise will be reduced to 20 per cent, with the intention of increasing this in subsequent exercises.
- The assessment of research outputs will account for 65 per cent, and environment will account for 15 per cent of the overall assessment outcomes in the 2014 REF. These weightings will apply to all units of assessment.

For the four impact domains a mix of quantitative methods (including bibliometric indicators wherever these are appropriate), case studies, and expert panels/peer reviews will be used. The assessment process will also involve research users. While the general framework of the REF has been settled recently, distinct aspects employment will be phased in from 2011-2012, and it will fully drive research funding for all disciplines from 2014.

Spain's political structure as a quasi-federal decentralised system consisting of 19 regions: (17 so-called *Autonomous Communities* and two *Autonomous Cities*) is reflected in its R&D and innovation-related policies. In the case of the universities the central government designs

[55] Source: http://www.hefce.ac.uk/research/ref/pubs/2011/01_11/

the overall legal frameworks while the 'regional governments' are responsible for the implementation of the legal setting. The financing model is therefore different in each region and has been defined according to the regional idiosyncrasies. Public support for research in universities block funding to cover current expenditures, R&D staff and infrastructures expenses are paid by the regional government. Besides, the regional governments can establish an accounting plan as well as the rules and procedures to implement the university budget.

Regions with an extended number of universities – as in the Madrid region - have the possibility of establishing a real performance-based funding system where some assessment indicators are compared for achieving research funding. The **financing model of the public universities in the Madrid region** is such a model but it is still in an implementation phase and no evaluation is yet carried out. However, the fact that the mechanism is not used for internal distribution of funds within the university could reduce the impact because most researchers are not directly affected by the measure. Moreover, most researchers are still not aware of this instrument and its implementation is still neither clear nor transparent. Therefore, it is currently not possible to draw sound conclusions on the success of this policy instrument as well as on relevant success factors.

The **performance-related contracts in Iceland** between the universities and the ministry have had a considerable influence on the operation of those universities. They have done their best to pass performance-related measurements, and the Ministry's follow-ups have been active. Despite the fact that the government has not increased the budget towards research, as was planned, e.g. the universities have, notwithstanding, abided by the agreement.

From the universities' perspective (University of Iceland, Universitiy of Akureyri) the implementation of the performance-related contract was successful until the financial crisis, when the Ministry was not able to provide the anticipated increase for core research funding. The performance-related contracts have resulted in clear strategic goals with measurable indicators. They also have strengthened the universities' operations which have resulted in more efficient management and planning. According to information from University of Iceland and University of Akureyri, substantial progress has taken place on most indicators (e.g. increased number of publications in ISI journals).

In terms of teaching, the government succeeded in reaching its initial goals, i.e. to increase the number of students in tertiary education. The funding was linked to active students, i.e. those who took exams.

Currently, the discussion in Iceland seems to be moving from the individual performance-based contracts between the higher education institutions and the Ministry of Culture and Education to a more centralised system of performance-based funding using the same indicators for all higher education institutions. However, it is too early to tell whether this discussion will lead to changes at the policy level.

When looking at the analysed cases, it becomes obvious that all research assessment exercises/ performance-based funding schemes have – at least to a certain degree - met the expectations of the political level. Although the policy level considers 'their' PBRF-schemes a success, nearly all schemes were confronted with - sometimes harsh - criticism from affected stakeholders, partly linked to the fact that such schemes produce 'winners' and 'losers' in financial terms.

All government actions in view of the performance-based funding of universities are still experiencing certain problems. This is not surprising as such funding schemes are relatively recent policy tools. Certain (before unknown) limitations arose with their implementation. So - as shown in most of the cases - those schemes get reworked and improved (even the RAE in the UK which was introduced in 1986, still gets revised), thereby giving room for new solutions, and for improvements over time, for the development of learning and for the establishment of a form of collective intelligence.

When looking at the analysed cases, some factors for the success of diverse performance-based funding schemes can be identified. However, it has to be said that it is too early to draw sound conclusions from the cases.

The introduction of PBRF schemes is related to a departure from the understanding that all universities are equal and hence should be treated equally. Instead, such schemes result in a vertical differentiation of the university landscape (see the German case, for example). This has to be taken into account by the policy level when introducing and communicating such schemes. Another possibility is to follow Austria's lead, where a specific calculation methodology is used that takes into account the diversity of universities and avoids therefore a sharp (and unbalanced) reallocation of university funding. In this case the additional incentives are, however, limited.

With regard to the Czech case, it can also be recommended to the policy level that the introduction of PBRF systems should avoid an abrupt and complete departure from the previous system without 'grind-in' possibilities for the affected institutions and individuals. In addition, the involvement of the scientific community in the design of the respective policy instrument could contribute to the acceptance of specific policy instruments. The latter point is also highlighted in the UK case, where the scientific community was (although not from the outset) involved in the design of the REF.

The importance of close cooperation with the academic sector can also be seen in Iceland's case, where the common formulation of objectives (by the Ministry and the University) was a main factor for the success of the policy instrument.

Another important issue that the policy level has to keep in mind is that PBRF schemes can go on at the expense of the teaching activities of universities if no incentives are provided for teaching quality or efforts.

5.3.4 Limitations and remaining problems of performance-based funding schemes

Performance-based funding of universities is a recent policy tool (except the RAE in the UK), that is designed differently from country to country. Therefore, it is unsurprising that those policy schemes are confronted with certain limitations and problems. This section aims to highlight the limitations/problems based on the analysis of the research assessment exercises and the respective discussions in two workshops. In addition, information gathered by the literature review will underline those findings.

Some of the problems of performance-based funding schemes (and their research assessment methodologies) are more common than others. The vertical differentiation, the so-called 'Matthew effect' ('the rich get richer and the poor get poorer'); the reduced importance of teaching; the focus on some 'big players' and certain scientific areas as well as Article splitting may be the most well-known problems of current performance-based funding schemes, especially when bearing in mind that some of those problems are inherent in such schemes (e.g. the vertical differentiation). However, what has to be seen as a problematic outcome can only be judged on basis of the concrete targets of the scheme implemented.

Another disadvantage of competitive funding (even in the form of performance-based funding) is the possible bias to short term objectives. Whilst it is perceived that short-term funding schemes lead to quicker scientific results, this could lead to the research agenda moving away from an ultimate long-term objective, so moving away from future new scientific results useful for the production sector. The opportunity for strategic orientation for universities, which generally goes hand in hand with the introduction of PBRF-schemes, should outweigh some of these direct, negative effects.

The following paragraphs will highlight the diverse limitations and problems of the analysed cases (special emphasis will be given to the French case due to the available detailed information). Some of those limitations/ problems are a result of some specific circumstances, while others are more common and can therefore be observed in more than one case.

One of the main limitations of the **Austrian formula-based funding system** is its pure focus on input indicators (at least for the research part), completely ignoring the output of university-based research. In this context, voices have also called for a sharpening of the indicators. The mathematical model used in the formula-based funding ranks the progress of a university (in the indicators) in relation to its previous performance and to the performance of all other universities. This results – although performance-based – in a very balanced

distribution of funds. This has been criticized by some (mainly the best performers, who could get more funds), but others appreciated this fact.

The **German initiative for excellence** (IFE) meant a departure from a long-cherished conception that all universities are equal and pursued a path of inequality and the funding of elites instead. As a consequence, there has been a lot of criticism on the vertical differentiation of the university system (in 'elite institutions' and 'non-elite institutions' as well as in 'important disciplines' and in 'exotic disciplines'), that – in a second step – could result in respective tensions between universities as well as within universities.

In addition, critics argue that the initiative tends to favour big 'comprehensive universities' and very specialized ones and that a Matthew effect occurs in the university landscape (increased concentration of resources; those that already have a lot get even more). They argue in addition, that the IFE (although it is a peer review) tends to favour life sciences, technical sciences and engineering on the expense of humanities, social sciences and exotic sciences as it aims at research performance and output.

The missing information on the use of indicators in the informed peer reviews also caused some criticism.

The **Czech performance-based system** had a significant impact on the Czech research funding system (reallocation of funds; some institutions were confronted with substantial budget cuts) and resulted in huge discussions in the scientific community as well as in strong and sometimes aggressive reactions to it. The main critics and shortcoming could be seen in the nature of the system that is more quantitatively based than qualitatively mixing up all the types of research. Although the points assignation distinguishes between the types of the results and special formulas for redistributions of the weight of the impact factor is considered, the quantitative principle is still dominant. The scope of output is very wide – it includes both the results of basic research as well as the results of applied research such as trademark or prototype. Critics pointed to the fact that the system is a mechanistic process which does not reflect the specialities of universities and research fields but instead puts 'everything in one box'. So it is argued that that one can find a situation whereby the system equals one excellent peer reviewed result to a number of possibly non-significant results with questionable peer review, and where subject fields and research types are completely mixed.

In addition, critics argue that the Czech system respects subject fields' specificities and types of research only to a certain level. Specificity of the subject field is partially regarded in terms of higher point assignation for social science and humanities for certain types of results, or by using field normalised impact factor adjustments, but these are only partial corrections. Furthermore, the nature of the system, as set currently, is a very general formula that does not promote any strategy or policy directly, if we omit its rationale (promoting research quality and excellence).

Critics also argued that it is a 'system influencing system' which leads to a complete change of behaviour (e.g. a substantial increase of certain types of results was observable). The set-up of the Czech system also faced some criticism, as the process of methodology setting was not as widely discussed as it probably should have been (a more authoritative process) and as it was realised that the composition of the new R&D&I Council was not balanced between different scientific disciplines, for example.

In **France,** the changes in university funding which arrived with the introduction of a **performance-based funding scheme** and a new framework for performance agreement between the state and each institution[56] raised some new problems. Given its magnitude, the reform obviously requires fine adjustments which are still on-going

The introduction of the PBRF-system was accompanied by tension between the logic of fairness and the logic of efficiency that were simultaneously embodied by the reform. For reasons drawn from the previous system, institutions had very unequal endowments in posts (for the most qualified, mainly civil servants). From the outset, the ministry had the intention of reducing these inequalities. This policy, however, soon met with fierce opposition from the concerned stakeholders. To facilitate their ownership of reforms and community concerns, it was decided that there would be a freeze on the reallocation of resources in personnel

[56] With the definition of goals and quantitative targets to be achieved during the period (today 5 years).

between universities. It thus contributes to confirm and perpetuate existing inequalities between institutions.

This is especially true for another reason. In order to improve the political acceptability of the reform (and in order to take into account of the time needed to enable universities to make the necessary internal reforms), a ratchet mechanism has been established in the distribution of means: when a school or university sees its allocation fall below the calculated staffing it received in the past, it is maintained, just with lower growth than others. When the allocation is calculated in excess of that previously received the rate of increase in resources is the strongest. However, it is bounded a priori, which implies a greater number of years necessary to ensure the reduction of inequalities. In the meantime, the system can only function as the state significantly increased the resources it allocates each year to higher education institutions. But the state's capacity to support increasingly expensive thinking in sufficient time to suppress inequalities is currently being questioned.

In addition, limits to AERES assessment had been encountered:

- the assessment made by AERES ensures good comparability between evaluations realised at the same time/year, but not necessarily identical comparability between the assessments made during different years;
- comparability between disciplines is perhaps not entirely satisfactory, since the research teams in human and social sciences are, for example, less often classified as A + teams than other disciplines;
- with the current system 9 years are needed to ensure that all institutions have experienced at least one contract and that it has been evaluated (since 1/5 of the contracts are renewed each year);
- the first contracts awarded in recent years have not been able to rely on an assessment of previous contracts (since they did not obey the same logic).

In this context, questions about indicators in use also arose: statistical tools have been developed but their reliability has not yet been tested in real size. No new contract has been yet been evaluated and some uncertainty remains about how to balance the different degrees of achievement of various targets set in one contract. And finally, how to reward or penalise institutions for the results achieved (and the acceptability of this policy). Some important indicators of the new funding policy have even proved they are impassable/non-applicable (e.g. the indicator 'income from the commercialization of research'). Attempts are being made to develop new indicators (to be taken into account by the model, either through dialogue contract, or both), measuring for example the employability of doctors and more generally of all graduates. But the construction of its indicators is currently a major methodological problem. All these problems are related to the Ministry's intent to further improve the system, taking advantage of its basic principles are less challenged by the players. In conjunction with stakeholders, the Department currently experimenting therefore different solutions.

The proper balance between continuing need for funding mechanisms and necessary evolution of these mechanisms refers also to one of the limitations of the current performance-based funding system in France, as two necessities are confronted every year from now:

- to maintain the same funding mechanisms to enable institutions to integrate the logic they carry (which, obviously, takes a long time);
- to adapt these mechanisms to account for certain applications deemed legitimate institutions and take into account changes in priorities.

Over the past two years, the formula SYMPA was amended twice. Similarly, priorities, schedules, processes implemented during the contractual waves have been changing. However, these changes in result seem not to weaken the basic message that the Ministry wants to disseminate to the universities/ HEIs.

There are also some new debates which arose with the introduction of the current performance-based funding system in France (these are just a few examples of them):

- should institutions reallocate the acquired resources internally within research teams by using a formula similar to formula SYMPA57?
- how to handle payroll staff employed by higher education institutions?
- some of the universities most heavily involved in basic research (some listed in the Shanghai ranking) point out that as their current performance increases, their international visibility gets stronger, but yet they receive a smaller increase in resources from the Ministry than other universities or higher education institutions less engaged in advanced research (due to increase in funding dedicated to the activity and performance in education in the criteria model). They therefore ask for an adaptation of the funding system to address this particular problem;
- a portion of funds allocated by the ANR today as a result of its calls, diverted research teams from applying to the European framework program (the rules implemented by the ANR are considered clearer and more flexible, and the calls appear to be more adapted to the needs of research). Finally, is it an advantage or a drawback for the French innovative system and to what extent?

The main limitation to establish a performance-based funding scheme in the **Spanish University system** derives from the fact that, as it has been explained before, the system is regionalized. This reduces the possibility of establishing a performance-based funding model to the regional administrative level and makes it almost impossible to establish a national and competitive one which addresses all the Spanish universities. Moreover, the fact that the regional university systems and, therefore, their funding models are defined to target the regional needs and challenges and in line with the economic and cultural regional trends, makes them different from one region to another. In addition, the differences between regions (population, economic priorities, level of industrialization) set up a strong barrier for transferability of funding models and policies between regions. In this sense and as an example, the strong differences in terms of population and – therefore - economic resources between regions (i.e. some of them have more than 5 million inhabitants and some others less than 1 million) set, on the one hand, differences between regions in the number of students, teachers, professors, researchers and, therefore, the amount of regional block funds; and on the other hand, and as a consequence, differences in the number of public universities and possibilities to set competitive performance-based funding between them. Since 9 regions within the 17 Spanish ones have only one public university, there is no place for competitive performance-based funding in all the regions.

In addition to the findings from the analysed cases, the literature also points to another limitation of performance-based funding schemes: up to now such schemes focus solely on external incentives and ignore thereby the more or less intrinsic motivation of academics for conducting research. 'Intrinsic motivation' takes place when an activity is undertaken for its own sake (Laux and Liermann, 1993). Extrinsic incentives can crowd out intrinsic motivation. Important in this respect is how an extrinsic incentive is perceived by the targeted academics. Crowding out takes place particularly when an external instrument is perceived to control. Contrary to that, intrinsic incentives are reinforced when the external incentives is perceived to support (Frey 1997). This implies that although there are good reasons for research assessments and performance-based funding schemes, these have to be designed, communicated and implemented with great care. The fact that not only the incentives (and hence methods and indicators) matter but also how they are perceived, points to the importance of the process of implementing new assessment methods. This is even more the case for performance-based funding systems. It is also important to consider that the motivation for academics through external incentives is not restricted to monetary ones. Particularly for academics, a number of alternative incentives might provide incentives to perform. These are instruments enhancing prestige and reputation, enhanced career opportunities, autonomy to act (e.g. Stephan 1996, Evers 1991). Another important aspect with respect to the set of incentives provided to academics refers to the diversity of activities and readiness to assume risk. To limit funding decisions to a limited set of outputs might lead

[57] The formula has been constructed so to not allow the simple duplication internally and instead contractual dialogue encourages dialogue with management components.

to an undesired homogenization of the university landscape, and due to the increased competition between universities it might decrease the willingness of academics to cooperate and share their results (Jongbloed 2008).

A basic finding which has been discussed within the workshops of the project is that all analysed funding schemes focus on scientific performance and output. The economic and social impact of research funding is – up to now - quite inadequately addressed in the methodologies used by different countries for the performance based funding. There are some obvious reasons to explain this, e.g. the difficulty of measuring these kind of impacts or that some impacts can exist but not necessarily be felt in the countries that initially financed the research, etc. In this respect, it seems appropriate to invest in further work to better develop the dimension of the economic and social impacts of research (and how those impacts could be integrated in performance-based funding schemes), e.g. with periodic review of the methodologies used in each country through improved networking, sharing of experiences between countries, at least at European level, and perhaps, as in the UK, through large review assessments of the methodologies used during a period at a special time.

Another finding that was discussed within the workshops (and which is related to the missing focus on economic and societal impacts as explained above) is that the methodologies used to measure performance introduce a bias as they all are based directly or indirectly on a consideration of the number and level of peer-reviewed publications. The mechanism of peer review clearly has its strengths, but there are also some limitations which are unintended consequences (e.g. the 'slicing' of publications or that the work as a peer could be so time consuming that it effects the research activities of that reviewer).

To sum up the findings of this chapter, it can be concluded that satisfaction with performance-based research funding (PBRF) schemes is generally quite high, but that up to now, many limitations and problems can also be observed. This is hardly surprising as such schemes are relatively new and recent policy tools.

Some of the identified limitations are more common and can be found in many performance-based research funding schemes, such as:

- the vertical differentiation of the university landscape that goes hand in hand with the introduction of PBRF-schemes (all PBRF-schemes) might not be compatible with the societal perception of the system;
- pure focus on quantitative mechanisms and hence what can be measured (and not what is of interest) (e.g. the Czech and the Austrian case);
- the often missing recognition of the diversity and limited comparability of research disciplines (e.g. Czech case);
- pure focus on external (monetary) incentives and neglecting possible unintended consequences on the motivation of researchers (all cases);
- methodological limitations (all cases);
- uncertainty.

Others are very specific and related to the respective policy context:

- the indicators in use are not adequately communicated (German case);
- the regionalized system of governing and financing universities (Spain).

Some of these limitations are inherent to PBRF-schemes or are based on general circumstances that cannot be solved, as they constitute a trade-off. Therefore, the main conclusion for the policy level is to take the diverse limitations of PBRF-schemes into account and recognize that further work has to be done to address those limitations.

5.4 Conclusions and recommendations

This section will highlight some conclusions and recommendations based on the previous chapters, thereby also addressing the three guiding research questions of this chapter (it has to be noted that these research questions have already been tackled in sections 5.3.2 to 5.3.4). The central findings are highlighted as recommendations in grey boxes. Those findings not only address the policy level, but all who are involved in the set-up and implementation of performance-based funding schemes of university research (PBRF).

The importance of universities for the 'knowledge-based economy' is recognised on European and national levels. In order to raise the quality of research with given budget constraints by providing incentives for increasing the efficiency and effectiveness of money spent on research, PBRF schemes have increasingly been introduced. An additional common rationale for the implementation of PBRF-schemes is to justify why money has or has not been spent, because governments are eager to take evidence-based funding decisions *(Research Question 1)*.

These findings have been validated by the analysed cases: concerning the rationales of PBRF-schemes it has been shown that the interrelated targets of 'performance' and 'value for money' in particular are reflected in all analysed cases as being primary objectives. The objective of introducing 'accountability' is also reflected in many cases as a primary objective of the respective PBRF scheme.

Due to the short period in which the measures have been in place, there is only limited evidence on the effects and impacts of the PBRF schemes in the case studies. However, for the UK RAE which has already been in place for over two decades, the verdict with regard to the rationale is positive.

Irrespective of this limited evidence, the majority of the PBRF schemes analysed are considered successful, albeit for different reasons *(Research question 2).* This is a consequence of the differences in the schemes, because although the objectives and rationales for the use of PBRF-schemes are similar, the design of the respective policy instruments varies from country to country, thereby reflecting their specific political and regional contexts. Despite their success, all cases analysed are faced with a continuous process of improvement of the scheme.

Our analysis generally leads us to believe that there are good reasons for implementing PBRF-schemes and that these can contribute to an increase in science quality. However, this requires an avoidance of pitfalls when setting-up and implementing the schemes.

In the following section, six recommendations with respect to setting-up and implementing PBRF-schemes that follow from our analysis are presented *(Research questions 2 and 3)*.

Recommendation 1: The diverse missions/tasks of universities as well as the heterogeneity between universities and within universities have to be taken into account when evaluating/ assessing their research.

Universities play a crucial role in national research systems, particularly for fundamental research. However, universities do not only play a decisive role in research but they are multi-task, or more specifically multi input-multi output oriented institutions. In addition to research, they have the task of providing tertiary education (up the highest level) and are increasingly asked to engage directly with society and economy, the so-called 'third mission' of universities. To perform these tasks different inputs are required (e.g. capital equipment, trained scientists, etc.).

The multi-task nature of universities, their specific role in a national higher education and research system and the heterogeneity of departments/research groups within universities have important implications for the IA of university-based research and the related performance-based funding schemes. Indicators have to be designed specific to the characteristics of the individual university or research group and to the purpose of the assessment/ objective targeted. This is important because the different tasks of universities are performed by the same people: the academics.

Recommendation 2: When using or introducing PBRF-schemes, one has to be aware of possible unintended consequences.

When funding decisions are based on a specific set of indicators, it is particularly important to take into account that induced incentives regarding research efforts have to be specific and balanced so as not to crowd out the intrinsic motivations of academics, and streamlining their activities towards certain activities, irrespective of their own particular talents. This is important so that strong incentives for internationally visible research outputs, for example, do not have detrimental effects on teaching quality or science-industry collaborations. To limit funding decisions to a limited set of outputs might also lead to an undesired homogenization of the university landscape: the increased competition between universities might decrease the willingness of academics to cooperate and share their results (Jongbloed 2008).

In addition, there is also a possible bias of PBRF schemes to short term objectives. This could lead to the research agenda moving away from an ultimate long-term objective.

In general, the policy level has to be aware that the introduction of PBRF schemes may result in major changes for the university landscapes in the respective countries, e.g. in a vertical differentiation of the university landscape. Another conclusion that can be drawn from the analysed cases is that the introduction of PBRF systems should avoid an abrupt and complete departure from the previous system without 'grind-in' possibilities for the affected institutions and individuals in order to ensure the acceptance of the PBRF scheme by the academic community.

Recommendation 3: To increase the acceptance of PBRF-schemes, the appropriate inclusion of the academic community in the process of designing PBRF schemes is necessary.

For performance-based funding systems it is important that they are accepted by academics. This increases the propensity that the PBRF-system actually motivates academics. Therefore, the inclusion of the academic community (or at least their representatives) in the process of designing PBRF schemes could be of value.

In general, close cooperation with the academic sector in designing such policy instruments or at least in defining the objectives of universities could be a main factor for the success of a PBRF scheme (as the example of Iceland has shown, for example).

Recommendation 4: The impact of PBRF-schemes on research (performance) can only be recognized after a longer time period; this has to be taken into account in the IA planning.

An underlying condition for being able to link assessment and performance is the existence of possibilities to define and measure research and research performance. Although it is a widespread belief that research and research performance can be measured, the assessment practices and methods at hand provide evidence, that measuring research performance is a very challenging task.

A second important issue is the question of timing. Policy makers need to take decisions 'here and now'. The ultimate outcomes of research are however rarely predictable or quantifiable in advance and most of the outputs and impacts of science are not tangible codified knowledge but rather intangible, and often occur with considerable time lags.

Recommendation 5*:* It has to be kept in mind that every single quantitative and qualitative assessment method has its flaws. Only a combination of quantitative and qualitative methods may provide a holistic picture on the impact of research.

The fact that unpredictable time lags between outputs, outcomes and impacts exist also has an impact upon the creation and use of methodologies and indicators. At present, the majority of quantitative impact analyses focus on direct quantifiable indicators of research (journal publications, citations), or seek to identify the economic impact measured via econometric studies. We have to be aware that every single quantitative and qualitative assessment method has its flaws and that only a combination of quantitative and qualitative methods may provide a holistic picture on the impact of research.

Recommendation 6: The policy level has to be aware that there are still many limitations of PBRF systems. Thus, further work has to be done to address those limitations.

Finally, especially when looking at section 5.3.4, it is obvious that despite the merits of PBRF-schemes, there are still many limitations and problems (*Research question 3*). This is hardly surprising as such schemes are relatively new and recent policy tools. Some of the identified limitations are more common and can be found in many PBRF-schemes (vertical differentiation of the university landscape; pure focus on quantitative mechanisms; the missing recognition of the diversity and non-comparability of research disciplines; methodological limitations, etc.) and others are very specific and related to the respective PBRF-scheme. Therefore - and despite the merits of PBRF-schemes - the main conclusion for the policy level is to be aware of the diverse limitations of PBRF-schemes, address them as much as possible and recognize that further work (particularly on effects and impacts of schemes implemented) has to be done in order to address those limitations.

In addition, it became obvious that the economic and social impact of research and research funding is – up to now - quite inadequately addressed in performance-based funding schemes. Therefore, it can be recommended that further work to better develop the economic and social impacts of research (and how those impacts could be integrated in performance-based funding schemes) is required.

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Annexes

Annex I.1 Meetings and conferences during the CIA4OPM project

Planning workshops and conferences CIA4OPM		
Date - venue	Organiser	Main topics
27-28/4/2009 Brussels	CZELO/ TCASR	Project delineation
30/6-1/7/2009 Paris	MESR	Literature review and indicators – back to back with TIP meeting OECD
14-15/10/2009 Stockholm	VINNOVA	**EU presidency Sweden** - Impact Assessment Workshop - literature review – WP activities – newsletter 1
17-19/2//2010 Ankara	TUBITAK	Presentation case studies by partners
26-28/5/2010 Madrid	FECYT	**EU presidency Spain** - Workshop on FP6 Impact Assessment - presentation WP activities – newsletter 2
29/9 – 1/10/2010 Vienna	BMWF	Discussion WP outcomes (activities, mutual learning, and policy recommendations)
8-10/12/2010 Brussels	BELSPO-EWI	**EU presidency Belgium** - Policy Conference - presentation and discussion draft project outcomes – newsletter 3
9-11/3/2011 Malta	MCST	Final report and policy recommendations – newsletter 4

Annex I.2 Presentations delivered during the CIA4OPM project meetings and conferences

- ✓ Results based distribution of public R&D support in the Czech Republic (Lenka Lepicova; Vladimir Albrecht, TCASCR)
- ✓ A look into the black box: what difference do IWT R&D grants make for their clients (Evren Bukulmez, TTGV)
- ✓ Adding value to evaluation (Jakob Edler)
- ✓ An assessment of the industrial technology support program (TTGV) (Evren Bukulmez, TTGV)
- ✓ Analysis of the evaluation practice for policies that promote science industrial relationships (Joost Heijs)
- ✓ Evaluation of the Austrian Industrial Research Promotion Fund (FFF) Ozlem DOGAN, TUBITAK)

- ✓ Evaluation system of RTD results in the Czech Republic: methodics, system, results (Lucie Vavrikova, TCASCR)
- ✓ Governance of product and process factors to improve impact assessment as a tool for policy making - Experiences from OMC-net project (Deniz Bayhan, TTGV)
- ✓ Methods and indicators for the evaluation and impact assessment of (university-based) research - Experiences from OMC-net project (Michael Dinges; Andreas Niederl)
- ✓ The practice of impact assessment in the policy cycle - Experiences from OMC-net project (Peter Teirlinck, BELSPO)
- ✓ First results of the Impact Assessment of the RANNIS Technology Development Fund (Thorsteinn Gunnarsson, RANNIS)
- ✓ Flanders in the European 6th Framework Programme (Mieke Houwen, EWI)
- ✓ French case study: analysis of competitiveness poles (Marie de Lattre-Gasquet, ANR)
- ✓ Governance of Universities and PRIs in Iceland (Thorsteinn Gunnarsson, RANNIS)
- ✓ Governance of Universities and PRIs in Malta (Ian Gauci Borda, MCST)
- ✓ Impact Assessment in the policy cycle at the EC (Jim Dratwa, EC)
- ✓ Impact Assessment in the policy cycle in Finland (Jari Hyvarinen)
- ✓ Impact assessment of Framework Programme on French research and innovation system : support to the researchers mobility and R&D in SMEs (Florent Olivier, MESR, Mathieu Doussineau, Technopolis Group France)
- ✓ Impact assessment of programme Innovation measure in Czech Republic (Lucie Vavrikova, TCASCR)
- ✓ Impact assessment of public funding targeted at improving the amount and quality of private RTDI investment: delineation project and work plan (Deniz Bayhan, TTGV; Hakan Ozdemir, TTGV)
- ✓ Impact Assessment of public RTDI funding (including respective policies and instruments) targeting at improving the management of public research institutions and universities: delineation project and work plan (Bernhard Elias, BMWF)
- ✓ Impact Assessment of science industrial relationships related policies (Wolfgang Polt)
- ✓ Introduction of Impact Assessment of the RANNIS Technology Development Fund in Iceland (Thorsteinn Gunnarsson, RANNIS)
- ✓ Impact Assessment of the RANNIS Technology Development Fund (Thorsteinn Gunnarsson, RANNIS)
- ✓ Impact Assessment on the FP5 on the Spanish Universities – WP5 Case Study (Edgar Moya, MICINN)
- ✓ Impact Assessment Study on additionality of Public Support in the Czech Republic (Jiri Vanecek, TCASCR)
- ✓ Impact of policies: Co-financing of FP Projects (Lucie Vavrikova, TCASCR; Lenka Lepicova, TCASCR)
- ✓ Impact of Performance Agreements in Iceland (Thorsteinn Gunnarsson, RANNIS)
- ✓ Impacts on Industry from Research Institutes – Case Study Spain(Edgar Moya, MICINN)
- ✓ Indicators and Impact assessment : a story of friendship and enmity (Eric Hauet, MESR)
- ✓ Industry and Academia Cooperation (Ignacio Baanante, MICINN)
- ✓ Industry and Academia Cooperation – Way forward (Ignacio Baanante, MICINN)

- ✓ Industry participation in the FP6 (Vladimir Albrecht, TCASCR; Lucie Vavrikova, TCASCR)
- ✓ INNO-Appraisal Project (Abdullah Gok, MıoIR, University Of Manchester)
- ✓ Making the difference: the evaluation of behavioural additionality of R&D subsidies – Case study(Mieke Houwen, EWI)
- ✓ Malta's University system; a stock of the current situation (Ian Gauci Borda, MCST)
- ✓ Mechanisms of Technology Transfer between Science and Industry. The German experiences and its transferability to other countries. (Joost Heijs, Complutence University of Madrid)
- ✓ Methodological approaches of the evaluation of technology centres (Andres Barge-Gil)
- ✓ Methods for the Impact Assessment of university-based research (Henri Delanghe)
- ✓ National processes and experiences concerning the governance of Universities and PRIs – Relevant aspects in view of WP5 (Edgar Moya, MICINN)
- ✓ Preliminary findings on the impact assessment of university-based research (Michael Dinges; Andreas Niederl)
- ✓ Performance-based funding in Austria (Bernhard Elias, BMWF)
- ✓ Performing impact assessment (Faugert & Co)
- ✓ Perspective of a VINNOVA program manager (Margaretha Groth, Vinnova)
- ✓ Perspective of support system (gathering and handling data) (Kenth Hermansson)
- ✓ Presentation of an EC expert group on assessment of university-based research (Bernhard Elias, BMWF)
- ✓ Presentation on Tax incentives (Frédérique Sachwald, MESR)
- ✓ Policy recommendations on competitiveness pole (Annie Levy, Eric Hauet, MESR)
- ✓ Public funding for Industry-Science cooperation: Behavioural additionality in terms of Technology Transfer by Collective Research Centres in Belgium (Peter Teirlinck, BELSPO)
- ✓ RAE & economic impact assessment within the UK Research Councils (Andre De Campos)
- ✓ Research Funding in Malta (Ian Gauci Borda, MCST)
- ✓ Results of Self-Assessment approach (Kjell Hakan Narfelt)
- ✓ Self Assessment Task findings (Evren Bukulmez, TTGV)
- ✓ Spanish Research Institutes Impact Study (Carlos Vivas, FEDIT)
- ✓ State of the art in impact assessment (methodology, indicators, questionnaire – complementarity with PRO-INNO website, way forward
- ✓ TAFTIE Self-Assessment Approach (Evren Bukulmez, TTGV)
- ✓ The Austrian University System (Bernhard Elias, BMWF)
- ✓ The French system (Eric Hauet, MESR)
- ✓ The German initiative for Excellence (Ulrike Eickhoff)
- ✓ University-based research – Policy objectives and the assessment of research (Bernhard Elias, BMWF)
- ✓ Usefulness of Impact Assessment Studies: A Tour d'Horizon (Abdullah Gok, MIoIR Univesity of Manchester)
- ✓ Usefulness – lessons from INNO-Appraisal project (Abdullah Gok, MIoIR, University of Manchester)

- ✓ VINNOVA's view on context in which evidence is used to make policy (Peter Stern, Vinnova)
- ✓ Literature review on Impact Assessment: State of the Art Presentation (Peter Teirlinck, BELSPO and Henri Delanghe, Idea Consult)
- ✓ Case Studies on the Governance and Usefulness of IAs Synthesis (Abdullah Gok, MIoIR, University of Manchester)

The presentations are available on the project website www.cia4opm.com

Annex I.3 Involvement and links with other impact assessment projects/initiatives

INNO-Appraisal: the INNO-Appraisal project methodology has been largely considered for the literature review questionnaire in order to get the maximum synergy possible with other works already done in the area, mainly the Inno-Policy Trendchart repository of European policy measures and Inno-Appraisal repository of European evaluation studies (http://www.proinno-europe.eu/index.cfm?fuseaction=page.display&topicID=262&parentID=52). Mutual participation in PRO-INNO workshop 24-25/9 2009 and in the OMC-net EU Presidency Conference and workshop in Madrid in May 2010.

OECD: biannual reporting on progress of the OMC-net project to TIP (December 2009 – June 2010).

SIAMPI: 'Social Impact Assessment Methods for research and funding instruments through the study of Productive Interactions between science and society.' SIAMPI is a two year research program funded by the Science in Society program of FP7. Mutual exchange of information and involvement of project coordinators in both projects.

Annex to Chapter 1

Annex 1.1: Survey on Value-added of OMC for participants

The purpose of this small-scale survey is identifying what the OMC project, a mutual learning and experience sharing process, has really meant for the participants; e.g. have the participants learned more about impact assessment (IA), will they use or are they already carrying out an IA exercise as a results of this OMC project? These and other lessons are important for motivating future actions in the area of increasing IA for policy making purposes and potential future OMC projects.

Who should fill out this survey?

The main target group of this survey is the direct participants and their immediate collaborators who have been involved in the project throughout its duration.

Practical arrangements

The questionnaire should be filled out (in underlying document/questionnaire) and returned to us before **31 January 2011** by sending the results to dita.uslu@stis.belspo.be with a copy to peter.teirlinck@belspo.be

Respondent name: …….

Organisation: ……..

Your function/responsibility within your organization (please briefly describe and pay attention to the hierarchical level you have in your organisation):

……
……..

I. Context at the beginning of the project

1. What was your (you personally) starting point with respect to IA at the beginning of the OMC-net project (begin 2009)?

   a. Did you have any prior 'technical' knowledge on IA methods and potential applications?

      □ None □ Limited □ Substantial

      Please further explain in maximum half a page

      ……

   b. Had you already carried out IA in the past?

      □ None □ On an ad hoc basis □ Systematically

      Please further explain in maximum half a page

      ……

   c. What were your motives/expectations to participate in this OMC-project?

      □ To learn about methodological aspects related to IA

      □ To learn about IA in general

      □ To gain insights in the usefulness of IA for policy making

      □ Other (please explain) …….

      Please further explain in maximum half a page

      ……

II. Improved understanding of IA related to the OMC-net project

2. This OMC project has increased your general knowledge of the terminology used for IA.

☐ Strongly Agree ☐ Mildly agree ☐ Agree nor disagree ☐ Mildly disagree ☐ Strongly Disagree

3. This OMC project has increased your general knowledge of the methods for IA.

☐ Strongly Agree ☐ Mildly agree ☐ Agree nor disagree ☐ Mildly disagree ☐ Strongly Disagree

4. This OMC project has increased your understanding of the use of indicators for IA.

☐ Strongly Agree ☐ Mildly agree ☐ Agree nor disagree ☐ Mildly disagree ☐ Strongly Disagree

5. This OMC project has increased your knowledge about the practice of IA (i.e. how to setup an IA exercise, how to manage it etc.)

☐ Strongly Agree ☐ Mildly agree ☐ Agree nor disagree ☐ Mildly disagree ☐ Strongly Disagree

6. This OMC project increased your understanding of the practice of IA (you heard/learned lessons and experiences that are of value to you in doing your own IA)

☐ Strongly Agree ☐ Mildly agree ☐ Agree nor disagree ☐ Mildly disagree ☐ Strongly Disagree

7. This OMC project increased your understanding of the place (usefulness) of IA in the policy cycle

☐ Strongly Agree ☐ Mildly agree ☐ Agree nor disagree ☐ Mildly disagree ☐ Strongly Disagree

III. Lessons learned and implementation of IA practices

8. How have the findings/results of this OMC project, and the process itself, influenced your opinions about the usefulness of IA for policy making in (and of) your agency?

   Open question

   ……

9. Have you already developed (or will you in the coming 6 months start to develop) your 'own' IA-exercise (as a direct result of this OMC)?

☐ Yes: Which projects? ……

☐ No: Why not (what were the hampering factors)? …… ……

10. Would you say that there is an immediate need to carry out IA in your agency?

☐ Yes: Explain: ……

☐ No: Why not? …… ……

11. On which factors will it depend whether or not an IA-exercise will be carried out?

    Please explain in maximum half a page

    ……

IV. Next steps for IA

12. Concerning the future use of IA in your agency and your country…

a. Do you think that further methodological development and learning are needed or should there be more attention for the take-up of evaluation and IA outcomes in policy making? Where would your priority be?

☐ Methodological aspects: Explain: ……

☐ Development of indicators for IA: Explain: …… ……

☐ Usefulness for policy making: Explain: ……

☐ Other? Explain: ……

b. Do you think that more attention should be paid to (new) methodological development and learning in themes like societal impact analysis? And how should we proceed?

Please explain in maximum half a page

13. This OMC project helped you (or will help you) to promote the usefulness of IA in your country?

☐ Strongly Agree ☐ Mildly agree ☐ Agree nor disagree ☐ Mildly disagree ☐ Strongly Disagree

Please explain how this will be done in maximum half a page

……

14. Would you be in favour of a follow-up to this OMC-IA project? What should be different in that project, both content and process wise?

Please explain in maximum half a page

……

15. If you have any particular comment/lesson for/from this project you can describe it here:

……

Annex to Chapter 2

Annex 2.1: Questionnaire on impact assessment for R&D funding

This questionnaire has been designed in order to get the maximum synergy possible with other works already done in the area, mainly the Inno-Policy Trendchart repository of European policy measures and Inno-Appraisal repository of European evaluation studies.

Inno-Policy Trendchart repository of European policy measures is used in Section 2 in order to add detailed information already collected on the main national RTDI policy measures (although our project is only interested in the policy measures targeted at WP3-4-5 goals). Source: http://www.proinno-europe.eu/index.cfm?fuseaction=page.display&topicID=262&parentID=52

Section 1: OVERVIEW AT COUNTRY LEVEL OF THE USE OF IMPACT ASSESSMENT (IA) IN PUBLIC FUNDING FOR RTDI

In this section, the objective is to get an overview at country level of the existence of a general attitude of using IA in public funding for RTDI practice. Hence, the focus does not lie on listing examples of IA studies but on gaining insight into the practice and role of IA in policy making in the different partner countries. *Instruction: When a description is required, please try to be as brief as possible maintaining the main information.*	
1. Country	
2. Partner	
3. To what extent is impact assessment planned at the policy cycle for policy measures funding RTDI?	
Always	☐
In some cases	☐
Never	☐
If applicable, since when?	
4. Are the results of Impact Assessment studies used for	
The design of new policy measures or the improvement of existing ones?	☐
Other uses?	☐
5. If yes, please specify time period and frequency	
6. If yes, provide examples	

7. Have there been major changes or will there be changes in the near future in the way impact assessment is used in policy making towards RTDI?	
Yes, there is an increasing use of IA.	☐
Yes, there is a decreasing use of IA.	☐
No	☐
If yes, please describe	

Section 2: IMPACT ASSESSMENT OF POLICY MEASURES FUNDING RTDI

This section should be filled for Impact Assessment studies conducted in the last 5 years.

General overview of the use of impact assessment on public funding and specific information gathering on impact assessment in the three clusters of policy interventions targeted in WP3 - 5:

- improving the amount and quality of private RTDI investment

- improving the cooperation and transfer of technologies between public research institutes and private enterprises, including through developing public private partnerships

- improving the governance of public research institutions and universities

Question 2: Trendchart code and title of the corresponding policy measure. Codes can be found at http://www.proinno-europe.eu/index.cfm?fuseaction=page.display&topicID=262&parentID=52

1. Country	
2. Partner	
3. Please list all the Impact Assessment studies undertaken in the last 5 years in the area of public funding for RTDI in your country (economic and social IA studies).	
1	
2	
3	
4	
5	
6	
4. (B.1.a) For the Impact Assessment studies specified in question 1, please identify the Trendchart code and title of the corresponding policy measure **(Please go to the following link to check the policy measures and their codes: http://www.proinno-europe.eu/index.cfm?fuseaction=page.display&topicID=262&parentID=52. Use the explanation provided in the Instructions).**	

1
2
3
4
5
6
5. In the case that the IA study corresponds to a policy measure not covered by Inno-Policy Trendchart, please classify it regarding the following list (more than one can be chosen).
1
2
3
4
5
6
1. Governance & horizontal research and innovation policies **1.1 Support to policy making (policy intelligence)** 1.1.1 Strategy policy documents (official documents, policy consultation papers, green or white papers, Operational Programmes of Structural Funds) 1.1.2 Activities of official advisory and consultative forum 1.1.3 Policy Advisory services (technology foresight, scoreboard type activities, cluster mapping, sectoral studies of innovation) **1.2 Research and Innovation strategies** 1.2.1 Strategic Research policies (long-term research agendas) 1.2.2 Innovation strategies **1.3 Horizontal programmes/measures** 1.3.1 Cluster framework policies 1.3.2 Horizontal measures in support of financing 1.3.3 Other horizontal policies (ex. society-driven innovation) **2. Research and Technologies** **2.1 Research organisations** 2.1.1 Policy measures concerning excellence, relevance and management of research in Universities 2.1.2 Public Research Organisations 2.1.3 Research and Technology Organisation (private non-profit) 2.1.4 Research Infrastructures **2.2 Science-Industry linkages** 2.2.1 Support infrastructure (transfer offices, training of support staff) 2.2.2 Knowledge Transfer (contract research, licences, research and IPR issues in public/academic/non-profit

institutes)

2.2.3 R&D cooperation (joint projects, PPP with research institutes)

2.3 State aid measures in support of business R&D

2.3.1 Direct support of business R&D (grants and loans)

2.3.2 Indirect support to business R&D (tax incentives and guarantees)

3. Human Resources (education and skills)

3.1. S&T education

3.1.1 Awareness creation and science education

3.1.2 Relation between teaching and research

3.1.3 Stimulation of PhDs

3.2 Research personnel

3.2.1 Recruitment of researchers (e.g. fiscal incentives)

3.2.2 Career development (e.g. long-term contracts for university researchers)

3.2.3 Mobility of researchers (e.g. brain-gain, transferability of rights)

3.3 Skills development and recruitment

3.3.1 Job training (LLL) of researchers and other personnel involved in innovation

3.3.2 Recruitment of skilled personnel in enterprises

4. Promote and sustain the creation and growth of innovative enterprises

4.1. Support to sectoral innovation programmes

4.1.1 Support to sectoral innovation in manufacturing

4.1.2 Support to innovation in services

4.2 Support to entrepreneurial innovation

4.2.1 Support to innovation management and advisory services

4.2.2 Support to organisational innovation incl. e-business, new forms of work organisations, etc

4.2.3 Support to technology transfer between firms

4.3 Support to start-ups and access to finance

4.3.1 Support to innovative start-ups incl. gazelles

4.3.2 Support to risk capital

5. Markets and innovation culture

5.1. Measures in support of innovation culture

5.1.1 Support to the creation of favourable innovation climate (ex. roadshows, awareness campaigns)

5.1.2 Innovation prizes incl. design prizes

5.2 Support to the creation of new markets

5.2.1 Fiscal incentives in support of the diffusion of innovative technologies, products and services

5.2.2 Support and guidelines on innovative Green Public Procurement (GPP)

5.2.3 Impact assessments (on research and innovation issues) of new legislative or regulatory proposals in any policy field

5.3 Intellectual property protection and standards

5.3.1 Measures to raise awareness and provide general information on IPR

5.3.2 Consultancy and financial incentives to the use of IPR

5.3.3 Support to the innovative use of standards

6. For the Impact Assessment studies listed in question 1, please specify the correspondence to the policy measures targeted at WP3-4-5 (more than one can be chosen).

WP3: Improving the amount and quality of private RTDI investment	*WP4: Improving cooperation between public research institutes and private enterprises*	*WP5: Improving the governance of universities*

Study	*WP3: Improving the amount and quality of private RTDI investment*	*WP4: Improving cooperation between public research institutes and private enterprises*	*WP5: Improving the governance of universities*
1	☐	☐	☐
2	☐	☐	☐
3	☐	☐	☐
4	☐	☐	☐
5	☐	☐	☐
6	☐	☐	☐

Section 3: STUDIES ON IMPACT ASSESSMENT

1. Instructions
ONLY FOR IMPACT ASSESSMENT STUDIES ASSESSING POLICY MEASURES TARGETED AT WP3-4-5. This section intends to collect information on the methodologies and impact indicators used in the impact assessment studies, which refer to the clusters of policy interventions targeted in WP3-4-5. Here, details on the impact assessment studies (mainly methodology and indicators) are requested. Complete the following questionnaire for those IA studies which you consider most important from the point of view of methodology innovation, lessons learnt and usefulness for mutual learning. You will have to complete one questionnaire for each of the IA studies.

2. General	
1. Country	
2. Partner	

3. IA Study	
Title of the study:	
[B.1.a] The policy measure name / code.	
Institution that has ordered the study	
Institution (firm) that has carried out the study:	
[C.10.b-C.10.c] Impact assessment period (start/end date):	
[C.11.c] URL of the Report:	

3. Objective		
5. What is (are) the objective(s) of the policy measure (referred to in the IA) in terms of expected impact?		
6. [C.8] State which kind of impacts the study has measured (more than one can be chosen)	*YES*	*NO*
Scientific	☐	☐
Technological	☐	☐
Economic	☐	☐
Societal	☐	☐
Policy	☐	☐
Other (please specify)		
7. Cluster of policy intervention that the impact assessment concerns	*Main focus of IA study*	*Secondary focus of IA study*
WP3: Enhancement of the amount and quality of private RTDI investment	☐	☐
WP4: Improvement of the cooperation between public research institutes and private enterprises	☐	☐

WP5: Improvement of the management of public research institutions and universities	☐	☐

4. Context		
8. Object of impact assessment	*YES*	*NO*
One or more institutions	☐	☐
Projects	☐	☐
Programmes	☐	☐
Policy measures	☐	☐
Other (please specify)		
9. Level of analysis at which impacts are assessed	*YES*	*NO*
Micro		
Individual	☐	☐
Institution	☐	☐
Meso		
Cluster	☐	☐
Regional	☐	☐
Sectoral	☐	☐
Macro		
National	☐	☐
European	☐	☐
Global	☐	☐
Other (please specify)		
10. [C.14] User group of the impact assessment conclusions/report	YES	NO
Policy Makers (politicians)	☐	☐
Policy Makers (Government officials)	☐	☐
Programme Management	☐	☐
Auditors/Financial Authorities	☐	☐
Those directly supported by the measure	☐	☐

External/International (co)sponsor of the measure	☐	☐
Potential Users of the Policy Measure	☐	☐
Policy Analysts	☐	☐
General Public	☐	☐
Other (specify)		
11. Is all the information of the IA study publicly available?	☐	☐

5. Methodology	**YES**	**NO**
12. Has a previously designed methodology been used for this study?	☐	☐
If yes, please specify when this methodology was created and whether it is used at institutional, national or international level.		
13. Has the same methodology been used for all the studies focused on the policy measure so far?		
Yes No Not applicable, it is the first IA study in the field		
14. [C.13] Data collection methods (more than one can be chosen)	*YES*	*NO*
Existing Surveys/Databases	☐	☐
Participant Surveys	☐	☐
Non-participant Surveys	☐	☐
Interviews	☐	☐
Focus Groups/Workshops/Meetings	☐	☐
Peer Reviews	☐	☐
Technometrics/Bibliometrics Search	☐	☐
Document Search	☐	☐
Monitoring Data	☐	☐
Other methods		
15. [C.12] Data analysis methods	*YES*	*NO*
Case study analysis	☐	☐

Network analysis	☐	☐
Econometric analysis	☐	☐
Descriptive statistics (e.g. uptake analysis)	☐	☐
Input/output analysis	☐	☐
Document Analysis	☐	☐
Context Analysis	☐	☐
Before/After Group Comparison Approach	☐	☐
Control Group Approach	☐	☐
Counter-Factual Approach	☐	☐
Cost/Benefit Approach	☐	☐
Other methods		
16. Does the methodology combine qualitative and quantitative approaches?	☐	☐
17. [C.7] What topics have been covered by the study?	*YES*	*NO*
External consistency	☐	☐
Internal consistency	☐	☐
Coherence/Complementarity	☐	☐
Goal Attainment/Effectiveness	☐	☐
Outputs, outcomes and impacts	☐	☐
Quality of outputs	☐	☐
Value for Money/Return on Investment/Cost-Benefit Analysis	☐	☐
Programme Implementation Efficiency	☐	☐
Project implementation Efficiency	☐	☐
Input additionally	☐	☐
Output additionally	☐	☐
Behavioural additionally	☐	☐
Policy/Strategy Development	☐	☐
Gender issues	☐	☐
Minority issues	☐	☐
Other (please specify)		

18. [D.3.a] Was the design of the study and the chosen methodology appropriate for your institution, given the objectives of the impact assessment and the nature of the policy measure?	☐	☐
1 Not appropriate at all	☐	
2 Moderately inappropriate	☐	
3 Average Appropriate	☐	
4 Fairly appropriate	☐	
5 Very appropriate	☐	
Please explain		
19. What main methodological lessons did your institution learn?		
20. Do you consider this study worthy for further analysis and mutual learning?		
1 Not useful at all	☐	
2 Moderately useless	☐	
3 Average useful	☐	
4 Fairly useful	☐	
5 Very useful	☐	
Please explain		

6. Indicators		
21. Were any impact assessment indicators included in the following stages?	*YES*	*NO*
at the set-up of the policy measure	☐	☐
in the ex-post Impact Assessment report	☐	☐
22. Which impact assessment indicators did the IA study use? (more than one can be chosen)	*YES*	*NO*
Existing ones (already in use) New for the institution	☐ ☐	☐ ☐

New in the field of IA	☐	☐
23. Are all the indicators public?	☐	☐
How many indicators does the IA study include?		
24. List all the indicators grouped by the impacts that the study has measured: Scientific / Technological / Economic/ Societal / Policy / Other.		

25 Were these indicators appropriate to measure these impacts?

	YES	*NO*	*In some cases*
Scientific	☐	☐	☐
Technological	☐	☐	☐
Economic	☐	☐	☐
Societal	☐	☐	☐
Policy	☐	☐	☐
Other.	☐	☐	☐

If not, which are the shortcomings? What other indicators would be needed?

26. Were these indicators efficient (in terms of information provided / resources devoted) to measure these impacts?

	Not efficient at all	*Moderately inefficient*	*Average efficient*	*Fairly efficient*	*Very efficient*	*N/A*
Scientific	☐	☐	☐	☐	☐	☐
Technological	☐	☐	☐	☐	☐	☐
Economic	☐	☐	☐	☐	☐	☐
Societal	☐	☐	☐	☐	☐	☐
Policy	☐	☐	☐	☐	☐	☐
Other.	☐	☐	☐	☐	☐	☐

7. Impact Assessment Results

27. [E.2.a and E.2.b] Did the assessment contain any recommendations?

No	☐

Yes, targeted at the design of the programme/measure?	☐	
Yes, targeted at the programme management?	☐	
Yes, targeted at broader policy design?	☐	
Other		
28 [F.1.a – F.1.b] Were the analysis and recommendations widely discussed with:	*YES*	*NO*
government?	☐	☐
participants/stakeholders?	☐	☐
29. [F.3] What were the consequences of the assessment?		
Termination of the measure	☐	☐
Re-design of the measure	☐	☐
Re-design of another measure	☐	☐
Expansion of the measure	☐	☐
Merger of measures	☐	☐
If there were no consequences, please state why not.		
8. Other		
30. Please, add any comment or further explanation regarding the issues of this questionnaire.		

9. End	**YES**	**NO**
31. If you are not part of the project CIA4OPM, please specify whether you would like to receive the results of this study.	☐	☐
Your e-mail address (if different from Question 1, Section 1)		

Annex to Chapter 3

Annex 3.1: List of partners

Country	Organisation Title	Organisation
Turkey	TTGV	Technology Development Foundation of Turkey
France	ANR	The French National Research Agency
Belgium	BELSPO	Belgian Federal Science Policy Office
Belgium	EWI	Flemish Government, Department of Economy, Science and Innovation
Spain	FECYT	The Spanish Science and Technology Foundation
France	MESR	Ministry for High Education and Science
Iceland	RANNIS	The Icelandic Centre for Research
Czech Republic	TCASCR	The Technology Centre for Academy of Sciences of Czech Republic
Turkey	TUBITAK	The Scientific and Technological Research Council of Turkey

Annex 3.2: Case Study Tools

Tool 1: Guidance Note for Case Studies

The Project: The focus of the OMC-Net project is to increase the usefulness of impact assessment in the context of RTDI policy formulation, or in other words, making sense of impact assessment (IA) for policy making. Rather than finding optimal ways of performing impact assessments, the project will develop a framework facilitating communication between policy makers and different stakeholders in the policy making process to make impact assessment more meaningful and useful as a tool in the policy making process.

WP3: The objective in WP3 is to increase the use of impact assessment concerning public policies to improve the quality and quantity of private RTDI investments.

This Case Study: This case study intends to explore the governance of the impact assessment process by focusing on usefulness. From the literature on impact assessment, we have identified a number factors (related to the product and process of IA) critical for usefulness. These factors documented by the literature will be examined to understand how they are managed in order to ensure high degree of usefulness for policy and operational learning. In other words, we study real-life cases of impact assessments to learn how they managed various dimensions and stages of IA to maximise operational and policy learning. To that end, we have selected a number of IA studies and we study these by using primary (interviews with various stakeholders of IA) and secondary sources (the report itself, other research, etc.).

Web Site: www.cia4opm.com

The aim of these case studies is to learn from the experience of the governance of IA process and its product for policy and operational learning.

Data sources for these case studies will be:

- The IA report: obtain and read the IA report prior to the interview
- Interviews:

(1) Interviewees: These interviews are advised to be conducted with the following groups. At least one group should be interviewed according to the priority order below. Where possible, it would be very valuable to interview the other groups.

- policy-makers (those who make the policy decisions)
- programme managers (those who run the programme)
- evaluators
- people from other public bodies who have participated in the IA process and have a considerable interest

(2) Interview procedure: the following procedure is recommended whilst it is in discretion of the partners to act differently as appropriate, of course.

- Identify the possible interviewees: this might be more challenging than it seems as the people responsible for the IA might have left the organisation.
- Approach the interviewee: explain the aim of the study and the potential benefit to them by i) giving them an opportunity to review the IA and ii) contributing to a study later they will learn from.
- Send the interview guide to the interviewee in advance: please note that experience tells that optimum time for this is 1-2 weeks in advance. Explain them that the guide seems too detailed but it outlines the issues you would like to discuss with them. The interview should normally take around 1 hour. Please quote this expectation so that they are not disheartened with the length of the interview guide.
- Decide if you would like to conduct the interview face-to-face or over-the-phone. There are obvious advantages and disadvantages in relation to both of the alternatives.
- Decide if you would like to record the interview. If you want to record, it is better you ask the interviewee's permission while sending the template. If you do not record, you might want to type while speaking or print the guide and take notes to the blank sections of the guide.
- During the interview, it is advised to begin with a summary of the project, WP and case study. You can also mention the date they can expect to receive the final report (project end date).
- You do not have to ask each and every question. As the discussion develops you will realise some of them are less important or simply irrelevant to the particular case. Similarly, although you need to follow the logical flow, you do not have to follow the order of questions strictly. Discussion will sometimes lead you otherwise. Try to ensure that all of the relevant issues presented in the guide are covered.
- After the interview, complete the interview report by completing the respective sections in the interview guide. It is advised to do it as soon as possible after the interview. You do not have to transcribe everything but giving the essence of the discussion would suffice. In order to ensure the mutual learning, taking notes as self-explanatory as possible and in English would be good.
- Circulate the interview reports. Other partners' feedback could be very useful for revisions and it provides mutual learning.

- **Other sources:** where possible try to reach and study other sources that are relevant to the IA. These could be research on the particular IA, policy documents referring to the particular IA, internal documents (management and evaluation reports etc.) about the IA and mid-term reports of the particular IA, etc.

The case study report will take into consideration the above sources. It will outline the measure, the general features of the IA and the issues that our project looks at. The case study template which outlines the main sections will be used. Each case study is expected to be around 7500 words (15 pages). However, this may vary according to the case's particulars. If deemed necessary partners can adjust it.

Tool 2: Interview Guide for Case Studies

The Project: The focus of the OMC-Net project is to increase the usefulness of impact assessment in the context of RTDI policy formulation, or in other words, making sense of impact assessment (IA) for policy making. Rather than finding optimal ways of performing impact assessments, the project will develop a framework facilitating communication between policy makers and different stakeholders in the policy making process to make impact assessment more meaningful and useful as a tool in the policy making process.

WP3: The objective in WP3 is to increase the use of impact assessment concerning public policies to improve the quality and quantity of private RTDI investments.

This Case Study: This case study intends to explore the governance of the impact assessment process by focusing on usefulness. From the literature on impact assessment, we have identified a number factors (related to the product and process of IA) critical for usefulness. These factors documented by the literature will be examined to understand how they are managed in order to ensure high degree of usefulness for policy and operational learning. In other words, we study real-life cases of impact assessments to learn how they managed various dimensions and stages of IA to maximise operational and policy learning. To that end, we have selected a number of IA studies and we study these by using primary (interviews with various stakeholders of IA) and secondary sources (the report itself, other research, etc.).

Web Site: www.cia4opm.com

1. Information about the Respondent

1.a.Name:	
1.b.Affiliation:	
1.c.Telephone:	
1.d.E-mail:	
1.e.Notes:	

2. Policy Measure in Question

{In this section, we explore the general features of the policy measure for which the IA conducted. This part is only to provide a basis for the issues this study intends to examine; the focus of the case study should be given in part 4 and 5.}

2.a. Name of the Policy Measure	

2.b. Please tell us about the policy measure objectives (Why and how did the policy measure originate? What are the objectives of the measure? How clear are these objectives? What time horizon is envisaged for the measure to make an impact? How does the measure fit into your overall policy? Are there any preset performance indicators?)	{Here the impact logic, at least in its very basic form, should be derived.}
2.c. Please tell us about the modalities of your measure. (What kind of support do you give? On what basis is the support given: competition, first come first serve, other? Who are your beneficiaries?)	
2.d. Please tell us about the institutional structure for this measure. (Which institutions are involved as programme manager, policy-maker, and etc? Who are the stakeholders?)	

3. Impact Assessment (IA) in Question

{In this section, we explore general features of the IA. This part is only to provide a basis for the issues this study intends to examine; the focus of the case study should be given in part 4 and 5.}

3.a. Please tell us about the decision for the IA. (How did you decide to commission an IA? Whose idea was that? What was the purpose of the IA for different stakeholders: policy maker, programme management, other public bodies, beneficiaries, target group? Can you tell us about why and how the IA was planned? Was it a condition from the beginning of the programme or did a policy discussion lead to it? Was there a budget earmarked for the IA in the design of the measure? How much did you invest for the IA (in absolute terms and as percentage of the measure annual budget))	

3.b. Please tell us about the IA design process. (Was there a Terms of Reference (ToR)? Who has written it? How detailed was the ToR? Who has designed the IA? At the end of the process, do you think the TOR were adequate? If not, how could it has been improved? What was the stakeholder (policy-maker, programme management, other public bodies, beneficiaries, target group) involvement in this process? Can you tell us about the involvement of the programme management in the design of the IA? What did the different stakeholders expect from this IA? Were there indicators in the IA, how did you design them?)	
3.c. Please tell us about the tender process. (Who was responsible for the tender? What kind of tender: Open tender, closed tender, no tender etc. What were the criteria for selection of the evaluator?)	
3.d. Please tell us about the evaluator. (Type of the evaluator; person, university, consultancy, etc. What specific expertise did the evaluator need to have in order to do the IA?)	
3.e. Please briefly tell us about the process of implementation of the IA. (How long did it take? (please also mention the milestones: design, selection, data collection, data analysis and final report) What were the main questions? What was the main methodology?)	
3.f. Please briefly tell us about the results, recommendations and consequences of the IA study. (This question is a very brief warming up, these issues will be explored in the coming questions in more detail)	

4. Governance of Process Factors for Usefulness

{In this section, we investigate the governance of process factors of IA to increase usefulness. We try to understand how to manage the process of IA in order to ensure that it is useful. This part, along with part 5, is the focus of the case study.}

4.a. Timing: Please tell us about your experience of the timing of the IA and its stages. (When did you conduct the IA? What stages were identified? What was the timing of various stages of the IA? Looking back now, what would have you done in timing differently?)	{Here we investigate not only the timing of the IA in relation to the measure history but also the timing of the various stages of the IA}
4.b. Programme Objectives/Logic: Please tell us about the role of your programme objectives to maximise the usefulness of the IA. (Have you experienced any difficulties because of your unclear programme objectives (or if too wide or too narrow) if so? How did you overcome these problems? Looking back now, what would have you done differently to increase the usefulness?)	
4.c. Stakeholder Expectations: (How did you manage stakeholders' (policy-maker, programme manager and other stakeholders) expectations so that the usefulness was increased? Looking back now, what would have you done differently to increase the usefulness?)	
4.d. Stakeholder Engagement: (How did you manage stakeholder (policy-maker, programme manager and other stakeholders) engagement so that the usefulness was increased? Looking back now, what would have you done differently to increase the usefulness?)	
4.e. Evaluator: Please tell us how you managed your relationship with the evaluator. (What were the challenges in this relationship for usefulness and how did you overcome them? Looking back now, what would have you done differently to increase the usefulness?)	

4.f. Dissemination: Please tell us how you managed the dissemination. (What was its implication to usefulness? Looking back now, what would have you done differently to increase the usefulness?)	

5. Governance of Product Factors for Usefulness

{In this section we investigate the governance of product factors of IA to increase usefulness. We try to understand how to manage the product of IA in order to ensure that it is useful. This part, along with part 4, is the focus of the case study.}

5.a. Scope of the IA: Please tell us your experience about the scope of the IA (the scope of the questions that the IA sought answers for). Was it narrow or wide? How did you manage the scope of the IA in order to increase the usefulness? Looking back now, what would have you done differently to increase the usefulness?)	
5.b. Operational learning: Please tell us if the IA lead to operational learning and if this learning has proved useful for you. (How useful was the information produced by the IA on the design, management and implementation of the measure? How did you manage the process and different stakeholders (including the evaluator) so that information for operational learning was more useful? How did you manage the extent, quality and relevance of operational learning information to increase the usefulness? Looking back now, what would have you done differently to increase the usefulness? Were there any indicators presenting information related to operational learning? How did you use them? Looking back now, what would have you done differently about indicators to increase the usefulness?)	{Here we try to understand if and how useful the information that the IA produced is for operational learning (information on the design, management and implementation of the measure)}

5.c. Policy Feedback: Please tell us if the evaluation led to policy feedback (Has this policy feedback been useful for you? How useful was the information presented by the IA on the achievement of objectives of the measure? How did you manage the process and different stakeholders (including the evaluator) so that information for policy feedback was more useful? How did you manage the extent, quality and relevance of policy feedback information to increase the usefulness? Looking back now, what would have you done differently to increase the usefulness? Were there any indicators presenting information related to policy feedback? How did you use them? Looking back now, what would have you done differently about indicators to increase the usefulness?))	{Here we try to understand if and how useful the information that the IA produced for policy feedback (information on the achievement of the objectives of the measure)}
5.d. System Impact: Please tell us if the evaluation provided information on the system impact (Has this information on the system impact been useful for you? How useful was the information presented by the IA on the broader impacts in the system level? How did you manage the process and different stakeholders (including the evaluator) so that information for system impact was more useful? How did you manage the extent, quality and relevance of system impact information to increase the usefulness? Looking back now, what would have you done differently to increase the usefulness? Were there any indicators presenting information related to system impact? How did you use them? Looking back now, what would have you done differently about indicators to increase the usefulness?))	{Here we try to understand if and how useful the information that the IA produced is for system impact (information on the broader impacts on the system level)}

5.e. Presentation of the information: Please tell us about how the IA presented the information/output (Was it useful for policy learning? How will you incorporate it in further policymaking? Was it understandable, justifiable and interpretable? How did you manage the process and different stakeholders to increase this usefulness? Looking back now, what would have you done differently to increase the usefulness? How did you present the indicators? Looking back now, what would have you done differently about the presentation of indicators to increase the usefulness?)	

Tool 3: Case Study Report Template

Case Study Title
Case Study Sub-title **Author Name(s)** **Author Affiliations**

Guidance Notes (To be deleted in the final copy)

- The aim of these case studies is to derive lessons for better governance of impact assessment studies. In other words, these case studies intend to explore the governance of the impact assessment process by focusing on usefulness.
- From the literature on impact assessment, we have identified a number factors (related to the product and process of IA) critical for usefulness. These factors documented by the literature will be examined to understand how they are managed in order to ensure high degree of usefulness for policy and operational learning. In other words, we study real-life cases of impact assessments to learn how they managed various dimensions and stages of IA to maximise operational and policy learning.
- These factors critical to the usefulness of an IA:

(1) Process Factors:

- Timing (this includes the timing of the IA with respect to the life-cycle of the programme and also the timing of various stages of the IA in question)
- Programme objectives
- Policy-maker's /programme manager's expectations from the IA
- Policy-maker's /programme manager's engagement in the IA process
- Trust and compliance of all stakeholders in the IA process

- Dissemination of the IA results

(2) Product Factors:

- Scope (not only the success cases and also not all programmes are evaluable at a given time)
- Operational Learning: Information the IA produces on the effectiveness of design, management and implementation of the measure and the IA itself (extent, quality, relevance)
- Policy Feedback: Information the IA produces on the achievement of objectives of the measure (extent, quality, relevance)
- System Impact: Information the IA produces on the broader impacts of the measure (extent, quality, relevance)
- The way the IA presents that information (understandable, justifiable, interpretable)

- To that end, we have selected a number of IA studies and we study these by using primary (interviews with various stakeholders of IA) and secondary sources (the report itself, other research, etc.).
- For some of the cases, some of the points regarding to the governance of some of the above factors might be irrelevant or unknown/not explorable. Although we need to ensure every effort to give a comprehensive account, in these cases we will clearly acknowledge caveats and the reasons for them.
- We have also a special emphasis in exploring how the IA exercises we study use indicators.
- Total size of each case study is expected to be around 7500 words (1 page is roughly 500 words). However, this may vary according to the case's particulars. If deemed necessary partners can adjust it.
- Suggested structure is given in this document. However, if deemed necessary partners can adjust it.

Executive Summary

[Here there should be a one-pager executive summary]

Introduction

[To be deleted in the final version: Here we outline the aim of the case study. Each case study should be self-explanatory. It should also introduce the context.

This section should be around 500 words (1 page). (However, this may vary according to the case's particulars. If deemed necessary partners can adjust it.)

[Title of the Programme in Question]

[To be deleted in the final version: Here we give an overview of the programme in question. This overview should include the programme logic, at least in its most basic form.

Points to touch:

- Programme Objectives/Logic: what does the measure aspire to achieve? It would be better to briefly discuss the role of this programme within the national innovation system.
- Programme Modalities: how does the measure fulfil its objective? What kind of support does it give, for instance?
- Programme's institutional structure: what are the key institutions relevant to this programme?
- The role and importance of the indicators in the programme's policy cycle.

This section should be around 1000-1500 words (2-3 pages). (**However, this may vary according to the case's particulars. If deemed necessary partners can adjust it.**)

[Title of the IA in question]

[To be deleted in the final version: Here we introduce the basics of the IA.

Points to touch:

- The basic objectives of the IA
- The reasons for conducting this IA (for various stakeholders)
- The design process of the IA: who designed it? What was the stakeholder involvement in the design process? Who designed the ToR, etc?
- The tender process
- The evaluator
- The characteristics of the IA (topics & main questions covered, type of impacts assessed, data analysis methods, data collection methods and data sources, sponsors, main audiences and etc.)
- The indicators and the way they were used
- Results recommendations consequences (briefly as these will be explore later in the case as well)

This section should be around 1000-1500 words (2-3 pages). However, this may vary according to the case's particulars. If deemed necessary partners can adjust it.

Governance of the process

[To be deleted in the final version: Here we discuss the governance of the process factors. If any of them is irrelevant, we can skip but we need to reason.

Points to include:

Governance of the fallowing process factors (how these factors were handled to ensure maximum usefulness):

- Timing (this includes the timing of the IA with respect to the life-cycle of the programme and also the timing of various stages of the IA in question): how they managed the timing of the IA to maximise the usefulness.
- Programme objectives: how they select the relevant programme objectives for the IA to maximise the usefulness
- Policy-maker's /programme manager's expectations from the IA: how they managed the expectations of the IA to maximise the usefulness
- Policy-maker's /programme manager's engagement in the IA process: how they managed the engagement of the IA to maximise the usefulness
- Trust and compliance of all stakeholders in the IA process: how they managed the trust and compliance of the IA to maximise the usefulness
- Dissemination of the IA results: how they managed the dissemination of the IA to maximise the usefulness

This section should be around 2000-2500 words (4-5 pages) (However, this may vary according to the case's particulars. If deemed necessary partners can adjust it.)

Governance of the product

[To be deleted in the final version: Here we discuss the governance of the product factors (factors related to the IA report itself). If any of them is irrelevant, we can skip but we need to reason.

Points to include:

Governance of the fallowing product factors (how these factors were handled to ensure maximum usefulness):

- Scope of the IA (not only the success cases and also not all programmes are evaluable at a given time): how they managed the scope of the IA to maximise the usefulness. The relationship between the scope of the IA and its methodology should also be discussed in relation to usefulness and governance.
- Operational Learning: Information the IA produces on the effectiveness of design, management and implementation of the measure and the IA itself (extent, quality, relevance): how they managed the information that the report produced relevant to operation learning in order to increase the usefulness. The methodology and the role of indicators to present information related to operational learning should be discussed.
- Policy Feedback: Information the IA produces on the achievement of objectives of the measure (extent, quality, relevance): how they managed the information that the report produced relevant to policy feedback in order to increase the usefulness. The methodology to present information relevant to policy learning should also be discussed. **.** The role of indicators to present information related to policy feedback should be discussed.
- System Impact: Information the IA produces on the broader impacts of the measure: how they managed the information that the report produced relevant to system impact in order to increase the usefulness (extent, quality, relevance). The methodology and the role of indicators to present information relevant to system impact should also be discussed.
- The way the IA presents that information (understandable, justifiable, and interpretable): how they managed the way the IA report presented its results in order to increase the usefulness. The relationship between the way the IA presents the information and its methodology should be discussed. The way the IA presents the indicators should also be discussed.

This section should be around 2000-2500 words (4-5 pages) (However, this may vary according to the case's particulars. If deemed necessary partners can adjust it.)

Conclusion

References

Annexes

[Any non-directly relevant information should be presented in the Annexes.]

Annex 3.3: Case Study Summaries and Contributions

Case Study Contributors

IA Title	Case Study Owner	Name of the Interviewer(s)	Programme Owner	Name and Affiliation of the Interviewee(s)
A look into the Black Box: What difference do IWT R&D grants make for their clients?	TTGV	Deniz BAYHAN Evren BUKULMEZ Atilla Hakan OZDEMİR	IWT	Eric Sleecks (IWT)
Industrial Technology Project &Technology Development Projects Support Programme	TTGV	Deniz BAYHAN Evren BUKULMEZ Atilla Hakan OZDEMİR	TTGV	Vinod Goel (World Bank – Policy Maker), Erol TAYMAZ (METU – Evaluator), Evren Büklümez (TTGV)
Making the Difference: The Evaluation of Behavioural Additionality of R&D Subsidies	EWI	Mieke HOUWEN Peter TEIRLINCK	IWT	Jan Larosse (IWT – Former Policy Maker, Manager of the Study)
Impact Assessment of the Programme Innovation in the Czech Republic	TCASCR	Jiri VANECEK	Czech Ministry of Industry and Trade	Vladislav Cadil (TCASCR), Petr Porak (Ministry of Industry and Trade)
Evaluation of the Austrian Industrial Research Promotion Fund (FFF)	TUBITAK	Ozlem DOĞAN	Ministry for Transport, Innov. & Tech. (BMVIT)	Rupert Pichler (BMVIT)
Impacts on Industry from Research Institutes (Hacia una medida de la contribución de los Centros Tecnológicos (CTs) españoles a la mejora de la competitividad de las empresas)	FECYT	Edgar MOYA Ignacio BAANANTE	Spanish Ministry of Science & Innovation	Carlos Vivas (FEDIT)
Impact Assessment of the RANNIS Technology Development Fund	RANNIS	Thorsteinn GUNNARSSON	RANNIS	Hallgrimur Jonason
Evaluation of the French Research Tax Credit	MESR	Peter TEIRLINCK	MESR	Frédérique Sachwald (MESR)
Impact Analysis of Fiscal Stimuli on R&D Investment in Flanders	BELSPO +TTGV	Peter TEIRLINCK	BELSPO	Ruslan Lukach (University of Antwerp), Vincent Thoen (Flemish Research Policy Council)

Competitiveness Clusters Policy in France	ANR +MESR	Eric HAUET	ANR +MESR	Marie de Lattre-Gasquet (ANR) and Colleagues from MESR
Impact Assessment of FP 6 in the Case of France	MESR	Eric HAUET	MESR	Florent Olivier (MESR), Mathieu Doussineau (TECHNOPOLIS – FRANCE)

Measure Type: RTDI Funds

Flemish 1st IWT Case:

'A look into the Black Box: What difference do IWT R&D grants make for their clients?'

This IA study aimed to analyse and evaluate the behavioural additionality of the funding provided by IWT within the context of the two programmes named 'Companies' R&D projects' and the 'SME-support programmes'. 'Companies' R&D projects' programme targets (large or small) enterprises with activities in Flanders that wish to realise an innovation through an R&D project and that need to acquire scientific-technological knowledge in this perspective. The SME support programme is an addition to the R&D projects of companies. It is set up by IWT in order to stimulate and support SMEs to innovate.

The Flemish government asked for an analysis and evaluation of the behavioural additionality of the R&D subsidies IWT provides to companies. The objective is to provide answers on the effectiveness and efficiency of the IWT subsidies covering three broad categories: resource-based concepts (input), result-based concepts (output) and concepts that measure the success of policy intervention by examining desirable changes in the process of innovation (behavioural). The IA looked at scientific, technological, economic and societal impacts. The database of the IA study covered the projects submitted to IWT in the period of 2001 – 2004. In 2003 IWT conducted a pilot IA study internally with the expert support of two external consultants covering same period of time. There were no other government department or public bodies involved. The output of the pilot study (Case 7) was used as an input for this final study. There was a tender process for the final IA study and the IA took eight months. IWT involved three external international experts to help them to formalize the results.

The result of the IA study is publicly available on IWT website in English and was disseminated widely. After the publication of the final report two workshops were organised to present results to the stakeholders.

Turkish TTGV Case:

'Impact Assessment Study of Technology Development Projects Support Programme of TTGV (1999-2006)'

This case study covers the impact assessment activity of the Technology Development Projects Support (TDP) Programme. TDP is one of the four components of a larger programme entitled the Industrial Technology Project (ITP). The objectives of the ITP project are to assist in the harmonization of Turkish technology infrastructure with European Union (EU) standards, assist firms in upgrading their technological capabilities and create stronger links between the infrastructure institutions and enterprises.

The Technology Development Foundation of Turkey (TTGV) is the programme manager for the World Bank funded TDP Programme. The objective of the Technology Development Projects Support Programme was to support R&D activities of the companies through a loan scheme within the technological product and technological process innovation. The Programme

intends to stimulate more R&D activities within more companies and to support sustainable R&D capacity building in companies.

The scope of the IA was set in parallel with the design of the ITP project and it has been optimised according to the needs which emerged during the programme implementation. The main objective was to demonstrate the effectiveness of the support model on the companies' productivity, innovation capabilities and commercial performances.

The IA study was carried out at three stages: at the beginning (2000) with surveys; during the programme (middle) which was based on client interviews conducted in 2004; and it concluded with an overall evaluation conducted in 2005 on the basis of extensive interviews with clients. This timing was predetermined by the programme managers at the design stage of the programme. The State Institute of Statistics (SIS) and TTGV also participated in the IA study. The assessment was conducted at five levels: objectives, implementation, impact, client perceptions and outcomes. The indicators were determined by the evaluator in consultation with TTGV during the IA activity.

The effects of ITP have been assessed on the basis of the descriptive analysis of survey data and qualitative information provided by participating firms through face-to-face interviews. Control groups were established for several cases by using propensity score matching. Moreover, a number of econometric analyses were conducted to test the impact of the programme on clients' performance.

A workshop was organised to discuss the results and obtain feedback from stakeholders. The final report was also sent to the beneficiary companies that took part in the study. This report includes all data analysis methodology in detail. It is also publicly available on the TTGV website. The findings indicate that the project was successful in achieving its objectives and showed that TTGV made valuable contributions to develop and improve technology culture and awareness in Turkey. The methodology that has been developed in this IA activity was used in other World Bank programmes in developing countries all around the world.

Flemish 2nd IWT Case:

'Making the difference: The evaluation of behavioural additionality of R&D subsidies of IWT'

The main objective of the impact assessment exercise was for the Flemish R&D agency IWT (Institute for the Promotion of Innovation by Science and Technology in Flanders) to legitimate itself as a funding agency (in terms of R&D subsidies). This was done by measuring its own additionality in order to strengthen the agency's role as an actor in the innovation system in Flanders/Belgium. The envisaged measures of the impact assessment are all R&D grants and subsidies of the IWT agency. These measures are developed to stimulate knowledge development, excellence and innovation in companies so that more (economical) added-value can be created. IWT is one of the executing agencies where the Flemish Minister for Science and Technology is the political actor responsible for and the department EWI is the principal administration involved.

IWT took the initiative for the evaluation exercise. The study was conducted in 2004 covering the period 2001-2004, and lasted for one year. It was a consortium of a policy maker at the agency, 2 university professors and a consultant that developed the impact assessment. The programme manager was quite closely involved in the whole process. The concept and methodology were predefined and information/indicators were collected based on qualitative interviews. Four different groups of companies were defined, based on specific characteristics and the main questions were formulated in terms of the counterfactual situation. Three types of additionality are considered: input, output and behavioural additionality. The intention was to develop a methodology (and indicators) for future measurement of behavioural additionality.

The main results were distributed to the business enterprise sector and findings on the additionality of the R&D subsidies managed by IWT were transmitted to policy makers to show the importance of IWT as a funding agency. The study did not have any direct impact on the design of the policy measure and did not succeed in influencing policy making in the field of R&D subsidies. However, the study was a useful instrument to underline the importance of

IWT as an agency creating additionality by means of the subsidies it distributed to firms. Also the segmentation in the study revealed the necessity to reflect on fiscal measures for large companies. This indirectly influenced the policy agenda at federal level. Also, the segmentation led to less administrative procedures for SMEs to apply for R&D subsidies. Besides, this work is also integrated in international cooperation with other agencies and study departments in the framework of TAFTIE (the European network of innovation agencies) and OECD-TIP (the think-tank of OECD on new policy concepts in technology and innovation policy).

Czech TCASCR Case:

'Evaluation of effects of Operational Programme Industry and Enterprise 2004-2006 projects in the research and development area and their impact on innovation potential of regions of the Czech Republic'

This IA study evaluated the programme 'Innovation', which is one of the 11 programmes under the Operational Programme Industry and Enterprise (OPIE). The programme Innovation was designed by the Ministry of Industry and Trade. The programme was managed and implemented by the Czechinvest, the investment and business development agency of the Czech Republic established and controlled by the Ministry of Industry and Trade. The programme Innovation supported innovation activities in firms in the form of a grant. Its specific objective was promotion of innovations of products, technologies and services and it was focused on support of development of entrepreneurial projects by implementing technical innovations in the area of industry and industrial services. The programme started in 2004 and new project applications were accepted until October, 2006.

The impact assessment was designed by the Ministry of Industry and Trade. In the ToR the Ministry required parallel assessment of three different programmes belonging to OPIE: Innovation, Prosperity and Clusters. The main reason of IA was to learn what effects the programme Innovation had on the innovation potential of regions and to gain knowledge for improvement and optimization of the future rounds of the programme. The impact assessment was an obligatory condition from the beginning since OPIE was financed jointly from EU and Czech public sources. However, there was no clear definition of the innovation potential at the beginning and the evaluators had to provide their own definition. Impacts of the support programme on the innovation potential of regions were evaluated with the following monitoring indicators and the results of supported projects in each region: additionality of the programme effect on macroeconomic characteristics of RTDI (growth of turnover, employment and export in high-tech sectors and R&D); knowledge creation (increase of BERD, increase of yield of high-tech and medium high-tech firms etc.) and increase of innovativeness (increase of the yield-number of innovating firms and innovating SMEs, increase of innovation expenses and expenses on ICT etc.).

The IA was commissioned to the Technology Centre AS CR (TC) after an open tender process. It was a medium-sized project (about 50,000 Euro which was less than 0.3% of the annual budget of the measure) and was financed from the programme itself and so has to be completed soon after its termination. The IA started in August 2008 and took only 3 months, which covered the projects started from 2004 to 2006.

Three groups of stakeholders were involved in the impact assessment: the Ministry of Industry and Trade, which was responsible for the support measure and its IA, the implementing agency Czechinvest and the Monitoring Committee of the umbrella programme OPIE. Evaluators reported to the Ministry of Industry and Trade at the predetermined intervals (preliminary and final reports). The Ministry then reported to the Monitoring Committee.

According to the IA study, the largest effects of the programme on innovation potential was found to be in 3 regions which had high number of supported projects (and firms), showing a clear relationship between number of supported projects and resulting impacts. Dissemination of the IA results was quite extensive. The final report was presented to the administration of the Ministry of Industry and Trade. The shortened version of the report and its conclusions were then presented to the Monitoring Committee of the programme OPIE. Compilation of the

report was also published on the web pages of the programme. The evaluators have also prepared a short article about the impact assessment study and its results.

Austrian FFF Case:

'Evaluation of the Austrian Industrial Research Promotion Fund (FFF) Impact Analysis'

This study is part of a larger evaluation of the FFF set by the Ministry for Transport, Innovation and Technology (BMVIT). FFF is the major funding agency and was established in 1967 as a 'bottom-up' funder of industrial R&D projects with the goal to increase efforts for applied industrial research. FFF has four support mechanisms: (i) grants, (ii) loans, (iii) subsidies for bank loan interest and (iv) bank loan guarantees.

The impact study aimed to provide a through description of the patterns of R&D funding by the FFF, identifying parameters which influence the provision of funds and presenting the direct, indirect and broader effects of FFF funding. The additionality concept was used to analyze different (input, output and behavioural additionality) aspects of firms that have received funding from the FFF.

BMVIT commissioned this evaluation in 2003, following a two stage international tender process. An international consortium led by Technopolis including WIFO (Austrian Institute of Economic Research), ETH Zürich (Swiss Federal Institute of Technology Zürich), University of Twente and Joanneum Research (Institute of Technology and Regional Policy) employed a broad mix of qualitative and quantitative approaches and methods. The IA exercise took one year.

Firstly, the input additionality had been investigated with the question of whether the funding acts as a compliment or a substitute to privately financed R&D where a panel regression model is used. For output additionality the factors explaining the intensity of R&D subsidies and the productivity effects of both privately and publicly funded R&D (the economic impact) were analysed using an empirical model and hypothesis. To measure the intangible social returns, the long-term behavioural changes emerging from FFF participation (behavioural additionality) including project additionality, acceleration additionality, scope and scale additionalities was addressed. The data base was provided by the FFF.

The IA study was more like a summative type of assessment and the results showed FFF to be an efficient of project-related business research promotion. But it also points out that FFF needs to expand its strategic-analytic capacities which will impact on their administrative costs. The evaluation report was made public and discussed in a number of different fora.

Spanish FEDIT Case:

'Impact assessment of the Technology Centres in the competitiveness of the Spanish companies' *(Hacia una medida de la contribución de los Centros Tecnológicos españoles a la mejora de la competitividad de las empresas)*

The objectives of this IA study were development of a new methodology that could assess the impact of the different R&D agents (technology centres (TCs), universities and PRIs) separately and to evidence and measure the contribution of TCs to R&D and Innovation Development in Spain. This study is part of a group of studies developed by FEDIT that try to analyse the socioeconomic impact of research bodies (public and private), especially TCs.

TCs are private non-for-profit research bodies that use their own material and human resources to carry out R&D activities for generating (or accumulating) technological knowledge, putting it at the service of the companies and facilitating its use, either by existing companies or by generating start-ups. Their success is measured by the competitive improvement of (local) companies and their contribution to the economic development of their environment. The TCs get their own funding from the private sector (over 40% of total incomes) and from public programmes (lower than a 30% of non-competitive funds).

The decision to commission the IA study was taken by FEDIT after a consultation with the TCs members of its platform in 2005. FEDIT is the Spanish Federation representing Technology Centres (TCs). The project was carried out by FEDIT in close collaboration with the Carlos III Madrid University (UC3M) which took care of the academic and technical part of the study, largely the data analysis. There was no tender process and no terms of reference. The study was scheduled in three phases and took 30 months: review of state of the art; pilot survey; general questionnaire sent to more than 2000 companies and data analysis (this part took 18 months).

Variety of quantitative and qualitative impact indicators were used such as: technical impacts (new products, processes, intellectual property and etc.); economic impacts (increase of exports, benefits, productivity and etc.); impacts in the level of investments (human resources, new internal software and hardware and etc.); intangible impacts (external relations, new strategic vision, and etc.) and other impacts (level of satisfaction and additionally of collaboration with the R&D agent).

The results of this study were received positively and a new assessment methodology was elaborated to evaluate the activities of the R&D agents and on the other side, it illuminated the important role of the TCs in the Spanish R&D system and their capacity to foster the private R&D activities. The results of this study were sent to the policy makers and programme managers of the Spanish Ministry of Science and Innovation and they are being used as a powerful tool to promote the role of Technology Centres in R&D and Innovation development.

Icelandic RANNIS Case:

'Impact Assessment of the RANNIS Technology Development Fund'

The objective of this case study is to analyse the implementation and impacts of research activities completed within The Technology Development Fund (TDF). This exercise is based on the Act on Public Support for Scientific Research which defines the role of the RANNIS to handle data collection and dissemination of information for the Science and Technology Policy Council and its committees on scientific research, technological development and innovation in Iceland, and to conduct evaluation procedures of the outcome of RTDI work in Iceland on a regular basis and participating in international comparative studies in this regard on behalf of Iceland, as requested.

Until the CIA4OPM project, the Fund has not been subject to an impact assessment. RANNIS used the opportunity provided by the project to conduct an impact assessment of the Fund.

The Technology Development Fund has been operating since 2004 under the auspices of the Ministry of Industry, Energy and Tourism. The main objective of the Fund is to support research and development activities on the basis of projects, with the aim of influencing innovation within Icelandic business and industry. Projects are evaluated on the basis of originality, likelihood of success, economic value and general values like knowledge-related benefits, value relating to international cooperation, value to start-up companies, and the product as an export. TDF Fund is managed by RANNIS but the funding decisions are taken by an independent board.

This impact assessment was carried out internally by the Division of Analysis, Evaluation and Indicators in close cooperation with the staff and board of the TDF. There was an external reference group for this study with members from an international consultant company and from University of Iceland.

At the initial phase of the study the Fund's main objective was analysed by using impact logic assessment. The terms of reference for this study was then developed and discussed with key TDF stakeholders, the Ministry of Industry, Energy and Tourism, the Science and Technology Policy Council (STCP), the TDF Board and the CIA4OPM project team. This study also benefited from the self-assessment approach which was conducted by Kjell Hakan Narfelt, using the TAFTIE Self-Assessment Approach. The self-assessment approach was used to help the programme team initiate and design an evaluation and impact assessment process for the programme. The programme management participated fully in the IA process, i.e. was involved in writing the term of reference and the overall design of the IA.

Both quantitative and qualitative research methods were used during this exercise. Quantitative research methods include questionnaires and analysis of available statistical data. Qualitative research methods, such as interviews, were used to follow and highlight some interesting results from the survey questionnaires. To ensure impartiality a contract was made with the University of Iceland Social Science Institute to administer the survey.

The results of the impact assessment of The Technology Development Fund indicate that the fund has considerable impact in providing important support as the main foundation for innovation at national level. The fund's beneficiaries generally agree that it provides important benefits for various fields of research and development, emphasising that the support provided by the fund generates tangible value in the form of products and services, as well as increased knowledge, education and experience. The fund supports projects in their first stages of development, which is a process that can take 5 to 10 years or even longer in some fields, so it is not always possible to point at statistical facts regarding turnover and increased jobs in the longer term. A similar assessment will be carried out later, which may provide more support for these indicators.

The main results of the impact assessment can be summarised as follows:

- The Technology Development Fund has an important impact on innovation in Icelandic industry. It has supported progressive innovation companies that have achieved international success. Thus, the fund has encouraged the increase and protection of valuable jobs.
- The Technology Development Fund is very important for the development of innovation in Iceland. A total of 75% of its beneficiaries believe that their research and innovation projects would not have been realised without the fund's support.
- The Technology Development Fund contributes to creating valuable knowledge at national level. More than 90% of beneficiaries agree that funded projects lead to increased innovation competence; that they generate new projects and that the acquired knowledge contributes to increased success in other projects.
- Projects supported by the fund encourage important networking, companies are more successful in raising venture capital following a positive evaluation and project results often lead to patents.

For dissemination of study results, a conference with policy makers, user groups, industry and the academic community will be held to introduce the findings and discuss the lessons from this study.

Measure Type: RTDI Tax & Fiscal Incentives

French MESR Case:

'Impact assessment studies on the French research tax credit (CIR): 2005-09'

The French research tax credit (*credit impôt recherché*, CIR hereafter) was started in 1983. Its main objective has been to stimulate R&D investment by reducing the cost of R&D for all firms, irrespective of their size, age, reputation, or sector of activity. The enterprises are free to select their projects and investments. The Ministry of Finance is the main institution involved in the management of the CIR. The Ministry of Higher Education and Research (MESR) is also a major actor as it assists the Ministry of Finance when the latter decides to control firms' CIR declarations. The MESR is also in charge of the data base, which is used both to manage the tax credit scheme and to produce statistics, indicators and more generally the source of data, including for impact evaluation purposes.

When the research tax credit was introduced in the early 1980s, no impact evaluation had been planned and there was no specific indicator put forward to evaluate its impact. A number of ad hoc analysis/initiatives and audit reports took place over the 20 years to 2005. After the 2004 reform and the steady increase in the CIR, the MESR took the decision to start impact evaluations of the tax credit. This case study deals with the impact evaluation studies or

outcome evaluations that have been conducted or monitored by the MESR between 2005 and 2009.

The basic objective of these studies has been to assess the impact of the tax credit on business R&D spending in France. This has been the major research question for all of the studies, but the precise issues examined and methodologies have been slightly different for each study. Some were mainly based on quantitative surveys, some on qualitative surveys with interviews and one of them used econometric study based on the matching technique.

Indicators involve the number of claimants, the total amount of CIR and its distribution by company size and sector, as well as the regional distribution. Data is also available on the type of expenses companies include in their declaration. The major type of expenses is salaries of researchers and research technicians.

For the first three impact assessment studies the MESR designed the ToR and the surveys and econometric analysis were conducted externally. Studies 4 and 5 were internalized by the MESR. This choice was based on the experience of the first two surveys and of the allocation of more internal resources to impact assessment. The steering committee in all studies included several administrations, external qualified persons and some company representatives.

The results have been presented in Reports to the Parliament and in several seminars, including a workshop on research tax credits at OECD. The studies indicated a positive impact of CIR on business R&D spending and results also favoured radical reform in 2008. Qualitatively, it seemed that CIR promotes longer term research and in some cases more risky projects. The first results on the positive impact of the CIR as well as some indications on its working were used to decide the 2008 radical reform in favour of a simplification and extension of the scheme.

France has been devoting increasing resources to the observation and evaluation of its research tax credit scheme. Resources allocated to impact assessment of CIR have increased and have also changed in nature. In general it costs around 30 – 75 K€ with approximately 1.1 man-month is allocated each year to impact assessment by MESR. Other parts of the French administration as well as the Parliament also contribute to the evaluation and impact assessment of the CIR and allocate resources to that process.

Flemish BELSPO Case:

'Impact analysis of fiscal stimuli on R&D investment in Flanders'

This study had the aim to measure the impact of fiscal measures on private R&D expenditures/efforts which include R&D personnel labour cost exemption; increased investment deduction for R&D; deduction of patent income from revenue; notional interest deduction for new R&D investment debt of large companies; exemption of taxes on profit for additional R&D personnel; and tax deduction for innovation premiums. On request by the Flemish Minister for Science Policy, the Flemish Research Policy Council ordered the IA study of fiscal measures in 2008 by means of an open call for tender.

The Federal Ministry of Finance is the Programme Manager for tax allowances at federal level. The Belgian Science Policy is the policy maker at federal level. No regional governments/administrations are directly involved in the set-up or design of the fiscal measure(s) for R&D.

The IA study covers the period of 2005-2008 for tax credits for R&D personnel and the period 1999-2008 for the other measures. The design process of the impact assessment exercise was done by the evaluator (university research team) performing the exercise and the Flemish Research Council who has ordered the study and designed the terms of reference (ToR). The exercise was a rather small project: 1 full time equivalent person for 1 year plus some additional costs (in total 76Keuro). The Flemish Research Council ordered and supervised the study together with a steering committee of external experts from different public organisations.

The main purpose of the exercise was to launch a discussion of regionalisation of the (federal) tax credits for research and innovation. The measurement and evaluation of the tax credit

focused at input additionality in terms of R&D expenditures. Indicators were related to the use and the results of the tax credits (both quantitative and qualitative) such as: international competitiveness; cost competitiveness of the research; expansion of the firms investing in R&D; additional R&D personnel; keeping R&D employment in Flanders; and attracting high level foreign researchers. The econometric model was developed for measuring the additionality of the policy measures. The main outcome of the study was an econometric framework for analysing fiscal measures for R&D.

The policy maker's expectations were a study presenting evidence on the impact of fiscal measures on R&D investment and to open a discussion on regionalisation of fiscal policy for R&D. None of these objectives has been attained because firstly, the Minister who ordered the study had to resign and her successor showed less interest in the topic; and secondly, because the programme manager (Ministry of Finance) was not involved in the project; and thirdly, the initiative was restricted to one region in Belgium whereas the fiscal measures apply to the whole Belgian territory and to the federal responsibilities.

The output was an analytical report prepared by the evaluator to the Flemish Research Council which communicated the results to the Ministry with no further dissemination. Besides, due to data limitations (both on R&D expenditures and on tax credits granted per company) and the fact that most of the measures were only recently implemented, the outcomes of the study were not considered particularly robust or representative and therefore the outcomes have not been widely disseminated and impact on policy making has been very limited. However, from a methodological point of view the study can be considered a source of inspiration for further impact assessment/evaluation exercises mainly due to its views on the inclusion of a broader policy mix.

Measure Type: Networks, Clusters and Transfer

French Cluster Case:

'Study of the impact of the competitiveness clusters policy on public research institutions in France: analysis and recommendations for improvement'

In 2010, the Minister for Research and Higher education launched a study relative to the impact assessment of the 'competitiveness clusters policy' on the strategy and performance of public research institutions. The competitiveness clusters policy is one among many policies that have an impact on the research system. By 2004, the French government launched a policy dedicated to promoting regional clustering and technological collaboration, here called the competitiveness clusters policy.

The competitiveness clusters policy encourages local actors (research and education institutions, companies and local authorities) to get together and create cluster organizations (competitiveness clusters or "pôles de compétitivité"). Despite the fact the scope of this policy is expected to go beyond research and development activities, the main policy instrument consists in funding of collaborative research projects. There are currently 71 clusters. More than 5,000 companies are members of clusters, 80% of them are SMEs (small medium size enterprises). The clusters policy is supervised by two administrations: the Ministry of Industry and the interministerial delegation for land settlement and competitiveness (DATAR).

The funding scheme of the competitiveness clusters policy is complex. Four institutions give funds to the clusters: (1) the interministerial fund (FUI) that gathers several Ministries' budgets; (2) the national research agency (ANR), (3) OSEO, an agency dedicated to SMEs, and (4) a governmental financial institution (CDC). Co-financing by territorial authorities is also expected in this policy.

There are more than twenty studies that have been recently conducted to examine various aspects of this cluster policy. Most studies were conducted by private consulting firms. A couple of studies were conducted by academic researchers, specialised in the evaluation of public policies.

The idea of IA was initiated to counter the prevailing idea that competitiveness clusters are mainly a tool for industries and SMEs, and that it should mainly benefit to private firms. The

study was subject of a public tender-for-proposal. A tender for proposals was launched and a private consulting firm has been chosen to conduct the 10 month long study. The evaluator will also take part in a forthcoming study for designing the evaluation process and criteria.

The study has been governed by a steering committee whose role was to orientate the methodology for the IA. Public research institutions and universities were well represented in the Steering committee. However, private institutions were not well represented. This study takes place a year after the results of the evaluation carried out at the end of first phase of the policy, and two years before the end of the second phase of the programme.

The methodology chosen for this impact analysis combines qualitative and quantitative data collection. The study is still going on. However during mid-term meetings, the evaluators presented intermediate results. The panel expressed some positive results from their participation in competitiveness clusters but also moderated the relevance of impact analysis in that field.

Proving legitimacy of policy measures

Czech Exemplary Study:

'Effect of public support on innovation activity of Czech firms'

This paper analyses the effect of public support for carrying out innovation activities. One of the questions of the CIS questionnaire addressed this topic and asked whether the firm has received public support for innovation and distinguished among four different types of such support: from regional sources, from national authorities, from EU sources and from the Framework Programme. In the present analysis, all types of support have been pooled and the effects of any public support on input, behavior and output of firms in the area of innovations have been analyzed.

All enterprises receiving public support have performed at least one innovation activity, because otherwise they would not receive public support. Because firms running innovation activities may have different characteristics in several aspects than non-innovative ones, we have compared the innovation activities of firms receiving public support (Support+) with those of enterprises not receiving support in the surveyed period, and of enterprises performing innovative activities including the ongoing and interrupted ones, without taking into consideration that these activities lead into the implementation of innovation and were not supported from public sources (Support-).

Results of the study aiming at impacts and additionality of public support on the innovation activity of the firms in the Czech Republic collected findings from the data from three consecutive Community innovation surveys. The effects of public support on innovation inputs, outputs and behavior of the firms were analyzed. Public support had significant stimulatory effect on total innovation expenses of the firms and particularly on the expenses of their in-house R&D. Public support also increased the collaboration rate of the firms with other actors in the innovation system, namely (most of all) with the universities. The support also enhanced registration of industrial designs by the firms, and the innovation of goods and processes. However, most of these positive effects were only transient and disappeared after termination of the support.

Annex 3.4: Self-Assessment Case Study Contributions

Name of the Agency	Name of the Programme	Name and Affiliation of the Interviewee(s)	Name and Affiliation of the Interviewee(s)
RANNIS	Technology Development Fund	Thorsteinn GUNNARSSON Hallgrimur JONASSON Sigurdur BJORNSSON	Kjell-Hakan NARFELT

TTGV	Technology Development Programme	Erol TAYMAZ (METU - Evaluator) Evren BUKULMEZ (TTGV - Project Associate)	Kjell-Hakan NARFELT Deniz BAYHAN Atilla Hakan OZDEMIR
BELSPO	Tax Incentive Scheme	Peter TEIRLINCK (BELSPO) Ward ZIARKO (BELSPO) Pierre MOORTGAT (Belgian Federal Research Council)	Kjell-Hakan NARFELT Deniz BAYHAN

Annex to Chapter 4

Annex 4.1: Cooperative projects between scientific organisations and enterprises

Main character of the evaluation study (Matrix 2)

2.1. Research questions or evaluation mission

- Who contracted the study
- Research question of the study
- Justification of the policies
- Improvement of the policy and its implementation
- Thresholds that hampers the impact or implementations

(Matrix 2) Main character of the evaluation study

2.2. General overview of the analysed aspects

- Type of activities partners
- Specific motives for cooperation
- Administrative aspects of the implementation
- Basic results of the supported project

(Matrix 2) Main character of the evaluation study

2.3. Type of evaluation data and methodological analysis

- Type of information (Survey, official data....)
- Inclusion of a control group of not supported firms
- Cause – Effect analysis versus inventory approach
- Creation of a profile of firms with a higher/lower impact level

Characteristics of the instrument (Matrix 1)

Matrix 1.1.

- Main objectives
- Secondary objectives
- Type of support (Subventions, loans, …)
- Type of support instrument
- Technological or sectoral focus
- Who can apply

Matrix 1.2

- Which market or system failures are subject of the instrument

(Matrix 4) Obstacles or barriers that influence or limit the effectiveness of the instrument (success factors)

4.1. Obstacles related with the project and partners

- Motives for cooperation
- Obstacles during the cooperation
- Motives to not cooperate of not supported firms
- Specific characteristics of the support measure (Implicit and explicit selection criteria….)
- Specific characteristics of the supported project (Size of the project, % of support related to the total project budget….)

4.2.Administrative efficiency and efficacy

- Implicit and explicit selection criteria
- Complexity and costs of the tenders and applications

Indicators on Additionality (Matrix 3)

3.1. Financial additionality
3.2. Behavioural additionality
3.3. Technological and commercial additionality
3.4. Broad social economic impacts in the sector, innovation system or society as a whole

(Matrix 5) Control variables on firm level for the econometric treatment to analyse the impact (Cause effect analyses and the profile elaboration) (Size, sector, innovative behaviour, export etc…

Matrix 6.1. Policy recommendations

Matrix 6.2. Recommendations for future policy evaluations

Matrix 6.3. Critical success factors

Matrix 6.4. Policy implications

Characteristics of the instrument and evaluation study
Real impact (additionality) and cause-effect analysis
Impact facilitating or obstructing aspects and success factors and recommendations

Annex 4.2: Matrix Template of the meta-evaluation

NAME OF THE STUDY:

Matrix 1.1 Characteristics of the instruments

Which kind of SI relations are promoted	
MAIN OBJECTIVES OF THE INSTRUMENTS FOR WP4 ***(At least one of the two main instruments has to be aim of the policy)***	**YES/NO**
1.- SI based collaborative projects (Contract research or cooperative projects)	
2.- SI based Technology Centres with activities on the crossroad of Science and Innovation	
OTHER OBJECTIVES PROMOTED BY THE SAME INSTRUMENT	**Y/N**
Mobility of researchers	
Teaching/ training of R&D Staff	
Mobility of graduate students	
Promotion of technology transfer	
Consultancy and R&D related services (not directly related with science – like quality control, tests and applied experiments)	
Others ……..	
Type of support	**Y/N**
Subventions	
Low interest credits	
Tax advantages	
Others ……..	
Type of support instrument	**Y/N**
Direct state support for specific projects designed and selected by the state	
Support for a **limited number of proposals of <u>all technological fields</u>** or sectors	
support for a **limited number of proposals in <u>specific fields</u>** or sectors	
General support for all firms that cooperate with scientific institutions (no selection mechanism exists: tax reduction or support for wages of R&D employment)	
Others ……..	
Technological or sectoral focus of the support	**Y/N**
Traditional sectors	
High tech sectors	
Science based sectors	
Others ……..	
Who applies (takes the initiative) for the support and who is responsible for the project	**Who applies**
Firms	
Universities	
Research centres	
Technology centres or institutes	
Others	

Matrix 1.2 Characteristics of the instruments

Objectives of the policy instrument in relation with the need and problems of the national innovation system and productive structure NIS/NPS

WHICH NEEDS OR PROBLEMS ARE SUBJECT OF THE INSTRUMENT	PROMOTION (Objective of the instrument) **YES/NO**
Lack of linkages between Science Industrial relationship	
Improve usefulness of scientific results (increase their commercialisation)	
Promotion of technology transfer (SI based)	
Promotion of technological capabilities in scientific organisations	
Promotion of cooperation	

Promotion of regional or sectoral cluster building	
Promotion of excellence in scientific organisations	
Others……	

Matrix 2.1 Main characteristics of the evaluation study (Research question, contractor, etc…)

Contractor (Who did contract the study?)	**YES/NO**
Public agency unit in charge of the support measure	
Other (semi) public organisation	
No contractor at all (Evaluation studies of academic researchers, PhD students etc….)	
Others…..	
Typical R&D evaluation questions (evaluated aspects).	**Y/N**
Justification of the policy	
Impact assessment and additionality of the effects	
Efficiency of the policy and its implementation	
Improvement of the implementation and the policy mix	
▪ Process Improvement: How can we do it better?	
▪ Strategy: What should we do next?	
▪ Others …….	
Thresholds that hampers the impact or implementation	
▪ Lack of transparency	
▪ The implicit requirements (Project definition. Etc…)	
▪ Implicit selection criteria	
▪ Others …….	

Matrix 2.3 Main characteristics of the evaluation study (Methodological aspects)

Methodological aspects	**YES/NO**
Type of information used	
Specific questionnaire-based survey	
Case studies	
Econometric exploitation of an existing data base	
Official statistics (R&D, patents)	
Interviews with stakeholders	
Peer review by experts	
Bibliometrical Data	
Others	
Characteristics of the sample (which firms are included in the sample)	
Only supported firms (organisations)	
Also not supported firms	
The way of statistical data processing (SEE EXAMPLE)	
1. A merely inventory of the results and effects (Frequencies of number of generated patents, technologies, created employment etc…)	
2. A basic descriptive comparison of main impacts by a few basic variables (Contingency tables that compares the impact by size, R&D intensity, etc…)	
3. In depth analysis of the causal relationships using econometric methods or models.	

Matrix 3 Analysed aspects and the corresponding indicators used in the evaluation study

Matrix 3.1 FINANCIAL ADDITIONALITY (Input indicators)

	Inventory approach (increase of R&D efforts in supported firms)	Descriptive comparison of supported and not supported firms	Analysis of the causal relationship by Econometric Analysis
FINANCIAL ADITIONALITY based on quantitative data (using a specific data base) (A comparison of supported and not supported firms based on external or specific databases)			
FINANCIAL ADITIONALITY Qualitative survey (Based on opinions of the supported enterprises about the importance of financial aid for carrying out the project)			
The study carried out a profiles of the type of firms with a higher lower level of impact (YES / NO)	YES / NO		

Matrix 3.2 Behaviour additionality: Impact on learning and cooperation

INDIVIDUAL LEARNING ASPECTS OF THE SUPPORTED FIRMS (Increase of technological capabilities or knowledge)	**Y/N**
Learning impact on the supported firm	
Learning impact on the cooperation partner	
Organisational learning	
COLLECTIVE LEARNING ASPECTS OF THE SUPPORTED FIRMS	
The study carried out a profiles of the type of firms with a higher lower level of impact (YES / NO)	
Increase of the cooperative culture	
The previous experience (before getting support) in cooperation	
The study carried out a profiles of the type of firms with a higher lower level of impact (YES / NO)	

Matrix 3 Analysed aspects and the corresponding indicators used in the evaluation study

Matrix 3.3 Output indicators (technological and commercial results)

Use of a qualitative survey (Based on opinions of enterprises about the importance of financial aid for carrying out the project)	YES / NO
Technical results (for example) ▪ New or improved products or processes (including artefacts or prototypes) ▪ Adaptation of acquired or external technologies, products or processes ▪ Publications or intellectual property rights (Patents etc…) ▪ Others technological results ……..	
Commercial results (for example) ▪ Increase of the sales ▪ Increase of the export ▪ Increase of employment ▪ Increase of productivity ▪ Reduction of costs	
Level of goal achievement	
Technological goal achievement	
Commercial goal achievement	
Profiles of the type of firms with a higher lower level of impact	

3.4 Did the evaluation study analyse the large term broad social economic impacts in the sector, innovation system or society as a whole
If yes, which kind of aspects were analysed and what where the main conclusions

Matrix 4 Aspects that can influence or limit the impact of the policies

Matrix 4.1 Obstacles related with the project and partners

Motives for cooperation with PRO/UNI Reason of the firm to collaborate in a cooperative project or contract research with PRO/UNI	YES/NO
Motives related with technology aspects (for example) ▪ Access to knowledge not available in the firms ▪ Access to (large scale) S&T infrastructure not available in the firm ▪ The PRO as a radar or sign post for new technologies and there importance (role for forecasting or ▪ The development of the project on a individual level is not feasible ▪ Reduction of the technical risks	
Motives related with economic aspects (for example) ▪ Reduction of the economic risks ▪ Access to public support ▪ Cost saving	
Image making (reputation – quality stamp)	
Reduction of the technical or commercial risks	
Others ……..	
Obstacles during the cooperation EXAMPLES ▪ The PRO/UNI has less technological competences than expected ▪ Lack of accomplishment of the planning ▪ Cultural differences ▪ Divergence in the objectives of the joint project ▪ Lack of interest of the involved researchers of the PRO/UNI ▪ Difficulties of coordination ▪ Difficulties of the attribution of the responsibilities and the activities that has to be carried out ▪ Difficulties of confidentiality ▪ Difficulties of the intellectual property rights	
Motives to not cooperate with PRO/UNI **(Based on the not supported firms)**	
Lack of accessibility of the PRO/UNI	
Lack of knowledge in PRO/UNI	
Others ……..	

Matrix 4 Aspects that can influence or limit the impact of the policies

Matrix 4.2 Administrative efficiency and efficacy

Implicit selection criteria (Selection criteria used by the agency but not explicitly mentioned)		
Explicit selection criteria (clearly mentioned by the funding agency)		
Complexity of the application forms		
Economic and time costs of the application process		

5 Did the evaluation study used control variables for measuring the impact
If yes, which kind of aspects were analysed and what where the main conclusions

Matrix 6.1 Policy recommendations

Please provide at least 5 of the most important policy recommendations that are important to improve the instruments ▪ Targeted at the design of the programme / Measure ▪ Targeted at the programme management ▪ Targeted at the broader policy design

Matrix 6.2 Recommendations for future policy evaluations

Please provide ***at least 5 recommendations*** *for future evaluation studies:* ▪ Targeted at the methods ▪ Targeted at the specific indicators ▪ Targeted at the information sources

Matrix 6.3 Remarks: Please provide the critical success factors

Please provide the most important success factors that are ***critical for transferability*** *of the best practice towards other countries*

Matrix 6.4 Describe effects on policy making/measure implementation

Please provide the **effects on policy making/measure implementation**
1.-Effect on the design of the programme / Measure
2.- Effect on the programme
3.- Effect on the broader policy design
How did these effects occur – what can be further improved. Why did no effects
2. no effects in terms of implementation Explain why no effects occurred – related to process and product factors for IA.

Annex 4.3: Questionnaire for national experts on Technology Centres

Questionnaire on the role of technology centres in the process of technology transfer from the scientific system to the production sector

Questionnaire of the OCM-net:

'Common Impact Assessment for Optimising the Policy Mix' (CIA4OPM)

In response to the growing interest for the use and increased usefulness of impact assessment (IA) in the context of RTDI policy formulation, the Belgian Science Policy Office (BELSPO) has taken – together with 15 partner organizations - the initiative for an FP7 OMC-net project 'Common Impact Assessment for Optimising the Policy Mix' (CIA4OPM) focused at an assessment of the socio-economic impacts of public funding for RTDI. This challenging project aims to contribute to the debate on policy priorities in terms of research for the coming decade, and to facilitate mutual learning and communication between policy makers and stakeholders in the policy making process.

Launched in March 2009, CIA4OPM, brings together a network of 15 partners from 11 countries around Europe (a mix of EU Member States, MS, and Associated MS) with the goal of exchanging information and mutual learning with respect to the assessment of (socio-) economic impacts of public funding (policies and instruments) of RTDI. The project focuses at public funding for RTDI in three policy areas in particular: (i) enhancement of private R&D investment (WP3); (ii) improved industry-science linkages (WP4); and (iii) improved (management of) research in public research institutions and universities (WP5).

Participating countries

Austria, Belgium, Bulgaria, Czech Republic, Estonia, France, Iceland, Malta, Spain, Sweden, Turkey

This questionnaire is part of the working package that analyse the science-industry relationships in technology centres or institutes. By this questionnaire we hope to throw some light on the role of technology centres in the process of technology transfer from the scientific system to the production sector (commercialisation of scientific results).

The main objective of this survey is to obtain examples of best practices for the development of such linkages. Although on the same time we hope to get a broad idea about how this aspect (the role of science in technology centres) is included in the national R&D and innovation policies.

In some countries do exist different types of technology centres. If this is the case in your country please indicate to which group or type of technology centres you refer.

Name of the type of technology centres to which your answers respond …… …… ……
…… …… …… …… …… …… …… …… …… …… …… ……
…… …… …… …… …… …… …… …… …… …… …… ……
…… …… ……

Website or specific references
…… …… …… …… …… …… …… …… …… …… …… ……
…… …… …… …… …… …… …… …… …… …… …… ……
…… …… ……

1. **Give a general description on the background of the technology centres in reference to their relation with the scientific organisations and their role as a bridge between science and applied commercial R&D and innovation by answering the following questions:**

		None of them	A few of them	Half of them	Almost all of them	All of them
1.A	Do the technology centres of your country have a (strong) science base?	1	2	3	4	5
1.B	Are they integrated in universities or public research organisations	1	2	3	4	5
1.C	Do their staff (director or directors of departments or units) include researchers of the universities (in other words they work in both institutions)	1	2	3	4	5

		Never	On individual base	Some - times	On a very regular way	Often based on formal regulation
1.D	Do researchers of universities and PRO work on part-time base in technology centres	1	2	3	4	5
1.E	Do researchers of technology centres work on part time basis in universities and PRO	1	2	3	4	5
1.F	Do the TC have cooperative projects with universities	1	2	3	4	5
1.G	Do the researchers in the TC direct or supervise PhD Thesis	1	2	3	4	5

2. Based on you experience could you give us a raw estimation of the percentage of

		Less than 10%	10-30%	30-60%	60-90%	Over 90%
2.A	The PhD holders of the total **research staff** of the TC	1	2	3	4	5
2.B	The total budget of the TC spend to basic R&D	1	2	3	4	5

3. Please indicate if some specific policies or legal conditions exist that promote directly or indirectly the science industrial linkages

		Yes	No
3.A	Has the TC the obligation to spend part of their budget to basic R&D	☐	☐

		Yes	No
3.B	Mobility schemes for researchers	☐	☐
3.C	Specific tax reduction for cooperation between technology centres and universities or PRO	☐	☐
3.D	Specific support for PhD students that develop their PhD in the technology centres	☐	☐
3.E	Do technology centres of your country compete in public tenders for support with others R&D organisations or enterprises	☐	☐
3.F	Do technology centres of your country have specific tenders for their R&D activities	☐	☐
3.G	Do the selection mechanisms of those specific tenders include the scientific level as a selection criteria	☐	☐
3.H	Are their specific policies to stimulate or reinforce the scientific base of the technology centres or institutes	☐	☐

Could you give us some references about evaluation studies of technology centres in your country
Name of the study .... Website or link of the report ....
Name of the study .... Website or link of the report ....
Name of the study .... Website or link of the report ....

Do in your country exist specific technology centres or institutes with a (strong) science base? If yes could you identify some of them? (If it is a large organisation with several institutes please only mention the main organisation)

Name............ ....
....
Website Technology centre............ ....

Name ....
....
Website Technology centre ....

Name ....
....
Website Technology centre: ....

Annex 4.4: List of Case studies analysed in the meta evaluation

Code		Title	Year	Authors	Country	Agencia/ Ministry in charge of the instrument (contractor*)	Partner that carried out the matrix
1	TC	IMEC Impact Analysis 2002-2008	2009	Idea Consult	Belgium	EWI	Stijn Eeckhout
2	Coop	Política Tecnológica e Innovación en la Empresa Española. Una Evaluación de la Actuación del CDTI.	1995	Buesa, M.; Molero, J.	Spain	CDTI	Joost Heijs
3	Coop	Evaluación de la efectividad de la política de cooperación en la innovación. Documento de trabajo, Nº 43. IAIF-UCM.	2004	Fernández, A; Valadez, P; Heijs, J; Coronil, A.	Spain	CDTI (FECYT)	Joost Heijs
4	Coop	Evaluación del impacto de los proyectos de I+D+I realizados conjuntamente por los centros públicos de investigación y empresas de Andalucía	2005	Pino, J.L.; Solís, F.M.; López, A.J.	Spain	CDTI (Consejería de Innovación, Ciencia y Empresa)	Ignacio Baanante
5	Coop & TC	L'évaluation de la 1ère phase (2006-2008) de la politique des pôles de compétitivité	2008	Boston Consulting Group et CM International	France	Min. de l'écologie et Ministère de l'économie	Eric Hauet
6	Coop & TC	Carnot Institute evaluation	2010		France	ANR	Marie de Lattre-Gasquet
7	Coop	Collective Research Centres: A Study on R&D and Technology Transfer Involvement	2009	A. Spithoven, M. Knockaert, C. Vereert-brugghen	Belgium	BELSPO	Peter Teirlinck
8	Coop & TC	First Evaluation of the VINNOVA VINN Excellence Centres NGIL, Helix, Samot, and Eco	2007	Reeve, D.; Anderson, A:; Stenius, P.	Sweden	VINNOVA	Özlem Dogan
9	Coop	De waarde van strategisch basisonderzoek. Effectmeting van STWW-, GBOU- en SBO-projecten met een economische finaliteit	2008	Meijer, I.; Veen, G.; Giessel, J.F.; Mostert, B.; Til, J.; Vullings, W.	Belgium	EWI	Stijn Eeckhout
10	Coop	Interimevaluierung von protec 2002+ Das Programm zur Förderung des Technologietransfer	2006	Sheikh, S.; Fischl, I.; Lo, V.; Stahleck-er, T.; Wga-ner Luptacik, P.; Archut, S.	Austria		Joost Heijs
11	TC	Hacia una medida de la contribución de los Centros Tecnológicos españoles a la mejora de la competitividad de las empresas	2009	FEDIT	Spain	MICINN (FEDIT)	Édgar Moya
12	Coop	Flujos externos de conocimiento y dinamismo del proceso de innovación	2007	Barge, A.	Spain	(Tesis doctoral)	Joost Heijs
13	TC	Mid Term Evaluation of the Institute Excellence Centres Programme	2009	Martensson, K.; Kleemola, H.	Sweden	VINNOVA	Nikolay Mateev

14	TC	First Evaluation of the Institute Excellence Centres Programme	2008	Stenius, P.; Martensson, K.	Sweden	VINNOVA	Nikolay Mateev
15	coop	De effectiviteit van de innovatievoucher 2004 en 2005	2007	Cornet, M.; Steeg, M.; Vroomen, B.	The Netherlands	CPB	Ward Ziarko
16	coop y TC	The effectiveness of the Flemish Innovation Co-operation Program (VIS)	2007	Idea consult	Belgium	IWT	Rocío Castrillo
17	Coop and TC	Do innovation vouchers help SMEs to cross the bridge towards science?	2006	Cornet, M.; Steeg, M.; Vroomen, B.	The Netherlands	Min. of Economic Affairs (CPB)	Ian Gauci-Borda
18	Cluster	Endbericht der Evaluation des BMBF-Programms „Innovative Regionale Wachstumskerne"	2005	Gebhardt, C.; Bon-siep, W.; Kreiken-bom, H.; Goebel, A.; Allgoewer, L.; Debus, C.	Germany		Joost Heijs
19	Cluster	LES PÔLES DE COMPÉTITIVITÉ Que peut-on en attendre ?	2008	Duranton, Mayer	France	CIADT (Min. of Research)	Marie de Lattre-Gasquet
20	Coop	European Community R&D support: Effects on the cooperative behaviour of firms	1994	Katsoulacos, Y.		European Community (SPEAR)	Joost Heijs
21	TC	Evaluation leading technological institutes	2005	Technopolis	The Netherlands	Min. of Economic Affaires	Eric Hauet/ Marie de Lattre-Gasquet
22	TC	Evaluation of the Centre Contract/Innovation Consortium Programme	2005	Inside Consulting and Oxford Research	Denmark	Min. of Science, Technology and Innovation	Özlem Dogan
23	TC	Impacts of the Swedish competence centres programme 1995-2003	2004	Arnold, E.; Clark, J.; Bussillet, S. (Technopolis)	Sweden	VINNOVA	Ian Gauci-Borda
24	TC and coop	Evaluación del programa de fomento de la investigación técnica (profit 2000-2003) en el área de tecnologías de la información y telecomunicaciones	2005	Consultrans	Spain	Ministerio de Industria	Joost Heijs
25	TC	Estudio del impacto socioeconómico de los parques científicos y tecnológicos españoles	2008	APTE	Spain		Joost Heijs
26	Coop	Evaluation FFF-Impact analysis	2004	Schibany, A.; Streicher, G.; Gretzmacher, N.; Falk, M.; Falk, R.; Knole, N.; Schwarz, G.; Woerter, M.	Austria	Min. of Transports & Innovation Technology	Joost Heijs
27	Coop	Assessment Zukunft der Kompetenzzentreprogramme (K plus und K ind/net) und Zukunft der Kompetenzzentren	2004	Edler, J.; Bührer, S; Lo, V.; Rainfurth, C.	Austria	Bundes Min Für Verkehr, Innovation und Technologie	Joost Heijs
28	Coop	Impact evaluation of Finnish programmes for centres of excellence in research 2000-2005 and 2002-2007	2009	Hjelt, M.; Ahonen, P.; Pessala, P.; Gaia, G. Consulting	Finland	AKA	Ignacio Baanante

29	Coop	Financiación pública de las actividades innovadoras empresariales: Evaluación de los créditos blandos para proyectos de I+D.	2000	Heijs, J.	Spain	CDTI (PhD Thesis)	Joost Heijs
30	Coop	Cooperación en innovación en España y el papel de las ayudas públicas.	2007	Heijs/Buesa et al.	Spain	CDTI	Joost Heijs
31	CT	El papel de los Centros Tecnológicos en el Sistema Regional de Innovación".	2003,	Barge, A.	Spain	(Master Thesis)	Joost Heijs
32	Coop	"Evaluación de la política de mejora del sistema de transferencia de tecnología a las empresas"	2009	AEVAL	Spain	Spanish government (AEVAL)	Joost Heijs

Note: Not all studies indicate clearly the agency in charge of the instrument and the organisation that contracted the evaluation study. Therefore in some cases the data is missing: TC evaluation of technology centres; Coop evaluation of policies to promote of cooperation; Cluster evaluation of cluster policies. * If different from agency/ministry in charge.

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