**Federal Ministry
for Economic Affairs
and Climate Action**

International
cooperation projects

Development of digital technologies

bmwk.de

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1. International cooperation projects

The German Federal Ministry for Economic Affairs and Climate Action (BMWK) supports a number of bilateral and multinational research and development (R&D) cooperation projects with selected partner countries in Europe and internationally. The aim is, on the one hand, to transfer technological developments to foreign application areas and markets and, on the other hand, to learn from the specific competences of research institutions and companies from the respective partner country in current funding areas for joint activities.

Digital technologies are deeply changing our ways of working and doing business as well as the way we interact and communicate. They are a prerequisite for maintaining the competitiveness of individual enterprises and the economy as a whole. The COVID-19 crisis has further emphasised the importance of digital technologies and infrastructures and showed how our societies and economies rely on digital solutions.

The BMWK promotes development of digital technologies, among others, by providing funding for pre-commercial research and development projects. A number of diverse technology programmes are currently supported, such as "Quantum Computing – Applications for industry", "5G Campus networks", "Innovation competition on artificial intelligence", "Secure digital identities", to name just a few.

Apart from national programmes, the BMWK is also providing funding for bilateral cooperation projects in Europe and internationally to support the transfer of technological developments to foreign markets and for harnessing the specific skills of companies and research institutions. There are ongoing projects with France, Austria, Canada and Japan. Further bilateral cooperation projects with Austria and France are in preparation.

The BMWK also provides funding for stand-alone international projects that are part of the EUREKA cluster CELTIC-NEXT and the new initiative of several EUREKA clusters on artificial intelligence ($\sum$! AI Call). At present, the BMWK co-funds six cooperation projects with Canada, the United Kingdom, Singapore, Sweden, Hungary, Austria, Portugal and Turkey that stem from this "bottom-up" approach.

Overview of the current bilateral international cooperation projects

Country	Project name	Application area
France	AIOLOS	Health
	CONTRAILS	Sustainability
	GanResilRob	Robotics & Resilience
	GreenBotAI	Robotics & Resilience
	RenovAIte	Construction industry
	5G-OPERA	Communication technologies
	5G-OR	Health
	5G-FORUM	Health
	5G4BP	Business parks
Canada	AIR_PTE	Health management
	ARIBIC	Robotics
	FLAIROP	Robotics
	NephroCAGE	Health management
Austria	BIMcontracts	Construction industry
	CampaNeo	Automotive industry
	ExDRa	Production and process industry
	Future Data Assets	Business administration
	PLASS	Production and supply chain
	Telemed5000	Health management
	EMPAIA	Health management
	Knowledge4Retail	Trade
	KI-SIGS	Health management
	AIQNET	Health management
	D-TRAS	Traffic safety
	SmartDIS	Disassembly
	CARNIVAL	Sensor technology
	EUProGigant	Production
	champI4.0ns	Production and wood industry
	IDunion	Secure digital identities
	ONCE	Secure digital identities
Japan	AIRPoRT	Robotics

Overview of the current EUREKA international cooperation projects

Country	Project name	Application area
UK and Canada	AIMM	Further development of 5G
Singapore	AISSI	Semiconductor manufacturing
UK	Piccolo	Mobile networks
Sweden, Austria, Hungary	6G-SKY	Communication technologies
Portugal, Turkey	CANOPY	Cognitive and Automated Network Operations
Singapore	ATTENTION!	Finance and trade

2. Cooperation with France

As laid down in the Treaty of Aachen, as well as in the Roadmap for a Research and Innovation Network on Artificial Intelligence, and in the Franco-German Dialogue on Technology, France and Germany are strengthening their collaboration in the field of artificial intelligence (AI) and 5G communication technologies.

The objective of the German Federal Ministry for Economic Affairs and Climate Action and the French Ministère de l'Economie et des Finances et de la Relance is to develop new cooperation projects, especially new projects involving cooperation between research and industry. The joint projects will aim at developing precompetitive products and services and will select subjects which entail technological barriers but offer great economic potential in both countries.

Nine bilateral cooperation projects resulted from two joint calls "Franco-German innovation projects on artificial intelligence technologies for risk prevention, crisis management and resilience" and "Technical developments and application ecosystems for private 5G networks". These Franco-German applied research collaborations will foster the creation of common AI as well as 5G ecosystems.

2.1. Franco-German AI innovation projects

France and Germany have pledged a total of 17.5 m € for five joint cooperation projects that aim to develop new artificial intelligence (AI) solutions to make our world more resilient to crises of different kinds. In particular, the projects intend to create AI solutions to fight climate change, to early detect and combat future epidemics and to make our industries more resilient to the supply-chains interruptions.

In the Treaty of Aachen (2019), Germany and France agreed to step up their cooperation in the field of artificial intelligence. As a result, the countries launched a joint call for proposals in February 2021. This call for projects was a great success, with 25 projects submitted and a total of 119 partners. There were 42 SMEs that applied, 17 large groups, 52 laboratories, research institutes and universities and 8 public institutions. The five winning projects have started in Spring 2022.

This joint call was directed towards applied Franco-German research and innovation projects on AI technologies for risk prevention, crisis management and resilience. The call aimed to explore how AI could help to create solutions that would detect and anticipate crises in the near future and minimise their impact by providing support with decision-making and automation. A new initiative for modelling and prediction tools and for automation in order to create a more resilient society is needed to help us tackle the challenges of crisis management. The main focus was on economically and politically important areas of application such as health, commerce and sustainability.

Franco-German AI innovation projects	
AIOLOS	Artificial Intelligence ToOLs for Outbreak Detection and response
CONTRAILS	Contrails in the Climate System: from Observation to Impact Modelling and Prediction
GanResilRob	Generative Adversarial Networks and Semantics for Resilient, Flexible Production Robots
GreenBotAI	Frugal and adaptive AI for flexible industrial Robotics
RenovAIte	Boosting renovation industry with AI

2.1.1. AIOLOS – Artificial Intelligence Tools for Outbreak Detection and Response

The Franco-German collaborative project AIOLOS aims to develop a web-based multi-dimensional data platform that will allow early detection of new outbreaks of respiratory infectious diseases (ALERT), tracking their spread and consequences (MONITOR), and simulating the impact and effectiveness of different interventions and measures to support decision-making at the scientific and policy levels (PREDICT).

The intended outcome of AIOLOS is a prototype that includes a decision-making dashboard, the underlying AI and predictive

2 YEARS DURATION

March 2022 – February 2024

5 PARTNERS

French: Sanofi Pasteur, Quinten Health

German: Fraunhofer ITMP and SCAI, Umlaut Consulting GmbH, CompuGroup Medical Deutschland AG

€ 4.7 MILLION FUNDING

The total project costs are
€ 7.7 million, of which
€ 4.7 million will be funded.

modelling engine, and the associated data feed infrastructure. In the interest of sustainability, flexibility, and privacy compliance, this solution will include a federated network of data providers that relies on application programming interfaces (APIs).

The development of new digital solutions for pandemic detection and control will support cross-national decision-making at the political but also at the economic level, e.g. with regard to the maintenance of supply chains or the preservation of productivity with simultaneous optimal health protection of the workforce. The AIOLOS project thus contributes to the safeguarding and expansion of competitiveness at the macro- and micro-economic level and the preservation of locations and employment.

Contact information of the project coordinator:
PD Dr Aimo Kannt, Fraunhofer-ITMP, contact@aiolos-project.org

2.1.2. CONTRAILS - Contrails in the Climate System: from Observation to Impact Modelling and Prediction

The observation, modelling and prediction of contrails and high clouds is an important and challenging area of atmospheric science, especially with regard to the interaction with air traffic and their immediate and long-term climate impact.

The Franco-German project CONTRAILS aims to develop and combine state-of-the-art, trustworthy AI methods and physical models to improve the identification, characterisation, data assimilation and prediction of contrails and high clouds. Specifically, new ground-based all-sky camera observations and satellite-based cloud observations in the infrared and visible range will be automatically evaluated for contrail and high cloud visibility in real time using artificial intelligence methods.

3 YEARS DURATION

March 2022 – February 2025

4 PARTNERS

<u>French</u>: THALES Group, University of Versailles Saint Quentin en Yvelines (UVSQ) / LATMOS, Reuniwatt

<u>German</u>: Deutscher Wetterdienst (DWD)

€ 2.6 MILLION FUNDING

The total project costs are € 3.7 million, of which € 2.6 million will be funded.

The results are automatically fed into the observation pool for the analyses of the numerical weather forecast, where they provide a significantly improved formation probability of contrails and the climate-relevant clouds that arise from them. The results of this project can provide tools for monitoring the effects of contrails on the climate and thus lay the foundations for future experimental tests to avoid contrails by optimising flight paths.

Contact information of the project coordinator:
Prof. Dr Roland Potthast, Deutscher Wetterdienst, Roland.Potthast@dwd.de

2.1.3. GanResiIRob – Generative Adversarial Networks and Semantics for Resilient, Flexible Production Robots

The industry is already highly automated and possesses a large number of industrial robots, that are precise, fast and powerful. Nevertheless, the pandemic has shown a lack in another key area: flexibility. As the global supply chains collapsed, industrial production experienced significant difficulties. Companies were unable to make up for missing parts and materials or to quickly switch to new products with available components. An additional critical aspect was the lack of on-site workers due to the pandemic.

3 YEARS DURATION

March 2022 – February 2025

5 PARTNERS

<u>French</u>: Two-I SAS, CNRS IRL2958 GT-CNRS, Secma SA
<u>German</u>: FZI Forschungszentrum Informatik, ArtiMinds Robotics GmbH

€ 2.7 MILLION FUNDING

The total project costs are € 3.9 million, of which € 2.7 million will be funded.

The goal of GANResilRob is to make available the inherent flexibility of industrial robots by enhancing them with a combination of AI technologies such as machine learning, Generative Adversarial Network (GAN), AI-based semantic interpretation and intuitive task programming.

By using AI, the project intends to support rapid manufacturing of new products, reconfiguration of production lines in case of changing supply chains as well as to create intelligent robotic production cells for assembly and disassembly. To demonstrate it, two applications that pose challenges in industrial automation are identified: the assembly of vacuum chambers and the recycling or recovery of components from old cars.

Expected impacts include: increased resilience in production industry; reduction in CO_2 emissions, due to the automated recycling of electronic/mechatronic components and reduction of human contacts during pandemic crises by remote-controlled task teaching.

Contact information of the project coordinator:
Dr-Ing. Arne Roennau, FZI Forschungszentrum Informatik, roennau@fzi.de

2.1.4. GreenBotAI – Frugal and adaptive AI for flexible industrial Robotics

The European manufacturing industry is facing several challenges: the change from mass production to mass customisation, the ever-increased complexity of production lines, the competition with low-income countries, the risk of pandemics and the expectation of low defect rates, to name a few. Against this backdrop, the project GreenBotAI has the following three main objectives: (1) ensuring continuous production in Europe during pandemics, (2) guaranteeing European sovereignty in terms of production automation, (3) reducing the environmental impact of European factories by reducing the energy consumption of robotic applications by 50%.

3 YEARS DURATION

March 2022 – February 2025

4 PARTNERS

<u>French</u>: GrAI Matter Labs SAS, Arts et Métiers (ENSAM LISPEN)

<u>German</u>: Fraunhofer-Institut IWU, Hochschule München

€ 3.7 MILLION FUNDING

The total project costs are € 4.7 million, of which € 3.7 million will be funded.

Focus of GreenBotAI is on reduction of the reaction and latency times of industrial robots, optimisation of smoothened path planning and the "on-the-fly execution" of certain tasks. The project addresses the development of necessary hardware components as well as state-of-the-art deep-learning methods for monitoring, data processing and error control in order to create a new generation in robotics. Environmental conditions are to be recognised automatically and the robot's behaviour is to be adapted to changing conditions in real time.

It is planned to develop a "GreenBotAI kit" for equipping industrial robots with intelligent applications and to facilitate their construction. A kit will include a low-latency and energy-saving AI processor, a circuit board and software including the algorithms.

Contact information of the project coordinator:
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2.1.5. RenovAIte – Boosting renovation industry with AI

In order to mitigate the effects of climate change, buildings are being renovated on a large scale, mainly to reduce energy demand with improved insulation and new heating concepts. Until now, the planning of such renovation projects has been based primarily on human assessment and experience as well as unstructured data. RenovAIte is creating an AI-based system for intelligent planning of renovation projects for houses and streets. Particular attention is being paid to the resilience, i.e. the ability to be affected by unforeseen disruptions, of the construction projects. The system is intended to enable decision-makers to plan renovation projects in such a way that delays in construction projects and early renewed renovations due to changing environmental conditions can be avoided.

3 YEARS DURATION

March 2022 – February 2025

5 PARTNERS

French: Leonard, Action Logement, ALEIA
German: OFFIS e.V. – Institute for Information Technology, VIA IMC GmbH

€ 3.8 MILLION FUNDING

The total project costs are € 7.8 million, of which € 3.8 million will be funded.

For this purpose, a simulation environment for planning and simulating renovation projects will be created on the basis of historical and current data. With the help of the AI methodology "Adversarial Resilience Learning", various configurations will be examined, considering critical factors such as environmental influences or supply bottlenecks, in order to optimise the plans.

The project thus addresses a research and development gap in the digitisation of the economy and makes an important contribution to achieving climate protection goals.

Contact information of the project coordinator:
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2.2. Franco-German cooperation in 5G private networks

As part of the Article 45 economic stimulus package, the Federal Ministry for Economic Affairs and Climate Action (BMWK) is cooperating with the French Ministère de l'Economie et des Finances et de la Relance (MEFR). The aim of the program is to intensify cooperation in the field of "Technical development and application systems for private 5G networks". In the funded projects, French and German partners will develop and test joint innovations in the field of virtualisation of 5G subsystems and components for the flexible design of the campus networks. In addition, they will investigate their interoperability via open interfaces.

The Franco-German cooperation will strengthen the establishment of an ecosystem of development partnerships and ultimately the digital sovereignty of both countries. It aims to help lower market entry barriers in Europe and open up the 5G communications market for new providers of industry-specific solutions for private 5G networks from France and Germany.

The four selected projects will receive total funding of € 17.7 million from the BMWK and the MEFR.

Franco-German cooperation in 5G private networks	
5G-OPERA	5G OPEn RAn
5G-OR	Building the next generation 5G-enabled operating theatre ecosystem to improve patient care
5G-FORUM	5G Flexible OR Use & Monitoring
5G4BP	5G For Business Parks

2.2.1. 5G-OPERA – 5G OPEn RAn

European companies must advocate and pursue open hardware and software with at least open interfaces in order to promote independence from American and Asian providers. The foundation for the digital sovereignty of the European mobile ecosystem and industries is to be laid primarily technologically by this project.

The overarching goal is to ensure that the hardware and software of all project partners can work with each other technologically independent of the respective manufacturer.

In addition, the developed platform should guarantee the interoperability of different manufacturers, so that the components Radio Unit (RU), Distributed Unit (DU) and Centralised Unit (CU) can be combined for the Open RAN architecture in a way that is convenient for the user. Uniform and openly documented interfaces are needed for this.

3 YEARS DURATION

January 2022 – December 2024

12 PARTNERS

French: EURECOM, FONDATION B-COM, CEA – Centre de Grenoble Ekinops France, ALSATIS, KALRAY, AW2S ADVANCED WIRE-LESS SOLUTIONS AND SERVICES, NXP Semiconductors France

German: Technische Universität Dresden, Fraunhofer-IIS, TU Berlin, Xelera Technologies GmbH, Industrieanlagen Betriebsgesellschaft mbH, Smart Systems Hub GmbH (UA der TUD)

€ 5.7 MILLION FUNDING

The total project costs are € 8.0 million, of which € 5.7 million will be funded.

The interoperability of the developed Open RAN solutions will be tested and verified by integration in testbeds in both countries.

Contact information of the project coordinator:
Prof. Frank Fitzek, Technische Universität Dresden, frank.fitzek@tu-dresden.de

2.2.2. 5G-OR – Building the next generation 5G-enabled operating theatre ecosystem to improve patient care

In order to mitigate Within the framework of the "5G-OR" project, a German-French 5G-capable operating theatre ecosystem for hospitals to improve patient care will be created. Different 5G applications in the operating environment will be developed, which will be used interoperably in German and French institutions with 5G campus networks and validated in a realistic clinical environment. Among other things, the use of data-driven and AI-assisted surgery should lead to improved patient outcomes and patient safety. The overall goal is to demonstrate the added value of a private 5G ecosystem in the healthcare sector.

3 YEARS DURATION

January 2022 – December 2024

8 PARTNERS

French: IHU Strasbourg, b<>com, RDS (Rhythm Diagnostic Systems)

German: Fraunhofer IPA, Hochschule Reutlingen, SectorCon Ingenieurgesellschaft für System- und Softwaretechnik mbH, KARL STORZ SE & Co.KG, Charité Berlin

€ 2.1 MILLION FUNDING

The total project costs are € 2.7 million, of which € 2.1 million will be funded.

By networking medical devices, essential medical data such as vital signs and endoscopic images can be collected and processed quickly and in a structured manner. In a clinical control centre, the data can be interpreted with the help of AI algorithms and used for telemedical applications. Furthermore, in the networked hospital environment, robotic assistance systems represent a crucial element in supporting the specialist staff. Autonomously navigating driverless transport systems can provide required equipment and consumables as needed for operations and take over time-consuming or time-critical logistics. In the operating theatre, robotic assistants can take over relieving and supporting tasks, enabling doctors to carry out surgical procedures telemedical through appropriate networking of the systems.

Contact information of the project coordinator:
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2.2.3. 5G-FORUM – 5G Flexible OR Use & Monitoring

The 5G-FORUM project investigates the potential of 5G technology for modular, intraoperative and real-time communication in the operating room and will subsequently implement demonstrators in France and Germany. The commercial SDC (Service-oriented Device Connectivity) library "sdcX" of SurgiTAIX AG will be extended to realise wireless real-time communication via 5G and Time-sensitive networking. In order to standardise the description of real-time requirements in SDC, the standardisation process of these requirements is initiated in the form of device profiles. A device profile specifies how a device must be modelled in the network and defines the semantic nomenclature for this application, which

3 YEARS DURATION

January 2022 – December 2024

6 PARTNERS

French: Haventure, AMA research and development, eCential Robotics

German: SurgiTAIX AG, Lehrstuhl für Medizintechnik an der RWTH Aachen, Klinik für Neurochirurgie (Universitätsklinikum Aachen AöR)

€ 1.1 MILLION FUNDING

The total project costs are € 1.6 million, of which € 1.1 million will be funded.

enables manufacturer-independent interoperability. Device profiles are to be defined for real-time, 5G and robotic applications and communicated to the IG-NB and OR. NET e.V. working groups. The Chair of Medical Technology at RWTH Aachen University (medi-TEC) is investigating the potential of modular, intraoperative and real-time communication using a neurosurgical use case. The core of the demonstrator is a navigated surgical system that must transmit data via 5G with high reliability and low latency, as well as a 3D tracking camera that records the position of surgical tools and transmits them in real time to a planning software.

Contact information of the project coordinator:
Dominik Stegemann, SurgiTAIX AG, stegemann@surgitaix.com

2.2.4. 5G4BP – 5G For Business Parks

While nationwide mobile networks of major operators primarily serve the mass market with their best effort broadband services, companies need customised 5G networks that can be seamlessly integrated into their existing communications infrastructure. Large companies have therefore started to build their own 5G campus networks using the designated spectrum. SMEs usually do not have the know-how nor the financial means to do so. On the other hand, their requirements for wireless communication networks are similar to those of large companies. They are thus in danger of falling behind technologically.

3 YEARS DURATION

January 2022 – December 2024

6 PARTNERS

French: 6WIND, SPECTRONITE, ALSATIS, AW2S ADVANCED WIRELESS SOLUTIONS AND SERVICES

German: highstreet technologies GmbH, Xelera Technologies GmbH

€ 0.3 MILLION FUNDING

The total project costs are € 0.6 million, of which € 0.3 million will be funded.

In order to diminish this digital divide, 5G For Business Parks (5G4BP) has set itself the goal of creating an Open RAN-based solution for SMEs which are often located in business parks. The 5G campus network extends over the entire business park and is set up and operated by a specialised operator. In order to reach companies even further away from the business park, a directional radio link will be offered.

Specific goals of 5G4BP: (1) the development of a fully integrated Open RAN solution for 5G campus networks including edge data centres in business parks; (2) the creation of a European ecosystem for such campus networks; (3) the deployment and commissioning of a reference network in an industrial park in the department of Isère in France; (4) the further deployment of this solution in business parks in France, Germany and other European countries

Contact information of the project coordinator:
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alfons.mittermaier@highstreet-technologies.com

3. Cooperation with Canada

In cooperation with the Canadian Embassy in Berlin, the BMWK has initiated a bilateral research cooperation. Canada is an attractive partner as a strong location for innovation and due to its leading role in the development of artificial intelligence. Transatlantic exchange has a long tradition: In 2021, Germany and Canada will celebrate the 50th anniversary of their successful scientific and technological cooperation.

Both countries are continuously working to advance technological progress together. Similar to the German Federal Government's High-Tech Strategy 2025, which identifies the digitisation of the economy and society as a priority task for the future, the Canadian government and the Canadian provinces have also defined investment in digital development and the location of high-tech companies as a clear goal.

The cooperation between the BMWK and the Canadian Embassy in Berlin has resulted in four research projects with Canadian and German partners, which are funded by the Canadian National Research Council (NRC) in Montreal, the Natural Sciences and Engineering Research Council of Canada (NSERC) in Ontario and the BMWK. The goal of the funded research projects is the further development and innovative application of artificial intelligence methods, so that companies benefit from the bilateral exchange. All four projects held a kick-off event in spring 2021 and successfully began their work. In the next three years, innovative technological developments are expected in the areas of health management and robotics.

Current Canadian-German bilateral projects	
ARIBIC	Artificial Intelligence based Indoor Cartography
AIR_PTE	AI-based risk prediction and treatment effect estimation based on health data
FLAIROP	Federated Learning for Robot Picking
NephroCAGE	Nephrology Disease Cooperation between Canada and Germany for Applied AI

3.1. ARIBIC – Artificial Intelligence based Indoor Cartography

The German-Canadian ARIBIC consortium aims to develop AI-based algorithms that enrich a 3D geometric map with additional semantic information.

The goal of the consortium is to develop an AI-based open platform for the localisation of autonomous transport vehicles in warehouse applications. This will enable digital applications and services that enable safe driving in these environments. In addition, typical fleet and warehouse management software systems can be linked to the platform to provide relevant data on the vehicles to perform picking tasks or specific deliveries.

2.5 YEARS DURATION

March 2021 – November 2023

4 PARTNERS

<u>Canadian</u>: LeddarTech, University of Toronto-STARS Laboratory

<u>German</u>: STILL GmbH, Karlsruhe Institute of Technology

€ 0.7 MILLION FUNDING

The total project costs are € 1.1 million, of which € 0.7 million will be funded.

The algorithms developed in the project for the real-time automatic generation and continuous updating of a highly accurate and detailed 3D indoor map provide the basis for safe movement of transport robots and thus for effective tracking and tracing of these vehicles in real time. The necessary data and information are provided by autonomous mobile robots or automated vehicles and stored in the cloud. The result can be considered as a living digital twin of the warehouse. The fully automated creation of 3D maps for indoor spaces also offers potential for use in various areas such as smart living, autonomous driving, intelligent construction or smart production.

Contact information of the project coordinator:
Dr Dennis Schüthe, STILL GmbH, <u>dennis.schuethe@still.de</u>

3.2. AIR_PTE – AI-based risk prediction and treatment effect estimation based on health data

AIR_PTE aims to develop artificial intelligence-based methods to improve and automate treatment effect estimation based on health insurance claims data in Canada and Germany. Both Canada and Germany can build upon large representative samples of long-term health claims data, well suited to obtain real world evidence and to exploit AI based methods.

The methods will be developed and compared based on the example of the current therapeutic options to treat venous thromboembolism (VTE) on Canadian and German health care claims.

2 YEARS DURATION

September 2020 – August 2022

4 PARTNERS

Canadian: McGill University Montreal, Macadamian HealthConnect

German: DCC Risikoanalytik GmbH, Ingef-Institut für Angewandte Gesundheitsforschung

€ 0.7 MILLION FUNDING

The total project costs are € 1 million, of which € 0.7 million will be funded.

The project's goal is to support multiple evaluations and therapy decisions with modern AI methods by using the analysis platforms SAHRA (BMWK funding program "Smart Data"), EVA (ingef spectrumk) and Macadamian HealthConnect Platform™.

Experience from the operation of digital health platforms, especially with regard to data protection and user acceptance, will be combined with experience from the application of innovative modelling methods to historical health insurance data. The result will provide reliable methods for treatment effect estimation and for personalised decision support at the point of care in Germany, Europe and Canada.

Contact information of the project coordinator:
Prof. Thomas P. Zahn, DCC Risikoanalytik GmbH, thomas.zahn@risikoanalytik.de

3.3. FLAIROP – Federated Learning for Robot Picking

FLAIROP aims to develop a distributed learning approach for pick-and-place robots to robustly recognise and grasp known as well as unknown objects.

The goal is to provide current artificial intelligence (AI) solutions with more data while respecting privacy regulations. There should be no exchange of training data (e.g. images, grasping points, etc.). In this context, FLAIROP investigates how training data from multiple plants or even companies can be used to increase recognition performance compared to single robot training.

2 YEARS DURATION

March 2021 – November 2023

4 PARTNERS

<u>Canadian</u>: University of Waterloo, Darwin AI
<u>German</u>: Festo SE & Co. KG, Karlsruhe Institute of Technology

€ 1 MILLION FUNDING

The total project costs are € 1.4 million, of which € 1 million will be funded.

The project focuses on automated generation of learning data required for the grasp detection and federated learning algorithms, via cloud structure. The AI models are designed to be as efficient as possible to both run locally in each site and globally on the central cloud server. This represents the next stage of development for the simple handling of autonomously acting systems in the context of Industry 4.0.

Federated learning has been used predominantly in the medical sector for image analysis (protection of patient data). Transferring the technology to the increasingly interconnected Industry 4.0/Logistics 4.0 offers strong potential for the use of AI and development of new, more powerful algorithms - while maintaining data protection guidelines.
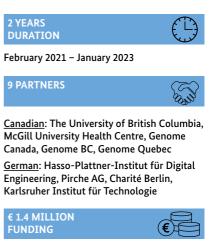
Contact information of the project coordinator:
Jan Seyler, Festo SE & Co. KG, jan.seyler@festo.com

3.4. NephroCAGE – Nephrology Disease Cooperation between Canada and Germany for Applied AI

The German-Canadian consortium is testing the safe application of AI on multinational health data using chronic kidney disease as a use case. The project's goal is to enable an international comparison of treatment strategies.

The project partners will create a learning AI system that will be used to match organ donors and recipients accurately in advance to reduce risks in kidney transplants and prevent organ damage. To this end, clinical centres of excellence in both nations are contributing transplant data from the past 10 years. They will be analysed using artificial intelli-

2 YEARS DURATION

February 2021 – January 2023

9 PARTNERS

<u>Canadian</u>: The University of British Columbia, McGill University Health Centre, Genome Canada, Genome BC, Genome Quebec

<u>German</u>: Hasso-Plattner-Institut für Digital Engineering, Pirche AG, Charité Berlin, Karlsruher Institut für Technologie

€ 1.4 MILLION FUNDING

The total project costs are € 1.7 million, of which € 1.4 million will be funded.

gence and combined with a novel matching algorithm to create clinical prognostic models for kidney transplant recipients. To enable the international comparison, a clinical prediction model is developed that allows combined analysis of clinical data, laboratory data, and genetics in kidney transplant patients.

By using a federated learning approach, the algorithms are transferred to the data: thus, data protection is maintained and the sensitive health data of both nations can serve as a common basis for clinical prediction models without having to leave the respective hospital.

Contact information of the project coordinator:
Dr Matthieu Schapranow, Hasso-Plattner-Institut für Digital Engineering gGmbH, schapranow@hpi.de

4. Cooperation with Austria

The BMWK with its funding framework "Development of Digital Technologies" is cooperating with the Austrian Federal Ministry for Climate Action, Environment, Energy, Mobility, Innovation and Technology (BMK) and its programmes "ICT of the Future" and "Production of the Future" since 2018. Both ministries have agreed on the common goal of intensifying cooperation between the R&D projects of the respective technology funding programmes. Austrian and German companies as well as research institutions can complement each other in their respective profiles and jointly create attractive solutions in the pre-competitive area, also in the direction of the digital European single market. Both ministries have implemented corresponding project funding for this purpose. For the cooperation within the programmes "Smart and sovereign use of data for production" and "Smart and sovereign use of data for sustainable production", budget is provided by the Austrian Research Promotion Agency (FFG).

The projects belonging to the first joint cooperation priority "Smart Data Economy" have successfully finished recently. Currently there are joint projects by German-Austrian consortia in five funding priorities.

4.1. ICT of the future – Smart Data Economy

The area of data economy offers good opportunities for the joint development of German-Austrian solutions. Both ministries have implemented cooperative project funding for this purpose. The funding calls "Smart Data Economy - Artificial Intelligence, Semantics, Sovereignty" from Germany and "Smart Data Economy AT/DE 2018 – AI-based Data Products" from Austria enabled cooperative research and development projects.

Six joint projects were launched in 2019 and successfully closed in 2022.

Projects in funding priority "Smart Data Economy"	
BIMcontracts	Automated Payment and Contract Management in the Construction Industry Using Distributed Ledger Technology and BIM-5D
CampaNeo	Platform for real-time vehicle data campaigns
ExDRa	Exploratory Data Science over Raw Data
Future Data Assets	Smart data balancing to determine corporate data assets
PLASS	Platform for analytic supply chain management services
Telemed5000	Development of a smart system for subsidiary telemedical care for large groups of cardiological risk patients

4.2. ICT of the future - AI platforms

Parallel to the BMWK's innovation competition "Artificial intelligence as a driver for economically relevant ecosystems", an Austrian call invited proposals for "ICT of the future - AI platforms". Four Austrian submissions qualified for funding in cooperation with projects from the AI innovation competition. These efforts further promote cross-border cooperation in the field of artificial intelligence.

The following cooperation projects have been established:

Current projects in funding priority "AI platforms"	
EMPAIA	EcosysteM for Pathology diagnostics with AI Assistance
Knowledge4Retail	
KI-SIGS	Artificial Intelligence Space for Intelligent Health Systems
AIQNET	Medical Data Ecosystem

4.2.1. EMPAIA – EcosysteM for Pathology diagnostics with AI Assistance

Only through the use of AI in diagnostics will modern treatment procedures, such as personalised medicine, be possible across the board. EMPAIA is therefore using pathology as an example to establish a platform for standardised, certified and explainable AI solutions for image-based medical diagnostics. In addition to an infrastructure for access to training data, a marketplace with AI applications for clinical practice will be created on the platform. In addition, solutions for the legal and billing challenges will be developed.

3 YEARS DURATION

January 2020 – December 2022

5 PARTNERS

<u>Austrian</u>: Medizinische Universität Graz

<u>German</u>: Charité – Universitätsmedizin Berlin, Fraunhofer-Gesellschaft zur Förderung der angewandten Forschung, Technische Universität Berlin, Qualitätssicherungs-Initiative Pathologie QuIP GmbH, Vitasystems GmbH

€ 11.3 MILLION FUNDING

The total project costs are € 20.6 million, of which € 11.3 million will be funded.

EMPAIA is the first platform for the development, marketing and use of AI solutions in pathology. Users can integrate data and AI models into diagnostic processes in a legally secure manner and also bill them correctly. The solutions developed in the project can be easily transferred to other fields, paving the way for the broad application of AI in diagnostics. The EMPAIA platform will be financed, among other things, by user fees for the data sets and AI solutions provided.

The platform envisioned in the EMPAIA project intends to overcome all current barriers to the development, distribution and use of AI in pathology. To achieve this, a highly qualified German and Austrian associated partners have joined the project.

Contact information of the project coordinator:
Prof. Peter Hufnagl, Charité Universitätsmedizin Berlin, peter.hufnagl@charite.de

4.2.2. Knowledge4Retail

By creating a platform solution, Knowledge-4Retail (K4R) is advancing the development and use of AI and the use of service robots in retail. Here, so-called "semantic digital twins" of shops serve as the basis for all applications and give retailers the opportunity to align their assortment even better with the wishes of their customers and to make the connection between online and offline shopping more effective. For example, services can analyse customer behaviour in the shops and optimise the placement of goods in terms of visibility and accessibility based on this. Other services will enable automated inventory and shelf replenishment with the help of service robots. This will strengthen the stationary retail trade in the long term.

The emerging K4R platform is intended to drive the dissemination and development of AI-supported hardware and software services in the retail sector with the help of standardised data formats, interfaces and solutions.

3 YEARS DURATION

January 2020 – December 2022

13 PARTNERS

Austrian associated partner: TU Wien

German: team neusta GmbH, German Research Center for Artificial Intelligence GmbH, dm-drogerie markt GmbH + Co. KG, dmTECH GmbH, EHI Retail Institute GmbH, fortiss GmbH, Fraunhofer-Gesellschaft zur Förderung der angewandten Forschung e. V., Nagarro AES GmbH, neusta GmbH, neusta software development West GmbH, Ubimax GmbH, University of Bremen, Technische Universität München

€ 8 MILLION FUNDING

The total project costs are € 12.4 million, of which € 8 million will be funded.

The Austrian contribution extends K4R with the expertise and qualifications in the field of AI methods for visual perception leading to an explainable interpretation.
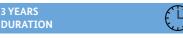
Contact information of the project coordinator:
Andreas Wulfes, team neusta GmbH, a.wulfes@neusta.de

4.2.3. KI-SIGS – Artificial Intelligence Space for Intelligent Health Systems

The aim of KI-SIGS is to create a common institutional framework, the "KI-Space", for the model region of Northern Germany. It serves to develop medical AI technologies better and faster and to bring them to application. The central instrument is a platform through which knowledge transfer is organised and planned developments are coordinated. In addition, regulatory and ethical guidelines are jointly developed.

With KI-SIGS, a platform is being created on which data and services relating to medical care can be posted and obtained. For the first time, a kind of regional excellence cluster is formed as a community of science, business and medical institutions around AI in medicine. The development of new AI technologies will be closely interlinked with joint business models of these players. Contributions from the participating companies and scientific institutions, fees for services and, in the long term, licensing income from successful product developments will finance the AI Space.

3 YEARS DURATION

April 2020 – March 2023

20 PARTNERS

Austrian associated partner: Software Competence Center Hagenberg Gmb

German: UniTransferKlinik, Uni Lübeck, Uniklinik Hamburg, Gesundheit Nord, Drägerwerk, Image IS, Pattern Recognition, mbits, Philips, apoQlar, Söring, Advanced Bionics, Stryker, szenaris, DFKI, FhG, Uni Bremen, Uni Hamburg, Uni Kiel, Uniklinik Schleswig-Holstein

€ 10.7 MILLION FUNDING

The total project costs are € 15.4 million, of which € 10.7 million will be funded.

The Austrian associated partner is researching the addition of cybersecurity functionalities to the KI-SIGS ecosystem to ensure the confidentiality of sensitive data.

Contact information of the project coordinator:
Prof. Martin Leucker, UniTransferKlinik, leucker@unitransferklinik.de

4.2.4. AIQNET – Medical Data Ecosystem

Medical device manufacturers and clinics for scientific studies rely on medical data. To meet regulatory requirements, however, many hurdles need to be overcome for data collection and data usage. In most cases, the data is distributed across non-interoperable systems or is available in different formats. The AIQNET project is developing a digital ecosystem that enables the use of medical data across sectors and in compliance with data protection regulations. The acquisition and analysis of the data will be largely automated with AI.

The AIQNET digital ecosystem aims to structure and make available medical data through software applications - modelled on the app stores on mobile devices. Automated data collection with AI applications can eliminate time-consuming tasks, leaving more time for treatment. For medical technology companies, access to product-related data makes it much easier to fulfil their legal obligation for ongoing product monitoring and to conduct clinical trials. Software providers can use the provided infrastructure and access to medical data to develop data-driven applications in a short time.

Austrian and German associated partners allow integration into an interdisciplinary network of experts.

Contact information of the project coordinator:
Frank Trautwein, RAYLYTIC, frank.trautwein@raylytic.com

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3 YEARS DURATION

January 2020 – December 2022

16 PARTNERS

Austrian associated partner:
ONDEWO GmbH

German: **Raylytic, Berlin Cert, BioLago, BioRegio STERN, Biotronik, Charité Berlin, Eberhard Karls Uni Tübingen, ExB Labs, HWI pharma services, inomed Medizintechnik, Aesculap, MedicalMountains, Uniklinik Magdeburg, TZM, Uniklinik Jena, Uniklinik Leipzig**

€ 9.2 MILLION FUNDING

The total project costs are € 15.7 million, of which € 9.2 million will be funded.

4.3. ICT of the future

As part of Austria's national ICT funding programme "ICT of the future", the Austrian Federal Ministry invited tenders for projects in April 2020, whereby the participation of German partners was a prerequisite for funding. The aim of the call was to strengthen cooperation between Austrian and German project partners in topics such as:

- Mastering complex ICT solutions: systems of systems

- Justifying trust: safe and secure systems

- Conquering data: intelligent Systems

- Ensuring interoperability: interfaces of systems.

The call resulted in the following three cooperation projects, which started in spring 2021.

Current projects in funding priority "ICT of the future"	
D-TRAS	Digital Platform for Traffic Safety-Risk Prediction in Rural Areas
SmartDIS	Smart Disassembly with a Knowledge-based Automation System
CARNIVAL	Consistent Aerial Radar-based Navigation In Visibility challenged Areas and Landscapes

4.3.1. D-TRAS – Digital Platform for Traffic Safety-Risk Prediction in Rural Areas

The project 'D-TRAS' brings together leading organisations in the field of digital mobility from Austria and Germany in a strategic partnership. The project's goal is to predict individual road safety risks, focussing on rural areas. Vehicles should be able to share safety-related data to improve the safety of other road users traveling on the same road. For this purpose, a combination of heterogeneous sensor data from different groups of road users (cars, motorcycles) with safety-relevant data from mobility data marketplaces and open data is investigated.

The D-TRAS concept involves computing safety-related information from sensor data ("on the edge") and transferring it to a digital platform in the cloud, where AI models are trained and implemented to predict a spatiotemporal traffic risk. The D-TRAS concept is validated in two European regions with different topology, data availability and behaviour, namely Styria (Austria) and Central Germany.

3 YEARS DURATION

February 2021 – January 2024

5 PARTNERS

<u>Austrian</u>: Virtual Vehicle Research GmbH, motobit GmbH

<u>German</u>: Universität Göttingen, Caruso, Next Data Service AG

€ 0.6 MILLION FUNDING

The total project costs are € 0.8 million, of which € 0.6 million will be funded.

Three different demonstrators for traffic risk information and warning will be evaluated in field studies together with at least one hundred road users.

Contact information of the project coordinator:
Henrik Lechte, Georg-August-Universität Göttingen, henrik.lechte@uni-goettingen.de

4.3.2. SmartDIS – Smart Disassembly with a Knowledge-based Automation System

SmartDIS represents a strategic partnership of leading organisations in the field of complex ICT solutions from Austria and Germany. The goal of the project is to develop and implement an automated knowledge-driven robot-centric disassembly system that autonomously adapts to the particular specifications and constraints required to disassemble a given product. A systematic approach to the automation of disassembly processes is ensured by applying knowledge-based systems and providing a semantic coupling between recognition, grasping, manipulation and individual disassembly operations.

2.5 YEARS DURATION

March 2021 – August 2023

7 PARTNERS

<u>Austrian</u>: Practical Robotics Institute Austria, Institut für Automatisierungs- und Regelungstechnik, Ing. Eric Dokulil, Reichmann SPS-Service, Augusta Buntmetalle

<u>German</u>: Christian-Albrechts-Universität, Boxx-IT Solutions

€ 0.27 MILLION FUNDING

The total project costs are € 0.35 million, of which € 0.27 million will be funded.

The concept of SmartDIS is to link the semantic representation of a product model with an image recognition system to realise automatic identification. Methods of image processing are integrated into the optimisation algorithms of path planning and model-based robot control to achieve a dynamic specification of the robot's motion sequence for the individual disassembly processes. The SmartDis system will be implemented as a demonstrator for the disassembly of desktop PCs. The possibility to use the system for a wider range of products in waste separation, will be demonstrated in another use case.

Contact information of the project coordinator:
Prof. Thomas Meurer, Christian-Albrechts-Universität zu Kiel, tm@tf.uni-kiel.de

4.3.3. CARNIVAL – Consistent Aerial Radar-based Navigation In Visibility challenged Areas and Landscapes

Recent advances in the miniaturisation and performance enhancement of radar sensors, particularly their high frame rate and ability to penetrate many environmental conditions (night, fog, particulate matter, smoke, etc.) that interfere with visual sensors, have given them a tremendous boost in several sectors. Just as Visual-Inertial Odometry (VIO) has had a breakthrough effect for GNSS (Global Navigation Satellite System) applications in impaired areas, the fusion of radar and inertial measurement is expected to enable and revolutionise applications in GNNS and visibility-restricted areas for this project.

3 YEARS DURATION

March 2020 – February 2024

3 PARTNERS

Austrian: Universität Klagenfurt

German: Deutsches Zentrum für Luft- und Raumfahrt, Neura Robotics GmbH

€ 0.34 MILLION FUNDING

The total project costs are € 0.73 million, of which € 0.34 million will be funded.

The "CARNIVAL" project's challenge is, among other things, to generate and analyse radar signals for the best extraction of motion information and to use these to extract motion-specific features from a raw radar signal. These will then be merged with inertial measurements and fed into a self-calibrating state estimator for both localisation and control of highly agile platforms.

Contact information of the project coordinator:
Dr Armin Wedler, Deutsches Zentrum für Luft- und Raumfahrt e.V.,
armin.wedler@dlr.de

4.4. Smart and souverain use of data I and II

German BMWK and Austria Research Promotion Agency (FFG) had two bilateral calls for proposals on topic smart data usage. The first call "Smart and sovereign use of data for production" closed in August 2020, while the second call "Smart and sovereign use of data for sustainable production" closed in August 2021.

The aims of both calls were:

- identification, extraction and organisation of production-relevant data

- to increase flexibility and efficiency in production by processing production-relevant data

- ensuring the security and availability of production-relevant data.

The second call had an additional focus on *sustainability, environment and climate goals.*

Besides, resulting lead projects from both calls should also illustrate the technological and economic benefits of the open GAIA-X platform.

As the winner of the competition in the first call, the EuProGigant project with a German-Austrian consortium started on the 1. March 2021. Project champI4.0ns won in the second call and started on 1. May 2022.

Current project in funding priority "Smart and sovereign use of data for production"	
EuProGigant	European Production Giganet for calamity-avoiding self-orchestration of value chain and learning ecosystems
Current project in funding priority "Smart and sovereign use of data for sustainable production"	
champI4.0ns	

4.4.1. EuProGigant – European Production Giganet for calamity-avoiding self-orchestration of value chain and learning ecosystems

In this project, leading representatives of industry and science from Austria and Germany will demonstrate the technological and economic benefits of the GAIA-X platform. The goal of the project is to demonstrate a cross-site digitally networked production ecosystem with resilient, data-driven and sustainable value creation.

The central research questions of the project are: How can (1) value chains be equipped with a resilience towards market changes and enabled for a high variety of variants, (2) interdependencies between value-added stages be recognised and made usable for increasing economic efficiency, (3) reactive and at the same time universal platforms for production systems be designed?

4 YEARS DURATION

March 2021 – February 2025

12 PARTNERS

<u>Austrian</u>: Pilotfabrik Industrie 4.0, TU Wien; Concircle Management Consulting; crafworks; Stark Spannsysteme; A1 Digital Inter-national; WFL Millturn Technologies GmbH&Co; Plasser & Theurer, Export von Bahnbau-maschinen, Gesellschaft; EIT-Manufacturing East

<u>German</u>: TU Darmstadt; IGH Infotec; Gebrüder Heller Maschinenfabrik; Software AG

€ 5 MILLION FUNDING

The total project costs are € 8.6 million, of which € 5 million will be funded.

In answering these questions, the consortium focuses on optimising the speed and flexibility of value creation by implementing the technical architecture of a data ecosystem in the sense of GAIA-X. High-frequency data acquisition by means of open low-cost solutions in combination with process-oriented aggregation of the acquired data should provide a high incentive for new users.

Contact information of the project coordinator:
Markus Weber, Technische Universität Darmstadt (PTW),
M.Weber@PTW.TU-Darmstadt.de

4.4.2. champI4.0ns

The wood industry is an important eco-nomic sector in both Austria and Germany. Wood is a sustainable and future-oriented material, but at the same time its processing is very machine and energy intensive. The variability of the natural raw material is a challenge in numerous production processes that can be made manageable through intel-ligent data exchange.

Within the framework of champI4.0ns, the use of production-relevant data is being advanced by using examples from the wood industry to show how the intelligent and sovereign use of data in an eco-system of diverse partners can succeed.

champI4.0ns will demonstrate the added value of using production-relevant data in the application fields of traceability, plan-ning and control, and quality assurance. In

4 YEARS DURATION

May 2022 – April 2026

17 PARTNERS

Austrian: Fraunhofer Austria Research GmbH; Kompetenzzentrum Holz GmbH; Joanneum Research Forschungsgesellschaft mbH; Universität für Weiterbildung Krems; Data Intelligence Offensive; Business Upper Austria GmbH; Semantic Web Company GmbH; nexyo GmbH; IoT40 Systems GmbH; NET-Automation GmbH; ADH Mölltal Möbel GmbH; Weitzer Wood Solutions GmbH; HASSLACHER PREDING Holzindustrie GmbH

German: Karlsruher Institut für Technologie; RWTH Aachen; Pfleiderer Deutschland GmbH; Siempelkamp Logistics & Service

€ 5.5 MILLION FUNDING

The total project costs are € 8.6 million, of which € 5.5 million will be funded.

each of the three fields, positive contributions will be made to the achievement of sus-tainability goals, from the creation of awareness for sustainable development, to higher productivity through innovation, to the more efficient use of energy and natu-ral resources.

Contact information of the project coordinator:
Martin Benfer, Karlsruher Institut für Technologie, wbk Institut für Produktions-technik, martin.benfer@kit.edu

4.5. ICT of the future – Secure digital identities

The "Secure digital identities" showcases aim to strengthen digital sovereignty by developing eIDAS solutions, which are at the same time user-friendly, trustworthy and cost-efficient. These solutions should be easier to access for administration, businesses – especially SMEs – and the general population. The aim is to create application-oriented eID ecosystems that are characterised by openness, interoperability and simple, intuitive and barrier-free usage.

The call for proposals was part of a cooperation between the Austrian Federal Ministry for Climate Protection, Environment, Energy, Mobility, Innovation and Technology (BMK) and the German Federal Ministry for Economic Affairs and Climate Action (BMWK). The focus of the call was to make an R&D contribution to at least one of the running showcase projects supported by the BMWK. This resulted in the following two cooperation projects.

Current projects in funding priority "Secure digital identities"	
IDunion	
ONCE	Online einfach anmelden

4.5.1. IDunion

Private technology companies are of signifi-cant importance in the digital age. They pro-cess personal data and bear responsibility for its secure storage and controlled use. To give users sovereignty over their own data, IDunion is creating an open and secure eco-system for digital identities. Thereby, the project adopted the self-sovereign identity (SSI) approach.

The aim is to give users the option to decide when and with whom they want to share their data. IDunion will test specific use cases in the model regions Berlin and Cologne to integrate SSI technology into everyday life. In doing so, IDunion is focus-ing on a solution which can be used across Europe. The users' personal information is stored and administered autonomously in a special app, a wallet, on their smartphones. Personal information is validated by public institutions, hence these digital credentials can be used in a legally secure manner.

3 YEARS DURATION

April 2021 – March 2024

14 PARTNERS

<u>Austrian</u>: Danube Tech GmbH, Verein zur Förderung der selbstständigen Nutzung von Daten

<u>German</u>: Bank-Verlag GmbH, Bundesdruckerei GmbH, DB Systel GmbH, Deutsche Telekom AG, esatus AG, GS1 Germany GmbH, ING-DiBa AG, Main Incubator GmbH, Robert Bosch GmbH, Siemens AG, Stadt Köln, Spher-ity GmbH, Technische Universität Berlin, Insti-tut für Internet-Sicherheit (Westfälische Hochschule), YES Payment Services GmbH

€ 15.6 MILLION FUNDING

The total project costs are € 31.4 million, of which € 15.6 million will be funded.

Austrian partners will test this technology for the administration of COVID-19 test certificates from individuals in Austria, as well as examine transnational interopera-bility by using German IDunion and EU EBSI/ESSIF networks, with a connection to the Austrian project EBSI4Austria.

Contact information of the project coordinator:
Helge Michael, Main Incubator GmbH, helge.michael@main-incubator.com

4.5.2. ONCE – Online einfach anmelden

ONCE aims to build decentralised, human-centric, open ID wallets to unify and manage multiple different digital identities of an individual. The project focuses on developing digital identities with a high level of technical security that originate from trustworthy institutions and companies. Companies and administrations should be supported in the digitisation of their services with digital IDs and online documents for the purpose of accessing the corresponding digital identities.

ONCE is developing different applications. ONCE Wallet-App will enable the administration and transfer of ID data on smartphones and the subsequent control via access management. The separate back-end system ("lifecycle management") includes functions for blocking and updating digital identities. In ONCE ID Gateway, identity data is transferred to service providers as needed. Integration interfaces are designed to enable operators of online services to use and verify the ID data.

The Austrian partner aims to bridge ONCE with its project Digidow to enable optimal synergies in the creation, management, and use of digital identities for a broad population.

2 YEARS DURATION

May 2021 – June 2023

13 PARTNERS

<u>Austrian</u>: **Universität Linz**

<u>German</u>: **HelloGuest Solutions GmbH, Universität Stuttgart, Governikus GmbH & Co. KG, ekom21 - Kommunales Gebietsrechenzentrum Hessen (KGRZ), FhG IAO/AISEC, Anstalt für Kommunale Datenverarbeitung in Bayern (AKDB), Deutsche Telekom Security GmbH, Jolocom GmbH, Giesecke+Devrient Mobile Security GmbH, regio iT GmbH, Behle Hochheide GmbH & Co., Stadt Fürth, Robert Bosch GmbH**

€ 9.7 MILLION FUNDING

The total project costs are € 15.5 million, of which € 9.7 million will be funded.

Contact information of the project coordinator:
Walter Landvogt, Bundesdruckerei GmbH, <u>walter.landvogt@bdr.de</u>

5. Cooperation with Japan

Germany and Japan have set themselves the goal of coordinated research funding for artificial intelligence and the Internet of Things in industrial application fields. This underlines the long-lasting nature in German-Japanese cooperation. In 2017, the German Federal Government developed a joint strategy with Japan, which was laid down in the Hannover Declaration.

In 2018, talks continued within the framework of the Digital Dialogues. Agreement was reached on the goals of joint R&D cooperation, including the goal of increasing productivity in the industrial sector in both countries through the use of AI and IoT. The Joint Declaration of Intent between the German Federal Ministry for Economic Affairs and Climate Action and the Japanese Ministries of Economy, Trade and Industry (METI) and Internal Affairs and Communications (MIC) of late 2018 sets the political framework for the cooperation.

The common policy goal is to increase the productivity of the whole economy and to implement the Sustainable Development Goals. Japan and Germany believe that cooperation between platforms, building ecosystems and shaping alliances are important ways to realise the potential of AI and IoT. Services and platforms will be more important in industrial areas in the future. The results and successes of joint research in the field of industrial IoT and AI will lead to the further development of cooperation in the academic field and also provide impetus for the entire economy.

The German-Japanese coordinated call for proposals "Artificial intelligence for mobile industrial communication" by the German BMWK and the Japanese Ministry of Internal Affairs and Communications for the funding of a lead project ran until 17 May 2019. As the winner of the competition, the AIRPoRT project with a German-Japanese consortium started on 1 October 2019.

Current Japanese – German bilateral cooperation project	
AIRPoRT	Artificial Intelligence for Robotics and Networked PRoducTion

5.1. AIRPoRT – Artificial Intelligence for Robotics and Networked PRoducTion

The aim of the AIRPoRT project is to develop and test innovative technologies for mobile communication and data analysis in flexible production environments based on AI processes. In addition, a comprehensive risk governance strategy is developed to enable corresponding production facilities in multi-organisational process structures to be safeguarded proactively and in a commercially viable manner.

The embedding in a German-Japanese project context should help to ensure that the technologies and concepts are best adapted to the requirements of global production contexts.

3 YEARS DURATION

October 2019 – September 2022

3 PARTNERS

<u>Japanese</u>: National Institute of Information and Communications Technology

<u>German</u>: DFKI (Smart Data & Knowledge Services / Intelligent Networks), Fraunhofer Society (Institute for Manufacturing Engi-neering and Automation/Institute for Industrial Engineering)

€ 2.6 MILLION FUNDING

The total project costs are € 2.6 million, of which € 2.4 million will be funded.

The German consortium will research, develop and test technologies in the fields of "Wireless communication networks in industrial environments", "Robot teams and populations in industrial production", "AI-based sensor data analysis" and "IT security". In parallel, the Japanese twin project "Reliable wireless communication for managing robots and objects at high speed" will work in the areas of wireless communication for mobile devices and adaptivity of media use in factory environments.

Contact information of the project coordinator:
Prof. Andreas Dengel, DFKI Smarte Daten & Wissensdienste, andreas.dengel@dfki.de

6. EUREKA projects

In addition to bilateral cooperation, BMWK also offers funding opportunities in European and international programmes. Currently, there are six ongoing projects through the European research initiative EUREKA. Three projects are being funded in the EUREKA cluster CELTIC-NEXT and three projects from the first EUREKA Clusters ∑! AI Call. With these six projects, the BMWK broadened its international cooperation to include Singapore, the United Kingdom, Sweden, Hungary, Portugal and Turkey.

EUREKA is an international network established in 1985 between 18 countries with intension to foster European competitiveness and integration and to encourage R&D cooperation. Currently it includes over 48 countries who share the same goals and have national funding available to organisations who apply through EUREKA programmes. The BMWK primarily provides funding for Cluster competition. EUREKA Clusters are strategic, long-term, industry-driven initiatives with a thematic focus. Among the six clusters, CELTIC-NEXT on information and communication technology (ICT) and the joint EUREKA Clusters AI call are currently supported by the BMWK.

Contrary to the bilateral cooperation projects that resulted from political decisions, the EUREKA cooperation projects are formed in a bottom-up approach, where companies and research institutes get in contact directly.

Current EUREKA projects	
AIMM	AI-enabled Massive MIMO
AISSI	Autonomous Integrated Scheduling for Semi-conductor Industry
Piccolo	In-network compute for 5G services
6G-SKY	6G for Connected Sky
ATTENTION!	ArTificial inTelligENce for the deTectIon of trade-based mOney lauNdering!
CANOPY	Cognitive and Automated Network Operations for Present and Beyond

6.1. AIMM – AI-enabled Massive MIMO

AIMM is a CELTIC-NEXT European collaborative research and development project. The new mobile communications standard 5G is an important component in driving forward the digitisation of Germany and the world. One example is Industry 4.0, which relies heavily on wireless communication. While the standardisation of the first version of 5G with the required basic functionalities has been completed, the focus is now shifting to the further development of these basic functionalities. AIMM is combining improved "massive multi-antenna functionalities" (massive MIMO) and the use of AI to achieve this goal.

The aim of AIMM is to analyse "conventional" signal processing methods, as they are commonly used today, and to compare them with new AI-based methods to be developed in the project. In the course of the project, new concepts will be created, examined and evaluated by means of computer simulations. In addition, individual selected components will be implemented and demonstrated.

The international cooperation between British, Canadian and German partners brings a great benefit for incorporating German and European requirements into the further development of 5G.

2 YEARS DURATION

October 2020 – September 2022

10 PARTNERS

<u>British</u>: BT, Vilicom UK Ltd; University of Bristol, Loughborough University, InterDigital Europe Limited

<u>Canadian</u>: ThinkRF, CEMWorks

<u>German</u>: Nokia Bell Labs Stuttgart, Universität Stuttgart, IMST GmbH

€ 0.8 MILLION FUNDING

The total project costs are
The total project costs are
€ 3.2 million, of which
€ 0.8 million will be funded.

Contact information of the project coordinator:
Dr Frank Schaich, Nokia Solutions and Networks GmbH & Co. KG,
frank.schaich@nokia-bell-labs.com

6.2. AISSI – Autonomous Integrated Scheduling for Semiconductor Industry

AISSI is an EUREKA project from the first EUREKA Clusters ∑! AI Call. The aim of AISSI is to enable European semi-conductor man-ufacturers to respond to unprecedented demand in semicon-ductor products through a new level of intelli-gent planning of manufacturing processes.

AISSI will develop, integrate, and apply new AI-based approaches that build on European auto-motive quality thinking. The core innovation of the project is to develop a fundamentally new system for production and maintenance planning in semiconduc-tor manufacturing. This concept is based on

3 YEARS DURATION

June 2021 – May 2024

5 PARTNERS

<u>German</u>: **Robert Bosch GmbH, Nexperia Germany GmbH, Systema GmbH, Karlsruhe Institute of Technology**
<u>Singaporean</u>: **D-SimLab Technologies**

€ 1.6 MILLION FUNDING

The total project costs are € 3.3 million, of which € 1.6 million will be funded.

a new level of interaction between expertise (human expert knowledge) and AI methods (which identify individual advantages based on human expert judgement). By applying reinforcement learning and knowledge graphs in a continual improve-ment framework for autonomous, integrated production and maintenance schedul-ing, competition can be outperformed in terms of efficiency, cost effectiveness and quality.
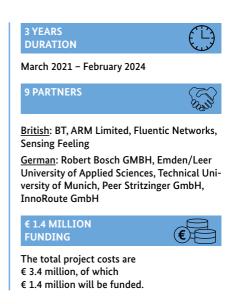
The Singaporean partner, D-SIMLAB, will bring expertise and long track record in wafer fab material flow planning and capacity optimisation to this cross-continental collaboration, supported by BMWK and Enterprise Singapore.

Contact information of the project coordinator:
Andrej Gisbrecht, Robert Bosch GmbH, Andrej.Gisbrecht@de.bosch.com

6.3. Piccolo – In-network compute for 5G services

Piccolo is a CELTIC-NEXT project that is funded by the BMWK in Germany and Innovate-UK in the UK. For 5G networks, more and more scenarios are emerging where the shift of services and functions from central cloud platforms to edge platforms is critical to ensure low latency and high availability. One example is automotive applications, in particular highly automated driving. Piccolo – In-network compute for 5G services - therefore focuses on virtualisation and security for connected mobility and smart city environments. Scaling is achieved by means of small, lightweight virtual functions (hence the name Piccolo).

**3 YEARS
DURATION**

March 2021 – February 2024

9 PARTNERS

British: BT, ARM Limited, Fluentic Networks, Sensing Feeling

German: Robert Bosch GMBH, Emden/Leer University of Applied Sciences, Technical University of Munich, Peer Stritzinger GmbH, InnoRoute GmbH

**€ 1.4 MILLION
FUNDING**

The total project costs are
€ 3.4 million, of which
€ 1.4 million will be funded.

Piccolo enables the execution of (application) logic not only on dedicated servers in data centres or the edge, but also on any network components, including routers, switches, base stations and future components of a comprehensive ecosystem. In-network computing eliminates the prevailing separation of network elements and computing systems, enabling highly dynamic, flexible sharing and allocation of resources – where they are needed and when they are needed. Piccolo will make an effective contribution to the improvement of edge and fog computing through the further and new development of the corresponding technologies. A highly qualified German-British consortium has been formed for this purpose.

Contact information of the project coordinator:
Dennis Grewe, Robert Bosch GmbH, dennis.grewe@de.bosch.com

6.4. 6G-SKY – 6G for Connected Sky

The multi-layer architecture of future 6G networks requires joint interaction between the telecoms, aerospace and space industries. The project innovations address key elements to demonstrate technologies for 6G that underpin this architecture and address technical challenges at an early stage.

The 6G for Connected Sky project aims to provide solutions that enable reliable and robust connectivity for users in the air and on the ground through a flexible and adaptable network architecture that uses multiple technologies such as satellite, high altitude platforms and direct air-to-ground communication. In addition, this project focuses on novel wireless network designs and management schemes in three-dimensional space, including different types of flying

3 YEARS DURATION

May 2022 – April 2025

17 PARTNERS

Austrian: Lakeside Labs; RED Bernard; Twins;

German: Airbus Defence and Space GmbH; Fraunhofer Institut IIS; Ericsson Antenna Technology (EAG); Deutsche Telekom; Motius; Meshmerize GmbH; LCA LOGISTIK CENTER Austria Sud GmbH

Hungarian: Ericsson Hungary; AITIA

Swedish: Royal Institute of Technology, KTH; Ericsson AB; Skysense AB; Swedish Post and Telecom Authority; SAS

€ 1.8 MILLION FUNDING

The total project costs are € 3.5 million, of which € 1.8 million will be funded.

vehicles with their unique requirements. Another focus is on providing robust, low-latency and/or high-performance communications to ground users in rural areas without infrastructure over non-terrestrial networks.

Contact information of the project coordinator:
Dominic Schupke, Airbus Defence and Space GmbH, dominic.schupke@airbus.com

6.5. ATTENTION! – ArTificial inTelligENce for the deTectIon of trade-based mOney lauNdering!

Illicit trade is a problem of massive proportions, yet the detection rate is close to zero worldwide. Currently, there are very few methods to detect complex, large-scale cases of trade-based money laundering. The necessary investigations are time-consuming and costly. Worldwide, there is a lack of scientifically sound understanding of how illegal transactions can be detected and what patterns they follow.

The ATTENTION! project will systematically collect, model and analyse multiple global data sources such as trade data for imports and exports, company and web data. Based on global trade activities and their contextual information, AI models will be developed and applied to detect and uncover illegal trade activities and their patterns in global, heterogeneous data. Challenges include the lack of known cases, the complexity of the patterns and the need to explain detected suspicious cases. To this end, ATTENTION! relies on the interplay of supervised and unsupervised learning as well as the creation of a knowledge graph.

3 YEARS DURATION

July 2022 – June 2025

5 PARTNERS

German: **Leibniz Universität Hannover, HASE & IGEL GmbH, SCHAEFFLER AG, Rheinische Friedrich-Wilhelms-Universität Bonn**

Singaporean: **RisikoTek**

€ 2 MILLION FUNDING

The total project costs are € 2.4 million, of which € 2.0 million will be funded.

The project will result in AI models, services and applications that will enable end-users (such as manufacturers, buyers, customs authorities, law enforcement agencies and banks) to perform checks on commercial transactions, product offers and trader profiles and detect patterns of illegal transactions in them, in order to identify whether goods bought, sold or financed could be at risk.

Contact information of the project coordinator:
Prof. Dr techn. Wolfgang Nejdl, Forschungszentrum L3S, Leibniz Universität Hannover, nejdl@l3s.de

6.6. CANOPY – Cognitive and Automated Network Operations for Present and Beyond

With increasing competition and cost pressure, communications service providers are facing major challenges in technological development. New strategies are needed to find the best compromise between Quality of Experience for the end customer and the cost of network operations.

Currently, most mobile network operators still operate in Network Operations Centres in a reactive manner, performing diagnostics and troubleshooting only when faults occur. This is inefficient and time-consuming as it requires manual analysis of a variety of information sources such as alarms, performance metrics and configuration data: Repairs take a long time, service availability decreases, customer complaints are the result.

3 YEARS DURATION

July 2022 – June 2025

9 PARTNERS

German: Detecon International GmbH; Expleo Germany GmbH;

Fraunhofer IIS/EAS

Portuguese: CELFINET; ISEP - Institute of Engineering, Polytechnic of Porto; IT/IST

Turkish: KoçSistem; Tarentum; TURKCELL TEKNOLOJI

€ 1.7 MILLION FUNDING

The total project costs are € 3.5 million, of which € 1.7 million will be funded.

CANOPY helps communications service providers implement more automated and self-managed processes, taking advantage of artificial intelligence (AI) and machine learning (ML). This allows a greater number of requests to be handled while using fewer resources. By using AI/ML, it is possible to make faster decisions, process network information in near real-time and automate network functions. These techniques rely on recognising known patterns based on past data to predict the future occurrence of similar network problems before they happen. This enables necessary self-healing measures to be taken before the customer is even affected.

Contact information of the project coordinator:
Herr Dr Peter M. Kruse, Expleo Germany GmbH, peter.kruse@expleogroup.com

7. Forthcoming cooperation

The Federal Ministry for Economic Affairs and Climate Action is always seeking to intensify its international cooperation efforts. Therefore, further bilateral cooperation projects as well as funding opportunities in EUREKA programme are in preparation.

Cooperation with Austria

After 17 bilateral projects in six funding priorities, Austria and Germany are further intensifying their cooperation. New projects are expected in fall 2022 in the funding priority "Edge data economy".

Cooperation with France

After successful calls in the field of artificial intelligence and 5G communication technologies, Germany and France recently closed the third joint call "Franco-German innovation projects for private 5G networks for industry". New projects from this funding priority are expected to start in winter 2022/2023.

Cooperation with Japan

A bilateral German-Japanese call for proposals "Mobile Connectivity for Key Industries" has also closed recently, hence a new lighthouse project is expected to start in fall 2022.

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