

Annual Report 2020

JOANNEUM RESEARCH



Photo: iStock: elenab / JOANNEUM RESEARCH

JOANNEUM RESEARCH
Forschungsgesellschaft mbH

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STATEMENTS



»We look back on a quite unusual financial 2020. I am grateful and proud to say that thanks to our staff's commitment and research work we managed to achieve an even better result as originally envisaged for that year, which was a rather difficult one. It was characterised by predominantly virtual contacts and formats, which we have used quite successfully, e.g. at our 10th Zukunftskonferenz. Nonetheless, we look forward to resuming provision of our customers and partners with our innovative power in person again in the future.«

Prof. Dr Wolfgang Pribyl | Managing Director of JOANNEUM RESEARCH

»2020 was an extraordinary year with many challenges. Thanks to the pro-active commitment of the JOANNEUM RESEARCH staff, we managed to drive forward and implement research projects also during this difficult time. Once more, JOANNEUM RESEARCH shows that it is a flagship of the Styrian and the Austrian research landscape.«

Barbara Eibinger-Miedl | Member of the Styrian Government for Economy, Tourism, Regions, Science and Research



Photo: Linghammer



»Also in the challenging year of 2020 JOANNEUM RESEARCH managed to set milestones. One milestone, which was an outstanding one for the location of Klagenfurt, was the certification of the ROBOTICS Evaluation Lab as the first accredited testing laboratory for robot safety in Europe. I warmly congratulate the entire team and look forward to other exciting developments.«

Dr Gaby Schaunig | Deputy Governor of Carinthia

Photo: Gernot Gleiss

»Research and development are the fundamental bases for growth and prosperity and are therefore inseparably connected. That is why I am particularly pleased that JOANNEUM RESEARCH concluded the extremely challenging financial 2020 so successfully. My special thanks go to the management, the entire staff and all partners.«

Dr Leonhard Schneemann | Member of the Government of Burgenland for Research, Digitalisation, Social Matters, Hunting and Fishery



Photo: Land Burgenland



»I am happy that the company managed to cope with 2020 so successfully from a business point of view and that all of us stayed healthy in those challenging times. My special thanks go to the management, the executive team and all members of staff, who have shown every day that in particular in difficult times research is absolutely indispensable for designing the future.«

Dr Martin Wiedenbauer | Chairman of the Supervisory Board of JOANNEUM RESEARCH

Photo: itiefab.com | martin.steinthaler

»We will all recall 2020 as having been a very difficult year. Thus, it is even more gratifying to see that Prof. Dr Pribyl, his team and all staff of JOANNEUM RESEARCH succeeded in achieving and in some cases even exceeding their defined scientific goals. I say thank you on behalf of all members of the Scientific Advisory Board.«

Prof. Dr Dr Gerald Schöpfer | Chairman of the Scientific Advisory Board of JOANNEUM RESEARCH

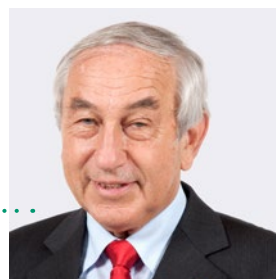


Photo: ÖRK/Nadja Meister

JOANNEUM RESEARCH Forschungsgesellschaft mbH

JOANNEUM RESEARCH develops solutions and technologies for business, industry and public authorities over a wide range of sectors and conducts applied cutting-edge research on an international level.

The company makes a significant contribution towards safeguarding the economic success of the region and assumes a key role in the transfer of technology and expertise into the economy.



Corporate Film

Our 3 Thematic Areas



Information and Production Technologies



Human Technologies and Medicine



Society and Sustainability



Owners

80,75%

State of Styria

14,25%

BABEG Carinthian Agency for Investment
Promotion and Public Shareholding

5%

Landesholding Burgenland GmbH

Certifications

ISO 9001

Requirements for quality management systems

ISO 13485

Medical devices – Quality management systems –
Requirements for regulatory purposes

ISO 14644

Cleanrooms and associated controlled environments

ISO 17025

Accredited test laboratory ROBOTICS Evaluation Lab

GLP

Good Laboratory Practice

Numbers – Data – Facts

around **500** employees (from over 20 nations)

3 overarching thematic areas

7 research units

6 locations

around **50** million Euro of research services per year

LOCATIONS

DIGITAL –

Institute for Information and Communication Technologies

MATERIALS –

Institute for Surface Technologies and Photonics

ROBOTICS –

Institute for Robotics and Mechatronics

COREMED –

Cooperative Centre for Regenerative Medicine

HEALTH –

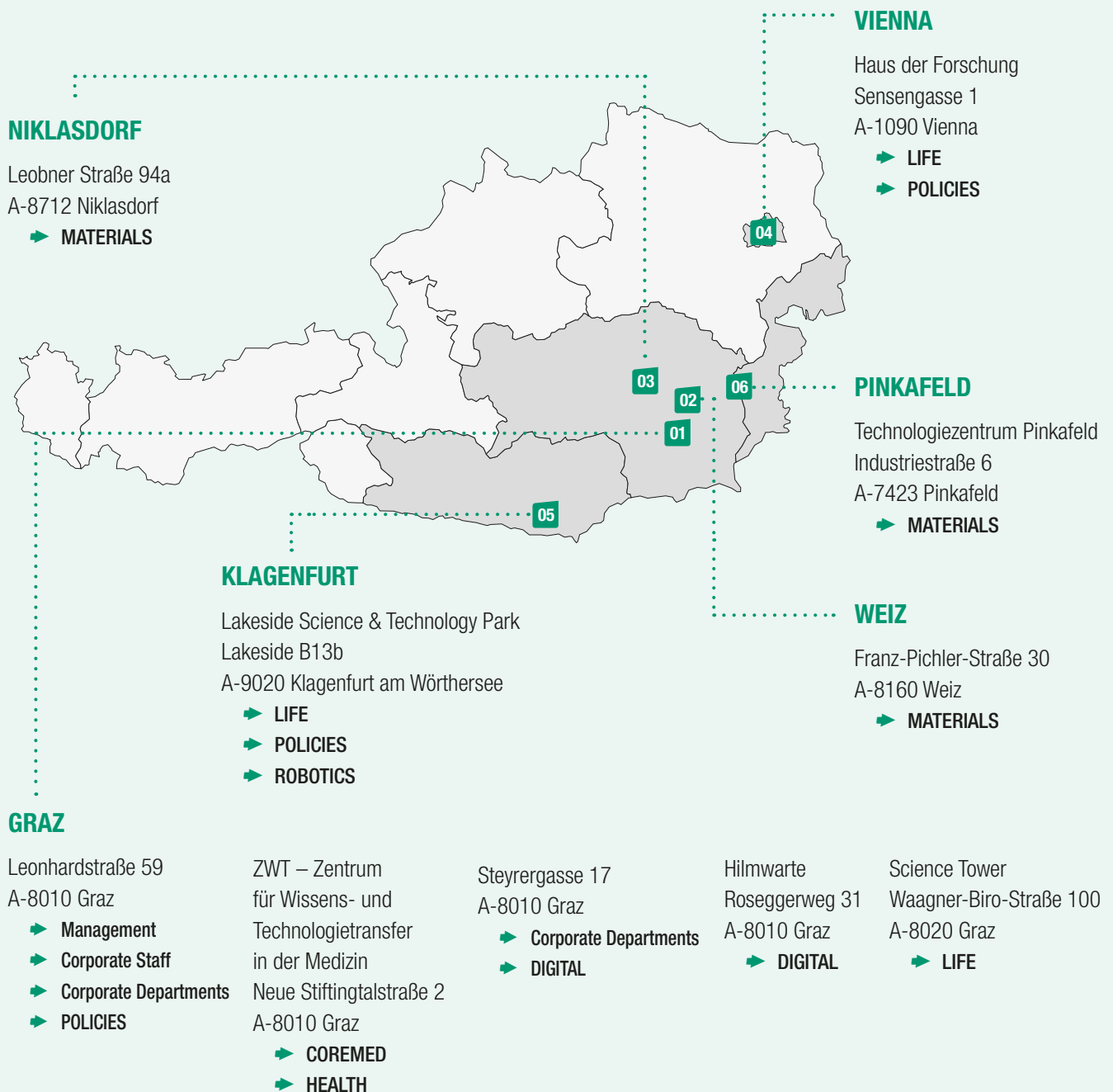
Institute for Biomedicine and Health Sciences

LIFE –

Institute for Climate, Energy and Society

POLICIES –

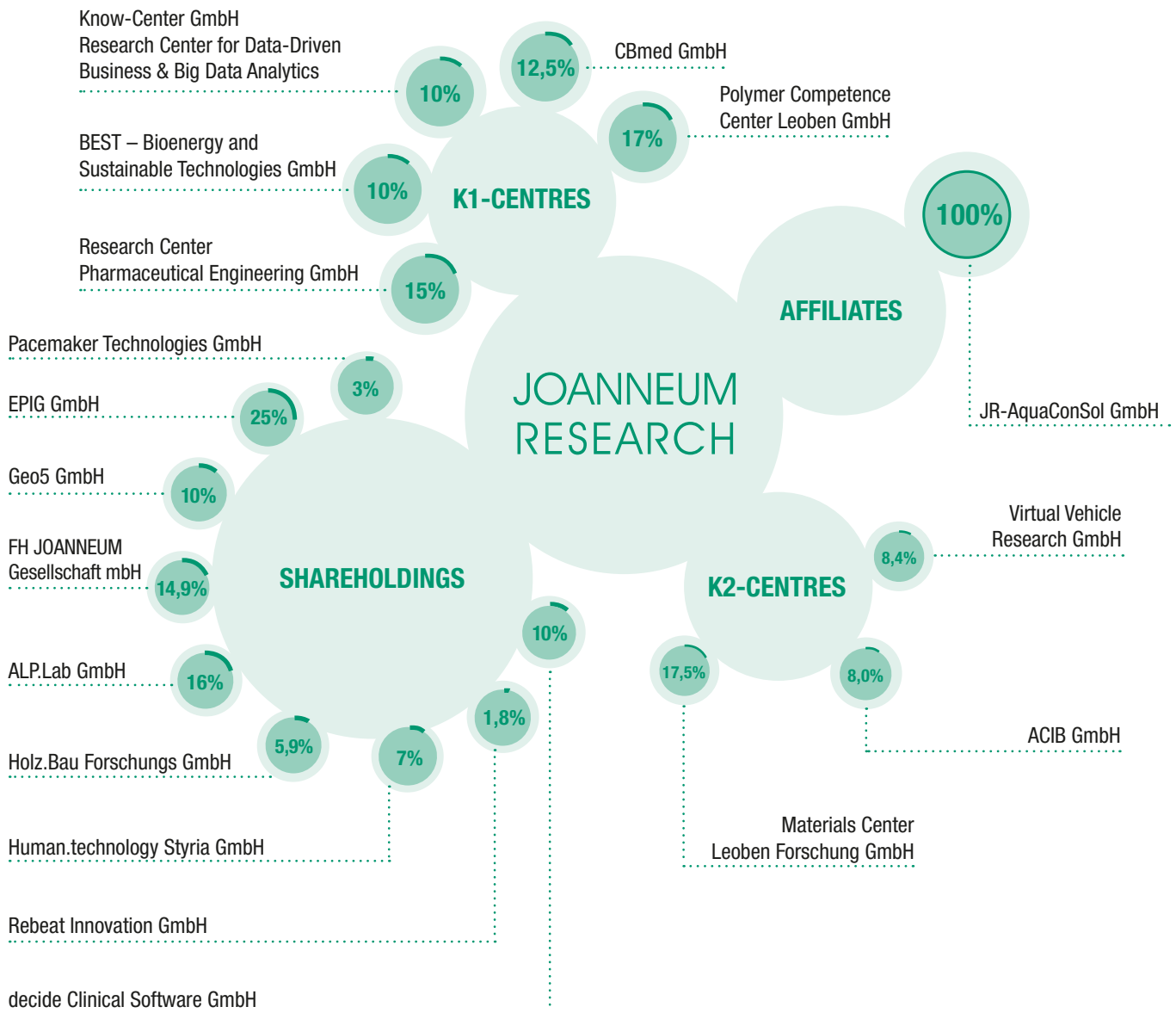
Institute for Economic and Innovation Research



CORPORATE SHAREHOLDINGS

As an active network hub in the national and international research and innovation system, JOANNEUM RESEARCH works for and in close cooperation with partners from the business, scientific and research community, as well as the public sector. With its thumbprint as an "INNOVATION COMPANY" JOANNEUM RESEARCH contributes substantially

to sustainable, innovative solutions and lives cooperation also through its corporate shareholdings in business enterprises, including spin-offs for exploitation of technologies and numerous companies under the Competence Centers for Excellent Technologies (COMET) programme.



Thematic Areas at JOANNEUM RESEARCH



Information and Production Technologies

250 EXPERTS CONDUCT RESEARCH IN THE FOLLOWING FIELDS:

DIGITAL

Institute for Information and Communication Technologies



MATERIALS

Institute for Surface Technologies and Photonics



ROBOTICS

Institute for Robotics and Mechatronics



Human Technology and Medicine

75 EXPERTS CONDUCT RESEARCH IN THE FOLLOWING FIELDS:



COREMED
Cooperative Centre for Regenerative Medicine



HEALTH
Institute for Biomedicine and Health Sciences



Society and Sustainability

75 EXPERTS CONDUCT RESEARCH IN THE FOLLOWING FIELDS:



LIFE
Institute for Climate, Energy and Society



POLICIES
Institute for Economic and Innovation Research

- **Digitalisation in Manufacturing:**
Industrial sensors and instrumentation, acoustic, real-time, industrial Internet-of-Things (IIOT), robotics, data analysis
- **Optimisation of Manufacturing Technologies and Processes:**
Generative manufacturing (laser production technology, 3D printing, plasma technologies), light and optical technologies
- **Robotics:**
Robot system technologies, accredited test laboratory, ROBOTICS evaluation laboratory, training centre
- **Cyber Security and Cyber Defence:**
Industry, e-commerce and critical infrastructure, cyber-attacks, military decision support systems
- **Printed Electronics**
- **Satellite Navigation and Communication technologies:**
Navigation systems (Galileo, GPS, Glonass), satellite communication, wave propagation
- **Remote Sensing and Geoinformation:**
Data from UAVs, aeroplanes, satellites
- **Roll-to-Roll Nanoimprint Lithography**
- **Traffic Telematics:**
Highly autonomous driving, high-resolution maps, acoustic tunnel safety
- **Digitalisation in the Fields of Culture, Media and Agriculture:**
Documentation, cataloguing, archiving

- **Pharmacokinetics, Pharmacodynamics, Bioequivalence**
- **Bio- and Pharmaceutical Analyses**
- **Metabolomics**
- **Medical Sensors**
- **Clinical Decision Support**
- **Skin Ageing and Anti-Ageing**
- **Wound Healing, Scar Formation and Tissue Regeneration**
- **Active and Assisted Living (AAL), and Digital Care**
- **Coating of Medical Implants and Surgical Instruments**
- **Metallic 3D Print for Implants**

- **Climate-Neutral Manufacturing and Life-Cycle Analyses**
- **Environment Monitoring, Consequences of Climate Change and Land Use**
- **Risk Assessment of Changes in Weather and Climate, Disaster Control**
- **Future-proof Energy Systems and Lifestyles**
- **International Climate Policies and Economics**
- **Regional Economic Analyses, Site Research, Structure and Regional Policies**
- **Design and Evaluation of National and International Funding Programmes and Institutions**
- **Data Analysis and Statistical Modelling**



»Digital technologies serve to optimise processes and allow to develop new business models and products. The experts of the DIGITAL Institute help to seize those opportunities.«

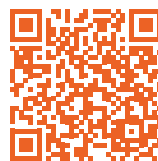
*Director of the Institute
Dr Heinz Mayer*

 Information and Production Technologies

DIGITAL –

Institute for Information and Communication Technologies

DIGITAL is a pioneer and reliable partner in the field of digital innovation and transformation and develops high-tech solutions which work reliably and robustly in practical use in rough conditions. The Institute's scientific and technological basis are multi-sensory systems where precise measurement systems are developed by the most modern sensors and new findings are made by methods of artificial intelligence. DIGITAL sees itself as an innovation driver that supports business enterprises in developing new services and business models. Therefore, components of DIGITAL can be found in many products and processes of its customers. Several products of DIGITAL, such as AKUT®, the 2D video disdrometer, Vidi-Cert® or imdas pro®, rank among the leading worldwide solutions in their relevant areas.



DIGITAL-News

FOCUS AREAS:

- Industry
- Mobility
- Security and Defence
- Telecommunications, Navigation and Space
- Environment, Climate and Disasters
- Culture and Creative Industries
- Human-Centered Computing



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»MATERIALS offers solutions for issues of the manufacturing sector and business sector regarding material sciences.«

*Director of the Institute
Prof. Dr Paul Hartmann*

 Information and Production Technologies

MATERIALS –

Institute for Surface Technologies and Photonics

Making use of the latest technologies and processes based on miniaturisation, integration and materials optimisation MATERIALS provides interdisciplinary solution approaches for the entire value-added chain, from the idea up to the prototype.

In combination with state-of-the-art equipment and infrastructure, the Institute offers pioneering solutions and services which are tailored to the requirements of the business sector and the industrial sector. Its core areas are large-scale microstructures and nanostructures, biosensors and chemosensors, lighting technologies, functionalised surfaces and laser processes.

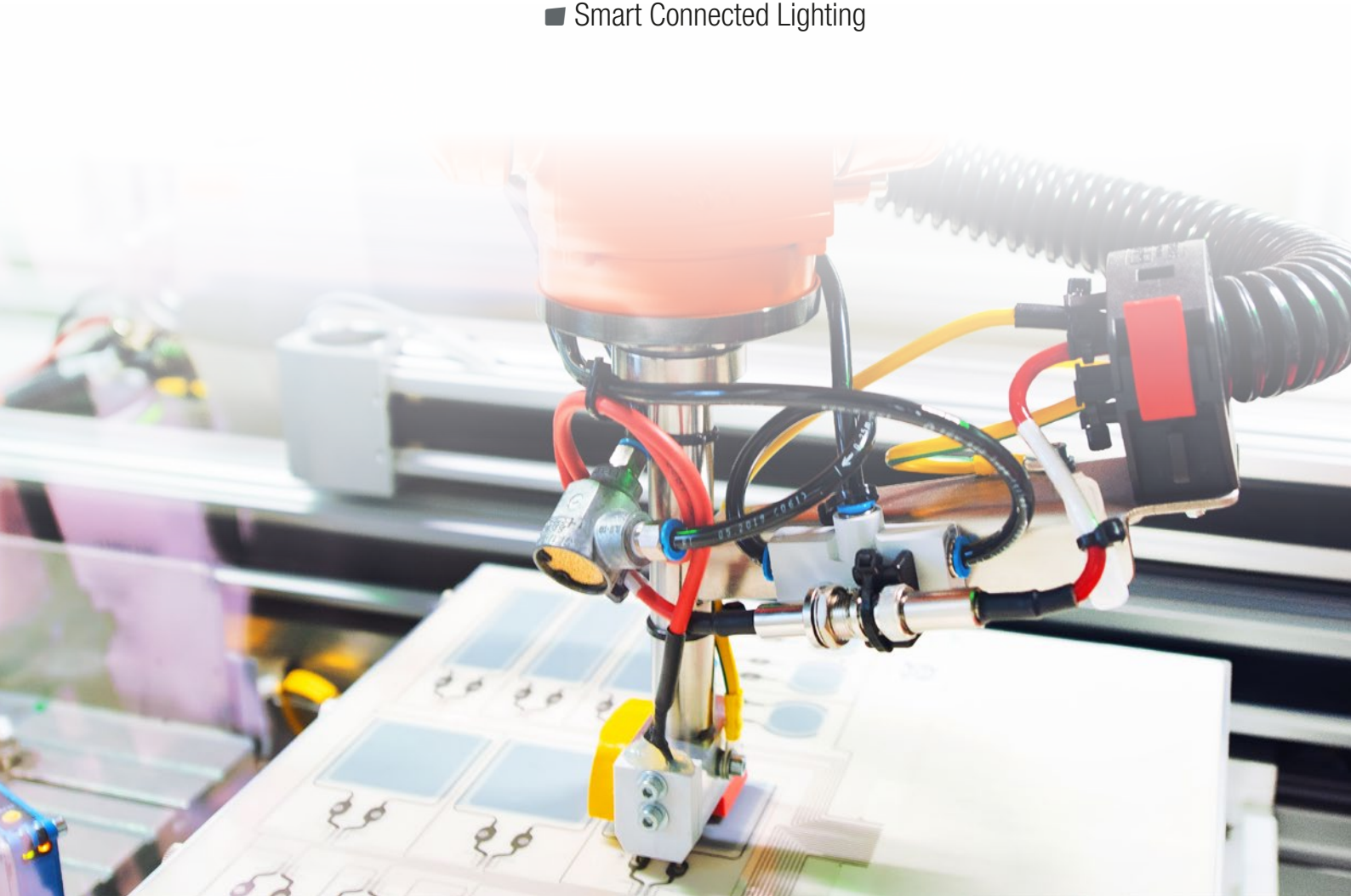
On the basis of its high-level scientific expertise, MATERIALS secures access to the latest technologies for its customers for implementation in innovative products and services.



MATERIALS-News

FOCUS AREAS:

- Hybrid Electronics and Patterning
- Light and Optical Technologies
- Laser and Plasma Processing
- Sensors and Functional Printing
- Smart Connected Lighting



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»ROBOTICS develops innovation-driving robot system technologies for the optimisation of work processes.«

*Director of the Institute
Dr Michael Hofbauer*

 Information and Production Technologies

ROBOTICS –

Institute for Robotics and Mechatronics

Robotics in its manifold and interdisciplinary forms will, in addition to classic industrial manufacturing, also influence major areas of our working and daily lives in the short and medium run. The Institute tackles the current demand of the economic sector for applied research for those technologies at the interface between the digital and the real world.

The specialisation areas of mechatronics and robotics in general, and research in the field of collaboration between man and robot in particular, constitute a promising supplement to the research portfolio of JOANNEUM RESEARCH due to their interdisciplinary structure characterised by mechatronics. The Institute is thus able to provide industrial partners with important assistance and comprehensive support in the development of innovative production processes and also raise the willingness to join new promising fields of technology involving intensive research.

The key technologies primarily include innovation-driving robot system technologies for optimising the work processes of manufacturers and service providers.



ROBOTICS-News

FOCUS AREAS:

- Robot System Technologies
- ROBOTICS Evaluation Lab
- ROBOTICS Training Center



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*»The motto of regenerative medicine is
)healing instead of just repairing«.
COREMED was established to foster
research and development in this field.«*

*Director of the Centre
Prof. Dr Lars-Peter Kamolz, MSc*



Human Technologies and Medicine

COREMED –

Cooperative Centre for Regenerative Medicine

COREMED is a joint initiative of JOANNEUM RESEARCH and the Medical University of Graz to foster research and development in the field of regenerative medicine with a focus on wound healing, scarring and on the process of skin ageing.

COREMED offers interdisciplinary overall solutions in R&D services for the pharmaceutical and medtech industry. As a reliable partner, the Centre provides established clinically relevant models to test products and to characterise their mechanisms of action. Clinical studies on the topics of wound healing and skin ageing can be planned, coordinated and carried out. COREMED also offers the classic methods of wound documentation, dermatography and methods for the characterisation of cutaneous perfusion.



COREMED-News

FOCUS AREAS:

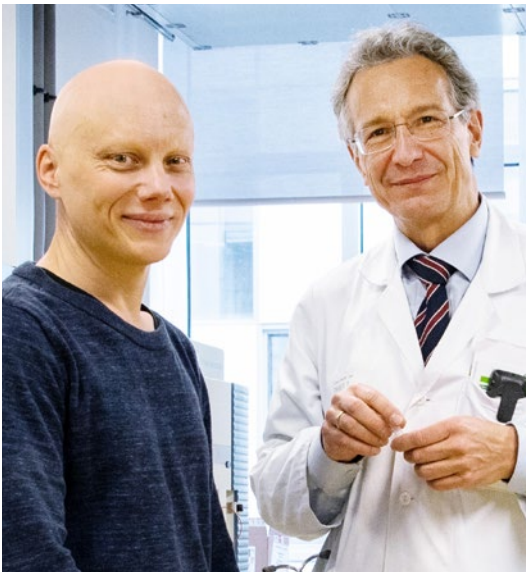
- Physiological processes of wound healing in acute wounds (e.g. burn injuries)
- Pathological mechanisms underlying the manifestation of chronic wounds or hypertrophic scars
- The skin ageing process and related alterations



CONTACT

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»Innovative ideas, products & solutions from HEALTH demonstrably contribute to an improved quality of life for people with medical needs.«

*Directors of the Institute
Prof. Dr Thomas Pieber (r.)
and Dr Frank Sinner (l.)*



Human Technologies and Medicine

HEALTH –

Institute for Biomedicine and Health Sciences

HEALTH sees itself as the link between basic medical research and industrial application, and offers interdisciplinary overall solutions as R&D services for the pharmaceutical and the medtech industry.

In close alliance with the Medical University of Graz the Institute acts as a dedicated “Boutique CRO” (Contract Research Organisation) for research projects and drug development programmes. HEALTH supports clinical and pre-clinical activities in the fields of diabetes, dermatology, metabolic research and neurology by providing customised studies, bioanalyses, data management and statistical services. Besides specialised research services HEALTH develops technologies for future medical solutions.



HEALTH-News

FOCUS AREAS:

- Clinical and Pre-Clinical Research
 - ▶ Pharmacokinetics, Pharmacodynamics and Bioequivalence
 - ▶ Bioanalytics and Pharmaceutical Analytics
 - ▶ Metabolomics
 - ▶ Data Management and Biostatistics
 - ▶ Medical Writing
- Technology Development
 - ▶ Clinical Decision Support
 - ▶ Medical Sensor Technology



CONTACT

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»LIFE answers the central questions of climate change and its impact on the economy, politics and society and thus drives innovations that are urgently needed.«

*Director of the Institute
Dr Franz Prettenthaler, M.Litt*



Society and Sustainability

LIFE –

Institute for Climate, Energy and Society

LIFE is an internationally renowned research partner and contact for complex interrelations in the areas of climate, energy and society and offers an excellent overall understanding of the system in economic, ecological, technological and social terms.

On the basis of its broad methodological competence and technical expertise in the Institute's application-relevant topics, LIFE is able to offer its customers a wide range of services in the form of

- Studies, Analyses, Reports;
- Surveys, Evaluations;
- Profitability Calculations;
- Life Cycle Analyses (LCA);
- (Eco-)balance Sheets;
- Cooperation in as well as Management and Processing of National and International Research Projects;
- Consulting and Accompanying Research.



LIFE-News

FOCUS AREAS:

- Weather and Climate Risk Management
- Future Energy Systems and Lifestyles
- International Climate Policy and Economics
- Urban Living Lab



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*»Towards evidence-based decisions
in politics and businesses – using the
expertise of POLICIES.«*

*Director of the Institute
Wolfgang Polt*



Society and Sustainability

POLICIES –

Institute for Economic and Innovation Research

POLICIES stands for successful, evidence-based political and business decisions. The Institute's empirical and methodological competences are used in projects where POLICIES provides support in the areas of economics and social sciences as well as statistics in developing innovation strategies and policies and also support for specific technologies and products. For example, POLICIES studies the innovation behaviour of businesses, assesses the effects of political measures, evaluates regional development potentials or studies gender-specific access to and impacts of scientific and technological developments.

POLICIES supports customers from the public sector and businesses in the form of consultancy, planning and evaluation of

- Technology and Innovation Strategies,
- Policies and Funding Programmes,
- Regional Site Analyses and Site Development, and
- Data-Supported Innovation Projects of Businesses.



POLICIES-News

FOCUS AREAS:

- Technology, Innovation and Political Consulting
- Data Analytics and Statistical Modelling
- Regional Economics and Structural Policies



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International Highlights

JOANNEUM RESEARCH is a research company which operates at a national and an international level. The research network of JOANNEUM RESEARCH ensures the high quality of research results and facilitates access to a broad international research spectrum for businesses and the public sector.

5 to 8 January 2020 | Daejeon, South Korea

MMM 2020

DIGITAL presented its research results in the field of multimedia analytics at the “26th International Conference on MultiMedia Modeling”.

22 to 24 January 2020 | Bern, Switzerland

CULTURA SUISE 2020

During the Swiss trade fair for museums, museum technology, monument preservation and cultural heritage DIGITAL presented imdas pro®, archivis pro® and antiqua pro®, its customised innovative database systems.



20 to 21 January 2020 | Den Haag, Netherlands

31st European Energy Law Seminar

LIFE presented examples of energy communities and the role and potential impacts of the European framework and the relevant national implementation.



27 and 28 January 2020 | Graz, Austria

HTH Pitch and Partner 2020

During the “HTH Pitch and Partner 2020”, the Health Technology Hub Styria addressed a wide range of innovative research projects and technologies from the field of life sciences. Also this time COREMED, HEALTH, DIGITAL and MATERIALS were actively represented there.

April 2020 | Online

Mission Innovation Week Austria

This annual event, organised by the Austrian Federal Ministry for Climate Action, Environment, Energy, Mobility, Innovation and Technology (BMK), which is dedicated to the development and implementation of new technologies and solutions for energy systems, was held over several weeks in the form of online sessions. JOANNEUM RESEARCH LIFE and BAUM Consult GmbH organised an online session about energy communities.

May 2020 | Online

CONTROL 2020

In 2020 the special show on “contactless measuring technology” of Fraunhofer-Allianz Vision, which has established itself as the marketplace for innovative solutions at the leading trade fair “Control International trade fair for quality assurance”, was held online. The DIGITAL Institute presented its most recent solutions in the field of production and process monitoring.





May 2020 | Online

Partner of the "agri benchmark Fish" network

Due to its activities in supporting specific funding programmes and projects under the EU Data Collection Framework (DCF) LIFE was able to gather comprehensive expertise in fishery and aquaculture. Now, LIFE is contributing its competences in the field of sustainable production in fishery and aquaculture also at an international level in the "agri benchmark Fish" network.

4 June 2020 | Online

ICRA 2020

ROBOTICS was co-organiser of the workshop, which took place during the virtual International Conference on Robotics and Automation (ICRA 2020). The workshop dealt with the most recent challenges in the area of safety and data protection in robot systems.



June 2020 | Online

DIGITAL is a partner of the Open AutoDrive Forum

Under a new partnership with the international "Open AutoDrive Forum" platform, the results of DIGITAL's research work can now be discussed regularly with important persons from the international automobile industry. In this way, valuable feedback from the industry can be immediately fed back into defining the direction of research work and ensure the exploitability of research results.



24 to 27 June 2020 | Budapest, Hungary

5G measurement campaign

The Budapest University of Technology and Economics carried out a unique 5G measurement campaign for developing intelligent infrastructure for autonomous vehicle tests, in which also Austrian partners such as JOANNEUM RESEARCH DIGITAL and Virtual Vehicle Research GmbH were involved.

30 July 2020 | Cape Canaveral, USA

Mars Rover with DIGITAL Technology

The NASA "Perseverance" Mars rover goes into space. "Mastcam-Z", a stereoscopic camera system with a zoom lens which was developed with DIGITAL's help, is on board the rover.



Photo: Nasa

23 to 28 August 2020 | Online

ECCV 2020

Experts of DIGITAL's "Smart Media Solutions" group presented technologies for automated analysis, interpretation and use of the innovative 360° media format at the renowned European Conference on Computer Vision (ECCV).

4 September 2020 | Online

ScanBalt Digital Forum

The Forum provides a framework to discuss digital solutions for a common European health data room. HEALTH presented "BARS – a digital warehouse for COVID-19 stratification" as an example of best practice for digital solutions in European health research.

3 September 2020 | Brno, Czech Republic

urbis smart city fair

The workshop was organised by the SPARCS and POCITYF Horizon 2020 projects as part of the general assembly of the European Innovation Partnership on Smart Cities and Communities. LIFE was represented by a case study for Vienna, which presented the economic effects of a so-called "local electricity grid tariff", in particular the impact on vulnerable households.

8 October 2020 | Graz, Austria

Cooperation with Friuli Venezia Giulia, Italy

JOANNEUM RESEARCH signed a strategic cooperation agreement for a term of three years with Friuli Innovazione, Science and Technology Park (BSO – Business Support Organisation), located in Udine. The focus of the new R&D cooperation is on additive manufacturing, digitalisation – especially in health care (active and assisted living and digital care), autonomous driving, smart buildings and environment monitoring in mountainous regions.



8 October 2020 | Klagenfurt

ICC Bolzano Delegation visiting ROBOTICS

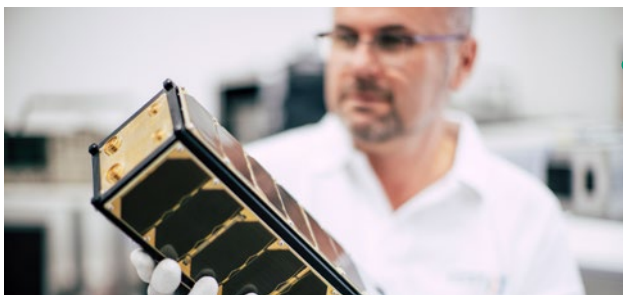
A delegation from South Tyrol's business sector, headed by Philipp Moser, the President of the Bolzano Chamber of Commerce, visited the ROBOTICS Institute.



20 to 22 October 2020 | Online

30th Alzheimer Europe Conference

Dr Lucas Paletta from DIGITAL presented a modern approach for activating cognitive functions and preventing dementia with the help of serious games and trainings.



21 to 22 October 2020 | Online

10th Advanced Satellite Multimedia Systems Conference (ASMS)

Together with the DLR Institute for Communication and Navigation and the Technical University of Graz, JOANNEUM RESEARCH DIGITAL organised a two-day conference with scientific support from the European Space Agency (ESA) and the University of Bologna.

November 2020 | Online

Strategic Partnership

DIGITAL entered into an exclusive distribution agreement with BEIJING KEYTEC TECHNOLOGY CO., LTD. The objective of the cooperation is to launch the 1D video disdrometer onto the Chinese market and to provide new options for accurate precipitation measuring, which constitute the basis for a wide range of applications in communications engineering, remote sensing or meteorology.



November 2020 | Brussels, Belgium

Photonics Digital Innovation Hub

MATERIALS is a partner of the new European Centre for Digital Photonics Innovations and the Photonics Digital Innovation Hub, worth 19 million euros. The Photonics Innovation Centre is supposed to accelerate the adoption and use of photonics technologies by the European industry and to unite all first-class photonics technologies, infrastructure, technical expertise and experiences of 53 top competence centers all over Europe under one roof.

25 November 2020 | Online

Mission-oriented Policies

The Norwegian Research Council organised a high-level conference with more than 1,000 participants. Wolfgang Polt, Director of POLICIES, held a lecture on the current research status and a political discussion on missions (contributions to social challenges).



10 to 11 December 2020 | Online

EIT Manufacturing Summit

EIT Manufacturing successfully concluded the first year of its existence by a summit. JOANNEUM RESEARCH has been part of it right from the start and is thereby sustainably expanding its European network in the focus area of information and production technologies with the objective of generating international research projects.



Highlights at the Locations

JOANNEUM RESEARCH plays a special role in Austria's innovation system, and not only because of its ownership structure. For decades JOANNEUM RESEARCH has been making a vital contribution to developing and securing the competitiveness of the research, innovation and business location.

January 2020 | Graz

Foundation of the "Data Management and Biostatistics" Competence Group

The competence group specialises in management and analysis of data from clinical studies. In this way, HEALTH is further expanding its research services portfolio as a Contract Research Organisation (CRO).

January 2020 | Klagenfurt

First Accredited Testing Laboratory for Robot Safety in Europe

At the end of December 2019 the ROBOTICS testing laboratory was accredited for the identification of biomechanical loads and the related conformity assessment, which are carried out in accordance with the ISO/TS 15066:2016 standard.



22 January 2020 | Vienna

Time Machine Austria Info Day

At Vienna Technical University DIGITAL presented innovative ways of developing, preserving, documenting and digitising cultural heritage.



Photo: © Time Machine Organisation

6 February 2020 | Graz

Best Employer 2019

Based on a survey of market institute, JOANNEUM RESEARCH ranked first in terms of modern and flexible work models. In Styria, JOANNEUM RESEARCH is among the top 10 employers.



12 February 2020 | Graz

Project Exhibition Opening

The project exhibition of Prof. Richard Kriesche in Graz, to which DIGITAL contributed, showed how well technology gets along with art and culture.

12 to 14 February 2020 | Graz

Paths Towards Climate Neutrality

During the 16th Energy Innovation Symposium under the motto "ENERGY FOR FUTURE – ways to reach climate neutrality" staff from LIFE talked about climate-friendly lifestyles, life cycle analyses (LCA) and potential energy community models.

24 February 2020 | Vienna

GRANteD Stakeholder Conference

At the kick-off of the "GRANteD" Horizon 2020 project, coordinated by POLICIES, more than 50 participants from the Czech Republic, the Netherlands, Switzerland, Germany, Sweden and Austria discussed the prerequisites for a fair distribution of research grants and how to ensure the same.

11 March 2020 | Graz

Zukunftskonferenz

Because of the Covid-19 pandemic, the 10th Zukunftskonferenz had to be cancelled at short notice.



26 May 2020 | Online

74. Digitaldialog: IT & Global Footprint

Dr Franz Prettenthaler, M.Litt and Dr Michael Brenner-Fließner from LIFE spoke in their lecture about the question of how digital behaviour affects our consumption-based carbon footprint.



23 June 2020 | Online

Evening with Women in Engineering 2020

On International Women in Engineering Day the Evening with Women in Engineering 2020 was held as an online event. JOANNEUM RESEARCH supported the event as a partner business.



25 June 2020 | Graz

Climate Risk Management Master Plan

Climate disasters jeopardise food supply: at a press conference Hans Seitinger (Member of the Styrian Government for Agriculture), Ursula Lackner (Member of the Styrian Government for Climate Protection and Environment) and Dr Franz Prettenthaler, M.Litt, Director of the LIFE Institute, presented results of the Climate Risk Management Master Plan for Agriculture. It had been prepared in the past three years and is part of the climate change adaptation strategy of the State of Styria.

June 2020 | Online

Best-Performance-Award 2020

The science award of JOANNEUM RESEARCH is awarded once a year during the Future Conference. The Best Performance Award is given to three of many top-class projects from the three categories of "largest overall project volume", "highest output" and "publications". In 2020, voting took place virtually for the first time due to the Covid-19 developments. Almost 5,000 votes were cast.



6 to 10 July 2020 | Salzburg

AGEO AWARD 2020

The master's thesis of Dr Roland Perko (DIGITAL) was honoured with first place in the AGEO AWARD 2020 call.



Credit: Lakeside Park/fritzpress

29 July 2020 | Klagenfurt

Federal Minister Gewessler awarded the "FFG Spirit"

During her visit to the Lakeside Science & Technology Park in Klagenfurt, the Federal Minister presented JOANNEUM RESEARCH with the FFG Spirit 2020 award as a symbol of special commitment to research.



25 to 28 August 2020 | Online

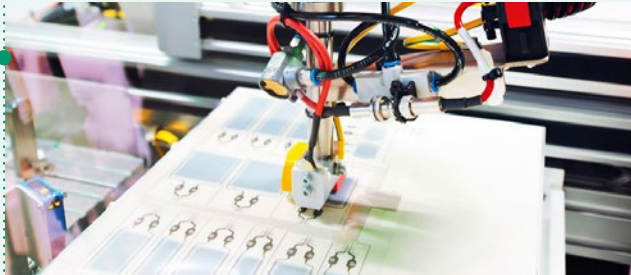
European Forum Alpbach

COREMED invited participants to a panel debate on the topic of "tomorrow's health care system". LIFE organised a session on the topic of "Europe as a production location in times of climate change".

September 2020 | Weiz

New Infrastructure Developed

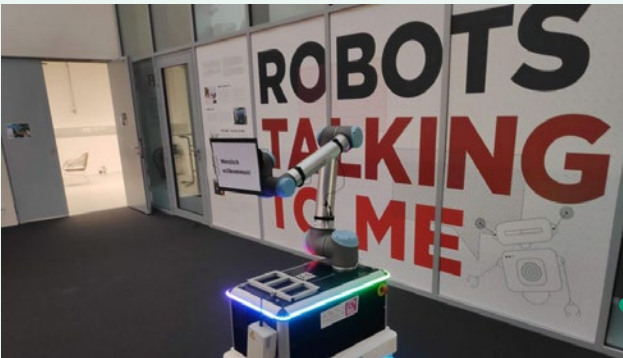
In September 2020 the new drying and poling machine for PyzoFlex® sensors of MATERIALS in Weiz, which is unique in the world, was put into operation. The drying and poling machine for piezoelectric and pyroelectric sensors printed on foils on a large area contributes to the testing and improvement of the quality of these sensors.



1 to 3 September 2020 | Online

UN/Austria Symposium

Once a year, the Office for Outer Space Affairs of the United Nations (UNOOSA) organises the UN/Austria Symposium in collaboration with JOANNEUM and Graz University of Technology; this was held as an online event in 2020. The symposium was dedicated to "Space Applications for Sustainable Development Goal 13: Climate Action". In sessions, panels and project pitches, the participants discussed the ways in which space technologies support climate protection.



9 to 13 September 2020 | Linz

Ars Electronica Festival 2020

In the course of a cooperation with Johannes Kepler University in Linz within the CoBot Studio project, ROBOTICS presented the mobile sensitive CHIMERA manipulator in the "Robots Talking To Me" exhibition area.

22 September 2020 | Graz and online

76th Digitaldialog: Spotlights on Cyber Security

In connection with the topic of "Design and Runtime Security for the Internet of Things" Dr Katharina Hofer-Schmitz from DIGITAL presented the interim results of the SecFIT project funded by BMK, which deals with innovative methods for increasing the security of flexible, modern communication networks that allow the linking of smart technologies to the internet of things.

21 September 2020 | Vienna

10th KIRAS Conference of Experts

At the meeting of security experts from the science and the business community, DIGITAL had the opportunity to present "WatchDog – A mobile communication and multi-sensor solution for security and risk management for outdoor areas and property protection" and "Be Aware" (a threat analysis based on GNSS vulnerabilities in Austria).



29 September 2020 | Klagenfurt

Publication of Commuter Study

POLICIES carried out a study on the commuting behaviour of employees in Carinthia on behalf of the Carinthian Chamber of Labour. The costs, duration and routes of public transport versus private car were compared. The results were presented together with Governor Peter Kaiser and Günther Goach, President of the Chamber of Labour.

1 October 2020 | Graz

Energy Globe STYRIA AWARD 2020

LIFE won the First Prize in the Research category for its project of Smart City Rooftop Farming: Urban Gardening on the rooftop of the Science Tower in Graz.



9 October to 30 December 2020 | Online

Lange Nacht der Forschung 2020

Ninety stations were transmitted online from three (real) Styrian regions (Graz, Kapfenberg and Leoben), 600 virtual stations all over Austria were online. JOANNEUM RESEARCH organised the event for Styria.



10 and 11 October 2020 | Graz

Markt der Zukunft

At the round table of the Market of the Future innovation festival organised by the Austrian radio station Ö1 on the topic of "How do research and innovation influence our lives tomorrow" JOANNEUM RESEARCH was represented by Prof. Dr Lars-Peter Kamolz, Director of the COREMED Institute, and Erwin Kubista.



13 and 14 October 2020 | Online

Future of Manufacturing

Future of Manufacturing combined two events, the Industrial Robotics Conference and the MMP (Man Machine Production) Symposium. DIGITAL and ROBOTICS were represented in the virtual exhibition hall AI & Digitalisation with the focus area SMART production.



15 October 2020 | Graz

Forum JOANNEUM RESEARCH

In connection with the “Forum JOANNEUM RESEARCH” series an online debate, organised by POLICIES, took place on the topic of “scientific integrity between the priorities of customers and funding parties, statutory regulations, expectations and conspiracy theories”.



23 October 2020 | Online

Opening of the Human Factors Laboratory

The official opening of the newly designed Human Factors Laboratory at DIGITAL (which was held as a virtual event) took place under the motto “man in the mirror of ergonomics and innovative digital sensor systems”.



27 October 2020 | Graz and online

77th Digitaldialog: COREMED – the Future of Medicine

During the event that was organised by COREMED concerning the “future of medicine” recent developments and technologies which will characterise medicine and the health care system in the 21st century were presented and discussed. In this context the aspects of astronautics, sports, ageing and digitalisation were looked at.



30 October 2020 | Graz

Cooperation with Inocon Technologie GmbH

MATERIALS entered into a strategic cooperation with Inocon Technologie GmbH, Upper Austria, and expanded its Microassembly Lab for photonic and electronic modules by new infrastructure, including from Inocon.



November 2020 | Graz

Winner of the Security Challenge

Thanks to an innovative software solution for automated documentation of visitors, DIGITAL won the security challenge organised by the Graz City Hall.



4 November 2020 | Online

4th IoT Conference of Experts

DIGITAL presented examples of applications in industrial environments and gave an overview of time-aware analytics in maintenance.

9 to 20 November 2020 | Online

Take Tech

In the course of the Take Tech vocational experience initiative, interested school groups were given an insight into daily research work by means of 360° virtual reality tours through the different laboratories of JOANNEUM RESEARCH.



360° Video clips of JOANNEUM RESEARCH laboratories



10 November 2020 | Online

Maintenance Conference

During this programme Dr Mathias Brandstötter from ROBOTICS and Titanilla Komenda, MSc, from Fraunhofer Austria held a lecture on maintenance of and by robot systems.

17 November 2020 | Online

"Second Krems Dementia Conference"

During the conference, DIGITAL and other partners organised the "International Symposium on Artificial Intelligence for Prevention & Intervention in Dementia Care" (AIDEM 2020).



9 December 2020 | Online

Mars Rover and Austria

The one-day symposium was organised in cooperation with the Commission for Astronomy of the Austrian Academy of Sciences (OeAW) and presented the research results of the Mars-DL project of JOANNEUM RESEARCH, VRVis, the Vienna Natural History Museum, SLR Engineering and the University of Vienna.

JOANNEUM RESEARCH Media Coverage

»Research has to serve mankind and not be an end in itself.« Our successes in research are also impressively reflected in the media: approximately 700 articles made our innovative range of services known to a broad public.

DREI FRAGEN AN ...



Markus Rumppler forscht bei Joanneum Research

1 Worum geht es in Ihrem Forschungsbereich?

MARKUS RUMPLER: Ich arbeite an der Entwicklung neuartiger medizinischer Sensoren, die die Diagnose und Therapie von verschiedenen Krankheiten beschleunigen oder vereinfachen. Ein klassisches Beispiel für die Anwendung medizinischer Sensoren ist die Messung des Blutzuckers bei Diabetes.

2 In welchem größeren Zusammenhang steht diese Forschung?

Patienten können unsere Sensoren selbstständig anwenden und die entsprechenden Werte messen. Dadurch müssen sie weniger oft zum Arzt, und Probleme können früher erkannt werden. Das steigert die Lebensqualität und entlastet gleichzeitig das Gesundheitssystem.

3 Wie sind Sie zu Ihrem Fach gekommen?

Am Ende meiner Schulzeit an einer HTL habe ich durch meine Tätigkeit beim Roten Kreuz mein Interesse an der Medizin entdeckt. Beim Studium der Biomedizintechnik an der Technischen Universität Graz konnte ich dann meine Interessen hinsichtlich Technik und Medizin verknüpfen. Die technische Lösung komplexer medizinischer Probleme, von der Idee bis zum Prototypen, konnte ich dann bei der Entwicklung von neuartigen Zuckermesssensoren in meiner Dissertation umsetzen.

Wasserstoffeinsatz als Schlüsseltechnologie für „grünen“ Stahl

Stahlerzeugung. Für zehn Prozent der globalen Treibhausgasemissionen ist die Stahlindustrie verantwortlich – höchste Zeit zu handeln. In Alpbach wurde diskutiert, wie Klimaneutralität in dem Sektor erreicht werden kann, ohne dass der Produktionsstandort Europa an Attraktivität einbüßt.

VON CORNELIA GROBNER

Europa soll der erste klimaneutrale Kontinent werden und bis 2050 keine Netto-Treibhausgasemissionen mehr freisetzen. Den Fahrplan für eine nachhaltige EU-Wirtschaft, bei der das Wachstum von Ressourcennutzung abgekoppelt ist, gibt der „Green Deal“ der Kommission vor. Insgesamt sollen eine Milliarde Euro in vielversprechende Projekte rund um CO₂-arme Lösungen für energieintensive Industriezweige investiert werden.

Kohlenstoffarme Stahlerzeugung

Die Stahlproduktion ist prozessbedingt mit einem sehr hohen Energieaufwand verbunden, der Industriezweig derzeit für zehn Prozent aller CO₂-Emissionen verantwortlich. Pro Tonne Stahl fallen im EU-Durchschnitt in der Stahlproduktion rund 1,7 Tonnen Kohlenstoff an. Theoretische Möglichkeiten, diese Ausstoße zu reduzieren, gibt es viele: Sie können etwa durch Recycling von Abfällen und Nebenprodukten verringert werden. Die Abgase aus dem Hochofen lassen sich auffangen und biologisch in recyceltem Kohlenstoff, also in Biokraftstoff, umwandeln. Außerdem gibt es die Vision, mit Biokohle aus Holzabfällen die im Hoch-

ofen genutzte Kohle zu ersetzen. Neben den Bemühungen, Kohlenstoffkreisläufe möglichst rasch zu schließen, wird als langfristige Zukunftsperspektive an der wasserstoffbasierten Stahlerzeugung geforscht. Das Potenzial zur CO₂-Reduktion liegt dabei – sofern der Wasserstoff aus CO₂-freier Erzeugung stammt – bei über 80 Prozent. „Da kommen wir schon sehr nahe an Klimaneutralität“, sagt der Wirtschafts- und Sozialwissenschaftler Franz Prettenhaller. Eine klimaneutrale Produktion könne man sich derzeit im Stahlsektor aber abseits dieser vielversprechenden Pilotprojekte noch nicht wirklich

gut vorstellen. „Wie kriegt man das technologisch hin, wie ökonomisch und wie hält man Europa als Produktionsstandort mit den umweltpolitischen Rahmenbedingungen aufrecht? Das sind große Herausforderungen.“ Prettenhaller ist Direktor des Instituts Life für Klima, Energie und Gesellschaft der Joanneum Research Forschungsgesellschaft in Graz, wo an Projekten zur Dekarbonisierung mit Stahlerzeugern unterschiedlicher Größe von der Marktmitteln über die Voestalpine bis hin zum weltweit größten Stahlproduzenten ArcelorMittal geforscht wird. Beim Forum Alpbach leitete er am Freitag eine

Diskussion über die Chancen des „Green Deal“ für die Stahlindustrie und über die Wege zur Sicherung des Produktionsstandorts Europa mit u. a. Daniela Jacob (Klimawissenschaftlerin, Climate Service Center Germany), Kerstin Jorna (Generaldirektorin für Binnenmarkt und Industrie der EU-Kommission) und Wim Van der Stricht (CTO Technology Strategy, ArcelorMittal).

„Während das Thema Wasserstoff im Mobilsektor überschätzt wird, wo das batterieelektrische Auto auf lange Sicht unschlagbar sein wird, ist es im industriellen Maßstab und bei großen Motoren ein sehr wichtiges Thema“, ist Prettenhaller überzeugt. „Wenn Europa hier die Umweltstandards schneller setzen kann als der Rest der Welt, dann wird diese Technologie auch zu einem entsprechenden Exportgut“, verweist er auf den „First Mover Advantage“.

„Stahl hat einen ordentlichen Emissionsrucksack, ja, aber Stahl ist auch ein Stoff, der sehr gut im Kreislauf geführt werden kann. Und wenn man diese CO₂-Emissionen in der Erzeugung in den Griff bekommt, so hat man einen guten Rohstoff für eine Kreislaufwirtschaft.“ Hinzu komme, dass Stahl im Prinzip unendlich zirkulieren könne und sich nicht „downcycle“, also die Qualität nicht minder werde.



Pro Tonne Stahl fallen in der Stahlproduktion im EU-Durchschnitt insgesamt rund 1,7 Tonnen CO₂ an. (Photo)

Kollaborativer Roboter im Labortest im Robotics Institut von Joanneum Research



Zehn Millionen Euro sind derzeit im Babeg-Venture-Fonds geplant. Von einem 250 bis 300 Millionen Euro schweren Beteiligungsfonds hat Wirtschaftskammerpräsident Jürgen Mandl gesprochen. Vorschnell, wie Schaunig meint, da Verhandlungen mit Bund und Europäischer Investitionsbank zu führen seien. Derzeit fallen bei COVAG-Mitteln des Bundes die als „Unternehmen in Schwierigkeiten“ klassifizierten Betriebe bei Garantien für Liquidität durch. Die will Schaunig „mit Beteiligungen stabilisieren. Diese schichten die Unternehmen nicht mit Rückzahlung, sondern mit Investitionen ab, das wirkt dann doppelt.“

Mensch, Roboter im Crashtest

Covid-19 forciert Automatisierung. Joanneum Research hat in Klagenfurt Europas erstes akkreditiertes Testlabor für Sicherheit der Roboter bei Mensch-Maschine-Kollaboration.

Von Adolf Winkler

Wir sehen unter dem Eindruck der Coronakrise zwei Trends: einerseits, wie in Unternehmen auf den wirtschaftlichen Druck mit Stabilisierung reagiert wird. Andererseits, wie Unternehmen gerade jetzt auf Automatisierung setzen und damit auch auf Robotics“, erklärt Michael Hofbauer, Leiter des Instituts für Robotics und Mechatronik des Joanneum Research im Lake-side Park in Klagenfurt. „Für den Wirtschaftsstandort Kärnten ist es wesentlich, dass man die Zeit nutzt und nicht in Kurzarbeit, sondern in Innovation geht.“

Für die zunehmende Automatisierung in der Industrie ist das Robotics Institut nun auch als speziell zertifizierte Prüfstelle gerüstet. „Als erste und einzige Prüfstelle in Europa konnte das Robotics Institut die Akkreditierung zur validen Messung der potenziellen Kräfteinwirkung in der Mensch-Roboter-Kollaboration erlangen“, meldet Joanneum Research. „Jeder Roboter ist eine Maschine und unterliegt der europäischen Ma-

schinenrichtlinie. Wir wollen aber, dass dabei die Sicherheit des Menschen rückführbar belegbar ist. Deshalb wollten wir nachvollziehbare Qualitätsstandards in den Messungen dafür einziehen“, berichtet Hofbauer über das erlangte Gütesiegel der Agentur für Qualitätssicherung und Akkreditierung Austria beim Digitalisierungsministerium.

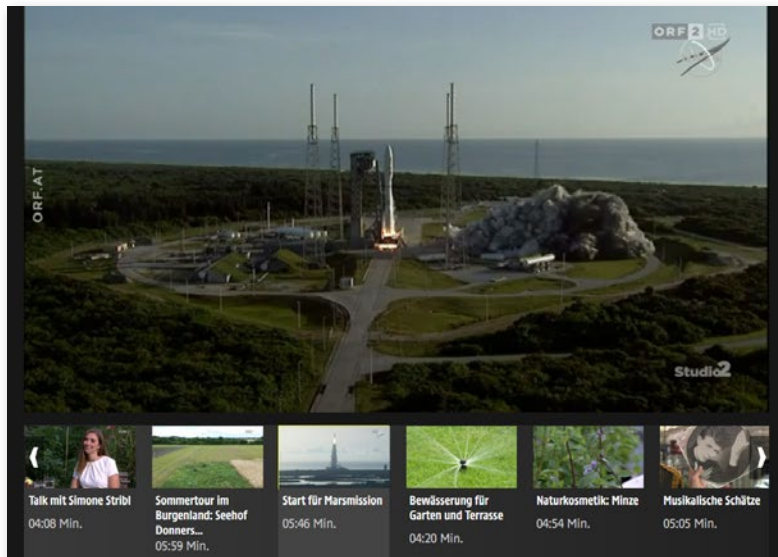
Roboter kommen nicht nur in eigenen Produktionsbereichen zum Einsatz, sondern operieren als „digitale Power tools“ mit und neben Fertigungspersonal in einer gemeinsamen Arbeitsumgebung. In ungeplanten Situationen kann auch der Zusammenstoß von Mensch und Roboter passieren. Darauf müssen Roboter mit Sicherheitseinrichtungen und Sensitivität reagieren und Grenzwerte erfüllen. Die Risikobewertungen erfordern genaue Messungen. „Die tatsächliche Abschätzung der Gefährdungssituation erfordert quasi Crashtests mit Roboter“, so Prüfstellenleiter Michael Rathmair. „Unsere Prüftechniker und Prüftechnikerinnen



Michael Hofbauer HELGE BAUER

übernehmen dabei europaweit eine Vorreiterrolle mit ihren Kenntnissen in der Durchführung dieser Sicherheitsbewertungen.“

„Die Akkreditierung bescheinigt uns sehr hohen Qualitätsstandard“, so Institutsleiter Hofbauer. Hinzu käme Know-how aus der internationalen Mitarbeit an Normen. „Damit können wir ‚Safety-as-a-Service‘ für unsere Kunden aus Wirtschaft und Industrie im Paket anbieten.“ Zu den Überprüfungen im Robotics Evaluation Lab werden auch Realisierung von Roboterlösungen, Know-how-Transfer, Machbarkeitsstudien und Schulungen angeboten.



Talk mit Simone Stribl 04:08 Min.
Sommertour im Burgenland: Seehof Donners... 05:59 Min.
Start für Marsmission 05:46 Min.
Bewässerung für Garten und Terrasse 04:20 Min.
Naturkosmetik: Minze 04:54 Min.
Musikalische Schätze 05:05 Min.

Eine Brille für Glücksmomente



Einen Ausflug ins Grüne machen oder einmal ins Stadion gehen: Forscher wollen pflegebedürftigen Menschen personalisierbare Erlebnisräume zugänglich machen.

Wenn das Leben nur noch auf wenigen Quadratmetern stattfindet, versiegt häufig die Lebensenergie. Eine Virtual-Reality-Lösung will Senioren in der Langzeitpflege dabei helfen, ihre Sehnsuchtsorte zu besuchen.

Doris Griesser

Viele Menschen haben in den vergangenen Wochen erstmals einen Eindruck davon bekommen, wie es sich anfühlt, sein Leben auf Dauer ausschließlich in den eigenen vier Wänden zu verbringen. Eine Erfahrung, die den Wert weitgehend unbegrenzter Bewegungsfreiheit ins Bewusstsein holt und die Vorfreude auf künftige Reisen schürt. Für einen gar nicht so kleinen Teil der Bevölkerung kann die Aufhebung der Ausgangsbeschränkungen allerdings nicht viel an ihrer eingeschränkten Situation ändern. Etwas für alle und/oder an Demenz erkrankte Personen in Pflegeeinrichtungen, die während der Covid-19-Pandemie auch noch auf ihre Kontakte zur Außenwelt verzichten mussten. In dieser klein und einsam gewordenen Welt können Virtual-Reality-VR-Technologien neue Fenster zur Welt öffnen.

Im Projekt VR4Care beispielsweise arbeiten Forscher daran, für diese spezielle Zielgruppe personalisierbare virtuelle Erlebnisräume zu entwickeln. „Ein Problem bei Menschen in Pflegeheimen, vor allem bei Demenztroffenen, ist eine durch den Mangel an Anregungen im Alltag zunehmende Apathie“, umriss Projektleiter Lucas Paletta von Joanneum Research die Ausgangslage. „Wir untersuchen in diesem von der Forschungsförderungsgesellschaft FFG unterstützten Projekt erstmals auf wissenschaftlicher Basis zentrale VR-Designparameter für Interaktionen in virtuellen Erlebniswelten, die bei dieser Zielgruppe stimmungsaufhellend, aktivierend und stressreduzierend wirken könnten.“

Virtueller Waldspaziergang

Um mithilfe individuell angepasster Imaginationen die Befindlichkeit positiv zu beeinflussen, mussten in einem ersten Schritt grundlegende Informationen über Interessen und Vorlieben der künftigen VR-Anwender gesammelt werden. Zu diesem Zweck wurden unter Leitung der Pflegewissenschaftlerin Sandra Schüssler von der Medizinischen Universität Graz Bewohner einer

steirischen Pflegeeinrichtung, deren Angehörige sowie das Pflegepersonal befragt. Dabei stellte sich heraus, dass vor allem Spaziergänge in der näheren Umgebung, im Wald, im eigenen Garten oder im einst bewohnten Haus sehr positiv besetzt sind und angenehme Erinnerungen wachrufen.

Gendersensible Erhebung

Abgesehen von der Freude an der (umgebenden) Natur und an vertrauten, aber nicht mehr erreichbaren Orten, zeigten sich im Zuge der gendersensiblen Erhebung bei dieser Altersgruppe wenig überraschende Geschlechterunterschiede. So bevorzugten die Männer im Schnitt ganz klassisch etwa technische Themen oder Fußball, während sich die Frauen tendenziell eher über Mode, Inneneinrichtung und Ähnliches aktivieren lassen. Aufgrund der Kontaktbeschränkungen während der Pandemie musste die zunächst persönlich vor Ort durchgeführte Anforderungserhebung telefonisch erfolgen. „Das hat aber gut funktioniert“, sagt Lucas Paletta. „Nur bei der Prototypentwicklung sind dann Feldtests unverzichtbar.“

Die direkten Auskünfte der Probanden werden durch Analysen des Blickverhaltens beim Betrachten unterschiedlicher Videos, Stressmessungen mittels Biosensoren und andere Human-Factors-Messtechnologien ergänzt. „Auf diese Weise können wir herausfinden, was die Menschen wirklich berührt“, sagt der Experte für Digital Care und Active-and-Assisted-Living (AAL-) Technologien. „Schließlich soll eine an die Bedürfnisse der Nutzer und Nutzerinnen angepasste VR-Technologie entwickelt werden, mit der sich die psychische Situation von Menschen in Pflegeheimen verbessern lässt – indem sie Einsamkeitsgefühle reduziert und durch das Erleben von Selbstwirksamkeit in der virtuellen Welt eine allgemeine Aktivierung fördert.“

Wie aber kann man sich durch das Eintauchen in virtuelle Welten, auch wenn sie noch so schöne Erinnerungen und positive

Gefühle wecken, weniger einsam fühlen? Sitzen die alten Menschen auch mit einer VR-Brille auf der Nase nicht trotzdem allein in ihren Zimmern und sehnen sich nach einem realen Gesprächspartner? „Um das zu vermeiden, arbeiten wir an einem VR-Prototyp, bei dem eine Begleitperson mit externem Control-Panel die virtuelle Umgebung steuert und die Inhalte mit dem Nutzer gemeinsam erleben kann“, beschwichtigt Paletta.

Grundsätzlich sollte man die Menschen am besten in vertrauter Gesellschaft auf die virtuelle Reise schicken. Über Skype können die Anwesenden sogar mit fernen Verwandten einen gemeinsamen Spaziergang erleben und währenddessen miteinander plaudern. Und was unterscheidet die neue Virtual-Reality-Lösung, die in Kooperation mit der Linzer Firma Netural entstehen soll, von den üblichen Haus-, Garten- und Urlaubsvideos? „Mit dieser Anwendung kann man in virtuelle Erlebnisräume eintauchen, die sich aus statischen Panoramabildern, dynamischen 360-Grad-Videos und moderat interaktiven 3D-Welten zusammensetzen“, erläutert der Fachmann für Human-Factors-Technologien.

Raus aus der Apathie

Damit wird das Erleben der virtuellen Ausflüge intensiver und fördert die Aufmerksamkeit und Aktivität der Nutzer stärker, da der Programmablauf durch ihre Eingriffe bis zu einem gewissen Grad gelenkt werden kann. „Letztlich geht es uns darum, mit dieser Technologie das Leben pflegebedürftiger Menschen zu verbessern. Ihnen trotz aller Einschränkungen schöne Erlebnisse zu ermöglichen und so einem Absinken in Apathie und Depression vorzubeugen.“ Die Kosten dafür seien überschaubar. „Im Grunde braucht man nicht mehr als eine gängige VR-Brille und ein durchschnittliches Smartphone.“ Und am besten auch noch einen Menschen, der sich gemeinsam mit dem VR-Brillen-Träger auf die sentimentale Reise macht.

DERSTANDARD

Startseite » Gesundheit » Krankheit » Dermatologie

SELBSTERNEUERUNG

Mediziner Kamolz: "Der Körper soll sich selbst heilen können"

Lars Kamolz erforscht, wie Verbrennungen besser heilen. Sollte ihm das gelingen, könnte er vielleicht auch den Alterungsprozess aufhalten

INTERVIEW Karin Pollack 6. Jänner 2020, 12:00 30 Postings



Foto: Coremed

Die 100. im Team

Institut Materials feiert zehn Jahre und 100 Mitarbeiter.

Kurz vor dem zehnjährigen Jubiläum des Instituts „Materials“ der Joanneum Research wurde im Institut mit Anne Linhardt die 100. Mitarbeiterin begrüßt. „Ein wichtiger Meilenstein für das Institut“, sagt Direktor Paul Hartmann.

Das Institut „Materials“ hat seit seinem Bestehen alle anfänglichen Erwartungen übertroffen und konnte über das vergangene Jahrzehnt seine Betriebsleistung im Schnitt pro Jahr um sechs Prozent steigern. 2016 kam es in Weiz zur Übernahme von

Projekten und zur Eingliederung der Mitarbeiterinnen und Mitarbeitern des NanoTecCenters Weiz. Das Institut zählt mittlerweile weltweit zu den führenden Kompetenzträgern in den Bereichen großflächiger Mikro- und Nanostrukturen, Bio-/Chemosensoren, Lichttechnologien sowie funktionalisierten



Hartmann, Linhardt JOANNEUM R

Oberflächen oder Laserprozessen. Die 100 Mitarbeiterinnen und Mitarbeitern an den Standorten Weiz, Niklasdorf und Pinkafeld betreiben Spitzenforschung auf höchstem Niveau.

MODERNER, FLEXIBLER ARBEITGEBER

Das Market Institut führt regelmäßig Untersuchungen zur Attraktivität von Arbeitgebern durch. In einer aktuellen Studie wurde im Bundesland Steiermark eine Vielzahl von inhaltlichen Kriterien aus der Sicht der für den Arbeitsmarkt relevanten Bevölkerung bewertet. In puncto moderne und flexible Arbeitsmodelle erhielt Joanneum Research (JR) den ersten Platz. In der Gesamtwertung befindet sich JR in der Steiermark unter den Top 10 der besten Arbeitgeber.



JR-Geschäftsführer Wolfgang Pribyl (l.) mit JR-Kommunikationsleiterin Gabriele Katz und Market Institut-Geschäftsführer Werner Beutelmeyer bei der Preisverleihung.

4 HINTERGRUND

MONTAG, 17. FEBRUAR 2020 **Salzburger Nachrichten**



E-Auto – und alles wird gut?

Strom statt Diesel: An dieser Umrüstung geht, so scheint es, kein Weg vorbei. Es stellen sich aber einige Fragen.

**KLAR
TEXT**

Andreas Koller



Elektronmobilität ist also das Gebot der Stunde, weniglich der Verzicht auf fossile Treibstoffe das Leben mütterlich ein wenig mähmäh macht. Das musste auch der grüne Sportminister Werner Kogler erfahren, als er zum Nachsitzen nach Schladming anreiste: Weil die in seinem Ministerium zur Verfügung stehenden E-Autos es ohne Tankstopp nicht bis ins steinerne Ennstal geschafft hätten, musste der Vizeminister ein elektrisches Fahrzeug anmieten. Und weil es seinem Chauffeur nicht erlaubt war, ein Leihauto zu lenken, mussten Kogler und sein Kabintenschef selbst ans umweltfreundliche Lenkrad. Man sieht: Die E-Mobilität ist noch nicht wirklich in der hiesigen Realität und schon gar nicht in der hiesigen Bürokratie angekommen.

Doch auch ganz grundsätzlich stellt sich die Frage, ob der Umstieg von Benzin beziehungsweise Diesel auf Strom tatsächlich eine so tolle Lösung ist, wie uns Wirtschaft und Politik verkaufen. Klar, die Politik profitiert, wenn sie in ein paar Jahren nachweisen kann, im Sektor Verkehr den Ausstoß an umweltschädlichen Dämpfen deutlich reduziert zu haben. Die Autoindustrie profitiert, wenn sie neue teure Modelle mit E-Motoren ausstatter, ansonsten aber an ihrem Geschäftsmodell nichts ändern muss. Und die E-Wirtschaft profitiert, wenn sie zusätzlich Strom für unsere individuelle Mobilität zur Verfügung stellen muss.

Ob und wie weit die Umwelt profitiert, ist hingegen gar nicht so leicht zu beantworten. Das am Joanneum Research laufende Projekt „Life Cycle Analysis“ zählt eine verblende Anzahl an Parametern auf, die in der ökologischen Gesamtbilanz zu berücksichtigen sind. Welchen Fußabdruck hinterlässt die Produktion von synthetischen und von Biotreib-

stoffen? Welche „kritischen Rohstoffe“ werden in der Batterie verarbeitet? Welche Umweltauswirkungen sind nicht nur beim Betrieb, sondern auch bei Herstellung und Entsorgung eines Pkw zu erwarten? Die Antworten fallen, je nach Situation, unterschiedlich aus.

Und nicht zuletzt ist es von Bedeutung, ob für die zusätzliche Stromproduktion schmerzhafter werden muss. Oder ob wir, ganz nachhaltig, die heimischen Flüsse und Windräder zwecks Stromgewinns anzapfen können. Woher die nächste Frage lautet, wo wir derzeit alle die Windräder unterbringen werden, mit denen wir unsere umweltfreundlichen E-Autos

Das Auto, ein Wohlstandsmehrer

betanken werden. Und wo die dazugehörigen Stromleitungen aufgestellt werden sollen. Das heißt Fragen nicht rasch zu politischen Verwerfungen führen können, kann im Bundesland Salzburg jederzeit beachtet werden.

Überrascht liegt der Verdacht nahe, dass der von der Politik massiv unterstützte Umstieg auf E-Mobilität ein weiterer Versuch unserer industrialisierten Wohlstandsgesellschaft ist, unser Umweltbewusstsein zu beruhigen, ohne unseren Lebensstil ändern zu müssen. Daher also jetzt ein E-Auto, noch dazu steuerlich begünstigt, in jede Garage – einerlei, woher der Strom kommt. Und einerlei, unter welchen arbeitsrechtlichen und ökologischen Bedingungen hinten, weit, in Afrika oder Südamerika die Rohstoffe aus dem Boden gekratzt werden, die wir für unsere automobilen Bequemlichkeit brauchen.

Das Problem am Auto ist nicht in erster Linie die Art seines Antriebs. Das Problem am Auto ist das Auto an sich: Die Rohstoffe, die bei seiner Produktion verbraucht werden. Der Platz, den es benötigt. Die Zersiedelung der Landschaft, die es begünstigt. Die Umwandlung der Städte in Verkehrsballen, die es verursacht. All das wird nicht besser, wenn der Benzin-beziehungsweise Dieselmotor durch einen E-Motor ersetzt wird.

Doch die Dinge sind, wie meist, noch viel komplizierter. Denn das Auto ist keineswegs nur ein umweltschädlicher Lärmereger, sondern für viele von uns ein Stück Freiheit, Mobilität und Selbstbestimmung. Viele von uns können ihrer Arbeit nicht nachgehen, würden sie sich nicht jeden Tag ins Auto setzen. Viele von uns müssten ihr Leben in unzumutbarer Weise ändern, müssten sie auf ihre individuelle Mobilität verzichten. Mehr noch: Unsere Gesellschaft, unsere Städte, unser gesamtes Lebenskonzept bis hin zum Supermarkt auf der grünen Wiese ist so sehr auf die Verfügbarkeit des Autos abgestellt, dass ein Verzicht auf dieses kaum vorstellbar scheint. Ganz abgesehen davon, dass die Automobilindustrie, ihre Zulieferbetriebe und alles, was damit verbunden ist, in Österreich zigtausende Arbeitsplätze sichert und wesentlich zum Wohlstand in unserem Land beiträgt.

Die neue Regierung setzt im Übrigen nicht nur auf E-Mobilität, sondern dazukomplexer Weise auch auf einen Ausbau des öffentlichen Verkehrs und auf flexible Mobilitätsangebote. Gut so. Die Lösung von Umwelt- und Verkehrsproblemen erfordert nicht Dogmatismus, sondern pragmatische Ansätze.

ANDREAS KOLLER/S&T

EU-Projekte ohne Grenzen aus Kärnten

Die WOCHEN Kärnten stellt in einer Serie grenzüberschreitende EU-Interreg-Projekte aus Kärnten vor.



Ein atemberaubender Blick in die außergewöhnlichen Geologieformationen des Unesco-Geoparks Karawanken

KÄRNTEN. Anlässlich des Jubiläums „25 Jahre EU-Beitritt“ gibt die WOCHEN Kärnten in einer vierwöchigen Serie einen Einblick in die Themenvielfalt grenzüberschreitender Zusammenarbeit und stellt ausgewählte Interreg-Projekte aus Kärnten im Rahmen der EU-Förderprogramme vor. Der erste Teil ist drei Projekten aus dem Kooperationsprogramm „Interreg Slowenien – Österreich (2014 – 2020)“ gewidmet.

„Geopark Karawanken“ Mit neun Kärntner und fünf slowenischen Gemeinden bietet der Unesco-Geopark Karawanken einzigartige erdgeschichtliche Phänomene. Mit touristischen Angeboten wollen die Partner im Projekt „Nakalt“ das geologische und kulturell vielfältige Erbe nun für alle sichtbar machen. Unterirdische Stollen sind per Kajak oder Fahrrad zugänglich. Auf einem mehr als tausend Kilometer umfassenden, grenzüberschreitenden Netz aus Weitwander-, Kletter- und Radwegen sind geologische und geomorphologische Sehenswürdigkeiten im Gelände zu erkunden.

Projektauzeit: 1. Mai 2018 bis 30. April 2021 (Gesamtförderung: 1,6 Millionen Euro)

„Crossrisk“ Effektivere Warnungen vor Lawinen und Hochwasser sollen Menschen und Infrastruktur besser schützen. Das Projekt „Crossrisk“ mit dem Lead-Partner ZAMG liefert verbesserte Vorhersagen und Warnungen. Im Rahmen der grenzüberschreitenden Kooperation mit den Ämtern der Kärntner und Steiermärkischen Landesregierung, dem Joanneum Research und den Slowenischen Partnern Universität Mariburg, dem Research-Center der slowenischen Akademie und der Slowenischen Umweltagentur (ARSO) zielt das Projekt auf die grenzüberschreitende Vereinheitlichung und die bessere Verständlichkeit, Verfügbarkeit

und Verbreitung der notwendigen Vorhersagedaten ab. Projektauzeit: 1. Juni 2018 bis 31. Mai 2021 (Gesamtförderung: 1,3 Millionen Euro)

„Coophealthcare“ Die Anforderungen an das Gesundheitssystem sind wegen komplexer Abläufe sehr wissensintensiv. Das Projekt „Coophealthcare“ ist eine Kooperation zur Förderung smarter Gesundheitservices. Es fördert Kooperationsmöglichkeiten und strebt an, die technologiebasierte Optimierung des Dienstleistungsbereichs im Gesundheitsbereich durch eine konsequente Kooperation relevanter Akteure und strategischer europäischer Partner voranzutreiben. Projektauzeit: 1. Mai 2018 bis 31. Mai 2020 (Gesamtförderung: 800.000 Euro)



Das Projekt „Crossrisk“ warnt auch vor Lawinen.



Experten: „Coophealthcare“ ist eine Kooperation zur Förderung smarter Gesundheitservices.



Das Mobile Mapping System oder die Vermessung der Welt

Seit zwei Jahren generiert die JOANNEUM RESEARCH mit DIGITAL, dem Institut für Informations- und Kommunikationstechnologien, hochgenaue Abbildungen – sogenannte „digitale Zwillinge“ – der (Straßen-)Umgebung zur detaillierten Erforschung hochautonomen Fahrens. Abnehmer und Anwender dieser präzisen, wirklichkeitsgetreuen Daten sind Projektpartner aus dem Mobilitätssektor. Jüngst kam zu den Interessierten auch die ÖBB, die die Vermessungsdaten der Bahnstrecken für Simulationszwecke nutzen werden.

Aufgrund des in der Steiermark hochentwickelten Mobilitätsnetzwerks setzte die JOANNEUM RESEARCH einen Forschungsschwerpunkt auf das Thema hochautomatisiertes Fahren. Dafür und für die Zusammenarbeit mit der AlpLab wurde im Unternehmen ein entsprechendes Forschungslabor aufgebaut. Herzstück des Labors ist das Mobile Mapping System zur 3D-Vermessung statischer Objekte mit dem klingenden Namen „Pegasus: Two Ultimate Dualhead“. Die Dual-Kamera von Leica wird auf ein Trägerfahrzeug montiert und ermöglicht eine zeiteffiziente und gleichzeitig umfangreiche Vermessung der Umgebung mittels Laserscanner, 360-Grad-Kameras und Satellitennavigation.



„Der Mobilitätstrend hat sich vom Auto hin zur Bahn entwickelt, die Luftfahrt rangiert erst an dritter Stelle“, stellt DIGITAL-Direktor Heinz Mayer fest. „Wir haben den Trend aufgegriffen und

Mit den aufgezzeichneten Daten lassen sich sogenannte georeferenzierte Punktwolken und Bilder erzeugen. Diese Daten sind die Grundlage für hochgenaue 3D-Karten, die für das autonome Fahren notwendig sind. Anhand dieser hochauflösenden HD-Karten werden Situationen im Straßenverkehr simuliert und bewertet. Und sie dienen natürlich vom Fahrzeug aus betrachtet zur Lokalisierung und Orientierung. Je genauer diese Karten sind, mit der autonomen Fahrzeuge versorgt werden, umso sicherer wird das Fahren ohne menschliches Lenken in Zukunft. Die Expertinnen und Experten von DIGITAL nutzen die langjährigen Kompetenzen im Bereich Lokalisierung, Photogrammetrie, digitaler Bildverarbeitung und Künstlicher Intelligenz, um möglichst automatisiert aus den Sensordaten des Mobile Mapping Systems, hochgenaue und vollständige Kartenmaterial zu generieren.

Die aufgenommenen und bearbeiteten 3D-Daten dienen der ÖBB-Infrastruktur zu Simulationszwecken. Das sorgt in Zukunft zum Beispiel für eine weitere Optimierung des Fahrbetriebs und der Anlagenwartung.

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GEFÜHL FÜR DATEN

Zukunftsmusik oder alltagstauglich? Forscherin Ulrike Kleb vom Institut Policies der Joanneum Research berichtet eingehend über die Vorteile und den Nutzen von Künstlicher Intelligenz.



Erkennung von Cyber-Attacken, Vorhersage von menschlicher Bewegung und Verhalten, gezielter Ressourceneinsatz in der Landwirtschaft oder Müllklassifizierung und Berechnung von Fehlwurfmengen.

Wie gehen wir mit den Daten um?

Künstliche Intelligenz ist für die Forscherinnen und Forscher der Joanneum Research mehr als ein intelligenter Algorithmus, der auf Daten angewendet wird. Wir verfügen über Domänenwissen in verschiedenen Bereichen, sodass wir die bestmögliche Methode einsetzen können, um ein bestimmtes Problem zu lösen.

Was ist ein bekanntes Produkt mit KI?

Sehr bekannt sind die sogenannten AKUT-Tunnelohren, die Tunnel akustisch mittels Sensoren und Mikrofonen „beobachten“ und die Geräusche in Tunneln aufnehmen. Bei einem Brand, Unfall, Reisepflichter oder bei Hilferufen reagieren die Mikrofone sofort und das System schickt binnen einer Sekunde eine Meldung an die Tunnel-Leitstelle.

Müssen wir uns fürchten, dass Roboter unsere Arbeit übernehmen?

Die Arbeitswelt unterliegt einer ständigen Veränderung. Und natürlich ist es so, dass viele niedrigqualifizierte Jobs von Maschinen übernommen werden, dafür wird es aber neue und andere Möglichkeiten höher qualifizierter Jobs geben. Letztendlich hängt vieles auch mit der Bildung zusammen. Die Voraussetzungen für benötigte Höherqualifizierungen zu schaffen, das wird wohl eine der Herausforderungen der nahen Zukunft sein.

www.joanneum.at

Wenn beim steirischen Forschungsinstitut Joanneum Research zur Lösungsfindung Methoden der Künstlichen Intelligenz eingesetzt werden, dann laufen die Fäden bei der Mathematikerin Ulrike Kleb zusammen, die vom Institut Policies, dem Institut für Wirtschafts- und Innovationsforschung ausgehend, die Forscherinnen und Forscher in diesem Bereich interdisziplinär vernetzt.

Was ist der Nutzen von KI?

Es wird zwischen starker und schwacher Künstlicher Intelligenz unterschieden. Eine starke KI wäre ein Computer, der selbst denkend Entscheidungen trifft, wie auch der Mensch. Aber das ist noch Zukunftsmusik. Schwache KI sind im Prinzip alle Verfahren, mit denen man aus Daten Muster, oder Zusammenhänge lernt.

Seit wann gibt es Künstliche Intelligenz?

Die Künstliche Intelligenz war eine Erfindung, die 1956 noch ihrer Zeit voraus war. Erst etwa ein halbes Jahrhundert später kamen komplexe Rechenmodelle auf Grund neuer leistungsfähiger Rechner und kostengünstiger Sensoren auch tatsächlich sinnvoll genutzt werden.

In welchen Bereichen forscht die Joanneum Research in Bezug auf KI?

Künstliche Intelligenz ist die Basis für die Prozess- und Qualitätsoptimierung, Muster- oder Objekterkennung. Wir forschen zum Beispiel in den Bereichen der Qualitätskontrolle für die Stahlindustrie, Softsensoren zur Qualitäts- und Effizienzsteigerung in der Halbleiterindustrie.

66 BUSINESS Monat



Digitale Fairness

LESENSWERT. Sibylle Reidl ist Expertin in der Genderforschung. Gemeinsam mit Jürgen Streicher, beide forschen bei POLICIES, dem Institut für Wirtschafts- und Innovationsforschung der JOANNEUM RESEARCH, hat sie eine Studie über digitale Ungleichheit erstellt.

Man möchte meinen, das Internet behandle alle Menschen gleich. Dem ist nicht so, wie sich beim genaueren Hinsehen auf Algorithmen & Co. herausstellt: Selbstfahrende Autos, die Personen im Rollstuhl nicht erkennen, Job-Algorithmen, die Frauen bei Technologiejobs automatisch nach hinten rufen oder Smart Homes, die nur noch von Technikern bedient werden können: Anhand vieler Beispiele zeigt sich, dass digitale Technologien keine neutralen Produkte sind, sondern

die Perspektive derer widerspiegeln, die sie entwickelt haben“, erklärt Studienautorin Sibylle Reidl. Und das sind zu einem Großteil jüngere und technisch gebildete Männer: Nur rund 18 Prozent der Informations- und Technikspezialisten sind Frauen, so eine Zahl aus der Studie „Digitale Ungleichheit“.

Chancengerechtigkeit.

Reidl forscht seit 20 Jahren an Genderfragen, die in den Anfängen hauptsächlich geschlechtsspezifische Unterschiede in der Arbeitswelt behandelten. „Wir müssen uns

auch ansehen, wie Wissen und Technologien entstehen. Hier müssen wir nicht nur Frauen, auch das Alter, den kulturellen Hintergrund und die unterschiedlichen Qualifikationen einbeziehen, um Technologien für alle zu entwickeln“, erläutert die Forscherin. Laut der Studie haben 650.000 Österreicher keinen Internetzugang, wodurch ihnen einige Nachteile erwachsen. Auch das ist weniger vom Geschlecht abhängig, als vom Alter, dem sozioökonomischen Status oder dem Stadt-Land-Gefälle bei Breitbandanschlüssen. Die Frage nach Chancengerechtigkeit stellt sich aber nicht nur hier, sondern auch in der Forschungsförderung. „Wir unterstützen bei JOANNEUM RESEARCH im Rahmen des EU-Projekts GRANTED auch eine mögliche geschlechtsbezogene Verzerrung in Hinblick auf Erfolgs- und Bewilligungsraten in der Forschungsförderung“, erklärt Sibylle Reidl.

Spitze. Die JOANNEUM RESEARCH Forschungsgesellschaft entwickelt Lösungen und Technologien für Wirtschaft und Industrie und betreibt national und international Spitzenforschung. Bestens eingebettet in nationale und internationale Innovationsnetzwerke erarbeiten die Forscherinnen Innovationen in den Themenbereichen Informations- und Produktionstechnologien, Humantechnologien und Medizin sowie Gesellschaft und Nachhaltigkeit. *

INFOS

Studie „Digitale Ungleichheit – und was wir dagegen tun können“:
www.fhg.at/aura-bassi-4-0-digitalisierung-und-chancen-gerechtigkeit-publikationen
Kontakt:
Mag. Sibylle Reidl
sybilreidl@joanneum.at
www.joanneum.at

WEEKEND MAGAZIN | 41



„Siri oder Alexa reagieren auf sexuelle Anspielungen von Männern verständnisvoll bis humorvoll – auf die von Frauen klar abtöndend.“

Sibylle Reidl
Studienautorin
„Digitale Ungleichheit“

ANERKE: FOTO: WALTER SCHWARZ/JOANNEUM RESEARCH



Im Dialog mit dem eigenen Haus

Die Joanneum Research leitet das Projekt DeSSnet, wo unter anderem nach Möglichkeiten einer sicheren digitalen Gebrauchsanweisung für das moderne Eigenheim geforscht wird.

Die Instandhaltung eines Eigenheims kann, abgesehen von Nerven, auch sehr viel Geld kosten – vor allem dann, wenn man Reparaturen sofort und nicht nach Plan durchführen muss. Die Joanneum Research ist Konsortialführerin des K-Projekts DeSSnet, wo internationale Konzerne wie Infineon, NXP oder Haas Fertigung gemeinsam an innovativen Anwendungen mittels drahtlos vernetzter Elektronik forschen. Unter anderem wird nach einer Möglichkeit gesucht, den Zustand moderner Eigenheime mithilfe drahtloser Sensornetze zu überwachen und mit einer

sicheren, interaktiven Betriebsanleitung in Form einer App zu kombinieren. Somit müssen keine kleingedruckten Gebrauchsanleitungen gelesen werden, sondern notwendige Wartungsmaßnahmen können zeitgerecht vorgeschlagen werden.

SENSORNETZWERK

Bei modernen Autos ist es mittlerweile State of the Art, dass viele Sensoren den Zustand der Systeme überwachen. Für Häuser, die eine wesentlich längere Lebensdauer als Autos haben, werden nun Sensornetze erforscht, die langlebig und sicher sind

und somit nicht nur den Komfort erhöhen, sondern auch nachhaltig und kosteneffizient Nutzen stiften. Die Ausgangslage des Projekts DeSSnet ist eine physische Aufgabenstellung, die mit moderner Informationstechnologie unterstützt werden soll. Oder: Man baut ein Haus und unterstützt es mit Software. Das klingt an sich einfach, ist aber doch eine technische Herausforderung. Will das Haus mit seinen Bewohnern aktiv kommunizieren, das heißt vor Schäden warnen oder an Wartungsarbeiten erinnern, dann erfordert das ein kompliziertes

Netzwerk von Sensoren, die vorab im Zuge der Produktion eingebaut werden müssen. „Diese Sensornetze müssen energieeffizient und kooperationsfähig sein und gleichzeitig muss die zeitgerechte Auswertung der Sensordaten erfolgen – das sind wohl die größten Herausforderungen bei der Gestaltung der Sensornetze“, erklärt der selbst bestens vernetzte Datenanalyst und Manager des Projekts, Herwig Zeiner von Digital. Mit dem Projektpartner Haas Fertigung werden derzeit Prototypen in einem „Testhaus“ erforscht. *

ALLES GUTE KOMMT VON OBEN

Borkenkäfer profitieren von klimatisch bedingten Dürreperioden und bedrohen Wälder stärker als je zuvor. Das Rezept steirischer Forscher heißt Früherkennung der Plagegeister aus dem All.

TEXT: ROBERT SPERL

D

DER NAME DES PROJEKTS VON JOANNEUM RESEARCH GRAZ zur Bekämpfung des Borkenkäfers passt: BEAT IT!, Verschwinde!, enthält lautmalend nicht nur das englische Vokabel für Käfer, beetle, und das Kürzel IT für Informationstechnik. Er definiert auch das Ziel der Bemühungen: dem Insekt den Garaus zu machen.

Im Hauptfokus steht der Buchdrucker, eine Untereinheit in der Familie der Borkenkäfer. Dieses Insekt schädigt die Fichtenbestände, die Forstwirtschaft in ganz Mitteleuropa leidet. Was dem Buchdrucker in die Hände spielt, sind ausgeprägte Fichten-Monokulturen und die durch den Klimawandel immer häufigere Trockenheit. Gesunde Fichten beherrschen Gegenstrategien zur Käferabwehr: Sie sondern Harz ab, das auf die Insekten toxisch wirkt. Wassermangel schwächt die Bäume jedoch, die Borkenkäfer treffen auf geringeren Widerstand. Das Rechenbeispiel des Bundesforschungszentrums für Wald ist unheimlich: Bei 50 Nachkommen pro Weibchen und einem Weibchenanteil von 50 Prozent entwickeln sich aus einem Weibchen in der ersten Tochtergeneration

50, in der zweiten 1.250 und in der dritten 31.250 Käfer. Und: Durch Trockenheit und längere Vegetationsperioden entwickeln sich jährlich zwei bis drei statt bislang ein bis zwei Generationen.

Bestallene Bäume müssen üblicherweise mühsam aus der Nähe identifiziert werden, durch verfarbte Kronen, Bohrmehlpapuren und abgelaufene Rinde. Mit Lockstofffallen wird punktuell die Erzwählung der Käferpopulationen überwacht. BEAT IT! reduziert den Arbeitsaufwand im Wald beträchtlich und liefert Blichtige Infos zum aktuellen Käferbefall. Basis sind Bildläsen des ESA-Erdbildwachtungsprogramms Copernicus, speziell der Satelliten „Sentinel2A“ und „Sentinel2B“, die die Erde in rund 800 Kilometer Höhe umkreisen.

Die Bilder werden in 13 Spektralbändern (im sichtbaren und im Infrarotbereich) aufgenommen. Das erlaubt mittels statistischer Zeitreihenmodelle eine präzise Interpretation, so Mag. Janik Deutscher, Spezialist für Fernerkundung und Geoinformation bei Joanneum Research. „Der Algorithmus kann unterscheiden: Ist hier nur Trockenstress erkennbar oder zeigen die Bilder bereits vom Käfer befallene Bäume? Handelt es sich bei den detektierten Anomalien um Käferschäden oder andere Waldänderungen, etwa Sturmwurf oder normalen Holzeinschlag?“ Vor allem eines will man möglichst früh herausfinden: Wo stehen befallene, geschwächte Stämme im Umfeld noch gesunder Bäume, von denen Käferkolonien ihre nächste Offensive starten?



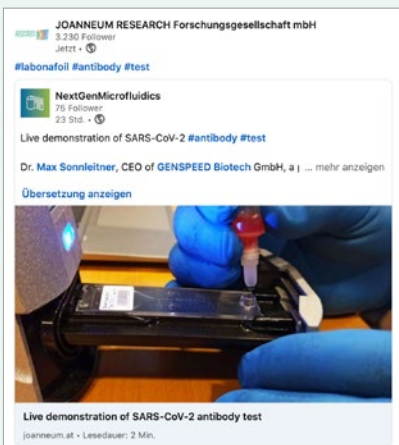
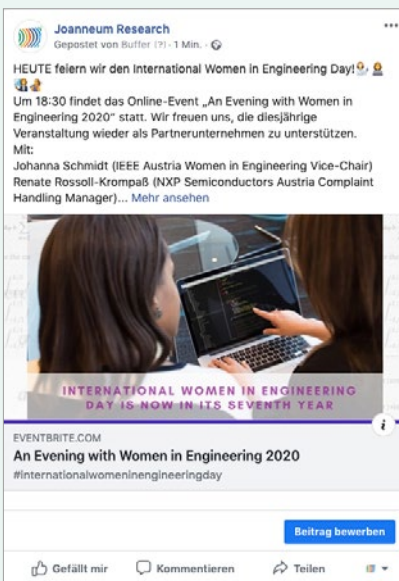
Janik Deutscher, Joanneum Research: „Das Konzept BEAT IT! soll möglichst früh herausfinden, wo von Borkenkäfern befallene und geschwächte Stämme stehen, um rechtzeitig Schutzmaßnahmen für den noch gesunden Wald zu ergreifen.“



Ips typographus Der Buchdrucker, ein Käfer aus der Familie der Borkenkäfer, ist der Hauptfeind von klimawandelgeschwächten Fichten.

Social Media

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🌟 Our **#MATERIALS** Institute based in **#Weitz**, Austria is now partner of the European innovation hub for photonics! 🌐 The One-Stop-Shop **#PhotonHub** Europe promotes local technologies and ensures global competitiveness. Even **#SMEs** from fields remote from photonics gain access to photonics technologies, from product concept to pilot production and market launch.

🌟 **MATERIALS** Institute Director Paul Hartmann sees opportunities: "I am sure that this is an ideal offer for many technologically oriented commercial and industrial companies in segments such as **#light** technology, **#sensor** technology, **#life** science, **#laser** technology or optical communication technologies.


📖 Read more: <https://buff.ly/2UF7VFP>

#innovationhub #bphot #photonics #innovation #industry #horizon2020

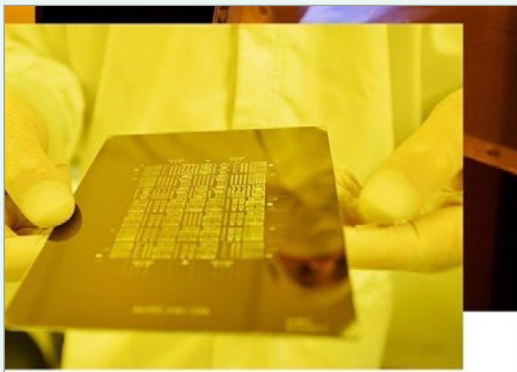
Übersetzung anzeigen



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GRAZ
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ROBOTICS NEWS 🤖 We are pleased to invite you to participate in our **#3rd Workshop on Proximity Perception in Robotics: Towards Multi-Modal Cognition** at **ROS On-Demand 2020**. Starting from **October 29th**, you will be able to watch recordings of all invited talks, each one including a Q&A with the workshop organizers. We are grateful to all of our invited speakers, as they have provided high quality contributions, which surely are of interest for the community. We cover subjects such as proximity sensing, tactile sensing, multi-modal cognition, novel and alternative sensing technologies, safe and physical HRI, prosthetics, etc.

Information about the invited speakers: <https://bit.ly/33Mfys8>

We have furthermore two upcoming live-events:
A Panel Discussion with the invited speakers on **October 28th** at 3pm CET via Zoom: <https://bit.ly/341z08z>
A PhD-Forum with talks from PhD students on **October 29th** at 3pm CET via Zoom: <https://bit.ly/2c3q9kx>

And we have an open call for **Collaboration Proposals**, where the deadline is **November 13th**. The idea is to foster collaboration between the participants of the workshop. The best proposal will be awarded a price between **1000USD** and **1500 USD**. Information for the call: <https://bit.ly/34uynRk>

We hope to see you soon!
#ros2020 #joanneumresearch #robotics #ros #robotics



joanneum_research • Abonniert

joanneum_research Schon einmal von Bio- oder Chemosensoren gehört? Diese kleinen Helfer haben große Wirkung, denn sie unterstützen uns, chemische oder biologische Stoffe besser analysieren zu können. Anwendungen finden die Sensoren etwa in der Lebensmittelindustrie, der Sicherheitstechnik, Umweltüberwachung, Hygiene sowie in der Human- und Veterinärmedizin. Unsere Forschungsgruppe »Sensoren und Funktionales Drucken«, unterstützt durch die Forschungsgruppen »Hybridelektronik und Strukturierung«, »Licht und Optische Technologien« und »Laser- und Plasma-Technologien« entwickelt diese

Gefällt **_malikesophie** und **6 weitere Personen**

VOR 1 STUNDE

Kommentar hinzufügen ...

Joanneum Research inspiriert.

Gepostet von **Maika Sophie Rindler** · Gerade eben ·

HEUTE | ab 17:00: Der 74. Digitaldialog steht im Zeichen der Auswirkungen der Digitalisierung auf unseren CO2-Fußabdruck! 🌍 Brandaktuelle Daten von etwa 18.000 Europäerinnen und Europäern aus der Zeit der CORONA-Krise – erhoben über den »Climate LifestyleCheck« (<https://www.lifestylecheck.at>) unseres Instituts **#LIFE** – beleuchten dabei auch die sozialen Hintergründe der Digitalisierung.

DIGITAL DIALOG

EINE VERANSTALTUNGSREIHE DES SILICON ALPS CLUSTERS

HEUTE UM 17:00
74. Digitaldialog | It & Global Footprint
Online-Veranstaltung
Dir gefällt „Digitaldialog“

Beiträge

Joanneum Research
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Am heutigen **#TagderBiene** 🐝 feiern wir unsere **#Hummeln**, die fürs **#Rooftopfarming** einen wahren Superheldenjob erledigen. Am Dachgarten für die Forschung in 60 Meter Höhe, sorgen sie für die unverzichtbare Bestäubung 🌱. Unsere Hummeln fliegen von Blüte zu Blüte um Pollen zu sammeln und besäuben gleichzeitig viele Kräuter, essbare Blüten wie Kapuzinerkresse, Apfelbäume, Tomaten, Melonen usw. 🌱 Wir sagen Danke: Ganz schön fleißig! 🐝

Am **#Scienctower** erforschen wir, welche Komponenten für eine klimafreundliche, nachhaltige Lebensmittelgewinnung der Zukunft auf Dächern nötig sind. 🌱 Mehr Infos: <https://rooftopfarming.at>

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Beiträge

Joanneum Research inspiriert.

Gepostet von **Maika Sophie Rindler** · 29. Juni um 14:08 ·

Unsere Studie zum Thema **"Digitale Ungleichheit"** ist im **Mag. "Road to Digital Austria"**.

Digitale Ungleichheit ist auch ein sozialer Prozess. Dazu gehören auch die Technologien so zu gestalten, dass alle davon profitieren können.

#digitaltransformation #DigitalAustria

FINANCIAL STATEMENTS OF JOANNEUM RESEARCH

AUDITOR'S REPORT

Report on the Financial Statements

■ Audit Opinion

We have audited the financial statements of JOANNEUM RESEARCH Forschungsgesellschaft mbH Graz. These financial statements comprise the statement of financial position as of December 31, 2020, with an equity of EUR 9,676,569.13, the income statement for the fiscal year then ended and the notes.

Based on our audit the accompanying financial statements were prepared in accordance with the legal regulations and present fairly, in all material respects, the assets and the financial position of the Company as of December 31, 2020 and its financial performance for the year then ended in accordance with Austrian Generally Accepted Accounting Principles.

■ Basis for Opinion

We conducted our audit in accordance with Austrian Standards on Auditing. Those standards require that we comply with International Standards on Auditing (ISA). Our responsibilities under those regulations and standards are further described in the "Auditor's Responsibilities for the Audit of the Financial Statements" section of our report. We are independent of the Company in accordance with the Austrian General Accepted Accounting Principles and professional requirements and we have fulfilled our other ethical responsibilities in accordance with these requirements. We believe that the audit evidence we have obtained until the date of this auditor's report is sufficient and appropriate to provide a basis for our opinion by this date.

■ Responsibilities of Management and of the Audit Committee for the Financial Statements

Management is responsible for the preparation of the financial statements in accordance with Austrian Generally Accepted Accounting Principles, for them to present a true and fair view of the assets, the financial position and the financial performance of the Company and for such internal controls as management determines are necessary to enable the preparation of consolidated financial statements that are free from material misstatement, whether due to fraud or error.

In preparing the financial statements, management is responsible for assessing the Company's ability to continue as a going concern, disclosing, as applicable, matters related to going concern and using the going concern basis of accounting unless management either intends to liquidate the Company or to cease operations, or has no realistic alternative but to do so.

The Audit Committee is responsible for overseeing the Company's financial reporting process.

■ Auditor's Responsibilities for the Audit of the Financial Statements

Our objectives are to obtain reasonable assurance about whether the financial statements as a whole are free from material misstatement, whether due to fraud or error, and to issue an auditor's report that includes our opinion. Reasonable assurance is a high level of assurance, but is not a guarantee that an audit conducted in accordance with International Standards on Auditing will always detect a material misstatement when it exists. Misstatements can arise from fraud or error and are considered material if, individually or in the aggregate, they could reasonably be expected to influence the economic decisions of users taken on the basis of these financial statements.

As part of an audit in accordance with Austrian Standards on Auditing, which require the application of ISA, we exercise professional judgment and maintain professional scepticism throughout the audit.

■ We also:

- identify and assess the risks of material misstatement of the financial statements, whether due to fraud or error, design and perform audit procedures responsive to those risks, and obtain audit evidence that is sufficient and appropriate to provide a basis for our opinion. The risk of not detecting a material misstatement resulting from fraud is higher than for one resulting from error, as fraud may involve collusion, forgery, intentional omissions, misrepresentations, or the override of internal control.
- obtain an understanding of internal control relevant to the audit in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the Company's internal control.

- evaluate the appropriateness of accounting policies used and the reasonableness of accounting estimates and related disclosures made by management.
- conclude on the appropriateness of management's use of the going concern basis of accounting and, based on the audit evidence obtained, whether a material uncertainty exists related to events or conditions that may cast significant doubt on the Company's ability to continue as a going concern. If we conclude that a material uncertainty exists, we are required to draw attention in our auditor's report to the related disclosures in the financial statements or, if such disclosures are inadequate, to modify our opinion. Our conclusions are based on the audit evidence obtained up to the date of our auditor's report. However, future events or conditions may cause the Company to cease to continue as a going concern.
- evaluate the overall presentation, structure and content of the financial statements, including the disclosures, and whether the financial statements represent the underlying transactions and events in a manner that achieves fair presentation.

We communicate with the Audit Committee regarding, among other matters, the planned scope and timing of the audit and significant audit findings, including any significant deficiencies in internal control that we identify during our audit.

■ Comments on the Management Report for the Company

Pursuant to Austrian Generally Accepted Accounting Principles, the management report is to be audited as to whether it is consistent with the financial statements and as to whether the management report was prepared in accordance with the applicable legal regulations.

Management is responsible for the preparation of the management report in accordance with Austrian Generally Accepted Accounting Principles.

We conducted our audit in accordance with Austrian Standards on Auditing for the audit of the management report.

Opinion

In our opinion, the management report for the Company was prepared in accordance with the valid legal requirements and is consistent with the financial statements.

Statement

Based on the findings during the audit of the financial statements and due to the thus obtained understanding concerning the Company and its circumstances no material misstatements in the management report came to our attention.

Vienna, March 4th, 2021


 Crowe SOT Wirtschaftsprüfung GmbH


 Dr. Anton Schmidl Mag. Andreas Maier
 Wirtschaftsprüfer

BALANCE SHEET

Assets	31 Dec 2020 EUR	31 Dec 2019 EUR
A. Non-current assets		
I. Intangible assets		
1. Rights and licences	320,614.00	415,573.00
II. Property, plant and equipment		
1. Land and buildings	10,099,978.02	10,382,303.02
2. Technical plant and machinery	5,205,773.00	5,275,122.00
3. Other plant, furniture and fixtures	743,418.00	764,828.00
4. Advances made and construction in progress	1,989,659.23	687,039.65
	<u>18,038,828.25</u>	<u>17,109,292.67</u>
III. Financial assets		
1. Shares in affiliates	150,000.00	150,000.00
2. Participating interests	341,688.25	341,688.25
3. Investment securities (book-entry securities)	1,724,750.00	1,570,750.00
	<u>2,216,438.25</u>	<u>2,062,438.25</u>
	<u>20,575,880.50</u>	<u>19,587,303.92</u>
B. Current assets		
I. Inventories		
1. Raw materials and supplies	3,638.10	3,952.74
2. Services not yet chargeable	8,392,501.98	7,631,695.65
3. Advances made	1,891.22	6,802.85
	<u>8,398,031.30</u>	<u>7,642,451.24</u>
II. Receivables and other assets		
1. Trade receivables	1,703,861.76	2,312,389.33
<i>(thereof due within 1 year</i>	<i>1,670,123.86</i>	<i>2,276,182.70)</i>
<i>(thereof due after more than 1 year</i>	<i>33,737.90</i>	<i>36,206.63)</i>
2. Receivables from affiliates	13,266.69	22,843.16
<i>(thereof due within 1 year</i>	<i>13,266.69</i>	<i>5,443.16)</i>
<i>(thereof due after more than 1 year</i>	<i>0.00</i>	<i>17,400.00)</i>
3. Receivables from undertakings with which the company is linked by virtue of participating interests	42,923.59	88,130.23
<i>(thereof due within 1 year</i>	<i>42,923.59</i>	<i>88,130.23)</i>
<i>(thereof due after more than 1 year</i>	<i>0.00</i>	<i>0.00)</i>
4. Receivables from proprietor	110,000.00	0.00
<i>(thereof due within 1 year</i>	<i>110,000.00</i>	<i>0.00)</i>
5. Receivables from subsidies and project grants	4,435,394.65	4,539,074.02
<i>(thereof due within 1 year</i>	<i>4,435,394.65</i>	<i>4,539,074.02)</i>
6. Other receivables and assets	13,289,004.50	19,208,214.68
<i>(thereof due within 1 year</i>	<i>13,289,004.50</i>	<i>19,208,214.68)</i>
	<u>19,594,451.19</u>	<u>26,170,651.42</u>
<i>(thereof due within 1 year</i>	<i>19,560,713.29</i>	<i>26,117,044.79)</i>
<i>(thereof due after more than 1 year</i>	<i>33,737.90</i>	<i>53,606.63)</i>
III. Securities and shares		
1. Other securities and shares	1,624,100.00	1,786,000.00
IV. Cash and balances at banks	<u>12,376,642.31</u>	<u>3,266,698.57</u>
	<u>41,993,224.80</u>	<u>38,865,801.23</u>
C. Prepayments and accrued income	3,282,568.31	3,492,737.59
D. Escrow funds	5,845,290.34	1,106,851.13
Total Assets	71.696.963.95	63.052.693.87

Liabilities and Shareholders' Equity	31 Dec 2020 EUR	31 Dec 2019 EUR
A. Equity		
I. Share capital called in and paid up	3,600,000.00	3,600,000.00
II. Capital reserves		
1. Appropriated	4,396,531.71	4,633,645.19
2. Unappropriated	362,637.44	362,637.44
	<u>4,759,169.15</u>	<u>4,996,282.63</u>
III. Retained earnings		
1. Statutory reserves	159,571.25	159,571.25
2. Other reserves (free reserves)	772,750.22	772,987.93
	<u>932,321.47</u>	<u>932,559.18</u>
IV. Net profit for the year	385,078.51	63,179.57
<i>(thereof profit carried forward)</i>	<i>63,179.57</i>	<i>1,265,962.97</i>
	<u>9,676,569.13</u>	<u>9,592,021.38</u>
B. Investment grants	1,792,330.57	1,679,763.40
C. Provisions		
1. Provisions for severance pay	5,122,400.00	4,921,900.00
2. Provisions for pensions	5,610,020.00	5,572,990.00
3. Tax provisions	6,614,200.00	6,188,800.00
4. Other provisions	9,903,200.00	9,869,730.00
	<u>27,249,820.00</u>	<u>26,553,420.00</u>
D. Liabilities		
1. Bank borrowings	1,580,333.71	3,674,645.11
<i>(thereof due within 1 year)</i>	<i>712,193.77</i>	<i>2,712,194.57</i>
<i>(thereof due after more than 1 year)</i>	<i>868,139.94</i>	<i>962,450.54</i>
2. Advances received on orders	19,119,812.92	13,356,080.47
<i>(thereof due within 1 year)</i>	<i>8,580,363.48</i>	<i>7,366,806.25</i>
<i>(thereof due after more than 1 year)</i>	<i>10,539,449.44</i>	<i>5,989,274.22</i>
3. Trade payables	2,269,434.59	2,892,716.62
<i>(thereof due within 1 year)</i>	<i>1,402,341.23</i>	<i>1,833,604.14</i>
<i>(thereof due after more than 1 year)</i>	<i>867,093.36</i>	<i>1,059,112.48</i>
4. Payables to affiliates	315,652.11	620,839.21
<i>(thereof due within 1 year)</i>	<i>0.00</i>	<i>6,338.80</i>
<i>(thereof due after more than 1 year)</i>	<i>315,652.11</i>	<i>614,500.41</i>
5. Payables to undertakings with which the company is linked by virtue of participating interests	0.00	14,000.00
<i>(thereof due within 1 year)</i>	<i>0.00</i>	<i>14,000.00</i>
6. Other liabilities	3,655,364.29	3,385,003.50
<i>(thereof due within 1 year)</i>	<i>2,267,887.29</i>	<i>1,997,526.50</i>
<i>(thereof due after more than 1 year)</i>	<i>1,387,477.00</i>	<i>1,387,477.00</i>
<i>(thereof for taxes)</i>	<i>496,527.12</i>	<i>367,741.16</i>
<i>(thereof for social security)</i>	<i>1,050,996.82</i>	<i>1,340,879.07</i>
	<u>26,940,597.62</u>	<u>23,943,284.91</u>
<i>(thereof due within 1 year)</i>	<i>12,962,785.77</i>	<i>13,930,470.26</i>
<i>(thereof due after more than 1 year)</i>	<i>13,977,811.85</i>	<i>10,012,814.65</i>
E. Accruals and deferred income	192,356.29	177,353.05
F. Escrow liabilities	5,845,290.34	1,106,851.13
Total Liabilities	71,696,963.95	63,052,693.87

INCOME STATEMENT

Income Statement	31.12.2020 EUR	31.12.2019 EUR
1. Revenue	14,031,646.60	17,090,555.30
2. Changes in the amount of services not yet chargeable	760,806.33	-571,020.74
3. Project-related other income	16,504,165.80	15,275,381.91
4. Shareholder contribution	9,816,017.71	9,746,042.38
5. Other own work capitalised	23,367.64	0.00
6. Other operating income		
a. Income from disposal of non-current assets except for financial assets	19,957.62	18,377.66
b. Income from reversal of provisions	492,742.06	1,178,474.22
c. Income from reversal of investment grants	315,882.57	292,518.95
d. Other	3,477,112.81	3,916,239.92
	<hr/>	<hr/>
	4,305,695.06	5,405,610.75
7. Cost of materials and other services purchased		
a. Cost of materials	1,637,626.69	1,842,201.74
b. Costs of services purchased	1,359,423.49	1,618,076.59
	<hr/>	<hr/>
	2,997,050.18	3,460,278.33
8. Cost of staff		
a. Salaries	23,113,298.04	23,224,306.15
<i>(thereof COVID-19 short-time work allowance)</i>	<i>-421,873.48</i>	<i>0.00</i>
b. Social benefits		
aa) Expenses for old-age provision	528,697.31	712,318.20
bb) Expenses for severance pay and contributions to Severance Pay and Pension Funds	867,571.60	1,144,932.53
cc) Expenses for statutory social security contributions and payroll-related taxes	6,437,258.13	6,345,758.62
dd) Other social benefits	138,971.01	151,057.23
	<hr/>	<hr/>
	31,085,796.09	31,578,372.73
9. Amortisation of intangible non-current assets and depreciation of property, plant and equipment	3,414,966.45	3,126,292.37

Income Statement	31.12.2020 EUR	31.12.2019 EUR
10. Other operating expenses		
a. Taxes, other than taxes stated in line 19	7,868.43	7,868.50
b. Other	8,010,104.53	10,075,535.30
	8,017,972.96	10,083,403.80
11. Subtotal lines 1 to 10 (Operating result)	-74,086.54	-1,301,777.63
12. Income from investments	200,000.00	0.00
13. Income from other securities	23,450.00	28,282.50
14. Other interest and similar income	18,024.80	18,606.49
15. Expenses for financial assets and securities held as current assets		
a. Write-downs	7,900.00	0.00
b. Expenses for affiliates	0.00	174,000.00
c. Other	19,953.87	10,468.37
	27,853.87	184,468.37
16. Interest and similar expenses	65,718.93	64,850.88
17. Subtotal lines 12 to 16 (Financial result)	147,902.00	-202,430.26
18. Profit or loss before tax (Subtotal lines 11 and 17)	73,815.46	-1,504,207.89
19. Income taxes	1,750.00	1,750.00
20. Profit or loss for the year = profit or loss after tax	72,065.46	-1,505,957.89
21. Reversal of capital reserves		
a. Appropriated	237,113.48	290,454.49
22. Reversal of retained earnings		
a. Other reserves (free reserves)	12,720.00	12,720.00
23. Profit carried forward from previous year	63,179.57	1,265,962.97
24. Net Profit for the Year	385,078.51	63,179.57

ANNEX

ACCOUNTING AND VALUATION POLICIES

■ General Principles

The annual financial statements of JOANNEUM RESEARCH Forschungsgesellschaft mbH were prepared in accordance with the provisions of the Austrian Business Code [Unternehmensgesetzbuch/UGB] as amended in accordance with generally accepted accounting principles and the general principle of presenting a true and fair view of the Company's financial position and financial performance.

When preparing the annual financial statements the principle of completeness was complied with.

Assets and liabilities were measured on a going concern basis according to the principle of item-by-item valuation.

The principle of prudent valuation was taken account of by recognising only the profits realised as at the balance sheet date. All recognisable risks and anticipated losses were taken into consideration.

■ Non-Current Assets

➤ Intangible Assets

Intangible assets are recognised at cost plus incidental acquisition costs less cash discounts deducted and after amortisation on a straight-line basis. The useful life applied is three to five years (20%-33%).

➤ Property, Plant and Equipment

Property, plant and equipment are recognised at cost plus incidental acquisition costs less cash discounts deducted and after depreciation.

Public subsidies for non-current assets are presented on the liabilities side as investment grants from public funds. Those investment grants are used for the non-current assets analogously to the depreciation of non-current assets.

Amortisation and depreciation is calculated on a straight-line basis according to the following useful lives and rates:

Property, Plant and Equipment	Useful Life in Years	Depreciation Rate in %
Buildings, including buildings on land owned by others	10 – 40	2.5 – 10
Machinery, scientific equipment and electronic data processing systems	3 – 10	10 – 33
Other plant, furniture and fixtures	4 – 10	10 – 25

The full annual depreciation is applied to additions in the first half of the financial year and half the yearly rate is applied to additions during the second half of the year.

Low-value assets as defined in Section 13 of the Austrian Personal Income Tax Act [Einkommensteuergesetz/ EStG] 1988, i.e. the cost of acquisition of which is less or equal to EUR 800 per asset, are fully written off in the year of acquisition and presented as additions and disposals in the non-current assets movement schedule.

➤ Financial Assets

Shares in affiliates and participating interests are measured at cost less impairment losses, where appropriate.

Investment securities are recognised at the lower of cost or fair value at the balance sheet date.

In the reporting year no write-downs of financial assets were made.

■ Current Assets

► Inventories

Services not yet chargeable in connection with contract research are calculated on the basis of cost accounting. Project costs are recognised on the basis of an itemisation by cost centre and direct cost statements. Item-by-item valuation at cost of production or acquisition as defined in Section 203 UGB is applied. Apart from the costs attributable according to the costs-by-cause principle, production costs also include pro rata production overheads that can be capitalised and portions of social expenses as defined in the second to last sentence of Section 203(3) UGB. Interest expenses and the research risk are not accounted for.

Due to the Company's project structure administrative overheads must be capitalised for projects with a term of more than twelve months. In order to give a true and fair view of the Company's financial position and financial performance, the option right (cf. Section 206(3) UGB) was exercised.

If losses are anticipated in connection with orders or if additional costs are expected to be incurred for services that have been invoiced already, semi-finished products are discounted or provisions are set up. For contingent warranty obligations in connection with contract research provisions are recognised in the balance sheet as well.

► Receivables and other Assets

Receivables and other assets are measured at nominal value unless the lower fair value is recognised in the case of specific recognisable risks. Provisions for general credit risks are made in the form of general allowances at a rate of 2% (previous year: 2%) of the total net receivables.

■ Provisions

Provisions for severance pay are calculated according to principles of financial mathematics on the basis of the 10-year average interest rate with a term of fifteen years. Calculation of the provision for severance pay was based on an interest rate of 2.30% (previous year: 2.71%) as at 31 December 2020, a salary trend of 2.70% (pre-

vious year: 2.52%) and a retirement age of 65 years on a going-concern basis.

No fluctuation discount was recognised. The allocation amount resulting from a change in measurement due to the Austrian Act on Changes in Accounting Practices [Rechnungslegungs-Änderungsgesetz/RÄG] 2014 is allocated over five years.

The **pension provision** is calculated in the amount of the actuarial cover requirement on the basis of the provisions of Section 198 and Section 211 UGB as amended by the RÄG 2014 in compliance with the AFRAC Opinion on "Provisions for pension, severance pay, long-service bonus and comparable long-term obligations under UGB provisions" of June 2016. The calculation was based on the Pagler & Pagler reference tables. The calculatory interest rate used was the 10-year average interest rate of 1.84% (previous year: 2.34%) with an average remaining term of ten years.

Other provisions take into account all recognisable risks and liabilities the amount of which is contingent and are recognised at the amounts which, according to best estimate, must be used to fulfil the obligation. No provisions other than those provided for by law are set up.

Changes in provisions concerning a reversal of provisions are recognised in item 6(b) and allocations to provisions are stated in item 8(b) if they are attributable to staff costs; all others are recognised as other operating expenses in item 10(b) of the income statement.

■ Liabilities

Liabilities are recognised at the realisable value in compliance with the principle of prudence.

■ Currency Translation

Receivables and payables are measured at the mean rate of exchange at the date of the transaction and according to the lower of cost or market principle or higher of cost or market principle at the balance sheet date, respectively.

ANNEX

NOTES TO THE BALANCE SHEET

ASSETS

■ Non-Current Assets

As to the development of the different non-current assets and the breakdown of annual amortisation and depreciation reference is made to the non-current assets movement schedule (Annex to the Notes). As at the balance sheet date non-current assets amounted to EUR 20,575,880.50 (previous year: kEUR 19,587.3) in total. In the financial year 2020 capital expenditure amounted to a total of EUR 4,627,428.03 (previous year: kEUR 5,402.2) and amortisation and depreciation amounted to EUR 3,414,966.45 (previous year: kEUR 3,126.3). In the financial year 2020 disposals at historical cost amounted to EUR 419,523.29 (previous year: kEUR 719.3).

Intangible assets include software and data transmission rights of a carrying amount of EUR 320,614.00 (previous year: kEUR 415.6). Additions in the amount of EUR 186,697.72 (previous year: kEUR 329.1) are attributable to the acquisition of licences and various software.

As at the balance sheet date **property, property, plant and equipment** amounted to EUR 18,038,828.25 (previous year: kEUR 17,109.3). The land value was EUR 2,877,794.02 (previous year: kEUR 2,875.2). The building value of land with buildings and buildings on land owned by others of EUR 7,222,184.00 (previous year: kEUR 7,507.1) is made up of the net building value of EUR 3,255,214.00 (previous year: kEUR 3,348.5) and structural improvements worth EUR 1,736,835.00 (previous year: kEUR 1,816.9), i.e. EUR 4,992,049.00 (previous year: kEUR 5,165.3) are attributable to buildings on land owned by the Company and an amount of EUR 2,230,135.00 (previous year: kEUR 2,341.7) is attributable to capital expenditure on buildings owned by others. Additions in a total amount of EUR 4,072,730.31 (previous year: kEUR 4,913.0) mainly concern the provi-

sion of modern scientific equipment for the Company's research activities and further expansion of the IT infrastructure. Disposals at historical cost in the amount of EUR 205,523.29 (previous year: kEUR 715.5) mainly concern disposals or, to a small extent, sale of scientific equipment, electronic data processing systems and various office equipment. No impairment losses were recognised.

Shares in affiliates in the amount of EUR 150,000.00 (previous year: kEUR 150.0) concern the shares in JR-AquaConSol GmbH in Graz.

According to the statement of investments the following participating interests are held:

(Please find the Statement of investments on the next page.)

As at the balance sheet date the carrying amount of investment securities was EUR 1,724,750.00 (previous year: kEUR 1,570.8).

► Write-up or revaluation

In the reporting year no write-downs of financial assets were made.

Amortisation and depreciation of the remaining non-current assets completely result from ordinary amortisation and depreciation.

ANNEX

Statement of Investments as at 31 December 2020	Interest		Equity EUR	Net profit or Loss in EUR	Balance Sheet Date
	EUR	%			
ACIB GmbH	16,000.00	8.00%	4,680,072.35	801,269.06	31 Dec 2019
ALP.Lab GmbH	5,600.00	16.00%	36,758.27	1,758.27	31 Dec 2019
BEST - Bioenergy and Sustainable Technologies GmbH	20,000.00	10.00%	1,032,389.16	797,035.23	31 Mar 2020
CBmed GmbH	25,000.00	12.50%	1,681,190.74	1,481,190.74	31 Dec 2019
decide Clinical Software GmbH	42,500.00	10.00%	97,952.87	-327,047.13	31 Dec 2019
EPIG GmbH	8,750.00	25.00%	216,286.06	181,286.06	31 Dec 2019
FH JOANNEUM Gesellschaft mbH	10,828.25	14.90%	4,000,000.00	0.00	30 Jun 2020
Geo5 GmbH	8,000.00	10.00%	68,828.09	-11,171.94	31 Dec 2019
Holz.Bau Forschungs GmbH	3,500.00	5.98%	362,939.65	304,439.65	31 Dec 2019
Human.technology Styria GmbH	2,450.00	7.00%	206,437.17	5,773.34	31 Dec 2019
Know-Center GmbH Research Center for Data-Driven Business & Big Data Analytics	14,540.00	10.00%	1,454,064.92	-204,489.29	31 Dec 2019
Materials Center Leoben Forschung GmbH	51,100.00	17.50%	6,563,367.00	302,598.65	31 Dec 2019
Pacemaker Technologies GmbH	1,050.00	3.00%	36,641.98	1,641.98	31 Dec 2019
Polymer Competence Center Leoben GmbH	34,000.00	17.00%	5,598,964.11	1,141,510.71	31 Dec 2019
Rebeat Innovation GmbH	80,000.00	1.88%	64,792.78	-1,071,876.22	31 Dec 2019
Research Center Pharmaceutical Engineering GmbH	15,000.00	15.00%	5,117,642.61	732,742.61	30 Jun 2020
Virtual Vehicle Research GmbH	10,640.00	8.40%	6,574,298.71	1,005,094.38	31 Dec 2019

ANNEX

CURRENT ASSETS

Inventories

The item **raw materials and supplies** in the amount of EUR 3,638.10 (previous year: kEUR 4.0) is made up of consumables (mainly paper, inked ribbons, computer network cards, laser printer spare parts and various small items of equipment).

The item **services not yet chargeable** in connection with contract research includes work in progress and services not yet chargeable in the amount of EUR 8,392,501.98 (previous year: kEUR 7,631.7), under which administrative overheads of EUR 1,598,218.56 (previous year: kEUR 1,464.1) were capitalised for contracts the execution of which lasts more than twelve months. According to the Company's project structure such capitalisation of administrative overheads is required in order to present a true and fair as well as a continuous view of the Company.

Advances made on inventories amounted to EUR 1,891.22 (previous year: kEUR 6.8).

Receivables and other Assets

Itemised allowances in the amount of EUR 1,045,719.96 (previous year: kEUR 622.2) were made for doubtful **trade receivables** and deducted from the assets.

Receivables from affiliates concern trade receivables.

Receivables from subsidies and project grants concern grant approvals from various funding agencies. Due to the fact that processing, including receipt of payment, takes more than three months, a discount in the amount of EUR 9,700.00 (previous year: kEUR 13.4) was made. The calculatory interest rate was 0.47% (previous year: 0.63%).

Other receivables and assets mainly include entitlements to insurance benefits vis-à-vis the insurance fund due to premiums paid, claims vis-à-vis the Tax Office of Graz-Stadt, various interest accrued, as well as refunds and aids. This item also includes a liability commitment of the State of Styria in the amount of EUR 5,600,000.00 (previous year: kEUR 5,600.0) to cover the loss from the tax audit by the Tax Office of Graz-Stadt, and claims vis-à-vis the Tax Office of Graz-Stadt from research allowances in the amount of EUR 6,068,572.46 (previous year: kEUR 12,154.8).

Receivables and Other Assets	Receivables as at 31 Dec 2020 (31 Dec 2019) EUR	thereof due after more than 1 Year EUR	thereof evidenced by bills of exchange EUR	Capitalised Accruals Section 225(3) UGB EUR	General Allowance EUR
Trade receivables	1,703,861.76 (2,312,389.33)	0.00 (33,737.90)	0.00 (0.00)	0.00 (0.00)	32,700.00 (46,600.00)
Receivables from affiliates	13,266.69 (22,843.16)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
Receivables from undertakings with which the Company is linked by virtue of participating interests or book-entry securities	42,923.59 (88,130.23)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
Receivables from the owners	110,000.00 (0.00)	0.00 (0.00)	0.00 (0.00)	110,000.00 (0.00)	0.00 (0.00)
Receivables from subsidies and project grants	4,435,394.65 (4,539,074.02)	0.00 (0.00)	0.00 (0.00)	4,435,394.65 (4,539,074.02)	0.00 (0.00)
Receivables from the liability commitment of the State of Styria	5,600,000.00 (5,600,000.00)	0.00 (0.00)	0.00 (0.00)	5,600,000.00 (5,600,000.00)	0.00 (0.00)
Other receivables and assets	7,689,004.50 (13,608,214.68)	0.00 (0.00)	0.00 (0.00)	7,494,233.54 (13,473,582.37)	0.00 (0.00)
Total	19,594,451.19 (26,170,651.42)	0.00 (33,737.90)	0.00 (0.00)	17,639,628.19 (23,612,656.39)	32,700.00 (46,600.00)

ANNEX

► Securities held as Current Assets

Securities held as current assets in the amount of EUR 1,624,100.00 (previous year: kEUR 1,786.0) concern bonds with a term until the end of October 2026.

► Cash and Balances at Banks

This item in the amount of EUR 12,376,642.31 (previous year: kEUR 3,266.7) is made up of cash in the amount of EUR 9,181.76 (previous year: kEUR 9.1) and bank balances of EUR 12,367,460.55 (previous year: kEUR 3,257.6).

■ Prepayments and Accrued Income

Prepayments and accrued income in the amount of EUR 3,282,568.31 (previous year: kEUR 3,492.7) include payments made in the financial year 2020 which have to be charged as expenses in the following year and mainly concern prepayments of maintenance expenses, various subscriptions and membership fees, insurance premiums, travel expenses and congress fees. In addition, this item includes a prepayment of rent in the amount of EUR 2,954,687.45 (previous year: kEUR 3,030.9) as well as additional expenses of EUR 0.00 (previous year: kEUR 58.6) resulting from a change in the calculation of both the provision for severance pay and the pension provision.

■ Escrow Funds

Escrow funds include balances at banks for projects with the Austrian Research Promotion Agency (Österreichische Forschungsförderungsgesellschaft mbH) and the European Commission, where JOANNEUM RESEARCH Forschungsgesellschaft mbH acts as the coordinator and holds the funds in escrow and manages payments for the project partners (see escrow liabilities).

LIABILITIES AND SHAREHOLDERS' EQUITY

■ Equity

The Company's **share capital** amounts to EUR 3,600,000.00 (previous year: kEUR 3,600.0), of which 80.75% (previous year: 80.75%) or EUR 2,907,000.00 (previous year: kEUR 2,907.0) are held by the State of Styria and 14.25% (previous year: 14.25%) or EUR 513,000.00 (previous year: kEUR 513.0) by BABEG - Kärntner Betriebsansiedlungs- und Beteiligungsgesellschaft m.b.H. and 5% (previous year: 5%) or EUR 180,000.00 (previous year: kEUR 180.0) are held by Landesholding Burgenland GmbH.

Taking into account the profit for the year of EUR 321,898.94 (previous year: loss for the year of EUR 1,202,783.8) and the profit carryforward in the amount of EUR 63,179.57 (previous year: EUR 1,265,962.97) the resulting **net profit for the year** is EUR 385,078.51 (previous year: EUR 63,179.57).

■ Approved Capital Reserve

Both in the Participation and Cooperation Agreement with Kärntner Betriebsansiedlungs- und Beteiligungsgesellschaft m.b.H. (BABEG) of 18 December 2014 and in the Participation and Cooperation Agreement with Landesholding Burgenland GmbH of 20 April 2018 the shareholders have agreed that the **appropriated capital reserve** be reversed as stipulated.

■ Special Items for Investment Grants from Public Funds

In the reporting year investment grants from public funds developed as follows:

	As at 1 Jan 2020	Additions	Consumption According to Depreciation	Reversal	Reclassi- fication or Corrections	As at 31 Dec 2020
	EUR	EUR	EUR	EUR	EUR	EUR
Property, plant and equipment						
1. Buildings, including buildings on land owned by others	1,092,864.08	55,291.44	-128,321.87	0.00	0.00	1,019,833.65
2. Machinery, scientific equipment and electronic data processing systems	457,439.40	373,158.30	-186,603.70	0.00	0.00	643,994.00
3. Other plant, furniture and fixtures	129,459.92	0.00	-957.00	0.00	0.00	128,502.92
Financial assets						
1. Financial assets	0.00	0.00	0.00	0.00	0.00	0.00
Total	1,679,763.40	428,449.74	-315,882.57	0.00	0.00	1,792,330.57

Applications for covid-19 investment grants were filed for the financial year 2020 as well as for the financial year 2021. In the financial statements as at 31 December 2020 they have not been recognised yet.

■ Provisions

An amount of EUR 49,031.0 (previous year: kEUR 0.0) of the **provisions for severance pay** was used. In order to meet the cover requirement of EUR 5,122,400.00 (previous year: kEUR 4,921.9), an amount of EUR 249,531.00 (previous year: kEUR 273.6) was allocated to the provision.

An amount of EUR 267,098.58 (previous year: kEUR 262.1) of the **pension provisions** (for former managing directors) was used for pension payments and an amount of EUR 146,357.96 (previous year: kEUR 0.0) was reversed. In order to meet the actuarial cover requirement of EUR 5,610,020.00 (previous year: kEUR 5,573.0), an amount of EUR 450,486.54 (previous year: kEUR 622.7) had to be allocated to the provision.

The item **provision for taxes** concerns additional tax claims resulting from the tax audit in connection with the temporary loss of the status of a non-profit organisation in the amount of EUR 4,731,700.00 (previous year: kEUR 4,731.7), additional tax claims in the amount of EUR 1,787,200.00 (previous year: kEUR 1,361.8) resulting from the tax audit in connection with the division of input taxes into a business part and a non-business part, and additional tax claims resulting from the tax audit in connection with VAT treatment of services provided for the State of Styria in the field of "locational positioning" in the amount of EUR 95,300.00 (previous year: kEUR 95.3).

Other provisions include as main items the provision for unconsumed annual leave in the amount of EUR 2,309,200.00 (previous year: kEUR 2,490.4), provisions for potential claims for refund of various funding parties in the amount of EUR 1,277,200.00 (previous year: kEUR 693.0), the provision for working time credits in the amount of EUR 639,600.00 (previous year: kEUR 837.4) and the provision for anticipated losses or costs of work in progress in the amount of EUR 571,700.00 (previous year: kEUR 681.3).

This item also includes the **provision for the tax audit** by the Tax Office of Graz-Stadt in the amount of EUR 3,980,700.00 (previous year: kEUR 3,980.7).

■ Liabilities

The item **bank borrowings** in the amount of EUR 1,580,333.71 (previous year: kEUR 3,674.6) includes an export fund credit line of EUR 712,193.77 (previous year: kEUR 712.2) and a loan for the acquisition of the property EZ [folio number] 458 GB [Land Register] 60340 in Niklasdorf with a remaining term of more than five years in the amount of EUR 868,139.94 (previous year: kEUR 962.5). The cash advance as at 31 December 2019 in the amount of EUR 2,000,000.00 was fully redeemed.

Advances received on orders that may be deducted from inventories amounted to a net amount of EUR 19,119,812.92 (previous year: kEUR 13,356.1). This item also includes advances of EUR 10,907,879.77 (previous year: kEUR 6,298.5) made by funding parties.

As at the balance sheet date trade payables were EUR 2,269,434.59 (previous year: kEUR 2,892.7), predominantly to Austrian suppliers.

Other liabilities include the profit-participating loan granted by the State of Styria on 1 November 2004 in the amount of EUR 1,387,477.00 (previous year: kEUR 1,387.5). In addition, this item mainly includes clearing funds with the Austrian Health Insurance Fund [Österreichische Gesundheitskasse/ÖGK] and other necessary deferrals.

Other liabilities include expenses in the amount of EUR 2,218,738.83 (previous year: kEUR 2,015.2), which will be paid only after the balance sheet date.

■ Other Financial Obligations

Based on the business plan of JR-AquaConSol GmbH and the resolution of the supervisory board of JOANNEUM RESEARCH Forschungsgesellschaft mbH of 6 June 2016 the financial obligations for the financial year 2020 were EUR 0.00 (previous year: kEUR 174.0). Thanks to the positive development of JR-AquaConSol GmbH, which was above expectations, there was no need to allocate the agreed shareholder contribution in the past financial year. The declining shareholder contribution in a maximum amount of EUR 1,660,000.00 expired on 31 December 2020.

Obligations arising from use of property, plant and equipment not presented in the balance sheet: (see below).

■ Accruals and Deferred Income

Accruals and deferred income in the amount of EUR 192,356.29 (previous year: kEUR 177.4) mainly concern price gains not yet realised.

■ Escrow Liabilities

Escrow liabilities result from projects with the Austrian Research Promotion Agency (Österreichische Forschungsförderungsgesellschaft mbH) or the European Commission, where JOANNEUM RESEARCH Forschungsgesellschaft mbH acts as the coordinator and holds the funds in escrow and manages payments for the project partners (see escrow funds).

■ Contingent Liabilities

(cf. in this respect Other disclosures, contingencies).

	For the Next Financial Year EUR	For Financial Years 2021 – 2025 EUR
Room rents (previous year)	893,669.00 (835,812.00)	4,468,345.00 (4,179,059.00)
Equipment rents (previous year)	60,312.00 (72,420.00)	207,160.00 (362,100.00)
Lease payments (previous year)	0.00 (15,471.00)	0.00 (15,471.00)
Total (Previous Year)	953,981.00 (923,703.00)	4,675,505.00 (4,556,630.00)

NOTES TO THE INCOME STATEMENT

The **revenues** generated in the financial year 2020 are classified according to areas of activity and divided into domestic and international revenues:

Amounts in EUR	Financial Year 2020 EUR	Financial Year 2019 EUR
Research	5,935,866.81	7,966,447.62
Royalties	702,551.84	849,059.89
Congress fees	3,919.11	3,861.48
Other	1,431,266.38	1,649,574.42
Total Domestic Revenues	8,073,604.14	10,468,943.41
International Revenues		
Research	5,938,449.13	6,565,387.04
Royalties	19,593.33	55,766.67
Congress fees	0.00	0.00
Other	0.00	458.18
Total International Revenues	5,958,042.46	6,621,611.89
Total Revenues	14,031,646.60	17,090,555.30

The expenses of EUR 867,571.60 (previous year: kEUR 1,144.9) stated in item 8.(bb) include contributions to Severance Pay and Pensions Funds in the amount of EUR 254,035.69 (previous year: kEUR 240.7) and expenses for severance payments in the amount of EUR 613,535.91 (previous year: kEUR 899.0) and severance compensation in the amount of EUR 0.00 (previous year: kEUR 5.3).

OTHER DISCLOSURES

■ Shares in Affiliates and Participating interests

As at the balance sheet date 31 December 2020 the Company held 100% of the shares or EUR 150,000.00

(previous year: kEUR 150.0) in JR-AquaConSol GmbH.

The annual financial statements for the year ended 31 December 2020 showed equity of EUR 1,299,286.08 (previous year: EUR 1,463,462.58) including a net profit for the year of EUR 999,286.08 (previous year: EUR 1,163,462.58).

In addition, the Company held another participating interest of 25% of the shares or EUR 8,750.00 (previous year: kEUR 8.8) in EPIG GmbH as at the balance sheet date 31 December.

The annual financial statements for the year ended 31 December 2020 showed equity of EUR 216,286.06 (previous year: EUR 132,719.66) that includes net profit for the year of EUR 181,286.06 (previous year: EUR 97,719.66).

All other participating interests were below 20%.

■ Staff

As at the balance sheet date the Company had 483 (previous year: 469) employees; taking part-time employees into account on a pro rata basis, the number of staff was 398.1 (previous year: 390.1). Taking part-time employees into account on a pro rata basis, the average number of employees was 392.5 (previous year: 385.4).

In application of the provisions of Section 242(4) UGB no itemisation of salaries, severance payments or pensions for the management as defined in Section 239(1) UGB was made.

Pensions in the amount of EUR 262,111.48 (previous year: kEUR 256.6) were paid to former members of bodies and a liability for pension payments of EUR 166,821.50 (previous year: kEUR 0) was recognised.

No loans or advances were granted to members of the management or of the supervisory board. No liability in favour of that group of persons was assumed either.

The cost of remuneration of members of the Scientific Advisory Board and of the supervisory board amounted to EUR 109,190.64 (previous year: kEUR 108.3) in total.

■ Results After the Balance Sheet Date

After closing of the accounts for the financial year 2020 no other significant events occurred which would have affected the financial position or financial performance in the financial year 2020.

BODIES OF THE COMPANY

Bodies of the Company in the Financial Year 2020:

■ Scientific Advisory Board

Prof. Dr Dr Gerald **SCHÖPFER**
Chairman

Prof. Dr Gerhard **FRIEDRICH**
Deputy Chairman

Prof. Dr Gernot **HANREICH**
Deputy Chairman

Prof. Dr Hansjörg **ALBRECHER**

Prof. Dr Horst **BISCHOF**

Dr Michaela **FRITZ**

Prof. Dr Günter **GETZINGER**

Prof. Dr Dr Manfred **HUSTY**

Dr Mario **MÜLLER**

Michael **PATAK**

Reinhard **PETSCHACHER**

Herbert **RITTER**, MBA

Prof. Dr Karin **SCHAUPP**

Waltraud **SCHINKO-NEUROTH**

Caroline **SCHOBERT-TRUMMLER**

Dr Stefan **TASCH**

Prof. Dr Frank **UHLIG**

■ Supervisory Board

Dr Martin **WIEDENBAUER**
Chairman

Prof. Fritz **SPERL**, MAS MBA
Deputy Chairman

Dr Ertfried **TAURER**
Deputy Chairman

Klaus **HATZL**, MA

Prof. Dr Werner **HAUSER**

Michaela **KRENN**

Ingolf **SCHÄDLER**

Dr Birgit **STRIMITZER-RIEDLER**

Ursula **STROHMAYER**

■ Members delegated to the Supervisory Board by the Works Council

Ferdinand **GOLJA**
Chairman of the Works Council

Clemens **HABSBURG-LOTHRINGEN**, MAS

Helen **HASENAUER**, MSc

Maria **HINGSAMER**

Gertrude **MATZER**, BA MSc

■ Management

Prof. Dr Wolfgang **PRIBYL**, MBA

ANNEX

■ Contingencies

Pursuant to Section 199 UGB guarantees for rent security deposits vis-à-vis Zentrum für Wissens- und Technologietransfer in der Medizin GmbH (EUR 110,890.00), W.E.I.Z. Immobilien GmbH (EUR 38,019.46) and SFL technologies Science Tower GmbH (EUR 36,000.00) as well as retention guarantees vis-à-vis Autobahnen- und Schnellstraßen-Finanzierungs Aktiengesellschaft (EUR 101,001.13) and voestalpine Wire Rod Austria GmbH (EUR 44,550.00) are presented below the balance sheet.

Pursuant to Section 199 UGB a performance bond vis-à-vis the Cochin University of Sciences and Technology (EUR 3,027.25), a bid bond vis-à-vis the Indian Institute of Tropical Meteorology (EUR 1,887.13) and guarantees for rent security deposits vis-à-vis Zentrum für Wissens- und Technologietransfer in der Medizin GmbH (EUR 110,890.00), W.E.I.Z. Immobilien GmbH (EUR 38,019.46) and SFL technologies Science Tower GmbH (EUR 36,000.00) as well as retention guarantees vis-à-vis Autobahnen- und Schnellstraßen-Finanzierungs Aktiengesellschaft (EUR 104,045.15) and voestalpine Wire Rod Austria GmbH (EUR 44,550.00) were presented below the balance sheet for the previous year.

■ Other Information

Based on the objectives defined in Article 1(3) of the Articles of Association the Company pursues the aim of furtherance of the general public in the fields of research, development and science exclusively and directly in the interest of public welfare. No net profit that may be generated will be distributed.

According to a decision dated 16 January 1995, reference no. 29/31-10/94, of the finance authority for the State of Styria, JOANNEUM RESEARCH Forschungsgesellschaft mbH belongs to the group of preferential recipients as defined in Section 4(4) No. 5(e) of the Austrian Personal Income Tax Act [Einkommensteuergesetz/EstG] 1988 as amended by Art. I No. 4(a) of the Austrian Tax Reform Act [Steuerreformgesetz] 1993.

The expenses for the statutory auditor for auditing the annual financial statements amounted to EUR 17,400.00 (previous year: EUR 23,800.00). No other certification services, tax advisory services or other services of the statutory auditor were rendered in the reporting year or in the previous year.

Graz, 4 March 2021

Univ.-Prof. DI Dr. Wolfgang Pribyl, MBA



Development of Non-Current Assets	Cost of Acquisition			Accumulated Amortisation and Depreciation			Carrying Amounts				
	1 Jan 2020	Additions	Disposals	Reclassification	31 Dec 2020	1 Jan 2020	Additions	Disposals	31 Dec 2020	31 Dec 2019	31 Dec 2020
I) Intangible assets											
Software, data transmission rights and other rights	3,035,926.32	186,697.72	0.00	0.00	3,222,624.04	2,620,353.32	281,656.72	0.00	2,902,010.04	415,573.00	320,614.00
Total intangible assets	3,035,926.32	186,697.72	0.00	0.00	3,222,624.04	2,620,353.32	281,656.72	0.00	2,902,010.04	415,573.00	320,614.00
II) Property, plant and equipment											
1) Land, rights equivalent to land and buildings, including buildings on land owned by others											
a) Land value	2,875,240.02	2,554.00	0.00	0.00	2,877,794.02	0.00	0.00	0.00	0.00	2,875,240.02	2,877,794.02
b) Building value	16,770,987.34	226,322.91	22,701.10	70,126.18	17,044,735.33	9,263,924.34	574,343.09	15,716.10	9,822,551.33	7,507,063.00	7,222,184.00
Subtotal land and buildings	19,646,227.36	228,876.91	22,701.10	70,126.18	19,922,529.35	9,263,924.34	574,343.09	15,716.10	9,822,551.33	10,382,303.02	10,099,978.02
2) Machinery, scientific equipment and EDP systems	28,887,677.04	1,675,344.26	42,567.47	476,763.14	30,997,216.97	23,612,555.04	2,219,029.40	40,140.47	25,791,443.97	5,275,122.00	5,205,773.00
3) Other plant, furniture and fixtures	3,562,543.01	206,812.80	37,894.02	9,826.74	3,741,288.53	2,797,715.01	237,576.54	37,421.02	2,997,870.53	764,828.00	743,418.00
4) Advances made and construction in progress	725,500.92	1,861,771.46	0.00	-595,177.33	1,992,095.05	0.00	0.00	0.00	0.00	725,500.92	1,992,095.05
Offsetting of input tax on advances for non-current assets	-38,461.27	-2,435.82	0.00	38,461.27	-2,435.82	0.00	0.00	0.00	0.00	-38,461.27	-2,435.82
Subtotal advances made and construction in progress	687,039.65	1,859,335.64	0.00	-556,716.06	1,989,659.23	0.00	0.00	0.00	0.00	687,039.65	1,989,659.23
5) Low-cost assets	0.00	102,360.70	102,360.70	0.00	0.00	0.00	102,360.70	102,360.70	0.00	0.00	0.00
Total property, plant and equipment	52,783,487.06	4,072,730.31	205,523.29	0.00	56,650,694.08	35,674,194.39	3,133,309.73	195,638.29	38,611,865.83	17,109,292.67	18,038,828.25
III) Financial assets											
1) Shares in affiliates	150,000.00	0.00	0.00	0.00	150,000.00	0.00	0.00	0.00	0.00	150,000.00	150,000.00
2) Participating interests	341,688.25	0.00	0.00	0.00	341,688.25	0.00	0.00	0.00	0.00	341,688.25	341,688.25
3) Investment securities (book-entry securities)	1,570,750.00	368,000.00	214,000.00	0.00	1,724,750.00	0.00	0.00	0.00	0.00	1,570,750.00	1,724,750.00
Total financial assets	2,062,438.25	368,000.00	214,000.00	0.00	2,216,438.25	0.00	0.00	0.00	0.00	2,062,438.25	2,216,438.25
Total Non-Current Assets	57,881,851.63	4,627,428.03	419,523.29	0.00	62,089,756.37	38,294,547.71	3,414,966.45	195,638.29	41,513,875.87	19,587,303.92	20,575,880.50

MANAGEMENT REPORT

The Management Report covers the reporting period of the financial year 2020 from 1 January 2020 to 31 December 2020 and is divided into three sections: I. Report on the course of the Company's business and financial position; II. Report on prospective developments and risks of the Company, and III. Report on research and development.

I. Report on the Course of the Company's Business and Financial Position

I.1 Business Organisation

As at 31 December 2020 JOANNEUM RESEARCH was organised in seven research units, which represent the main areas of activities.

Research Units	
DIGITAL	Institute for Information and Communication Technologies
MATERIALS	Institute for Surface Technologies and Photonics
ROBOTICS	Institute for Robotics and Mechatronics
COREMED	Cooperative Centre for Regenerative Medicine
HEALTH	Institute for Biomedicine and Health Sciences
LIFE	Institute for Climate, Energy and Society
POLICIES	Institute for Economic and Innovation Research

I.2 Investment Report

As at 31 December 2020 JOANNEUM RESEARCH held corporate investments in the following companies:

► I.2.1 Shares in Affiliates

In the balance sheet the limited liability company JR-AquaConSol GmbH, Graz, is presented as an affiliate.

	Share in %
JR-AquaConSol GmbH	100.0 %

► I.2.2 Corporate Investments

	Share in %
ALP.Lab GmbH	16.0 %
decide Clinical Software GmbH	10.0 %
EPIG GmbH	25.0 %
FH JOANNEUM Gesellschaft mbH	14.9 %
Geo5 GmbH	10.0 %
Holz.Bau Forschungs GmbH	5.98 %
Human.technology Styria GmbH	7.0 %
Pacemaker Technologies GmbH	3.0 %
Rebeat Innovation GmbH	1.88 %

MANAGEMENT REPORT

► I.2.3 Corporate Investments - COMET (K1, K2) Competence Center Programme

As at 31 December 2020 the Company owned shares in the following companies, which are funded through the COMET (Competence Centers for Excellent Technologies) Programme of the Federal Ministry for Climate Action, Environment, Energy, Mobility, Innovation and Technology (BMK) and the Federal Ministry for Digital and Economic Affairs (BMDW):

	Share in %
ACIB GmbH	8.0 %
BEST-Bioenergy and Sustainable Technologies GmbH	10.0 %
CBmed GmbH	12.5 %
Know-Center GmbH Research Center for Data-Driven Business & Big Data Analytics	10.0 %
Materials Center Leoben Forschung GmbH	17.5 %
Polymer Competence Center Leoben GmbH	17.0 %
Research Center Pharmaceutical Engineering GmbH	15.0 %
Virtual Vehicle Research GmbH	8.4 %

■ I.3 Branches

The Company has no branches.

■ I.4 Course of Business – FCO

As at 31 December 2020 the orders on hand amounted to approximately EUR 81.9 million. The work on hand amounted to approximately EUR 45.0 million, the value of offers submitted was approximately EUR 29.6 million. The profit for the financial year 2020 amounted to kEUR 321.9 (previous year: loss for the year of approximately kEUR 1,202.8). Accordingly, the calculated self-financing ratio (operating result / total expenses) was 78% (previous year: 77%).

The operating result from contract research projects for the financial year 2020 was approximately EUR 15.0 million (previous year: approximately EUR 16.5 million). Funded research projects generated an operating result of approximately EUR 16.8 million (previous year: approximately EUR 15.6 million).

At an international level JOANNEUM RESEARCH generated revenues from contract research projects and funded research projects of approximately EUR 11.5 million in the aggregate in the reporting year (previous year: approximately EUR 10.5 million). An amount of approximately EUR 5.5 million thereof (previous year: approximately EUR 3.9 million) is attributable to projects with the European Union and approximately EUR 6.0 million (previous year: approximately EUR 6.6 million) to contract research projects. Due to the participation of JOANNEUM RESEARCH in the programmes of the European Union and calls for proposals by the European Space Agency (ESA) the Company generated total revenues of approximately EUR 1.3 million in the financial year 2020. Under the Horizon 2020 programme projects with a funding volume of approximately EUR 15.7 million were awarded to the Company and in connection with ESA projects an order volume of approximately EUR 1.6 million was solicited.

In the financial year 2020 revenues of approximately EUR 6.3 million (previous year: approximately EUR 6.0 million) were achieved through national cooperative research projects related to the Austrian Research Promotion Agency (Österreichische Forschungsförderungsgesellschaft mbH/FFG).

Under a 2019-2021 funding agreement with the Federal Ministry for Climate Action, Environment, Energy, Mobility, Innovation and Technology (BMK) funds in an amount of EUR 7.8 million were granted. In the reporting period JOANNEUM RESEARCH generated revenues totaling approximately EUR 2.5 million from BMK.

In the financial year 2020 the attributable business share amounted to EUR 13.6 million.

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► I.4.1 Financial Position

The Company's assets and financing structure developed as follows:

As at the balance sheet date, 31 December 2020, JOANNEUM RESEARCH had a balance sheet total of approximately EUR 71.7 million (previous year: approximately EUR 63.1 million). This is comprised of non-current assets in the amount of approximately EUR 20.6 million and current assets (inclusive of prepayments and accrued income, and escrow funds) of approximately EUR 51.1 million.

As at 31 December 2020 shareholders' equity including investment grants amounted to around EUR 11.5 million (thereof investment grants of approximately EUR 1.8 million) or 16% of the balance sheet total compared to around EUR 11.3 million or 18% of the previous year's balance sheet total. Borrowings (inclusive of accruals and deferred income, and escrow liabilities) increased by approximately EUR 8.4 million to approximately EUR 60.2 million (previous year: EUR 51.8 million) and amounted to 84% (previous year: 82%) of the balance sheet total.

In the financial year 2020 cash flows from the result as the sum total of generated profit for the year and the income and expense items (the Company's internal financing potential) amounted to approximately EUR 3.2 million. Working capital (current assets minus short-term borrowings) was approximately EUR 15.6 million (previous year: approximately EUR 12.2 million).

No derivative financial instruments were used in the past financial year 2020. The financial instruments recognised in the balance sheet are part of the Company's general risk management, which is reflected in the book-keeping and accounting policies.

► I.4.2 Financial Performance

In the financial year 2020 the operating result including own work capitalised and other operating income net of shareholder contribution and research tax premium amounted to approximately EUR 32.2 million (previous year: approximately EUR 33.4 million).

Domestic revenues accounted for 63% and international revenues accounted for 37% of the operating result

generated in projects. The share of the operating result of 13% generated in projects attributable to Styria did not change compared to the previous year.

The amount of services not yet chargeable increased by approximately EUR 0.8 million compared to the previous year and amounted to approximately EUR 8.4 million as at 31 December 2020.

The expenses in the amount of approximately EUR 45.5 million (previous year: approximately EUR 48.2 million) are made up of staff costs including statutory social security charges and voluntary social benefits plus allocations to pension provisions (former managing director) and severance payments of approximately EUR 31.1 million (previous year: approximately EUR 31.6 million), cost of materials and other services purchased of approximately EUR 3.0 million (previous year: approximately EUR 3.4 million), amortisation and depreciation of approximately EUR 3.4 million (previous year: approximately EUR 3.1 million) and other operating expenses of approximately EUR 8.0 million (previous year: approximately EUR 10.1 million).

As at the balance sheet date the self-financing ratio was 78% (previous year: 77%). The shareholder contributions of the State of Styria, the State of Carinthia through Kärntner Betriebsansiedlungs- und Beteiligungsgesellschaft m.b.H. (BABEG), the State of Burgenland and the Grant Agreement with the Federal Ministry for Climate Action, Environment, Energy, Mobility, Innovation and Technology (BMK) constitute material parts of corporate financing and secure accomplishment of the Company's mission.

The Company closed the financial year 2020 with a profit before taxes (formerly profit or loss on ordinary activities) of EUR 73,815.46. Taking into account income taxes of EUR 1,750.00, reversal of reserves in the amount of EUR 249,833.48 and the profit of EUR 63,179.57 carried forward from the previous year, the net profit for the year is EUR 385,078.51.

After the accounts for the financial year 2020 had been closed no other significant events occurred which would have affected the financial position or financial

MANAGEMENT REPORT

performance in the financial year 2020.

► I.4.3 Capital Expenditure Report

In the financial year 2020 approximately EUR 4.1 million (previous year: approximately EUR 4.9 million) were invested in property, plant and equipment (scientific equipment, electronic data processing systems, furniture and fixtures, land with buildings).

► I.4.4 Staff Report

As at the balance sheet date the Company had 483 employees (186 women and 297 men), +2.99% (+6.29% women and +1.02% men) compared to the previous year's figures. This is equal to 398.1 full-time equivalents as at 31 December 2020, i.e. an increase by 2.06% compared to the previous year.

With 75 new employees (37 women and 38 men), and 61 employees who left the Company (26 women and 35 men) in the reporting period the fluctuation regarding active employees was approximately 12.63% (13.98% regarding women and 11.78% regarding men). This figure has decreased compared to the previous year (14.71%).

The average age of the Company's employees is 41.8 years and has therefore changed only slightly compared to the previous year (41.6 years).

As at 31 December 2020 the share of graduates from universities and universities of applied sciences was 71.22% (34.01% women); the share of grammar school graduates was 18.43%.

As at the balance sheet date 5 apprentices, 1 female and 4 male, were undergoing training at JOANNEUM RESEARCH.

In the reporting period a total of 7 interns (5 women, 2 men) were employed, who completed their compulsory internships in connection with their studies at universities of applied sciences or universities or international exchange programmes. In addition, 30 students (8 female and 22 male) were granted an opportunity to write their diploma or doctoral theses in an employment relationship with JOANNEUM RESEARCH in cooperation with the relevant universities.

II. Report on Prospective Developments and Risks of the Company

■ Economic Policy Framework conditions for Research and Development (R&D)

Due to the unexpected and massive slump in the global economy caused by the covid-19 pandemic, which manifested itself in early 2020 and has continued since, the economic outlook is currently subject to great uncertainty. In particular the globally varying intensity of repeatedly imposed lockdowns, which have severely affected trade and commerce and the tourism industry in Austria, and the delays in the manufacturing and distribution of approved vaccines in the European Union make forecasts on future economic developments more difficult.

Additional factors, such as the long-winded treaty negotiations between the European Union and the United Kingdom related to Brexit and the critical phase in connection with the presidential elections in the United States of America, have also contributed to increased economic uncertainty.

As a significant indicator of the presently difficult situation the major slump in the performance of the Austrian and international economies has to be mentioned. For example, for 2020 a decline in Austria's GDP by -7.3% compared to 2019 is expected (WIFO [Austrian Institute of Economic Research] Monthly Report 01/2021, p 25-38), although last summer the economy recovered for a short period, which led to economic rebound effects. The decline by -7.5% in GDP in the eurozone is not much higher, with specific countries like Germany (-5.1%) coping with the crisis much better.

For 2021 and 2022 the economy in the EEA is expected to recover, however with growth rates of +4.8% (2021) and +3.1% (2022) for the eurozone the losses from 2020 can only be balanced in part. For Austria GDP is expected to grow by +2.5% (2021) and +5.1% (2022) in the reference period taking into account the scenario of a third lockdown, which has already occurred. It is assumed that from Q 2/21, from the time the economy will start to recover, these developments will be strongly influenced by rebound effects such as additional spending due to the consumption backlog. However, those effects will decre-

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ase in the course of 2021 as the expected normalisation occurs. The pre-crisis level of domestic added value is expected to be reached by mid-2022 at the earliest.

Due to the extraordinary situation of both the public sector and the entrepreneurial sector as major investors in research activities no estimate of the research share for the past year was made. The only indication thereof is thus the revised global R&D estimate for 2019, which amounts to 3.18% (EUR 12.7 billion) (STATISTICS AUSTRIA of 9 October 2020).

■ Shareholder Contribution from the State of Styria

The Government of the State of Styria provided JOANNEUM RESEARCH with a shareholder contribution of EUR 7,700,000.00 for 2020 as a contribution to recurring expenses.

For 2021 an amount of EUR 7,700,000.00 will be provided as a shareholder contribution to recurring expenses. To cover pro-rata additional funds required due to covid-19 the State of Styria as the majority shareholder made an additional one-off shareholder contribution of EUR 200,000.00.

■ Shareholder Contribution from Kärntner Betriebsansiedlungs- und Beteiligungsgesellschaft m.b.H. (BABEG)

The shareholder contribution agreement between BABEG and JOANNEUM RESEARCH expired at the end of 2020.

For the financial years 2021-2024 a new agreement was concluded, under which BABEG has agreed to grant an annual shareholder contribution of EUR 1,504,000.00 to further develop the location of Carinthia. In addition, BABEG has agreed to make another shareholder contribution in the amount of EUR 100,000.00 for expanding the scientific know-how in the area of Next-Generation Robot Networks by 30 September 2021.

Likewise, also taking into account its participating interest, BABEG granted an additional one-off shareholder contribution of EUR 35,000.00 to cover pro-rata additional funds required due to covid-19.

■ Shareholder Contribution from the State of Burgenland

Under the Participation and Cooperation Agreement between the State of Styria, Kärntner Betriebsansiedlungs- und Beteiligungsgesellschaft m.b.H. (BABEG) and Landesholding Burgenland GmbH (LHB) the State of Burgenland agreed to grant JOANNEUM RESEARCH a shareholder contribution of EUR 464,500.00 for the term of the investment.

Likewise, also taking into account its participating interest, the State of Burgenland granted LHB an additional one-off shareholder contribution of EUR 12,500.00 to cover pro-rata additional funds required due to covid-19.

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■ Grant Agreement with the Federal Ministry for Climate Action, Environment, Energy, Mobility, Innovation and Technology (BMK)

In financial 2020 BMK provided funding in a total amount of EUR 2,585,000.00 for near-basic research projects under the current Grant Agreement 2019-2021.

Conclusion of another Grant Agreement for 2022-2024 was principally agreed with BMK. The parties plan to carry out fundamental research projects with a total funding of EUR 7.755 million.

The shareholder contributions of the State of Styria, Kärntner Betriebsansiedlungs- und Beteiligungsgesellschaft m.b.H. (BABEG), the State of Burgenland and the Grant Agreement with the Federal Ministry for Climate Action, Environment, Energy, Mobility, Innovation and Technology (BMK) are significant financing tools of JOANNEUM RESEARCH.

■ Risks and Prospective Development

As a research company JOANNEUM RESEARCH faces changing national and international framework conditions in research funding and due to the formation of new initiatives. Competition for available grants and excellent researchers is becoming increasingly tough.

Due to the global pandemic the financial year 2020 was quite challenging. Fortunately, the operating result did not drop as heavily as in other sectors due to the corona pandemic. The future consequences of the pandemic cannot be predicted, but there is hope that the federal government's measures to support the economy will contribute to an economic stabilisation in 2021.

JOANNEUM RESEARCH expects financial performance to stabilise and even recover during the financial year 2021.

■ IT Security at JOANNEUM RESEARCH

Attacks on IT and communication systems of Austrian business enterprises are a permanent threat. For 2020 a study on this subject showed that 57% of 652 surveyed entities had been victims of cyber attacks (previous year: 66%; comparison of the KPMG studies on "Cyber security in Austria" for 2020 and 2019). In almost half of the cases (49%) minor financial losses occurred; 4% suffered serious damage and in 36% of the cases the loss could not be quantified. The estimated number of undetected cases is much higher, as only one third of the entities report such attacks to the authority.

Three fourths of the entities were exposed to attacks which spied out log-in data (phishing), one half of the entities believes that attacks on government players have increased. Cyber attacks have become normal and are a constant threat, which is why 69% of all enterprises invest in precautionary measures.

In terms of the human factor gullibility of the victims, lack of awareness of the need for security measures and the increasing prominence of digital equipment in everyday life are used as attack vectors. Increased teleworking leads to decentralisation, which offers additional points of attack.

In March 2020, at the beginning of the lockdown due to the pandemic, the Company took supplementary IT measures to allow and implement the increased use of teleworking in the best possible way. Encrypted VPN connections, systems for video conferencing, online trainings and online webinars have optimally supplemented online systems that had existed before the crisis.

In 2020 77% of the surveyed entities demanded stronger support from the government. JOANNEUM RESEARCH has cooperated with the Federal Agency for State Protection and Counter Terrorism (BVT) for many years to be kept informed about the security situation for its company-wide risk provision. This concerns both threats to IT security and threats to public security. In this way measures can be taken early and staff can be informed accordingly, where necessary.

In May 2020 JOANNEUM RESEARCH was the victim of a cyber attack via the Austrian ACOnet internet research network. A DDoS (Distributed-Denial-of-Service) attack,

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presumably from Eastern Europe, caused an overload of the servers. The attack started on a Friday at 9:30 a.m. After approximately 20 minutes the Company's internet connection was completely overloaded. Therefore, the public websites of the Company could not be retrieved and the staff working from home had no access to the server data. The team of JOANNEUM RESEARCH's Computing Center immediately fought the attack in cooperation with the Graz University of Technology, the AConet operator of the University of Vienna. From 12:10 p.m. operations started to normalise and at 1:07 p.m., i.e. in less than four hours, our specialists were able to give the all-clear.

As a company that generates knowledge JOANNEUM RESEARCH faces worldwide competition in specific research areas. Accordingly, there is a strategic risk of trade secrets being spied out by competitors who possess significant resources, or by government-related agencies. In order to prevent that, the Company invests in creating high awareness among its staff, in comprehensive authorisation concepts, a strict password policy, a private cloud, encryption, and much more.

In summary it can be said that JOANNEUM RESEARCH has once more improved and further enhanced its IT security measures. In implementing new technical standards and legislation measures are regularly taken throughout the Company to enhance security, on the one hand, which, however, also requires capital expenditure, on the other hand.

III. Report on Research and Development

III.1 Research Units

➔ DIGITAL – Institute for Information and Communication Technologies

Activities planned for financial 2021

DIGITAL is one of the internationally leading applied research partners in the area of information and communication technology (ICT). In this function DIGITAL has assumed the role of a product innovator and business enabler in many areas of the economy with a permanent focus on the market also in 2021. Intelligent sensor systems constitute an important technological basis of the institute. Networking of dramatically increasing distributed data volumes originating not only from sensors but from different sources is the motor

for another focus of the institute, communication technology. The DIGITAL Institute offers solutions by means of innovative methods in this field. A major focus of DIGITAL is on the mapping of new and the transfer of existing complex algorithms in the edge-to-cloud continuum.

➔ MATERIALS – Institute for Surface Technologies and Photonics

Activities planned for financial 2021

For financial 2021 the major scientific goals of the institute as a whole are to strengthen its reputation as one of the leading research facilities for nanotechnology, surface technologies and photonics in Austria and abroad. Further development of the core competences in the technology fields with a USP, such as roll-based UV nano imprint technology, as well as the Smart Connected Lighting research group in Burgenland and its enhanced cooperation with business partners in the region are in the focus of the institute's activities. The expansion of ultraprecise laser micro-machining and manufacturing, which is suitable for industrial production, for developing technologies and products together with business partners is also driven forward.

➔ ROBOTICS – Institute for Robotics and Mechatronics

Activities planned for financial 2021

ROBOTICS' consistent further development of topics focuses on embedding robotics in the digitalisation projects of an industry 4.0 transformation. In 2021 a major focus is thus on applied AI and embedding this means of production in a closely interconnected ICT infrastructure and process chain by means of information technology. In addition to technical support by experts in the Robot Systems Technologies research group ROBOTICS therefore also offers supporting qualification through the ROBOTICS Training Center (RTC) and accredited audits by the ROBOTICS Evaluation Lab (REL) for the jointly developed innovations.

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► COREMED - Cooperative Centre for Regenerative Medicine

Activities planned for financial 2021

In 2021 and the next few years COREMED's research focus will continue to be on the development and validation of pre-clinical models for wound healing and wound healing disorders. Another important research topic will be the development and validation of in-vitro skin models and disease-specific models. Already established pre-clinical models and those being developed will serve the purpose of soliciting contract research projects and research projects funded by third parties. In 2021 COREMED's close cooperation with HEALTH and with the Medical University of Graz will be at the core of its strategic focus.

► HEALTH – Institute for Biomedicine and Health Sciences

Activities planned for financial 2021

HEALTH supports clinical and pre-clinical research into the effect and efficacy of medicines and interventions in dermatology, neurology, and metabolism research by customised studies in the fields of pharmacokinetics and pharmacodynamics, bioanalytics, data management and statistics. In addition, the institute cooperates with the producing pharmaceutical industry regarding issues of cleaning validations and determinations of content. Here the institute acts as a professional clinical research organisation (CRO) and will continue to expand and strengthen this position in 2021. HEALTH manages to build a bridge between scientific excellence and industry-oriented offers by applying its key technologies, namely open flow microperfusion (OFM) and mass spectrometry.

► LIFE – Institute for Climate, Energy and Society

Activities planned for financial 2021

In 2021 LIFE will continue to proactively research into topics of the future and intensively communicate its activities. Quantitative and data-driven research approaches will continue to be reinforced and are going in two clear directions: one is scientific excellence and the other is to systematically expand practical relevance together with and through so-called preferential business and/or preferential policy partners with a focus on the partners' topics. For 2021 it is also planned to prepare the potential outsourcing of products in the area of weather and climate risk management which are ready for the market, maybe also in cooperation with another scientific institution, until it is ready for a decision to be made.

► POLICIES – Institute for Economic and Innovation Research

Activities planned for financial 2021

The fundamental mission of POLICIES in providing advice and support to customers from politics and business in making strategic and operational decisions will be continued in 2021. Major focus areas will, above all, be research into the effects of the covid crisis and the climate crisis and supporting politics and businesses in evidence-based responses, provision and use of large information bases and systems, supporting politics in regional and national strategic processes, and evaluating policy measures and grants, as well as supporting user-friendly and responsible technological development and innovation. Another focus will be on the methodological support of data-driven technological developments for the Austrian industry.

Graz, 4 March 2021



Die Geschäftsführung:

Univ.-Prof. DI Dr. Wolfgang Pribyl, MBA e.h.

CONSOLIDATED FINANCIAL STATEMENT

AUDITOR'S REPORT

Report on the Consolidated Financial Statements

■ Audit Opinion

We have audited the consolidated financial statements of JOANNEUM RESEARCH Forschungsgesellschaft mbH Graz and of its subsidiaries (the group). These consolidated financial statements comprise the consolidated balance sheet as of December 31, 2020, with an equity of EUR 10,825,855.21, the consolidated income statement, the consolidated statement of changes in equity and the consolidated statement of cash flows for the fiscal year then ended and the notes to the consolidated financial statements.

Based on our audit the accompanying consolidated financial statements were prepared in accordance with the legal regulations and present fairly, in all material respects, the assets and the financial position of the group as of December 31, 2020 and its financial performance for the year then ended in accordance with Austrian Generally Accepted Accounting Principles.

■ Basis for Opinion

We conducted our audit in accordance with Austrian Standards on Auditing. Those standards require that we comply with International Standards on Auditing (ISA). Our responsibilities under those regulations and standards are further described in the "Auditor's Responsibilities for the Audit of the Financial Statements" section of our report. We are independent of the Company in accordance with the Austrian General Accepted Accounting Principles and professional requirements and we have fulfilled our other ethical responsibilities in accordance with these requirements. We believe that the audit evidence we have obtained until the date of this auditor's report is sufficient and appropriate to provide a basis for our opinion by this date.

■ Responsibilities of Management and of the Audit Committee for the Financial Statements

Management is responsible for the preparation of the consolidated financial statements in accordance with Austrian Generally Accepted Accounting Principles, for them to present a true and fair view of the assets, the financial position and the financial performance of the Group and

for such internal controls as management determines are necessary to enable the preparation of consolidated financial statements that are free from material misstatement, whether due to fraud or error.

In preparing the consolidated financial statements, management is responsible for assessing the Group's ability to continue as a going concern, disclosing, as applicable, matters related to going concern and using the going concern basis of accounting unless management either intends to liquidate the Group or to cease operations, or has no realistic alternative but to do so.

The Audit Committee is responsible for overseeing the Group's financial reporting process.

■ Auditor's Responsibilities for the Audit of the Consolidated Financial Statements

Our objectives are to obtain reasonable assurance about whether the consolidated financial statements as a whole are free from material misstatement, whether due to fraud or error, and to issue an auditor's report that includes our opinion. Reasonable assurance is a high level of assurance, but is not a guarantee that an audit conducted in accordance with International Standards on Auditing will always detect a material misstatement when it exists. Misstatements can arise from fraud or error and are considered material if, individually or in the aggregate, they could reasonably be expected to influence the economic decisions of users taken on the basis of these consolidated financial statements.

As part of an audit in accordance with Austrian Standards on Auditing, which require the application of ISA, we exercise professional judgment and maintain professional scepticism throughout the audit.

■ **We also:**

- identify and assess the risks of material misstatement of the consolidated financial statements, whether due to fraud or error, design and perform audit procedures responsive to those risks, and obtain audit evidence that is sufficient and appropriate to provide a basis for our opinion. The risk of not detecting a material misstatement resulting from fraud is higher than for one resulting from error, as fraud may involve collusion, forgery, intentional omissions, misrepresentations, or the override of internal control.
- obtain an understanding of internal control relevant to the audit in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the Group's internal control.
- evaluate the appropriateness of accounting policies used and the reasonableness of accounting estimates and related disclosures made by management.
- conclude on the appropriateness of management's use of the going concern basis of accounting and, based on the audit evidence obtained, whether a material uncertainty exists related to events or conditions that may cast significant doubt on the Group's ability to continue as a going concern. If we conclude that a material uncertainty exists, we are required to draw attention in our auditor's report to the related disclosures in the consolidated financial statements or, if such disclosures are inadequate, to modify our opinion. Our conclusions are based on the audit evidence obtained up to the date of our auditor's report. However, future events or conditions may cause the Group to cease to continue as a going concern.
- evaluate the overall presentation, structure and content of the consolidated financial statements, including the disclosures, and whether the consolidated financial statements represent the underlying transactions and events in a manner that achieves fair presentation.
- obtain sufficient appropriate audit evidence regarding the financial information of the entities or business activities within the Group to express an opinion on the consolidated financial statements. We are responsible for the direction, supervision and performance of the group audit. We remain solely responsible for our audit opinion.

We communicate with the Audit Committee regarding, among other matters, the planned scope and timing of the audit and significant audit findings, including any significant deficiencies in internal control that we identify during our audit.

■ **Comments on the Management Report for the Group**

Pursuant to Austrian Generally Accepted Accounting Principles, the group management report is to be audited as to whether it is consistent with the consolidated financial statements and as to whether it was prepared in accordance with the applicable legal regulations.

Management is responsible for the preparation of the group management report in accordance with Austrian Generally Accepted Accounting Principles.

We conducted our audit in accordance with Austrian Standards on Auditing for the audit of the group management report.

Opinion

In our opinion, the management report for the Group was prepared in accordance with the valid legal requirements and is consistent with the consolidated financial statements.

Statement

Based on the findings during the audit of the consolidated financial statements and due to the thus obtained understanding concerning the Group and its circumstances no material misstatements in the group management report came to our attention.

Vienna, March 4th, 2021

Crowe SOT Wirtschaftsprüfung GmbH



Dr. Anton Schmid Mag. Andreas Maier
Wirtschaftsprüfer

BALANCE SHEET

Assets	31 Dec 2020 EUR	31 Dec 2019 EUR
A. Non-current assets		
I. Intangible assets		
1. Rights and licences	337,014.02	422,496.00
II. Property, plant and equipment		
1. Land and buildings	10,105,595.34	10,388,794.02
2. Technical plant and machinery	5,285,605.20	5,367,095.00
3. Other plant, furniture and fixtures	774,278.44	780,260.00
4. Advances made and construction in progress	1,989,659.23	717,039.65
	<u>18,155,138.21</u>	<u>17,253,188.67</u>
III. Financial assets		
1. Shares in affiliates	0.00	0.00
2. Participating interests	341,688.25	341,688.25
3. Investment securities (book-entry securities)	1,724,750.00	1,570,750.00
	<u>2,066,438.25</u>	<u>1,912,438.25</u>
	20,558,590.48	19,588,122.92
B. Current assets		
I. Inventories		
1. Raw materials and supplies	3,638.10	3,952.74
2. Finished products and goods	36,000.00	
2. Services not yet chargeable	9,297,293.33	8,504,519.93
3. Advances made	1,891.22	6,802.85
	<u>9,338,822.65</u>	<u>8,515,275.52</u>
II. Receivables and other assets		
1. Trade receivables	1,891,666.81	2,383,052.25
<i>(thereof due within 1 year</i>	<i>1,891,666.81</i>	<i>2,349,314.35)</i>
<i>(thereof due after more than 1 year</i>	<i>0.00</i>	<i>33,737.90)</i>
2. Receivables from undertakings with which the company is linked by virtue of participating interests	42,923.59	88,130.23
<i>(thereof due within 1 year</i>	<i>42,923.59</i>	<i>88,130.23)</i>
<i>(thereof due after more than 1 year</i>	<i>0.00</i>	<i>0.00)</i>
3. Receivables from proprietor	110,000.00	0.00
<i>(thereof due within 1 year</i>	<i>110,000.00</i>	<i>0.00)</i>
4. Receivables from subsidies and project grants	4,435,394.65	4,539,074.02
<i>(thereof due within 1 year</i>	<i>4,435,394.65</i>	<i>4,539,074.02)</i>
5. Other receivables and assets	13,430,872.75	19,349,882.36
<i>(thereof due within 1 year</i>	<i>13,428,472.75</i>	<i>19,349,882.36)</i>
<i>(thereof due after more than 1 year</i>	<i>2,400.00</i>	<i>0.00)</i>
	<u>19,910,857.80</u>	<u>26,360,138.86</u>
<i>(thereof due within 1 year</i>	<i>19,908,457.80</i>	<i>26,326,400.96)</i>
<i>(thereof due after more than 1 year</i>	<i>2,400.00</i>	<i>33,737.90)</i>
III. Securities and shares		
1. Other securities and shares	1,624,100.00	1,786,000.00
IV. Cash and balances at banks	<u>13,691,897.90</u>	<u>4,705,620.78</u>
	44,565,678.35	41,367,035.16
C. Prepayments and accrued income	3,291,115.50	3,520,218.66
D. Escrow funds	5,845,290.34	1,106,851.13
Total Assets	74,260,674.67	65,582,227.87

Liabilities and Shareholders Equity	31.12.2020 EUR	31.12.2019 EUR
A. Equity		
I. Share capital called in and paid up	3,600,000.00	3,600,000.00
II. Capital reserves		
1. Appropriated	4,396,531.71	4,633,645.19
2. Unappropriated	362,637.44	362,637.44
	4,759,169.15	4,996,282.63
III. Retained earnings		
1. Statutory reserves	159,571.25	159,571.25
2. Other reserves (free reserves)	922,750.22	922,987.93
	1,082,321.47	1,082,559.18
IV. Net profit for the year	1,384,364.59	1,226,642.15
<i>(thereof profit carried forward)</i>	<i>1,226,642.15</i>	<i>1,720,780.70</i>
	10,825,855.21	10,905,483.96
B. Investment grants	1,792,330.57	1,679,763.40
C. Provisions		
1. Provisions for severance pay	5,561,900.00	5,559,900.00
2. Provisions for pensions	5,610,020.00	5,572,990.00
3. Tax provisions	6,649,774.00	6,188,800.00
4. Other provisions	10,132,100.00	10,157,130.00
	27,953,794.00	27,478,820.00
D. Liabilities		
1. Bank borrowings	1,580,333.71	3,674,645.11
<i>(thereof due within 1 year)</i>	<i>712,193.77</i>	<i>2,712,194.57</i>
<i>(thereof due after more than 1 year)</i>	<i>868,139.94</i>	<i>962,450.54</i>
2. Advances received on orders	20,067,178.51	14,158,491.22
<i>(thereof due within 1 year)</i>	<i>9,375,288.38</i>	<i>7,898,820.21</i>
<i>(thereof due after more than 1 year)</i>	<i>10,691,890.13</i>	<i>6,259,671.01</i>
3. Trade payables	2,286,581.67	2,916,265.98
<i>(thereof due within 1 year)</i>	<i>1,419,488.31</i>	<i>1,857,153.50</i>
<i>(thereof due after more than 1 year)</i>	<i>867,093.36</i>	<i>1,059,112.48</i>
4. Payables to undertakings with which the company is linked by virtue of participating interests	0.00	14,000.00
<i>(thereof due within 1 year)</i>	<i>0.00</i>	<i>14,000.00</i>
5. Other liabilities	3,716,954.37	3,470,554.02
<i>(thereof due within 1 year)</i>	<i>2,329,477.37</i>	<i>2,083,077.02</i>
<i>(thereof due after more than 1 year)</i>	<i>1,387,477.00</i>	<i>1,387,477.00</i>
<i>(thereof for taxes)</i>	<i>555,084.27</i>	<i>423,286.26</i>
<i>(thereof for social security)</i>	<i>1,050,996.82</i>	<i>1,369,112.60</i>
	27,651,048.26	24,233,956.33
<i>(thereof due within 1 year)</i>	<i>13,836,447.83</i>	<i>14,565,245.30</i>
<i>(thereof due after more than 1 year)</i>	<i>13,814,600.43</i>	<i>9,668,711.03</i>
E. Accruals and deferred income	192,356.29	177,353.05
F. Escrow liabilities	5,845,290.34	1,106,851.13
Total Liabilities	74,260,674.67	65,582,227.87

CONSOLIDATED INCOME STATEMENT

CONSOLIDATED INCOME STATEMENT 1 JANUARY 2019 TO 31 DECEMBER 2020		
	31 Dec 2020 EUR	31 Dec 2019 EUR
1. Revenue	15,783,423.56	20,371,275.75
2. Changes in the amount of services not yet chargeable	792,773.40	-1,762,286.03
3. Project-related other income	16,504,165.80	15,265,400.36
4. Shareholder contribution	9,816,017.71	9,746,042.38
5. Other own work capitalised	23,367.64	0.00
6. Other operating income		
a. Income from disposal of non-current assets except for financial assets	19,959.62	18,377.66
b. Income from reversal of provisions	660,690.06	1,266,579.40
c. Income from reversal of investment grants	315,882.57	292,518.95
d. Other	3,480,112.81	4,064,830.13
	<u>4,476,645.06</u>	<u>5,642,306.14</u>
7. Cost of materials and other services purchased		
a. Cost of materials	1,669,171.98	1,863,402.28
b. Costs of services purchased	1,597,700.50	1,731,721.77
	<u>3,266,872.48</u>	<u>3,595,124.05</u>
8. Cost of staff		
a. Wages	9,687.12	8,996.84
b. Salaries	24,198,687.33	24,382,298.44
<i>(thereof COVID-19 short-time work allowance</i>	<i>-421,873.48</i>	<i>0.00</i>)
c. Social benefits		
aa) Expenses for old-age provision	528,697.31	712,318.20
bb) Expenses for severance pay and contributions to Severance Pay and Pension Funds	1,152,108.05	1,232,557.80
cc) Expenses for statutory social security contributions and payroll-related taxes and compulsory contributions	6,467,076.99	6,639,681.68
dd) Other social benefits	103,588.80	70,231.44
	<u>32,459,845.60</u>	<u>33,046,084.40</u>
9. Amortisation of intangible non-current assets and depreciation of property, plant and equipment	3,469,750.93	3,170,242.00
10. Other operating expenses		
a. Taxes, other than taxes stated in line 17	10,467.47	7,868.50
b. Other	8,210,404.67	10,239,259.52
	<u>8,220,872.14</u>	<u>10,247,128.02</u>
11. Subtotal lines 1 to 10 (Operating result)	<u>-20,947.98</u>	<u>-795,839.87</u>

CONSOLIDATED INCOME STATEMENT 1 JANUARY 2019 TO 31 DECEMBER 2020

	31 Dec 2020 EUR	31 Dec 2019 EUR
12. Income from other securities	23,450.00	28,282.50
13. Other interest and similar income	18,968.19	48,018.58
14. Expenses for financial assets and securities held as current assets		
a. Write-downs	7,900.00	0.00
b. Other	19,953.87	10,468.37
	<u>27,853.87</u>	<u>10,468.37</u>
15. Interest and similar expenses	47,938.38	64,850.88
16. Subtotal lines 12 to 15 (Financial result)	<u>-33,374.06</u>	<u>981.83</u>
17. Profit or loss before tax (Subtotal lines 11 and 16)	-54,322.04	-794,858.04
18. Income taxes	37,789.00	2,455.00
19. Profit or loss for the year = profit or loss after tax	-92,111.04	-797,313.04
20. Reversal of capital reserves		
a. Appropriated	237,113.48	290,454.49
21. Reversal of retained earnings		
a. Other reserves (free reserves)	12,720.00	12,720.00
22. Profit carried forward from previous year	1,226,642.15	1,720,780.70
23. Net Profit for the Year	1,384,364.59	1,226,642.15

CONSOLIDATED CASH FLOW STATEMENT

CONSOLIDATED CASH FLOW STATEMENT from 1 January 2019 to 31 December 2019		31 Dec 2020 EUR	31 Dec 2019 EUR
1	Profit or loss before tax	-54,322.04	-794,858.04
2	+/- Depreciation amortisation, write-downs/write-ups of investment assets	3,469,750.93	3,170,242.00
3	-/+ Gain/loss on disposal of investment assets	221,925.38	-4,098.66
4	-/+ Investment income, income from other securities and loans held as financial assets and other interest and similar income/interest and similar expenses	33,374.06	-981.83
5	+/- Other non-cash expenses/income, unless concerning items 7 to 9	-303,400.28	-300,061.33
6	Cash flow from profit or loss	3,367,328.05	2,070,242.14
7	-/+ Increase/decrease in inventories, trade receivables and other assets	6,016,687.09	-5,564,652.63
8	+/- Increase/decrease in provisions	474,974.00	2,625,010.00
9	+/- Increase/decrease in trade payables and other liabilities	5,526,456.57	595,949.10
10	Net cash flow from profit or loss before tax	15,385,445.71	-273,451.39
11	- Income taxes paid	-37,789.00	-2,455.00
12	Net cash flow from operating activities	15,347,656.71	-275,906.39
13	+ Cash inflow from disposal of non-current assets (excluding financial assets)	19,959.62	18,377.66
14	- Cash used for additions to non-current assets (excluding financial assets)	-4,314,103.49	-5,287,576.79
15	- Cash used for additions to financial assets and other financial investments	-368,000.00	-1,050.00
16	+ Interest received and similar income	42,418.19	76,301.08
17	+ Cash inflow from investment grants	428,449.74	138,041.40
18	Net cash flow from investing activities	-4,191,275.94	-5,055,906.65
19	+ Cash inflows from profit distributions	0.00	0.00
20	- Cash used for profit distributions	0.00	0.00
21	+ Cash inflows from taking out finance loans	0.00	2,997,990.00
22	- Cash used to redeem bonds and finance loans	-2,094,311.40	-35,580.54
23	- Interest paid and similar expenses	-75,792.25	-75,319.25
24	Net cash flow from financing activities	-2,170,103.65	2,887,090.21
25	Cash change in cash and cash equivalents (lines 12+18+24)	8,986,277.12	-2,444,722.83
26	+/- Exchange rate-related and other changes in the value of cash and cash equivalents	0.00	0.00
27	+ Cash and cash equivalents, beginning of period	4,705,620.78	7,150,343.61
28	Cash and cash equivalents, end of period	13,691,897.90	4,705,620.78

CONSOLIDATED STATEMENT OF CHANGES IN EQUITY

Consolidated Statement of Changes in Equity	Share Capital	Capital Reserves	Retained Earnings	Net profit for the Year	Total Group Share	Noncontrolling interests	Total Equity
As at 1 January 2019	3.600.000,00	5.286.737,12	1.102.821,56	1.720.780,70	11.710.339,38	0,00	11.710.339,38
Profit or loss for the year				-797.313,04	-797.313,04		-797.313,04
Changes in reserves		-290.454,49	-12.720,00	303.174,49	0,00		0,00
Change in reserves through the income statement item			-7.542,38		-7.542,38		-7.542,38
Shareholder contribution							
Distributions				0,00	0,00		0,00
Acquisition of the subsidiary					0,00		0,00
As at 31 December 2019	3.600.000,00	4.996.282,63	1.082.559,18	1.226.642,15	10.905.483,96	0,00	10.905.483,96
As at 1 January 2020	3.600.000,00	4.996.282,63	1.082.559,18	1.226.642,15	10.905.483,96	0,00	10.905.483,96
Profit or loss for the year				-92.111,04	-92.111,04		-92.111,04
Changes in reserves		-237.113,48	-12.720,00	249.833,48	0,00		0,00
Change in reserves through the income statement item			12.482,29		12.482,29		12.482,29
Shareholder contribution							
Acquisition of the subsidiary					0,00		0,00
As at 31 December 2020	3.600.000,00	4.759.169,15	1.082.321,47	1.384.364,59	10.825.855,21	0,00	10.825.855,21

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Accounting and Validation Policies

Consolidated financial statements in accordance with Section 244 et seq. of the Austrian Business Code [Unternehmensgesetzbuch/UGB] were prepared for the first time for the financial year 2019. They are comprised of JOANNEUM RESEARCH Forschungsgesellschaft mbH, Leonhardstrasse 59, 8010 Graz, and JR AquaConSol GmbH, Steyrergasse 21, 8010 Graz. The total share capital of JR-AquaConSol GmbH in the amount of EUR 150,000.00 is held by JOANNEUM RESEARCH Forschungsgesellschaft mbH. It is fully consolidated in the consolidated financial statements.

■ General Principles

The consolidated company's balance sheet date is 31 December 2020 and the company applies the Group's standard accounting and valuation policies.

The consolidated annual financial statements were prepared in accordance with the provisions of the Austrian Business Code [Unternehmensgesetzbuch/UGB] as amended, in accordance with generally accepted accounting principles and the general principle of presenting a true and fair view of the company's financial position and financial performance.

When preparing the consolidated financial statements the principle of completeness was complied with.

Assets and liabilities were measured on a going concern basis according to the principle of item-by-item valuation.

The principle of prudent valuation was taken account of by recognising only the profits realised as at the balance sheet date. All recognisable risks and anticipated losses were taken into consideration.

■ Consolidation Measures

The capital was consolidated at the time of foundation of the subsidiary on 9 June 2016. No differences have resulted from initial consolidation of JR-AquaConSol GmbH in financial 2016. In the course of debt consolidation receivables from and payables to the fully consolidated entity were eliminated. Intra-group expenses and income of the entities included in the consolidated financial statements were segregated. In the case of intra-group deliveries and services the interim results are eliminated, where necessary. In financial 2020 there were no material interim results.

■ Non-Current Assets

➔ Intangible Assets

Intangible assets are recognised at cost plus incidental acquisition costs less cash discounts deducted and after amortisation on a straight-line basis. The useful life applied is three to five years (20%-33%).

➔ Property, Plant and Equipment

Property, plant and equipment are recognised at cost plus incidental acquisition costs less cash discounts deducted and after depreciation.

Public subsidies for non-current assets are presented on the liabilities side as investment grants from public funds. Those investment grants are used for the non-current assets analogously to the depreciation of non-current assets.

Amortisation and depreciation is calculated on a straight-line basis according to the following useful lives and rates:

Property, Plant and Equipment	Useful Life in Years	Depreciation in Years Rate in %
Buildings, including buildings on land owned by others	10 – 40	2.5 – 10
Machinery, scientific equipment and electronic data processing systems	3 – 10	10 – 33
Other plant, furniture and fixtures	4 – 10	10 – 25

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The full annual depreciation is applied to additions in the first half of the financial year and half the yearly rate is applied to additions during the second half of the year.

Low-value assets as defined in Section 13 of the Austrian Personal Income Tax Act [Einkommensteuergesetz/ EStG] 1988, i.e. the cost of acquisition of which is less or equal to EUR 800 per asset, are fully written off in the year of acquisition and presented as additions or disposals in the non-current assets movement schedule.

➔ Financial Assets

Investment securities are recognised at the lower of cost or fair value at the balance sheet date.

In the reporting year no write-downs of financial assets were made.

■ Current Assets

➔ Inventories

Consumables were measured at the lower of cost or market.

Services not yet chargeable in connection with contract research are calculated on the basis of cost accounting. Project costs are recognised on the basis of an itemisation by cost centre and direct cost statements. Item-by-item valuation at cost of production or acquisition as defined in Section 206 UGB is applied. Apart from the costs attributable according to the costs-by-cause principle, production costs also include pro rata production overheads that can be capitalised and portions of social expenses as defined in the second to last sentence of Section 206(3) UGB. Interest expenses and the research risk are not accounted for.

Due to the Company's project structure administrative overheads must be capitalised for projects with a term of more than twelve months. In order to give a true and fair view of the Company's financial position and financial performance, the option right (cf. Section 206(3) UGB) was exercised.

If losses are anticipated in connection with orders or if additional costs are expected to be incurred for services that have been invoiced already, semi-finished products are discounted or provisions are set up. For contingent warranty obligations in connection with contract research provisions are recognised in the balance sheet as well.

➔ Receivables and other Assets

Receivables and other assets are measured at nominal value unless the lower fair value is recognised in the case of specific recognisable risks. Provisions for general credit risks are made in the form of general allowances at a rate of 2% (previous year: 2%) of the total net receivables.

■ Provisions

Provisions for severance pay are calculated according to principles of financial mathematics on the basis of the 10-year average interest rate with a term of fifteen years. Calculation of the provision for severance pay was based on an interest rate of 2.30% (previous year: 2.71%) as at 31 December 2020, a salary trend of 2.70% (previous year: 2.52%) and a retirement age of 65 years on a going-concern basis.

No fluctuation discount was recognised. The allocation amount resulting from a change in measurement due to the Austrian Act on Changes in Accounting Practices [Rechnungslegungs-Änderungsgesetz/RÄG] 2014 is allocated over five years.

The **pension provision** is calculated in the amount of the actuarial cover requirement on the basis of the provisions of Section 198 and Section 211 UGB as amended by the RÄG 2014 in compliance with the AFRAC Opinion on "Provisions for pension, severance pay, long-service bonus and comparable long-term obligations under UGB provisions" of June 2016. The calculation was based on the Pagler & Pagler reference tables. The calculatory interest rate used was the 10-year average interest rate of 1.84% (previous year: 2.34%) with an average remaining term of ten years.

Other provisions take into account all recognisable risks and liabilities the amount of which is contingent and are recognised at the amounts which, according to best estimate, must be used to fulfil the obligation. No provisions other than those provided for by law are set up.

Changes in provisions concerning a reversal of provisions are recognised in item 6(b) and allocations to provisions are stated in item 8(c) if they are attributable to staff costs; all others are recognised as other operating expenses in item 10(b) of the income statement.

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■ Liabilities

Liabilities are recognised at the realisable value in compliance with the principle of prudence.

■ Currency Translation

Receivables and payables are measured at the mean rate of exchange at the date of the transaction and according to the lower of cost or market principle or higher of cost or market principle at the balance sheet date, respectively.

Notes to the balance Sheet

ASSETS

■ Non-Current Assets

As to the development of the different non-current assets and the breakdown of annual amortisation and depreciation reference is made to the non-current assets movement schedule (Annex to the Notes). As at the balance sheet date non-current assets amounted to EUR 20,558,590.48 (previous year: kEUR 19,588.1) in total. In the financial year 2020 capital expenditure amounted to a total of EUR 4,682,382.49 (previous year: kEUR 5,447.6) and amortisation and depreciation amounted to EUR 3,470,029.93 (previous year: kEUR 3,170.2). In the financial year 2020 disposals at historical cost amounted to EUR 449,107.04 (previous year: kEUR 723.3).

Intangible assets include software and data transmission rights of a carrying amount of EUR 337,014.02 (previous year: kEUR 422.5). Additions in the amount of EUR 204,267.75 (previous year: kEUR 337.4) are attributable to the acquisition of licences and various software.

As at the balance sheet date, **property, plant and equipment** amounted to EUR 18,155,138.21 (previous year: kEUR 17,253.2). The land value was EUR 2,877,794.02 (previous year: kEUR 2,875.2). The building value of land with buildings and buildings on land owned by others of EUR 7,227,801.32 (previous year: kEUR 7,513.6) is made up of the net building value of EUR 3,255,214.00 (previous year: kEUR 3,348.5) and structural improvements worth EUR 1,736,835.00 (previous year: kEUR 1,816.9), i.e. EUR 4,992,049.00 (previous year: kEUR 5,165.3) are attributable to buildings on land owned by the Company and an amount

of EUR 2,235,752.32 (previous year: kEUR 2,348.2) is attributable to capital expenditure on buildings owned by others. Additions in a total amount of EUR 4,110,114.74 (previous year: kEUR 4,950.1) mainly concern the provision of modern scientific equipment for the Company's research activities and further expansion of the IT infrastructure. Disposals at historical cost in the amount of EUR 235,107.04 (previous year: kEUR 719.4) mainly concern disposals or, to a small extent, sale of scientific equipment, electronic data processing systems and various office equipment. No impairment losses were recognised.

According to the statement of investments the following **participating interests** are held: see next page.

As at the balance sheet date the carrying amount of **investment securities** was EUR 1,724,750.00 (previous year: kEUR 1,570.8).

➔ Write-up or Revaluation

In the reporting year no write-downs of financial assets were made.

Amortisation and depreciation of the remaining non-current assets completely result from ordinary amortisation and depreciation.

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Statement of Investments as at 31 December 2020	Interest		Equity in EUR	Net profit or Loss in EUR	Balance Sheet Date
	EUR	%			
ACIB GmbH	16,000.00	8.00%	4,680,072.35	801,269.06	31 Dec 2019
ALP,Lab GmbH	5,600.00	16.00%	36,758.27	1,758.27	31 Dec 2019
BEST - Bioenergy and Sustainable Technologies GmbH	20,000.00	10.00%	1,032,389.16	797,035.23	31 Mar 2020
CBmed GmbH	25,000.00	12.50%	1,681,190.74	1,481,190.74	31 Dec 2019
decide Clinical Software GmbH	42,500.00	10.00%	97,952.87	-327,047.13	31 Dec 2019
EPIG GmbH	8,750.00	25.00%	216,286.06	181,286.06	31 Dec 2019
FH JOANNEUM Gesellschaft mbH	10,828.25	14.90%	4,000,000.00	0.00	30 Jun 2020
Geo5 GmbH	8,000.00	10.00%	68,828.09	-11,171.94	31 Dec 2019
Holz,Bau Forschungs GmbH	3,500.00	5.98%	362,939.65	304,439.65	31 Dec 2019
Human,technology Styria GmbH	2,450.00	7.00%	206,437.17	5,773.34	31 Dec 2019
Know-Center GmbH Research Center for Data-Driven Business & Big Data Analytics	14,540.00	10.00%	1,454,064.92	-204,489.29	31 Dec 2019
Materials Center Leoben Forschung GmbH	51,100.00	17.50%	6,563,367.00	302,598.65	31 Dec 2019
Pacemaker Technologies GmbH	1,050.00	3.00%	36,641.98	1,641.98	31 Dec 2019
Polymer Competence Center Leoben GmbH	34,000.00	17.00%	5,598,964.11	1,141,510.71	31 Dec 2019
Rebeat Innovation GmbH	80,000.00	1.88%	64,792.78	-1,071,876.22	31 Dec 2019
Research Center Pharmaceu- tical Engineering GmbH	15,000.00	15.00%	5,117,642.61	732,742.61	30 Jun 2020
Virtual Vehicle Research GmbH	10,640.00	8.40%	6,574,298.71	1,005,094.38	31 Dec 2019

ANNEX

■ Current Assets

➤ Inventories

The item **raw materials and supplies** in the amount of EUR 3,638.10 (previous year: kEUR 4.0) is made up of consumables (mainly paper, inked ribbons, computer network cards, laser printer spare parts and various small items of equipment).

The item **services not yet chargeable** in connection with contract research includes work in progress and services not yet chargeable in the amount of EUR 9,297,293.33 (previous year: kEUR 8,504.5), under which administrative overheads of EUR 1,716,408.82 (previous year: kEUR 1,654.2) were capitalised for contracts the execution of which lasts more than twelve months. According to the Company's project structure such capitalisation of administrative overheads is required in order to present a true and fair as well as a continuous view of the Company.

Advances made on inventories amounted to EUR 1,891.22 (previous year: kEUR 6.8).

➤ Receivables and other Assets

Itemised allowances in the amount of EUR 1,045,719.96 (previous year: kEUR 622.2) were made for doubtful **trade receivables** and deducted from the assets.

Receivables from subsidies and project grants concern grant approvals from various funding agencies. Due to the fact that processing, including receipt of payment, takes more than three months, a discount in the amount of EUR 9,700.00 (previous year: kEUR 13.4) was made. The calculatory interest rate was 0.47% (previous year: 0.63%).

Other receivables and assets mainly include entitlements to insurance benefits vis-à-vis the insurance fund due to premiums paid, claims vis-à-vis the Tax Office of Graz-Stadt, various interest accrued, as well as refunds and aids. This item also includes a liability commitment of the State of Styria in the amount of EUR 5,600,000.00 (previous year: kEUR 5,600.0) to cover the loss from the tax audit by the Tax Office of Graz-Stadt, and claims vis-à-vis the Tax Office of Graz-Stadt from research allowances in the amount of EUR 6,068,572.46 (previous year: kEUR 12,154.8).

Receivables and other Assets	Receivables as at 31 Dec 2020 (31 Dec 2019) EUR	Thereof due after more than 1 Year EUR	Thereof Evidenced by bills of Exchange EUR	Capitalised Accruals Section 225(3) UGB EUR	General Allowance EUR
Trade receivables	1,891,666.81 (2,383,052.25)	0.00 (33,737.90)	0.00 (0.00)	0.00 (0.00)	32,700.00 (46,600.00)
Receivables from undertakings with which the Company is linked by virtue of participating interests	42,923.59 (88,130.23)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
Receivables from the owners	110,000.00 (0.00)	0.00 (0.00)	0.00 (0.00)	110,000.00 (0.00)	0.00 (0.00)
Receivables from subsidies and project grants	4,435,394.65 (4,539,074.02)	0.00 (0.00)	0.00 (0.00)	4,435,394.65 (4,539,074.02)	0.00 (0.00)
Receivables from the liability commitment of the State of Styria	5,600,000.00 (5,600,000.00)	0.00 (0.00)	0.00 (0.00)	5,600,000.00 (5,600,000.00)	0.00 (0.00)
Other receivables and assets	7,830,872.75 (13,749,882.36)	2,400.00 (0.00)	0.00 (0.00)	7,631,706.24 (13,473,582.37)	0.00 (0.00)
Total	19,910,857.80 (26,360,138.86)	2,400.00 (33,737.90)	0.00 (0.00)	17,777,100.89 (23,612,656.39)	32,700.00 (46,600.00)

ANNEX

➔ Securities held as Current Assets

Securities held as current assets in the amount of EUR 1,624,100.00 (previous year: kEUR 1,786.0) concern bonds with a term until the end of October 2026.

➔ Cash and balances at banks

This item in the amount of EUR 13,691,897.90 (previous year: kEUR 4,705.6) is made up of **cash** in the amount of EUR 9,861.11 (previous year: kEUR 9.5) and **bank balances** of EUR 13,682,036.79 (previous year: kEUR 4,696.1).

■ Prepayments and Accrued Income

Prepayments and accrued income in the amount of EUR 3,291,115.50 (previous year: kEUR 3,520.2) include payments made in the financial year 2020 which have to be charged as expenses in the following year and mainly concern prepayments of maintenance expenses, various subscriptions and membership fees, insurance premiums, travel expenses and congress fees. In addition, this item includes a prepayment of rent in the amount of EUR 2,954,687.45 (previous year: kEUR 3,030.9). In addition, this item includes the additional expenses of EUR 0.00 (previous year: kEUR 58.6) resulting from the change in the calculation of both the provision for severance payments and the pension provision.

■ Escrow Funds

Escrow funds include balances at banks for projects with the Austrian Research Promotion Agency (Österreichische Forschungsförderungsgesellschaft mbH) and the European Commission, where JOANNEUM RESEARCH Forschungsgesellschaft mbH acts as the coordinator and holds the funds in escrow and manages payments for the project partners (see escrow liabilities).

LIABILITIES AND SHAREHOLDERS' EQUITY

■ Equity

The Company's share capital amounts to EUR 3,600,000.00 (previous year: kEUR 3,600.0), of which 80.75% (previous year: 80.75%) or EUR 2,907,000.00 (previous year: kEUR 2,907.0) are held by the State of Styria and 14.25% (previous year: 14.25%) or EUR 513,000.00 (previous year: kEUR 513.0) by BABEG - Kärntner Betriebsansiedlungs- und Beteiligungsgesellschaft m.b.H. and 5% (previous year: 5%) or EUR 180,000.00 (previous year: kEUR 180.0) are held by Landesholding Burgenland GmbH.

Taking into account the profit for the year of EUR 157,722.44 (previous year: profit for the year of EUR 494,138.55) and the profit carryforward in the amount of EUR 1,226,642.15 (previous year: EUR 1,720,780.70) the resulting **net profit for the year** is EUR 1,384,364.59 (previous year: EUR 1,226,642.15).

■ Appropriated Capital Reserve

Both in the Participation and Cooperation Agreement with Kärntner Betriebsansiedlungs- und Beteiligungsgesellschaft m.b.H. (BABEG) of 18 December 2014 and in the Participation and Cooperation Agreement with Landesholding Burgenland GmbH of 20 April 2018 the shareholders have agreed that the **appropriated capital reserve** be reversed as stipulated.

ANNEX

■ Special Items for Investment Grants from Public Funds

In the reporting year investment grants from public funds developed as follows:

	As at 1 Jan 2020	Additions	Consumption According to Depreciation	Reversal	Reclassi- fication or Corrections	As at 31 Dec 2020
	EUR	EUR	EUR	EUR	EUR	EUR
Property, plant and equipment						
1. Buildings, including buildings on land owned by others	1,092,864.08	55,291.44	-128,321.87	0.00	0.00	1,019,833.65
2. Machinery, scientific equipment and electronic data processing systems	457,439.40	373,158.30	-186,603.70	0.00	0.00	643,994.00
3. Other plant, furniture and fixtures	129,459.92	0.00	-957.00	0.00	0.00	128,502.92
Financial assets						
1. Financial assets	0.00	0.00	0.00	0.00	0.00	0.00
Total	1,679,763.40	428,449.74	-315,882.57	0.00	0.00	1,792,330.57

Applications for covid-19 investment grants were filed for the financial year 2020 as well as for the financial year 2021. In the financial statements as at 31 December 2020 they have not been recognised yet.

■ Provisions

An amount of EUR 274,949.40 (previous year: kEUR 98.5) of the **provisions for severance pay** was used. In order to meet the cover requirement of EUR 5,561,900.00 (previous year: kEUR 5,559.9), an amount of EUR 276,949.40 (previous year: kEUR 325.5) was allocated to the provision.

An amount of EUR 267,098.58 (previous year: kEUR 262.1) of the **pension provisions** (for former managing directors) was used for pension payments and an amount of EUR 146,357.96 (previous year: kEUR 0.0) was reversed. In order to meet the actuarial cover requirement of EUR 5,610,020.00 (previous year: kEUR 5,573.0), an amount of EUR 450,486.54 (previous year: kEUR 622.7) had to be allocated to the provision.

The item **provision for taxes** concerns additional tax claims resulting from the tax audit in connection with the temporary loss of the status of a non-profit organisation in the amount of EUR 4,731,700.00 (previous year: kEUR 4,731.7), additional tax claims in the amount of EUR 1,787,200.00

(previous year: kEUR 1,361.8) resulting from the tax audit in connection with the division of input taxes into a business part and a non-business part, and additional tax claims resulting from the tax audit in connection with VAT treatment of services provided for the State of Styria in the field of "locational positioning" in the amount of EUR 95,300.00 (previous year: kEUR 95.3).

Other provisions include as main items the provision for unconsumed annual leave in the amount of EUR 2,458,600.00 (previous year: kEUR 2,669.8), provisions for potential claims for refund of various funding parties in the amount of EUR 1,277,200.00 (previous year: kEUR 694.5), the provision for working time credits in the amount of EUR 657,700.00 (previous year: kEUR 855.4) and the provision for anticipated losses or costs of work in progress in the amount of EUR 580,300.00 (previous year: kEUR 721.5).

This item also includes the **provision for the tax audit** by the Tax Office of Graz-Stadt in the amount of EUR 3,980,700.00 (previous year: kEUR 3,980.7).

ANNEX

■ Liabilities

The item **bank borrowings** in the amount of EUR 1,580,333.71 (previous year: kEUR 3,674.6) includes an export fund credit line of EUR 712,193.77 (previous year: kEUR 712.2) and a loan for the acquisition of the property EZ [folio number] 458 GB [Land Register] 60340 in Niklasdorf with a remaining term of more than five years in the amount of EUR 868,139.94 (previous year: kEUR 962.5). The cash advance as at 31 December 2019 in the amount of EUR 2,000,000.00 was fully redeemed.

Advances received on orders that may be deducted from inventories amounted to a net amount of EUR 20,067,178.51 (previous year: kEUR 14,158.5). This item also includes advances of EUR 10,907,879.77 (previous year: kEUR 6,355.5) made by funding parties.

As at the balance sheet date trade payables were EUR 2,286,581.67 (previous year: kEUR 2,916.3), predominantly to Austrian suppliers.

Other liabilities include the profit-participating loan granted by the State of Styria on 1 November 2004 in the amount of EUR 1,387,477.00 (previous year: kEUR 1,387.5). In addition, this item mainly includes clearing funds with the Austrian Health Insurance Fund [Österreichische Gesundheitskasse/ÖGK] and other necessary deferrals.

Other liabilities include expenses in the amount of EUR 2,279,449.39 (previous year: kEUR 2,071.6), which will be paid only after the balance sheet date.

■ Other Financial Obligations

Obligations arising from use of property, plant and equipment not presented in the balance sheet: see table below

■ Accruals and Deferred Income

Accruals and deferred income in the amount of EUR 192,356.29 (previous year: kEUR 177.4) mainly concern price gains not yet realised.

■ Escrow Liabilities

Escrow liabilities result from projects with the Austrian Research Promotion Agency (Österreichische Forschungsförderungsgesellschaft mbH) or the European Commission, where JOANNEUM RESEARCH Forschungsgesellschaft mbH acts as the coordinator and holds the funds in escrow and manages payments for the project partners (see escrow funds).

■ Contingent Liabilities

(cf. in this respect other disclosures, contingencies).

	For the Next Financial Year EUR	For Financial Years 2021 – 2025 EUR
Room rents <i>(previous year)</i>	897,659.00 <i>(835,812.00)</i>	4,488,295.00 <i>(4,179,059.00)</i>
Equipment rents <i>(previous year)</i>	61,904.00 <i>(74,012.00)</i>	215,122.00 <i>(370,062.00)</i>
Lease payments <i>(previous year)</i>	10,269.00 <i>(17,198.00)</i>	10,269.00 <i>(18,493.00)</i>
Total <i>(previous year)</i>	969,832.00 (927,022.00)	4,713,686.00 (4,567,614.00)

ANNEX

Notes to the Income Statement

The **revenues** generated in the financial year 2020 are classified according to areas of activity and divided into domestic and international revenues:

Amounts in EUR	Financial Year 2020 EUR	Financial Year EUR
Research	7,552,412.52	11,041,194.15
Royalties	702,551.84	849,059.89
Congress fees	3,919.11	3,861.48
Other	1,437,785.68	1,675,233.55
Total Domestic Revenues	9,696,669.15	13,569,349.07
International Revenues		
Research	6,061,664.08	6,745,701.83
Royalties	19,593.33	55,766.67
Congress fees	0.00	0.00
Other	5,497.00	458.18
Total International Revenues	6,086,754.41	6,801,926.68
Total Revenues	15,783,423.56	20,371,275.75

The expenses of EUR 1,152,108.05 (previous year: kEUR 1,232.6) stated in item 8.(bb) include contributions to Severance Pay and Pensions Funds in the amount of EUR 262,993.96 (previous year: kEUR 248.2) and expenses for severance payments in the amount of EUR 640,954.31 (previous year: kEUR 979.0) and severance compensation in the amount of EUR 0.00 (previous year: kEUR 5.3).

Other Disclosures

■ Shares in affiliates and participating interests

As at the balance sheet date, 31 December, a participating interest of 25% of the shares or EUR 8,750.00 (previous year: kEUR 8.8) was held in EPIG GmbH.

The annual financial statements for the year ended 31 December 2019 showed equity of EUR 216,286.06 (previous year: EUR 132,719.66) that includes net profit for the year of EUR 181,286.06 (previous year: EUR 97,719.66).

All other participating interests were below 20%.

■ Staff

As at the balance sheet date the Company had 504 (previous year: 491) employees; taking part-time employees into account on a pro rata basis, the number of staff was 413.9 (previous year: 405.5). Taking part-time employees into account on a pro rata basis, the average number of employees was 410.0 (previous year: 402.0).

In application of the provisions of Section 242(4) UGB no itemisation of salaries, severance payments or pensions for the management as defined in Section 239(1) UGB was made.

Pensions in the amount of EUR 262,111.48 (previous year: kEUR 256.6) were paid to former members of bodies and a liability for pension payments of EUR 166,821.50 (previous year: kEUR 0) was recognised.

No loans or advances were granted to members of the management or of the supervisory board. No liability in favour of that group of persons was assumed either.

The cost of remuneration of members of the Scientific Advisory Board and of the supervisory board amounted to EUR 109,190.64 (previous year: kEUR 108.3) in total.

■ Results after the Balance Sheet Date

After closing of the accounts for the financial year 2020 no other significant events occurred which would have affected the financial position or financial performance in the financial year 2020.

BODIES OF THE COMPANY IN THE FINANCIAL YEAR 2020:

Bodies of the Company in the Financial Year 2020:

■ Scientific Advisory Board

Prof. Dr Dr Gerald **SCHÖPFER**
Chairman

Prof. Dr Gerhard **FRIEDRICH**
Deputy Chairman

Prof. Dr Gernot **HANREICH**
Deputy Chairman

Prof. Dr Hansjörg **ALBRECHER**

Prof. Dr Horst **BISCHOF**

Dr Michaela **FRITZ**

Prof. Dr Günter **GETZINGER**

Prof. Dr Dr Manfred **HUSTY**

Dr Mario **MÜLLER**

Michael **PATAK**

Reinhard **PETSCHACHER**

Herbert **RITTER**, MBA

Prof. Dr Karin **SCHAUPP**

Waltraud **SCHINKO-NEUROTH**

Caroline **SCHOBERT-TRUMMLER**

Dr Stefan **TASCH**

Prof. Dr Frank **UHLIG**

■ Supervisory Board

Dr Martin **WIEDENBAUER**
Chairman

Prof. Fritz **SPERL**, MAS MBA
Deputy Chairman

Dr Ertfried **TAURER**
Deputy Chairman

Klaus **HATZL**, MA

Prof. Dr Werner **HAUSER**

Michaela **KRENN**

Ingolf **SCHÄDLER**

Dr Birgit **STRIMITZER-RIEDLER**

Ursula **STROHMAYER**

■ Members delegated to the Supervisory Board by the Works Council

Ferdinand **GOLJA**
Chairman of the Works Council

Clemens **HABSBURG-LOTHRINGEN**, MAS

Helen **HASENAUER**, MSc

Maria **HINGSAMER**

Gertrude **MATZER**, BA MSc

■ Management

Prof. Dr Wolfgang **PRIBYL**, MBA

ANNEX

■ Contingencies

Pursuant to Section 199 UGB guarantees for rent security deposits vis-à-vis Zentrum für Wissens- und Technologietransfer in der Medizin GmbH (EUR 110,890.00), W.E.I.Z. Immobilien GmbH (EUR 38,019.46) and SFL technologies Science Tower GmbH (EUR 36,000.00) as well as retention guarantees vis-à-vis Autobahnen- und Schnellstraßen-Finanzierungs Aktiengesellschaft (EUR 101,001.13) and voestalpine Wire Rod Austria GmbH (EUR 44,550.00) are presented below the balance sheet.

Pursuant to Section 199 UGB a performance bond vis-à-vis the Cochin University of Sciences and Technology (EUR 3,027.25), a bid bond vis-à-vis the Indian Institute of Tropical Meteorology (EUR 1,887.13) and guarantees for rent security deposits vis-à-vis Zentrum für Wissens- und Technologietransfer in der Medizin GmbH (EUR 110,890.00), W.E.I.Z. Immobilien GmbH (EUR 38,019.46) and SFL technologies Science Tower GmbH (EUR 36,000.00) as well as retention guarantees vis-à-vis Autobahnen- und Schnellstraßen-Finanzierungs Aktiengesellschaft (EUR 104,045.15) and voestalpine Wire Rod Austria GmbH (EUR 44,550.00) were presented below the balance sheet for the previous year.

■ Other Information

Based on the objectives defined in Article 1(3) of the Articles of Association the Company pursues the aim of furtherance of the general public in the fields of research, development and science exclusively and directly in the interest of public welfare. No net profit that may be generated will be distributed.

According to a decision dated 16 January 1995, reference no. 29/31-10/94, of the finance authority for the State of Styria, JOANNEUM RESEARCH Forschungsgesellschaft mbH belongs to the group of preferential recipients as defined in Section 4(4) No. 5(e) of the Austrian Personal Income Tax Act [Einkommensteuergesetz/ESTG] 1988 as amended by Art. I No. 4(a) of the Austrian Tax Reform Act [Steuerreformgesetz] 1993.

The expenses for the statutory auditor for auditing the annual financial statements amounted to EUR 17,400.00 (previous year: EUR 23,800.00). No other certification services, tax advisory services or other services of the statutory auditor were rendered in the reporting year or in the previous year.

Graz, 4 March 2021



Die Geschäftsführung:

Univ.-Prof. DI Dr. Wolfgang Pribyl, MBA

CONSOLIDATED NON-CURRENT ASSETS MOVEMENT SCHEDULE

Development of Non-Current Assets	Cost of Acquisition			Accumulated Amortisation and Depreciation			Carrying Amounts				
	1 Jan 2020	Additions	Disposals	Reclassification	31 Dec 2020	1 Jan 2020	Additions	Disposals	31 Dec 2020	31 Dec 2019	31 Dec 2020
I) Intangible assets											
Software, data transmission rights and other rights	3,044,611.62	204,267.75	0.00	0.00	3,248,879.37	2,622,115.62	289,749.73	0.00	2,911,865.35	422,496.00	337,014.02
Total intangible assets	3,044,611.62	204,267.75	0.00	0.00	3,248,879.37	2,622,115.62	289,749.73	0.00	2,911,865.35	422,496.00	337,014.02
II) Property, plant and equipment											
1) Land, rights equivalent to land and buildings, including buildings on land owned by others											
a) Land value	2,875,240.02	2,554.00	0.00	0.00	2,877,794.02	0.00	0.00	0.00	0.00	2,875,240.02	2,877,794.02
b) Building value	16,780,241.56	226,322.91	22,701.10	70,126.18	17,053,989.55	9,266,687.56	575,216.77	15,716.10	9,826,188.23	7,513,554.00	7,227,801.32
Subtotal land and buildings	19,655,481.58	228,876.91	22,701.10	70,126.18	19,931,783.57	9,266,687.56	575,216.77	15,716.10	9,826,188.23	10,388,794.02	10,105,595.34
2) Machinery, scientific equipment and EDP systems	29,044,220.90	1,689,144.94	42,567.47	476,763.14	31,167,561.51	23,677,125.90	2,244,970.88	40,140.47	25,881,956.31	5,367,095.00	5,285,605.20
3) Other plant, furniture and fixtures	3,627,462.65	230,396.55	49,477.77	21,826.74	3,830,208.17	2,847,202.65	257,731.85	49,004.77	3,055,929.73	780,260.00	774,278.44
4) Advances made and construction in progress	755,500.92	1,861,771.46	18,000.00	-607,177.33	1,992,095.05	0.00	0.00	0.00	0.00	755,500.92	1,992,095.05
Offsetting of input tax on advances for non-current assets	-38,461.27	-2,435.82	0.00	38,461.27	-2,435.82	0.00	0.00	0.00	0.00	-38,461.27	-2,435.82
Subtotal advances made and construction in progress	717,039.65	1,859,335.64	18,000.00	-568,716.06	1,989,659.23	0.00	0.00	0.00	0.00	717,039.65	1,989,659.23
5) Low-cost assets	0.00	102,360.70	102,360.70	0.00	0.00	0.00	102,360.70	102,360.70	0.00	0.00	0.00
Total property, plant and equipment	53,044,204.78	4,110,114.74	235,107.04	0.00	56,919,212.48	35,791,016.11	3,180,280.20	207,222.04	38,764,074.27	17,253,188.67	18,155,138.21
III) Financial assets											
1) Shares in affiliates	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2) Participating interests	341,688.25	0.00	0.00	0.00	341,688.25	0.00	0.00	0.00	0.00	341,688.25	341,688.25
3) Investment securities (book-entry securities)	1,570,750.00	368,000.00	214,000.00	0.00	1,724,750.00	0.00	0.00	0.00	0.00	1,570,750.00	1,724,750.00
Total financial assets	1,912,438.25	368,000.00	214,000.00	0.00	2,066,438.25	0.00	0.00	0.00	0.00	1,912,438.25	2,066,438.25
Total Non-Current Assets	58,001,254.65	4,682,382.49	449,107.04	0.00	62,234,530.10	38,413,131.73	3,470,029.93	207,222.04	41,675,939.62	19,588,122.92	20,558,590.48

MANAGEMENT REPORT

The Management Report covers the reporting period of the financial year 2020 from 1 January 2020 to 31 December 2020 for the Group that comprises JOANNEUM RESEARCH Forschungsgesellschaft mbH, Leonhardstrasse 59, 8010 Graz, and JR-AquaConSol GmbH and is divided into three sections: I. Report on the course of the Company's business and financial position; II. Report on prospective developments and risks of the Company, and III. Report on research and development.

I. Report on the Course of the Company's Business and Financial Position

■ I.1 Business Organisation

As at 31 December 2020 JOANNEUM RESEARCH, being the parent company, was organised in seven research units, which represent the main areas of activities. In financial 2020 JR-AquaConSol GmbH (JR-Aqua-

Research Units	
DIGITAL	Institute for Information and Communication Technologies
MATERIALS	Institute for Surface Technologies and Photonics
ROBOTICS	Institute for Robotics and Mechatronics
COREMED	Cooperative Centre for Regenerative Medicine
HEALTH	Institute for Biomedicine and Health Sciences
LIFE	Institute for Climate, Energy and Society
POLICIES	Institute for Economic and Innovation Research

ConSol), being a wholly-owned subsidiary of JOANNEUM RESEARCH, was divided into the areas of services in water resource management, hydrogeochemistry, and laboratory analytics with a focus on measuring stable isotopes of the water cycle and lysimeter systems.

■ I.2 Investment Report

As at 31 December 2020 the Group held corporate investments in the following companies:

➔ I.2.1 Corporate Investments

	Share in %
ALP.Lab GmbH	16.0 %
decide Clinical Software GmbH	10.0 %
EPIG GmbH	25.0 %
FH JOANNEUM Gesellschaft mbH	14.9 %
Geo5 GmbH	10.0 %
Holz.Bau Forschungs GmbH	5.98 %
Human.technology Styria GmbH	7.0 %
Pacemaker Technologies GmbH	3.0 %
Rebeat Innovation GmbH	1.88 %

MANAGEMENT REPORT

➔ I.2.2 Corporate Investments - COMET (K1, K2) Competence Center Programme

As at 31 December 2020 the Company owned shares in the following companies, which are funded through the COMET (Competence Centers for Excellent Technologies) Programme of the Federal Ministry for Climate Action, Environment, Energy, Mobility, Innovation and Technology (BMK) and the Federal Ministry for Digital and Economic Affairs (BMDW):

	Shares in %
ACIB GmbH	8.0 %
BEST-Bioenergy and Sustainable Technologies GmbH	10.0 %
CBmed GmbH	12.5 %
Know-Center GmbH Research Center for Data-Driven Business & Big Data Analytics	10.0 %
Materials Center Leoben Forschung GmbH	17.5 %
Polymer Competence Center Leoben GmbH	17.0 %
Research Center Pharmaceutical Engineering GmbH	15.0 %
Virtual Vehicle Research GmbH	8.4 %

■ I.3 Branches

The Company has no branches.

■ I.4 Course of Business

As at 31 December 2020 the orders on hand amounted to approximately EUR 86.7 million. The work on hand amounted to approximately EUR 46.2 million, the value of offers submitted was approximately EUR 30.8 million. The profit for the financial year 2020 (after changes in reserves) amounted to kEUR 157.7 (previous year: loss for the year of approximately kEUR 494.1).

The operating result from contract research projects was approximately EUR 16.8 million for the financial year 2020. Funded research projects generated an operating result of approximately EUR 16.8 million.

At an international level the Group solicited contract research projects and funded research projects worth approximately EUR 11.6 million in the aggregate in the reporting year. An amount of EUR 5.5 million thereof is attributable to projects with the European Union and approximately EUR 6.1 million to contract research projects. Due to the participation of the Group in the programmes of the European Union and calls for proposals by the European Space Agency (ESA) total revenues of approximately EUR 1.3 million were generated in the financial year 2020. Under the Horizon 2020 programme projects with a funding volume of approximately EUR 15.7 million were awarded to the Company and in connection with ESA projects an order volume of approximately EUR 1.6 million was solicited.

In the financial year 2020 revenues of approximately EUR 6.3 million were generated through national cooperative research projects related to the Austrian Research Promotion Agency (Österreichische Forschungsförderungsgesellschaft mbH/FFG).

Under a 2019-2021 funding agreement with the Federal Ministry for Climate Action, Environment, Energy, Mobility, Innovation and Technology (BMK) funds in an amount of EUR 7.8 million were granted. In the reporting period the Group generated revenues totalling approximately EUR 2.5 million from BMK.

MANAGEMENT REPORT

► I.4.1 Financial Position

The Group's assets and financing structure developed as follows:

As at the balance sheet date, 31 December 2020, the Group had a balance sheet total of approximately EUR 74.3 million (previous year: approximately EUR 65.6 million). This is comprised of non-current assets in the amount of approximately EUR 20.6 million and current assets (inclusive of prepayments and accrued income, and escrow funds) of approximately EUR 53.7 million.

As at 31 December 2020 shareholders' equity including investment grants amounted to around EUR 12.6 million (thereof investment grants of approximately EUR 1.8 million) or 17% of the balance sheet total compared to around EUR 12.6 million or 19% of the previous year's balance sheet total. Borrowings (inclusive of accruals and deferred income, and escrow liabilities) increased by approximately EUR 8.6 million to approximately EUR 61.6 million (previous year: EUR 53.0 million) and amounted to 83% (previous year: 81%) of the balance sheet total.

In the financial year 2020 cash flows from the profit or loss as the sum total of generated profit for the year and the income and expense items (the Group's internal financing potential) amounted to approximately EUR 3.4 million. Working capital (current assets minus short-term borrowings) was approximately EUR 17.0 million (previous year: approximately EUR 13.8 million).

No derivative financial instruments were used in the past financial year 2020. The financial instruments recognised in the balance sheet are part of the Company's general risk management, which is reflected in the book-keeping and accounting policies.

► I.4.2 Financial Performance

In the financial year 2020 the operating result including own work capitalised and other operating income net of shareholder contribution and research tax premium amounted to approximately EUR 34.3 million (previous year: approximately EUR 35.6 million).

Domestic revenues accounted for 66% and international revenues accounted for 34% of the operating result generated in projects. The share of the operating result generated in projects attributable to Styria was approximately 12%.

As at 31 December 2020 services not yet chargeable amounted to approximately EUR 9.3 million (previous year: EUR 8.5 million).

The expenses in the amount of approximately EUR 47.4 million (previous year: approximately EUR 50.1 million) are made up of staff costs including statutory social security charges and voluntary social benefits plus allocations to pension provisions (former managing director) and severance payments of approximately EUR 32.4 million (previous year: approximately EUR 33.0 million), cost of materials and other services purchased of approximately EUR 3.3 million (previous year: approximately EUR 3.6 million), amortisation and depreciation of approximately EUR 3.5 million (previous year: approximately EUR 3.2 million) and other operating expenses of approximately EUR 8.2 million (previous year: approximately EUR 10.3 million).

The shareholder contributions of the State of Styria, the State of Carinthia through Kärntner Betriebsansiedlungs- und Beteiligungsgesellschaft m.b.H. (BABEG), the State of Burgenland and the Grant Agreement with the Federal Ministry for Climate Action, Environment, Energy, Mobility, Innovation and Technology (BMK) constitute material parts of parent financing and secure accomplishment of its mission.

The Group closed the financial year 2020 with a loss before taxes (formerly profit or loss on ordinary activities) of EUR 54,322.04. Taking into account income taxes of EUR 37,789.00, reversal of reserves in the amount of EUR 249,833.48 and the profit of EUR 1,226,642.15 carried forward from the previous year, the net profit for the year is EUR 1,384,364.59.

MANAGEMENT REPORT

After the accounts for the financial year 2020 had been closed no other significant events occurred which would have affected the financial position or financial performance in the financial year 2020.

➔ I.4.3 Capital Expenditure Report

In the financial year 2020 approximately EUR 4.1 million (previous year: approximately EUR 5.0 million) were invested in property, plant and equipment (scientific equipment, electronic data processing systems, furniture and fixtures, land with buildings).

➔ I.4.4 Staff Report

As at the balance sheet date 504 staff members (193 women and 311 men) were employed. This is equal to 413.9 full-time equivalents as at 31 December 2020.

With 79 new employees (38 women and 41 men), and 66 employees (28 women and 38 men) who left the Group in the reporting period the fluctuation regarding active employees was approximately 13.10% (14.51% regarding women and 12.22% regarding men).

The average age of the Group's employees is 42.0 years.

As at 31 December 2020 the share of graduates from universities and universities of applied sciences was 70.83% (33.33% women); the share of grammar school graduates was 18.85%.

As at the balance sheet date 5 apprentices, 1 female and 4 male, were undergoing training at the Group.

In the reporting period a total of 7 interns (5 women, 2 men) were employed, who completed their compulsory internships in connection with their studies at universities of applied sciences or universities or international exchange programmes. In addition, 32 students (9 female and 23 male) were granted an opportunity to write their diploma or doctoral theses in an employment relationship with the Group in cooperation with the relevant universities.

II. Report on Prospective Developments and Risks of the Group

■ Economic Policy Framework Conditions for Research and Development (R&D)

Due to the unexpected and massive slump in the global economy caused by the covid-19 pandemic, which manifested itself in early 2020 and has continued since, the economic outlook is currently subject to great uncertainty. In particular the globally varying intensity of repeatedly imposed lockdowns, which have severely affected trade and commerce and the tourism industry in Austria, and the delays in the manufacturing and distribution of approved vaccines in the European Union make forecasts on future economic developments more difficult.

Additional factors, such as the long-winded treaty negotiations between the European Union and the United Kingdom related to Brexit and the critical phase in connection with the presidential elections in the United States of America, have also contributed to increased economic uncertainty.

As a significant indicator of the presently difficult situation the major slump in the performance of the Austrian and international economies has to be mentioned. For example, for 2020 a decline in Austria's GDP by -7.3% compared to 2019 is expected (WIFO [Austrian Institute of Economic Research] Monthly Report 01/2021, p 25-38), although last summer the economy recovered for a short period, which led to economic rebound effects. The decline by -7.5% in GDP in the eurozone is not much higher, with specific countries like Germany (-5.1%) coping with the crisis much better.

For 2021 and 2022 the economy in the EEA is expected to recover, however with growth rates of +4.8% (2021) and +3.1% (2022) for the eurozone the losses from 2020 can only be balanced in part. For Austria GDP is expected to grow by +2.5% (2021) and +5.1% (2022) in the reference period taking into account the scenario of a third lockdown, which has already occurred. It is assumed that from Q 2/21, from the time the economy will start to recover, these developments will be strongly influenced by rebound effects such as additional spending due to the

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consumption backlog. However, those effects will decrease in the course of 2021 as the expected normalisation occurs. The pre-crisis level of domestic added value is expected to be reached by mid-2022 at the earliest.

Due to the extraordinary situation of both the public sector and the entrepreneurial sector as major investors in research activities no estimate of the research share for the past year was made. The only indication thereof is thus the revised global R&D estimate for 2019, which amounts to 3.18% (EUR 12.7 billion) (STATISTICS AUSTRIA of 9 October 2020).

Specific Framework Conditions for the Parent Company

■ Shareholder Contribution from the State of Styria

The Government of the State of Styria provided JOANNEUM RESEARCH with a shareholder contribution of EUR 7,700,000.00 for 2020 (previous year: EUR 7,800,000.00) as a contribution to recurring expenses.

For 2021 an amount of EUR 7,700,000.00 will be provided as a shareholder contribution to recurring expenses. To cover pro-rata additional funds required due to covid-19 the State of Styria as the majority shareholder made an additional one-off shareholder contribution of EUR 200,000.00.

■ Shareholder Contribution from Kärntner Betriebsansiedlungs- und Beteiligungsgesellschaft m.b.H. (BABEG)

BABEG granted JOANNEUM RESEARCH shareholder contributions of EUR 1,554,000.00 for 2020 (previous year: EUR 1,424,000.00).

The shareholder contribution agreement between BABEG and JOANNEUM RESEARCH expired at the end of 2020.

For the financial years 2021-2024 a new agreement was concluded, under which BABEG has agreed to grant an annual shareholder contribution of EUR 1,504,000.00 to further develop the location of Carinthia. In addition, BABEG has agreed to make another shareholder contribu-

tion in the amount of EUR 100,000.00 for expanding the scientific know-how in the area of Next-Generation Robot Networks by 30 September 2021.

Likewise, also taking into account its participating interest, BABEG granted an additional one-off shareholder contribution of EUR 35,000.00 to cover pro-rata additional funds required due to covid-19.

■ Shareholder Contribution from the State of Burgenland

Under the Participation and Cooperation Agreement between the State of Styria, Kärntner Betriebsansiedlungs- und Beteiligungsgesellschaft m.b.H. (BABEG) and Landesholding Burgenland GmbH (LHB) the State of Burgenland agreed to grant JOANNEUM RESEARCH a shareholder contribution of EUR 464,500.00 for the term of the investment.

Likewise, also taking into account its participating interest, the State of Burgenland granted LHB an additional one-off shareholder contribution of EUR 12,500.00 to cover pro-rata additional funds required due to covid-19.

■ Grant Agreement with the Federal Ministry for Climate Action, Environment, Energy, Mobility, Innovation and Technology (BMK)

In financial 2020 BMK provided funding in a total amount of EUR 2,585,000.00 for near-basic research projects under the current Grant Agreement 2019-2021.

Conclusion of another Grant Agreement for 2022-2024 was principally agreed with BMK. The parties plan to carry out fundamental research projects with a total funding of EUR 7.755 million.

The shareholder contributions of the State of Styria, Kärntner Betriebsansiedlungs- und Beteiligungsgesellschaft m.b.H. (BABEG), the State of Burgenland and the Grant Agreement with the Federal Ministry for Climate Action, Environment, Energy, Mobility, Innovation and Technology (BMK) are significant financing tools of JOANNEUM RESEARCH.

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■ Risks and Prospective Development of the Group

The Group faces changing national and international framework conditions in research funding and due to the formation of new initiatives. Competition for available grants and excellent researchers is becoming increasingly tough.

Due to the global pandemic the financial year 2020 was quite challenging. Fortunately, the operating result did not drop as heavily as in other sectors due to the corona pandemic. The future consequences of the pandemic cannot be predicted, but there is hope that the federal government's measures to support the economy will contribute to an economic stabilisation in 2021.

Financial performance is expected to stabilise and even recover during the financial year 2021.

The positive development of JR-AquaConSol GmbH in the financial year 2020, which was above expectations, is not expected to continue in the same way in the coming financial year. JR-AquaConSol expects a tense market development in financial 2021 due to the corona pandemic, which will be reflected in financial performance.

■ IT Security within the Group

Attacks on IT and communication systems of Austrian business enterprises are a permanent threat. For 2020 a study on this subject showed that 57% of 652 surveyed entities had been victims of cyber attacks (previous year: 66%; comparison of the KPMG studies on "Cyber security in Austria" for 2020 and 2019). In almost half of the cases (49%) minor financial losses occurred; 4% suffered serious damage and in 36% of the cases the loss could not be quantified. The estimated number of undetected cases is much higher, as only one third of the entities report such attacks to the authority.

Three fourths of the entities were exposed to attacks which spied out log-in data (phishing), one half of the entities believes that attacks on government players have increased. Cyber attacks have become normal and are a constant threat, which is why 69% of all enterprises invest in precautionary measures.

In terms of the human factor gullibility of the victims, lack of awareness of the need for security measures and the increasing prominence of digital equipment in everyday life are used as attack vectors. Increased teleworking leads to decentralisation, which offers additional points of attack.

In March 2020, at the beginning of the lockdown due to the pandemic, the Company took supplementary IT measures to allow and implement the increased use of teleworking in the best possible way. Encrypted VPN connections, systems for video conferencing, online trainings and online webinars have optimally supplemented online systems that had existed before the crisis.

In 2020 77% of the surveyed entities demanded stronger support from the government. JOANNEUM RESEARCH has cooperated with the Federal Agency for State Protection and Counter Terrorism (BVT) for many years to be kept informed about the security situation for its company-wide risk provision. This concerns both threats to IT security and threats to public security. In this way measures can be taken early and staff can be informed accordingly, where necessary.

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In May 2020 JOANNEUM RESEARCH was the victim of a cyber attack via the Austrian ACOnet internet research network. A DDoS (Distributed-Denial-of-Service) attack, presumably from Eastern Europe, caused an overload of the servers. The attack started on a Friday at 9:30 a.m. After approximately 20 minutes the Company's internet connection was completely overloaded. Therefore, the public websites of the Company could not be retrieved and the staff working from home had no access to the server data. The team of JOANNEUM RESEARCH's Computing Center immediately fought the attack in cooperation with the Graz University of Technology, the ACOnet operator of the University of Vienna. From 12:10 p.m. operations started to normalise and at 1:07 p.m., i.e. in less than four hours, our specialists were able to give the all-clear.

As a company that generates knowledge JOANNEUM RESEARCH faces worldwide competition in specific research areas. Accordingly, there is a strategic risk of trade secrets being spied out by competitors who possess significant resources, or by government-related agencies. In order to prevent that, the Company invests in creating high awareness among its staff, in comprehensive authorisation concepts, a strict password policy, a private cloud, encryption, and much more.

In summary it can be said that JOANNEUM RESEARCH has once more improved and further enhanced its IT security measures. In implementing new technical standards and legislation, measures are regularly taken throughout the Company to enhance security, on the one hand, which, however, also requires capital expenditure, on the other hand.

III. Report on Research and Development

■ III.1 Research Units of the Parent Company

➔ DIGITAL – Institute for Information and Communication Technologies

Activities planned for financial 2021:

DIGITAL is one of the internationally leading applied research partners in the area of information and communication technology (ICT). In this function DIGITAL has assumed the role of a product innovator and business enabler in many areas of the economy with a permanent focus on the market also in 2021. Intelligent sensor systems constitute an important technological basis of the institute. Networking of dramatically increasing distributed data volumes originating not only from sensors but from different sources is the motor for another focus of the institute, communication technology. The Institute DIGITAL offers solutions by means of innovative methods in this field. A major focus of DIGITAL is on the mapping of new and the transfer of existing complex algorithms in the edge-to-cloud continuum.

➔ MATERIALS – Institute for Surface Technologies and Photonics

Activities planned for financial 2021:

For financial 2021 the major scientific goals of the institute as a whole are to strengthen its reputation as one of the leading research facilities for nanotechnology, surface technologies and photonics in Austria and abroad. Further development of the core competences in the technology fields with a USP, such as roll-based UV nano imprint tech-

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nology, as well as the Smart Connected Lighting research group in Burgenland and its increased cooperation with business partners in the region are in the focus of the institute's activities. The expansion of ultraprecise laser micro-machining and manufacturing, which is suitable for industrial production, for developing technologies and products together with business partners is also driven forward.

➔ **ROBOTICS – Institute for Robotics and Mechatronics**

Activities planned for financial 2021:

ROBOTICS' consistent further development of topics focuses on embedding robotics in the digitalisation projects of an industry 4.0 transformation. In 2021 a major focus is thus on applied AI and embedding this means of production in a closely interconnected ICT infrastructure and process chain by means of information technology. In addition to technical support by experts in the Robot Systems Technologies research group ROBOTICS therefore also offers supporting qualification through the ROBOTICS Training Center (RTC) and accredited audits by the ROBOTICS Evaluation Lab (REL) for the jointly developed innovations.

➔ **COREMED - Cooperative Centre for Regenerative Medicine**

Activities planned for financial 2021:

In 2021 and the next few years COREMED's research focus will continue to be on the development and validation of pre-clinical models for wound healing and wound healing disorders. Another important research topic will be the development and validation of in-vitro skin models and disease-specific models. Already established pre-clinical models and those being developed will serve the purpose of soliciting contract research projects and research projects funded by third parties. In 2021 COREMED's close cooperation with HEALTH and with the Medical University of Graz will be at the core of its strategic focus.

➔ **HEALTH – Institute for Biomedicine and Health Sciences**

Activities planned for financial 2021:

HEALTH supports clinical and pre-clinical research into the effect and efficacy of medicines and interventions in dermatology, neurology, and metabolism research by customised studies in the fields of pharmacokinetics and pharmacodynamics, bioanalytics, data management and statistics. In addition, the institute cooperates with the producing pharmaceutical industry regarding issues of cleaning validations and determinations of content. Here the institute acts as a professional clinical research organisation (CRO) and will continue to expand and strengthen this position in 2021. HEALTH manages to build a bridge between scientific excellence and industry-oriented offers by applying its key technologies, namely open flow microperfusion (OFM) and mass spectrometry.

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► LIFE – Institute for Climate, Energy and Society

Activities planned for financial 2021:

In 2021 LIFE will continue to proactively research into topics of the future and intensively communicate its activities. Quantitative and data-driven research approaches will continue to be reinforced and are going in two clear directions: one is scientific excellence and the other is to systematically expand practical relevance together with and through so-called preferential business and/or preferential policy partners with a focus on the partners' topics. For 2021 it is also planned to prepare the potential outsourcing of products in the area of weather and climate risk management which are ready for the market, maybe also in cooperation with another scientific institution, until it is ready for a decision to be made.

► POLICIES – Institute for Economic and Innovation Research

Activities planned for financial 2021:

The fundamental mission of POLICIES in providing advice and support to customers from politics and business in making strategic and operational decisions will be continued in 2021. Major focus areas will, above all, be research into the effects of the covid crisis and the climate crisis and supporting politics and businesses in evidence-based responses, provision and use of large information bases and systems, supporting politics in regional and national strategic processes, and evaluating policy measures and grants, as well as supporting user-friendly and responsible technological development and innovation. Another focus will be on the methodological support of data-driven technological developments for the Austrian industry.

■ III.2 JR-AquaConSol GmbH

Activities planned for financial 2021:

In the financial year 2021 the focus of research activities is on lysimeter systems, on the topical field of "atmosphere, soil and unsaturated zone", on developing numerical models for agricultural irrigation and developing models for data-based and model-based control systems for water supply companies.

Graz, 4 March 2021

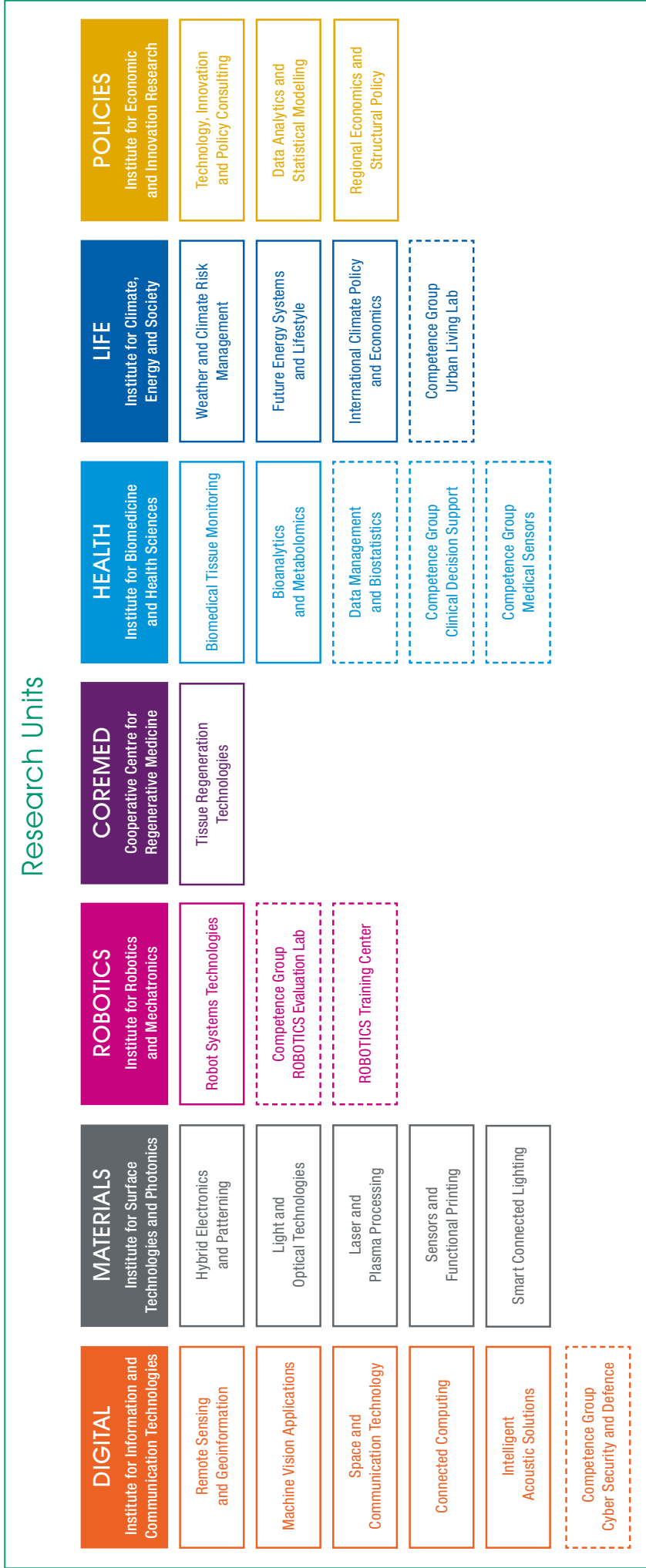


Prof. Dr. Wolfgang Pribyl, MBA
Managing Director

JOANNEUM RESEARCH Forschungsgesellschaft mbH

Executive Board, Corporate Staff and Departments

as of 2020



JOANNEUM RESEARCH

Forschungsgesellschaft mbH

Executive Board, Corporate Staff and Departements

as of 2021

Thematic Areas and Research Units

Information and Production Technologies

DIGITAL Institute for Information and Communication Technologies	MATERIALS Institute for Surface Technologies and Photonics	ROBOTICS Institute for Robotics and Mechatronics
Remote Sensing and Geoinformation 01	Hybrid Electronics and Patterning 02	Robot-Systems Technologies 05
Machine Vision Applications 01	Light and Optical Technologies 02	Competence Group ROBOTICS Evaluation Lab 05
Space and Communication Technology 01	Laser and Plasma Processing 03	ROBOTICS Training Center 05
Connected Computing 01	Sensors and Functional Printing 02	
Intelligent Acoustic Solutions 01	Smart Connected Lighting 06	
Cyber Security and Defence 01		

Human Technology and Medicine

COREMED Cooperative Centre for Regenerative Medicine	HEALTH Institute for Biomedicine and Health Sciences
Tissue Regeneration Technologies 01	Biomedical Tissue Monitoring 01
	Bioanalytics and Metabolomics 01
	Competence Group Data Management and Biostatistics 01
	Competence Group Clinical Decision Support 01
	Competence Group Medical Sensors 01

Society and Sustainability

LIFE Institute for Climate, Energy and Society	POLICIES Institute for Economic and Innovation Research
Weather and Climate Risk Management 01 04	Technology, Innovation and Policy Consulting 01 04
Future Energy Systems and Lifestyle 01	Data Analytics and Statistical Modelling 01 05
International Climate Policy and Economics 01	Regional Economics and Structural Policy 01 05
Competence Group Urban Living Lab 01 05	

Standorte: 01 Graz 02 Weiz 03 Niklasdorf 04 Vienna 05 Klagenfurt 06 Pinkafeld

Affiliated Company

- JPR-AquaConSol GmbH

Shareholdings

- EPIG GmbH
- FH JOANNEUM Gesellschaft mbH
- Holz.Bau Forschungs GmbH
- Human.technology Syria GmbH

Commercial utilization/Spin-offs

- ALP.Lab GmbH
- decide Clinical Software GmbH
- Geo5 GmbH
- Pacemaker Technologies GmbH
- Rebeat Innovation GmbH

Shareholdings COMET-Centres

- ACIB GmbH
- BEST – Bioenergy and Sustainable Technologies GmbH
- CBmed GmbH
- Know-Center GmbH
- Research Center for Data-Driven Business & Big Data Analytics
- Virtual Vehicle Research GmbH
- Materials Center Leoben Forschung GmbH
- Polymer Competence Center Leoben GmbH
- Research Center Pharmaceutical Engineering GmbH

Equity Holdings

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Information and Production Technologies

DIGITAL

Institute for Information and Communication Technologies

- Remote Sensing and Geoinformation
- Machine Vision Applications
- Space and Communication Technology
- Connected Computing
- Intelligent Acoustic Solutions
- Competence Group Cyber Security and Defence

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- Light and Optical Technologies
- Laser and Plasma Technologies
- Sensors and Functional Printing
- Smart Connected Lighting

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- ROBOTICS Training Center

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- Competence Group Clinical Decision Support
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Society and Sustainability

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- Future Energy Systems and Lifestyle
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