

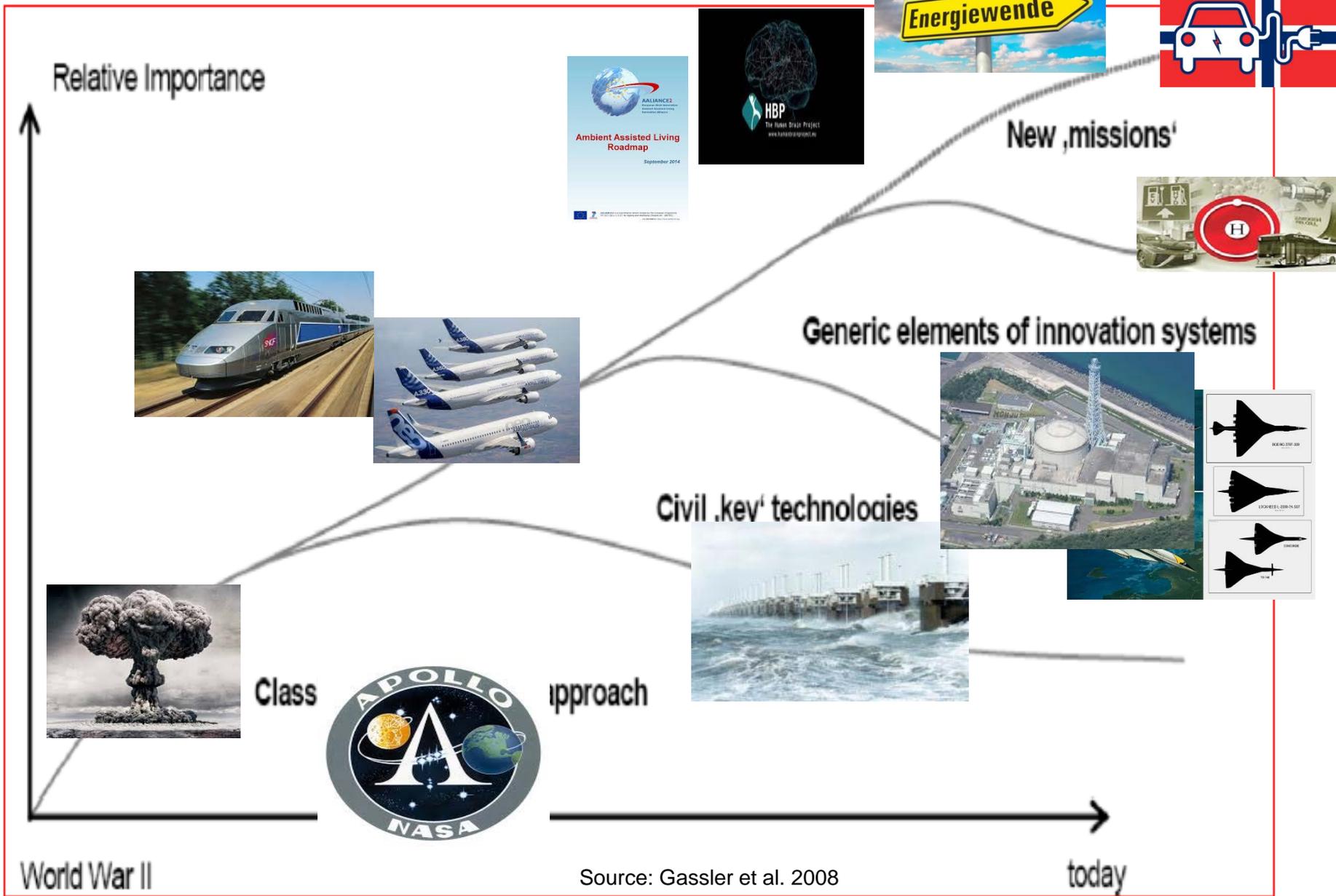
Re-orienting STI Policies towards Mission-oriented Innovation Policies – Where do we stand? Where are we heading?

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Joint CSTP / CIIE Workshop
Session 2: Reorienting STI Policies and Funding to Tackle Societal Challenges

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Missions – old and new

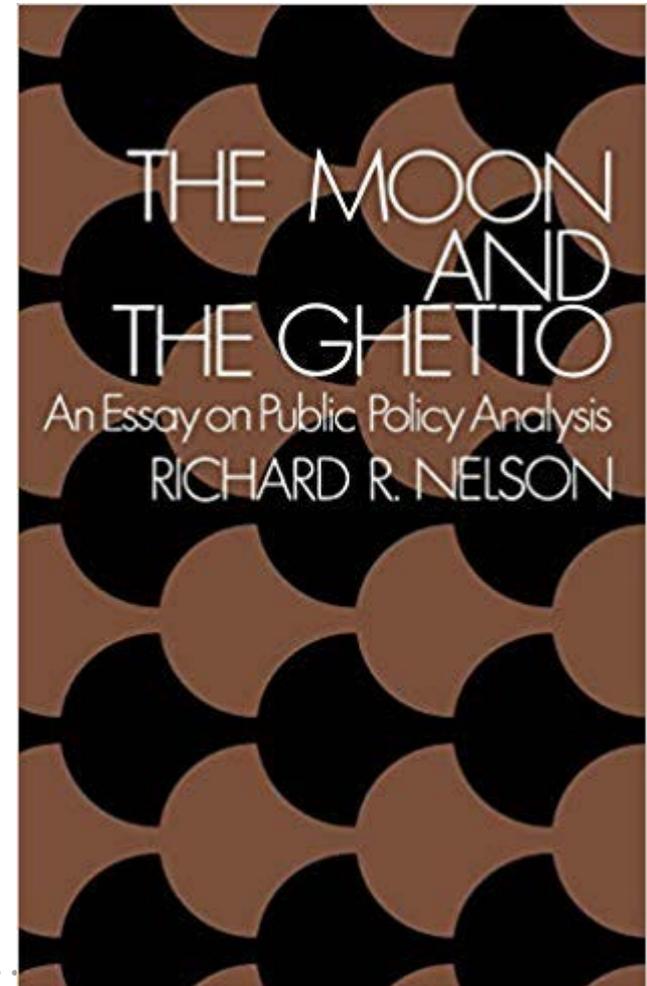


Why NEW Mission-Oriented Policy?

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“If we can land a man on the moon, why can’t we solve the problems of the ghetto?”

(Richard NELSON, *The Moon and the Ghetto*. An Essay on Public Policy Analysis. 1977)



The recent turn in RTI policy

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- **Mission-orientation is part of the „normative (or strategic) turn“ in RTI policy** (Daimer et al. 2012; Weber 2012; JIIP 2018)
 - Growing attention to the „directionality“ of innovation and technological change
 - Emphasis on societal rather than primarily economic goals
 - Broader understanding of innovation
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STI Policy Paradigms

STI Policy Paradigm	Thematic dimension	Conceptual / legitimacy dimension	Institutional dimension
<p>“Old / traditional” mission-oriented approach</p>	<p><i>Emphasis on “large-scale” technologies/technological systems (i.e. space, defence, energy, transport, etc.)</i></p>	<p><i>Production of “public” and/or “merit” goods – but not necessarily with an economic aim</i></p> <p><i>Addressing “market failure”, the main intervention logic</i></p> <p><i>“Linear model” of technological change and innovation</i></p>	<p><i>Top-down definition of thematic priorities</i></p> <p><i>Establishing of thematically specialised large-scale public R&D organisations (e.g. nuclear or space research centres)</i></p>
<p>“Industrial policy” approach (“key civilian/dual-use technologies”)</p>	<p><i>First: more narrowly defined “strategic sectors/technologies” (e.g. nuclear power, supersonic transport, micro-electronics)</i></p> <p><i>Later: other “general purpose technologies” (e.g. ICT, biotechnology, new materials, nanotechnology)</i></p>	<p><i>Fostering competitiveness in “strategic industries”</i></p> <p><i>Emphasis on static and dynamic economies of scale and specific market failures, especially spill-overs from “generic” technologies</i></p>	<p><i>Emphasis on planning, technology forecasting, technology assessment</i></p> <p><i>Establishment of “National Technology Programs”</i></p> <p><i>Increased efforts in “technology transfer” between basic/applied, military/civilian</i></p>

STI Policy Paradigms

Source: Kuittinen, Polt, Weber (2018)

STI Policy Paradigm	<i>Thematic dimension</i>	<i>Conceptual / legitimacy dimension</i>	<i>Institutional dimension</i>
Innovation systems/ systemic approaches	<p><i>Emphasis on “functional” aspects of the innovation system:</i></p> <p><i>Interaction & cooperation (especially industry/science relations)</i></p> <p><i>Conditions for business start-ups, regulation, improving “innovation eco-systems”</i></p>	<p><i>“Systemic failures” instead of market failures</i></p> <p><i>Addressing “innovations systems” as a whole, but with specific emphasis:</i></p> <p><i>National innovation system</i></p> <p><i>Regional innovation system/ clusters</i></p> <p><i>Sectorial innovation systems</i></p> <p><i>“Open innovation” model gaining ground</i></p>	<p><i>Increasing number of actors/ institutions involved in STI policy (e.g. agencies and councils)</i></p> <p><i>Regional dimension of innovation becomes important</i></p> <p><i>Great number of “horizontal measures” emerge (e.g. for Industry-Science Relations [ISR])</i></p> <p><i>Challenges of multi-level governance and policy coordination are accentuated</i></p>

STI Policy Paradigms

Source: Kuittinen, Polt, Weber (2018)

STI Policy Paradigm	<i>Thematic dimension</i>	<i>Conceptual / legitimacy dimension</i>	<i>Institutional dimension</i>
“New” mission-oriented approach	<p><i>Sustainable development</i></p> <p><i>Climate change</i></p> <p><i>Food security</i></p> <p><i>Renewable energies</i></p> <p><i>Security & safety</i></p> <p><i>Demographic change and ageing</i></p> <p><i>Mobility</i></p> <p><i>Often “challenge-oriented” rather than “mission-oriented”!</i></p>	<p><i>Orientation towards societal needs and “Grand Challenges”</i></p> <p><i>Not confined to “supply/technology push”! Adoption, diffusion and demand-side are essential</i></p> <p><i>Systemic innovation of large-scale technological systems (e.g. infrastructures for mobility, energy distribution, communication ...)</i></p> <p><i>Social & institutional innovations increasingly in focus!</i></p>	<p><i>Integration of different societal groups, need for “participatory” approaches</i></p> <p><i>Need for horizontal coordination of hitherto different/distinct policy areas</i></p> <p><i>Much greater need for international cooperation in STI Policy</i></p>

MOP – a traditional attempt of definition

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...Mission-oriented Policies can be defined as systemic public policies that draw on frontier knowledge to attain specific goals, or ‘**big science deployed to meet big problems**’ (Ergas 1987)”
(Mazzucato 2018)

MOP – a workable definition for today's challenges

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...“initiatives [which] typically are ambitious, exploratory and ground-breaking in nature, often cross-disciplinary, targeting a concrete problem/challenge, with a large impact and a well-defined timeframe. More specifically, they have **clearly defined (societal or technological) goals** with preferably **qualified and/or quantified targets** and **progress monitored along predefined milestones**.

Directionality and **intentionality** of these initiatives is what differentiates them from other types of initiatives, such as **systemic or challenge-oriented policies**” (JIIP, 2018a, 4)

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A typology of MOIPs

Type of Mission	Goals / Orientation	Examples
,Science / Breakthrough-Missions‘	Aiming at scientific breakthroughs sometimes, but not always with view to the potential application	<ul style="list-style-type: none"> ▪ Human Brain Project, ▪ Quantum Flagship, ▪ (Research on) Ebola
,Technology / Accelerator‘ – Missions	Realizing functioning complex solutions, which need concerted and massive application of resources	<ul style="list-style-type: none"> ▪ Apollo/Artemis-Mission, ▪ civil nuclear powerplants, ▪ TGV, Concorde, ▪ Battery research
,Transformative Missions‘	Change of existing (large-scale) socio-technical systems, involving social, technological, organisational and institutional innovations	<ul style="list-style-type: none"> ▪ German ,Energiewende‘ ▪ Transport/Mobilitätswende ▪ Sustainable and secure water management (NL)
,Umbrella-Missions‘	Initiatives that follow over-arching goals, including parts which are missions in the proper sense (even of different sorts)	<ul style="list-style-type: none"> ▪ High-Tech-Strategy (GER) ▪ Top-Sector Strategy (NL) ▪ UK Industrial Strategy ▪ EU’s Missions within ,Horizon Europe‘

Typology of MOIPs

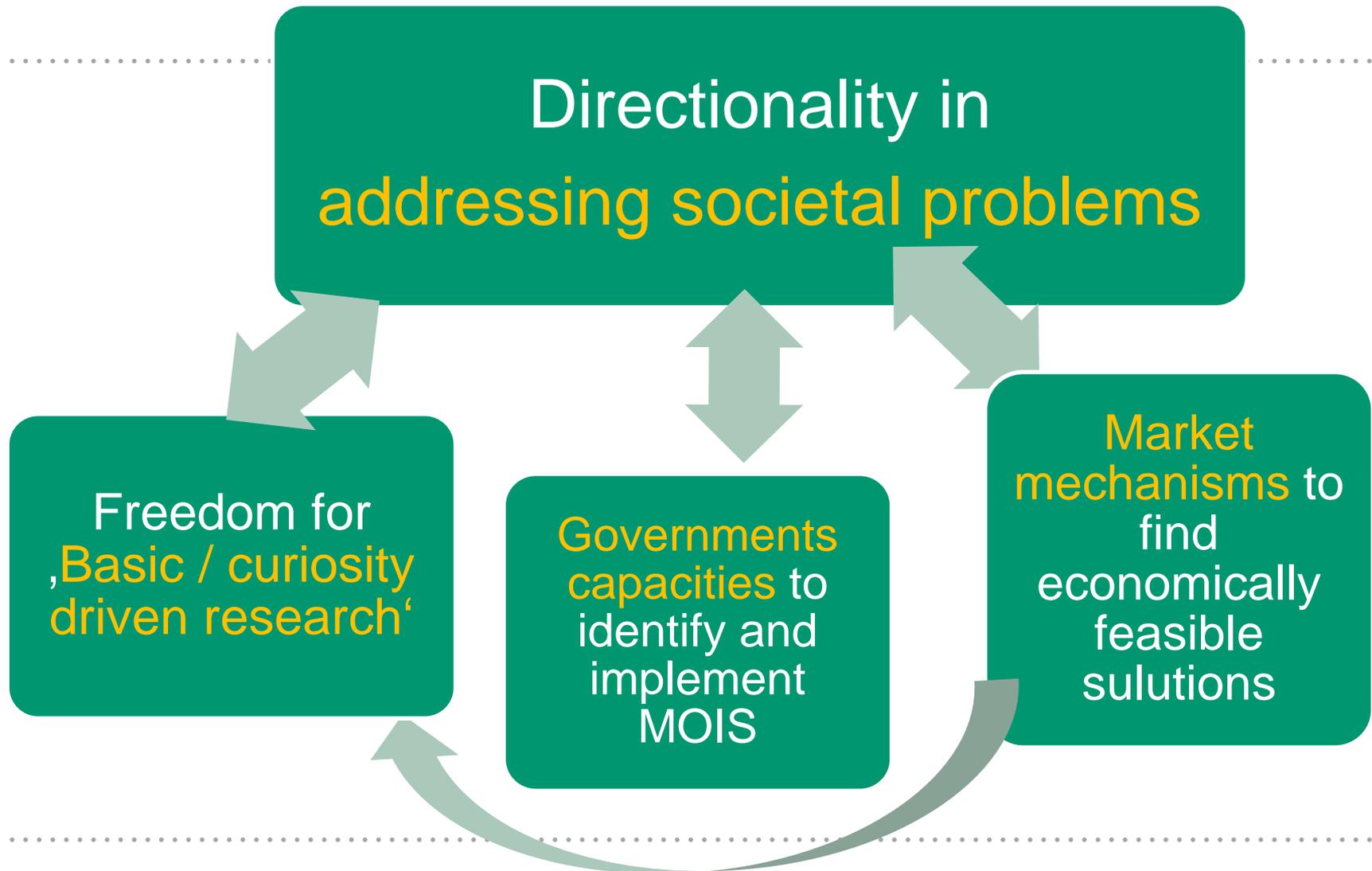
Type of Mission	Predominant style of governance	Challenges
‘Science / Breakthrough-Missions’	<p>„Oriented (or even targeted) serendipity“</p> <ul style="list-style-type: none"> ▪ Initiation centralised, implementation more decentral, ▪ medium level of aspiration level on coherence (high diversity because of differing groups of actors in the science system, scientific uncertainty) 	<ul style="list-style-type: none"> ▪ Interdisciplinary cooperation ▪ scientific/technological uncertainties („ontological expansion“)
‘Technology / Accelerator’ – Missions	<p>„flexible/reflexive planning“</p> <ul style="list-style-type: none"> ▪ Initiation centralised, implementation: often centralised or limited to smaller numbers of actors, often with specialised („dedicated“) institutions/organisations; ▪ high aspiration level w/r to coherence (a functioning artefact/system being the goal) 	<ul style="list-style-type: none"> ▪ Planning approach despite uncertainty about availability /feasibility of technological solutions, ▪ institutionalised links to basic research

Typology of MOIPs

Type of Mission	Predominant style of governance	Challenges
<p>„Transformative Missions‘</p>	<p>„Goal oriented modulation“ (Kemp et al. 2004)</p> <ul style="list-style-type: none"> ▪ Initialisation: mostly decentral (also central forms conceivable). ▪ Implementation: coordinated, but mostly decentral implementation (multi-level/multi-actor), ▪ Governance with experimentation and learning processes; ▪ medium aspiration level of coherence, great challenge for coordination because of high complexity, longterm timeframe and large number of actors, ▪ adaptive approach needed 	<ul style="list-style-type: none"> ▪ Considerable uncertainty about problem, solution and goals, ▪ long-term adjustment processes, ▪ combination of experimental and ‚framing‘ approaches, ▪ policy coordination together with scaling / generalisation
<p>„Umbrella-Missions‘</p>	<p>„Soft guidance“</p> <ul style="list-style-type: none"> ▪ Initiation decentral, but rather loose bundeling under one umbrella, ▪ Implementation: combination of different initiatives, ▪ weak coordinative linking , ▪ low to medium level of aspiration with respect to coherence 	<ul style="list-style-type: none"> ▪ Securing coherence in the absence of strong coordination mechanisms

Science, Markets, Policy and Missions – perceived trade-offs

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Science and Missions



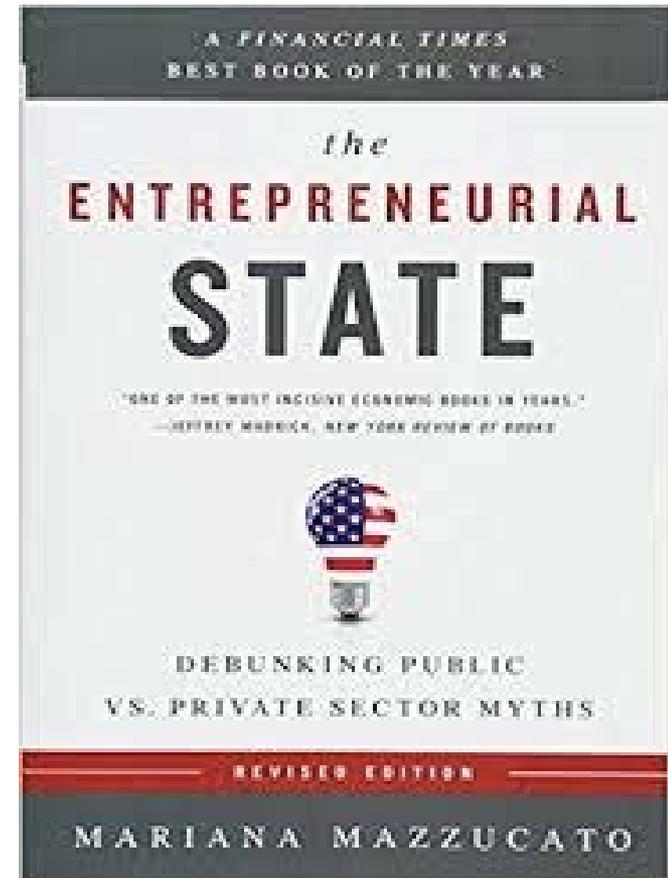
“As Pasteur’s scientific studies became progressively more fundamental, the problems he chose and the lines of inquiry he pursued became progressively more applied,” [...] “Many of his detailed lines of [basic] inquiry...are unintelligible apart from his applied goals. The mature Pasteur never did a study that was not applied, [even] as he laid out a whole new branch of science.”

Donald Stokes (1997)



Markets and Missions

“*Mission-Oriented Innovation Policy*. ... focuses on the potential of *mission-oriented*, strategic public sector investment to catalyse economic activity, spark innovation, solve public problems, and lay the foundations for future economic growth.” (Mazzucato, 2013)



Policy and Missions

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Learning from past experiences - ‚generalised‘ success factors

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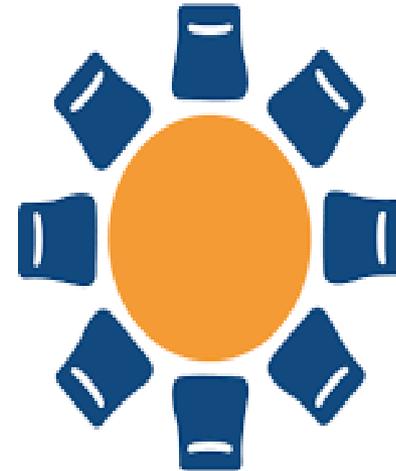
- They almost always emerge from a **sense of urgency** that is shared by a wide array of stakeholders
- There must be a ‚**fertile ground**‘ in terms of scientific and industrial capacities and political and cultural environments → there can be ‚**great leaps forward**‘, but they cannot be too great...



Learning from past experiences - ‚generalised‘ success factors

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- There must be **long-term direction** towards and **commitment to clearly identified missions**
- They are managed by a **clearly identified and empowered governance body** which can be held responsible for the achievements of the mission(s) – even in missions where there are **multiple stakeholders**



Learning from past experiences: ,generalised' success factors

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- Include **application and diffusion in the design of the policy**
(especially in the technology accelerator/ transformative types),
 - Employ a **broad concept of innovation** (including social innovation;
especially in the transformative types)
 - Ensure **coherent application of instruments and means** (policy mix)
 - Establish strong **,political ownership'**
 - Ensure strong **operational and political governance**
 - ... and in some cases **widespread buy-in of acteurs**
 - Build in **reflexive mechanisms** (especially for longer-term missions)
 - Secure a more differentiated knowledge base of and **new policy
intelligence approaches** to underpin longer-term and strategic mission
policies
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Missions and the challenges for STI Policy

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- Missions redefine the roles of government in system change, and call for a pro-active role of the state with considerable expertise and capabilities
 - *Governments will have to (re)build their transformative capacities*
- Overly ,rationalistic‘ and ,top-down‘ policy approaches are unlikely to succeed given the complexity of the approach
 - *New programme and policy experimentation to accelerate scaling, adaptation and diffusion of innovations*
- Many missions will involve STI, but not necessarily as the main part
 - *STI policy not be in the driving seat; shared responsibility with sectoral policies in agenda-setting and instrumentation*
- Missions differ depending on the nature of the project and the context in which they are embedded
 - *Need for a differentiated, and at the same time pragmatic approach*

Elements of a new implementation model

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- **(Re-)building public sector capabilities**
- **Combination of top-down and bottom-up agenda-setting**
- **More emphasis on social, organisational and institutional innovation**
- **Stronger and earlier involvement of citizens, practitioners and stakeholders**
- **More ‚built-in‘ flexibility and adaptability of programming**
- **Scaling and generalisation through finance and mobilisation of „downstream“ actors**

A (rationalistic) design of the Implementation steps for MOPs

MISSION IDENTIFICATION

- **Search processes** to find suited ‚Missions Topics/Areas‘ and adequate missions-types → Technology- and Policy studies, Foresight, Stakeholder processes, links to an international discussions and goal settings [SDGs, ...]

MISSION SELECTION

- **Ex-Ante Assessments** (Risiks, Cost-Benefit Assessments, distribution of effects) → constructive Technology Assessment
- **Political process** involving the relevant stakeholders

MISSION IMPLEMENTATION

- **Capacity building** (institutions [e.g. specialised agencies and programmes], administrative instruments [e.g. public procurement, regulation, ...])
- **Design** of suited policy-mixes
- **Governance structures** for coherent policy implementation (Steering boards, management structures , ...)

MISSION STEERING

- **Monitoring** (development of indicators and assessment criteria for the success) and (interim) evaluations
- Policy processes needed to ensure **reflexivity and flexibility** in responding to changes of framework conditions, technological opportunities, societal demands, ...)

Challenges for MO Policy making

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- Settle on a **‘workable definition’** of MOPs
- Allow for **plurality of approaches and experimentation** with different MOPs
- Allow for **‘pragmatic’ implementations**, avoid **‘super-rationalistic’** approaches
- Take into account the **historical trajectories** of NIS and STI policy systems and the **sectoral specificities** when designing MOPs
- **(Re)build** governments’ and societies’ **capacities** to implement MOPs

OECD project on MOPs as a major step to close these knowledge gaps

References (1)

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- BOHEMIA project (AIT/Fraunhofer ISI/ISINNOVA/Institutul de Prospectiva)
 - Transitions on the Horizon: Perspectives for the European Union's future research and innovation policies, Foresight in support of the preparation of FP9, Brussels, May 2018 (https://ec.europa.eu/info/research-and-innovation/strategy/support-policy-making/support-eu-research-and-innovation-policy-making/foresight/activities/current/bohemia_en)
- JIIP (Joanneum Research/Tecnalia/TNO/VTT & DTI / VVA) (2018):
 - Mission-Oriented Research and Innovation. Inventory and characteristics of initiatives. Project Report for the European Commission. Brussels March 2018 (<https://publications.europa.eu/en/publication-detail/-/publication/3b46ce3f-5338-11e8-be1d-01aa75ed71a1/language-en>)
 - Mission-Oriented Research and Innovation. Assessing the Impact of a mission-oriented research and innovation approach. Project Report for the European Commission. Brussels March 2018 (<https://publications.europa.eu/en/publication-detail/-/publication/c24b005f-5334-11e8-be1d-01aa75ed71a1/language-en>)

References (2)

32

- GASSLER, H., POLT, W., RAMMER, C. (2008): Priority Setting in Technology Policy – Historical Developments and Recent Trends. In: Nauwelaers, C. Wintjes, R. (Eds.) Innovation Policy in Europe, Edward Elgar, Cheltenham, pp. 203-224
- KUITTINEN, H., POLT, W., WEBER, K.M. (2018): Mission Europe? A revival of mission-oriented policy in the European Union: In: RFTE – Council for Research and Technology Development (Ed.): RE:THINKING EUROPE. Positions on Shaping an Idea. Vienna, September 2018, pp. 191-207
- MAZZUCATO, M. (2018): Mission-Oriented research and Innovation in the European Union. A problem-solving approach to fuel innovation-led growth. European Commission. Brussels, February 2018
- MAZZUCATO, M. (2019): Governing Missions in the European Union, European Commission, Brussels, July 2019
- MEISSNER, D, POLT, W.; VONORTAS, N. (2017): Towards a broad understanding of innovation and its importance for innovation policy. In: [The Journal of Technology Transfer](#), 2017, vol. 42, issue 5, 1184-1211 DOI: 10.1007/s10961-016-9485-4
- NELSON, R. (1977): The Moon and the Ghetto. An Essay on Public Policy Analysis. New York

References (3)

33

- POLT, W. , SCHUCH, K., WEBER, M., DALL, E., UNGER, M., SALOMON, N. (2019) Debating Impact and mission-orientation of R&I Policies, Forthcoming in: „fteval Journal for Research and Technology Policy Evaluation“
- POLT, W., WEBER, M., BIEGELBAUER, P., UNGER, M. (2019): Matching type of mission and governance in mission-oriented R&I policy. Presentation at EU-SPRI Conference, Rome, June 2019
- WEBER, M. (2019): Transformative Innovation: A new frame for innovation policy, CSIC Seminar on „New Trends in STI Policy“, Santander, 3-4 September 2019



Thank you for your attention!

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