



36 months

47 partners

11 European countries

33 M€

**DAIS is coordinated by  
RISE RESEARCH INSTITUTES OF SWEDEN**



**PROJECT COORDINATOR/MANAGER**

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DAIS has received funding from the ECSEL Joint Undertaking (JU) under grant agreement number: 101007273. The JU receives support from the European Union's Horizon 2020 research and innovation programme and Sweden, Netherlands, Germany, Spain, Denmark, Norway, Portugal, Belgium, Slovenia, Czech Republic, Turkey



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**DAIS - Distributed Artificial Intelligence Systems**



**DAIS ECSEL Project**



**DAIS ECSEL Project**

## ABOUT DAIS

The use of Artificial Intelligence (AI) in Edge Computing is entering a new era based on the use of ubiquitous small and connected devices. Until now, Europe has not been doing well, as America sets the standards and most components are produced in Asia or America.

This project believes doing better is realized by:

**1** Putting European values of self-organization, privacy by design and low use of energy in the core of the Edge Computing components that shape this new era, and delivering the technology needed to promote these.

**2** Focusing on pan-European cooperation to ramp up the capabilities needed to deliver these new components at a scale that can make a real impact. All partners in the project participate in delivering key parts of these new Edge Computing components.

**3** Demonstrating the use of these components in key European industrial areas. Clear and early examples are needed to un-lock corporate and external funding to deliver on the promise of this very exciting project.

The DAIS project will research and deliver distributed artificial intelligent systems. It will not research new algorithms, as such, but solves the problems of running existing algorithms on these vastly distributed edge devices that are designed based on the above three European core values.



## OVERALL OBJECTIVES OF DAIS

DAIS has the ambitious objective of developing Intelligent and Secure Edge solutions for industrial applications for European industry throughout the whole Supply Chain.

More precisely, we do so by:

**COMPETITIVENESS FOR  
STRONG  
EUROPEAN INDUSTRY**

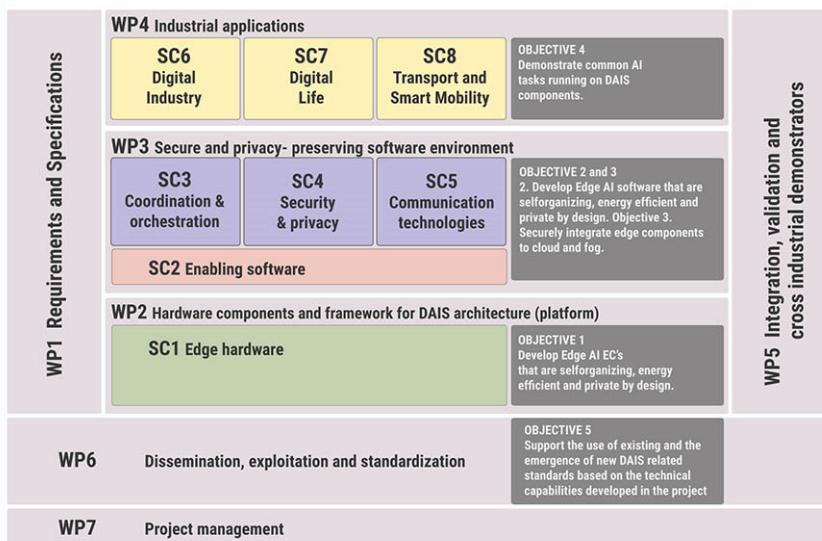
- Providing intelligent processing of data and communication locally at the edge to enable real-time and safety-critical industrial applications.
- Developing industrial-grade secure, safe and reliable solutions that can cope with cyberattacks and difficult network conditions.
- Providing AI techniques on the edge that match with diverse computing powers contrary to relatively consistent computing power on the cloud. As different AI algorithms have different computing power requirements, it is a big challenge to match an existing algorithm with the certain edge platform.
- Distribute and divide the complex AI operations between the cloud and edge, with edge undertaking early intelligent data processing reducing the bandwidth of data being transmitted to cloud; and building the hardware and software infrastructure to provide for this in Europe.
- Providing data sharing and collaborating solutions on the edge to handle the temporal-spatial diversity of edge data.
- Developing solutions for IoT, i.e. mostly wireless devices with energy- and processing- constraints, in heterogeneous and also hostile/harsh environments
- Providing re-usable solutions across industrial domains.
- Methodological approach with the Integral Supply Chain, from academic, to system designers and integrators, to component providers, applications and services developers & providers and end users.

## WORKPLAN

Due to the orientation of the project towards product industrialization, a careful partitioning of the work is necessary.

As such, DAIS is split into:

- Five technical work packages (WP1 – WP5)
- One work-package (WP6) that covers regulatory alignment, standardisation, exploitation and dissemination activities, due to the project's high importance for generating impact.
- The project management work-package (WP7) ensuring and monitoring the collaboration.



*The supply chain structure of DAIS*



## WORKPLAN

To manage the wide technology base of DAIS, the consortium has defined so-called supply chains (SC) and mapped them into the work packages. A supply chain is the logical/virtual combination of partner activities fitting together within a specific topic and leading to a combined result, such as a demonstrator. DAIS defines two types of supply chains:

- The **enabling** technology supply chains (1-5) developing the fundamental core SW and HW technology elements (such as components, systems and architectures) required by other supply chains (6-8).
- The **application** supply chains (6-8) employing and validating the results achieved in the enabling technology supply chains. Each supply chain addresses a specific DAIS objective.

This approach forms an arranged matrix structure ensuring a clear understanding of responsibilities for project results and the achievement of project objectives by assigning a lead for each supply chain and well-defined interfaces towards the WPs as well as to parallel supply chains. Consequently, this matrix structure supports the effective and efficient collaboration between the partners in a focused manner.

### DAIS IN NUMBERS

**11** countries

**47** partners

**33** million €

**36** months

## PROJECT PARTNERS

- Rise Research Institutes Of Sweden AB (RISE)
- Almende Bv (ALM)
- Danmarks Tekniske Universitet (DTU)
- Sirris Het Collectief Centrum Van De Technologische Industrie(Sirris)
- Tecnologias Servicios Telematicos Ysistemas Sa (TST)
- Jožef Stefan Institute (JSI)
- Institut Mikroelektronickych Aplikaci Sro (IMA)
- Jotne Epn Technology As (Jotne)
- PDM E Fc Projecto Desenvolvimento Manutencao
- Formacao Econultadorialda (PDM E Fc Lda)
- Expert Analytics As (XAL)
- Step Solutions As (Step Solutions)
- Cosylab Laboratorij Za Kontrolne Sisteme Dd (CLB)
- Tpv Automotive, Tovarna Avtomobilskih Komponent d.o.o. (TPV)
- Instituto De Telecomunicacoes (IT)
- NXP Semiconductors Netherlands Bv (NXP NL)
- AnyWi Technology Bv (AnyWi)
- Danfoss Power Electronics As (Danfoss)
- Technicka Univerzita V Liberci (TUL)
- Vysoka Uceni Technicke V Brne (Brno University)
- Octavic Pts Aps (Octavic PTS IVS)
- NXP Semiconductors Germany GmbH (NXP)
- Fraunhofer Gesellschaft Zur Foerderung Der Angewandtenforschung E.v. (Fraunhofer)
- Nuromedia Gmbh (Nuromedia GmbH)

## PROJECT PARTNERS

Giesecke+Devrient Mobile Security GmbH (GD)  
esc Aerospace Gmbh (ESC)  
Universitaet Zu Luebeck (UZL)  
Sentigrate (Sentigrate)  
Vestel Elektronik Sanayi Ve Ticaret Anonim Sirketi  
Sestek Ses Ve Iletisim Bilgisayar Teknolojileri Sanayi  
Ticaretanonymsirketi (Sestek A.S.)  
Akim Metal Sanayi Veticaret As (Akim)  
Schneider Electric Espana SA (SCHN)  
Fundacion Centro Tecnoloxico De Telecomunicacions  
De Galicia(GRADIENT)  
Universidad De Cantabria (UC)  
Universidad De Granada (UGR)  
Technische Universiteit Eindhoven (TU/e)  
Seven Solutions SI (7SOLS)  
Instituto Tecnologico De Informatica (ITI)  
Technische Universiteit Delft (TU Delft)  
Stichting Imec Nederland (IMEC-NI)  
Innatera Nanosystems Bv (INBV)  
Sensative AB (Sensative AB)  
Tieto Sweden Ab (Tieto)  
Greensphere Unipessoal Lda (GS)  
Koala Tech Lda (Koala Tech)  
Arctos Labs Scandinavia Ab (Arctos Labs)  
Beyond Vision - Sistemas Moveis Autonomos De  
Realidadeaumentada Lda (BEV)  
Maelardalens Hoegskola (MDH)

RISE is a research institute in the most expansive area of industry this century: the total digitalization of products, services and businesses. We contribute with cutting edge technology within the fastest growing and most relevant areas for this revolution to happen, including big data analytics, automation, security, Internet-of-Things and interaction design. RISE is a state-owned research institute, which offers unique expertise and over 100 testbeds and demonstration environments for future-proof technologies, products and services. The Digital Systems Division offers expertise throughout the chain for a digital, innovation-driven society—hardware, software, business development and industry knowledge in a range of strategic areas. RISE is closely collaborate with many industrial companies in Sweden and has strategic collaboration partnerships with companies such as ABB, Ericsson, Volvo, Scania, SAAB, and with public bodies.

RISE is a partner in EIT Digital (one of the European Knowledge and Innovation Communities), and of the ARTEMIS Industrial Association and ECSEL.

**WPs and SCs involvement:** WP1, WP3 (SC3-5), WP4(SC6-SC7), WP5, WP6, WP7

**Main contact person(s):** Ali Balador, Daniella Magnusson

[www.ri.se](http://www.ri.se)



Almende is an SME focusing on the application of principles of self-organisation to increase the sustainability and resilience of sociotechnical systems, based on innovations in information and communication technology. Our staff is multidisciplinary, with expertise in, e.g., software engineering methodology, data analytics, AI and electronics engineering. We have a large track record in R&D projects in multiple fields, including health, energy, logistics, manufacturing and (cyber)security.

During the past 20 years, we have created various software tools and hardware devices which are commercialized via our spin-off companies, all belonging to the Almende Group. Throughout the past decades, we have played an important role as R&D partner, software developer and system integrator in more than 50 European and national R&D projects (ITEA, ECSEL, FP6, FP7 and H2020). ALM has been the one of the main parties behind the DAIS project.

**WPs and SCs involvement:** WP1, WP3 (SC2-SC3), WP4(SC7), WP5, WP6

**Main contact person(s):** Andries Stam

[www.almende.com](http://www.almende.com)





DTU Compute, the department of applied mathematics and computer science of the Technical University of Denmark (DTU), is a unique and internationally recognized academic environment spanning the science disciplines mathematics, statistics, computer science, and engineering. We conduct research, teaching and innovation of high international standard—producing new knowledge and technology-based solutions to societal challenges. We have a long-term involvement in applied and interdisciplinary research, big data and data science, artificial intelligence (AI), internet of things (IoT), smart and secure societies, smart manufacturing, and life science. DTU Compute has joined DAIS with its section for Embedded Systems Engineering (ESE). ESE conducts research in a broad range of topics central for design of modern embedded systems, including real-time systems, fault-tolerant and safety-critical systems, hardware/software codesign, concurrent and parallel programming, heterogeneous distributed multi-core architectures and execution platforms, as well as a range of models, methods and tools for the analysis, design and verification of such systems.

**WPs and SCs involvement:** WP1, WP3 (SC3), WP4(SC6), WP5, WP6, WP7

**Main contact person(s):** Xenofon Fafoutis, Paul Pop

<https://www.dtu.dk>



DTU



Sirris is the collective centre for and by the technological industry. We help small and large companies make the right technological choices, achieve sustainable economic growth and remain innovative. Both the Sirris EluciDATA Lab and the Software Engineering teams participate in DAIS. The EluciDATA Lab provides substantial knowledge and research expertise in AI and ML, obtained through fundamental research and R&D projects, and has ample experience with applying this knowledge and expertise in industry-driven R&D projects.

In addition, the Software Engineering team has extensive expertise in IoT system security, data security and secure data analytics applied as industrial advice to companies and in industry-driven R&D projects.

Sirris expects to acquire new knowledge and know-how related to the optimal exploitation of the computation potential of IoT networks and specifically edge devices, in the form of:

- Distributed machine learning techniques and approaches that are adapted to the constraints imposed by this type of networks and devices
- Privacy-preserving and security measures that can be used to protect on-device and shared data
- Resulting in building blocks for new industrial services for the Belgian industry

Within DAIS, we will closely cooperate with the Belgian partner Sentigrate in view of industrial validation of the developed research outputs.

**WPs and SCs involvement:** WP1, WP3 (SC2-3-4), WP4 (SC6), WP5, WP6, WP7

**Main contact person(s):** Anna Hristoskova, Nicolás González-Deleito

[www.sirris.be](http://www.sirris.be)



TST is an engineering company specialized on custom design and manufacture for IoT products and services. TST support companies aiming to transform their ideas into innovative, profitable and feasible market solutions, with main focus on Smart City, Agri-food and Energy Efficiency business areas.

TST is part of the CELESTIA Technologies Group (CTG), an international multi-technology group composed of more than 250 engineers and offices in several European countries. CTG is a merge of high-tech SMEs sharing a common strategic vision: innovation and technology to change the business concept and therefore provide value contribution to clients.

**WPs and SCs involvement:** WP1, WP2, WP3 (SC4, SC5), WP4 (SC6), WP5, WP6, WP7

**Main contact person(s):** Alberto Puras, Fran Alcalá and Iván Bermejo

<http://tst-sistemas.com>

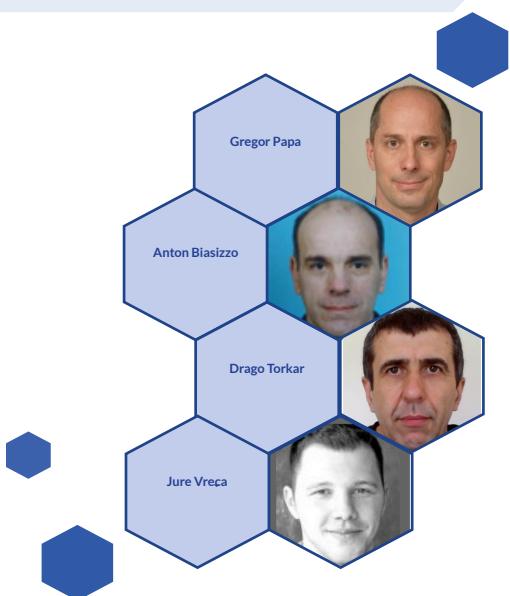


JSI is the leading Slovenian scientific research institute, covering a broad spectrum of basic and applied research. With a total of around 1000 staff it plays the role of a national research institute, complementing the role of the universities and bridging the gap between science and industry. The Computer Systems Department, with an interdisciplinary team of researchers (computer science and informatics, electrical engineering, mathematics, physics), is specialised in theoretical and practical aspects of artificial intelligence, machine learning, advanced optimization, and hardware implemented algorithms. The research results are implemented within applications for production, transport, energy, bioinformatics, and health. The Department participates in several international project consortia within the programmes of H2020, and ECSEL JU as well as in national industrial projects.

**WPs and SCs involvement:** WP1, WP2, WP3 (SC2), WP4 (SC6), WP5, WP6

**Main contact person(s):** Gregor Papa

[www.ijs.si/ijsw](http://www.ijs.si/ijsw)



## INSTITUTE OF MICROELECTRONIC APPLICATIONS (IMA)

IMA s.r.o. is a limited private company located in Praha and Pardubice (Czech Republic). Founded in 1992, IMA follows up micro technologies bridging towards nanotechnology. IMA deals with electronic identification and utilizes smart cards, RFID/NFC, biometrics and wireless IoT technologies. IMA represents CZ in ISO and CEN groups for standards in the health care domain. Providing large systems in CZ, IMA is now launching applications hosted in NFC mobile sets and collaborating with mobile operators on management of identities. Within real applications running, IMA is piloting various advanced technologies.

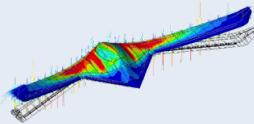
**Main contact person(s):** Karel Setnicka, Dana Reznáková

[www.ima.cz](http://www.ima.cz)



EPM Technology data products have successfully reduced development and product lifecycle costs through the use of intelligent data management in the areas of Defense, Aeronautics, Oil & Gas, Built Environment and Aerospace. Jotne EPM Technology is a leader in the development of standards-based software products specializing:

- Product Data Exchange
- Product Lifecycle Management
- Long-term data & product OAIS archiving
- Data validation & verification, code checking
- Rules based data modeling
- Cross-platform data sharing



Our suite of products is based upon the EXPRESS Data Manager™ (EDM) utilizing ISO standards, particularly STEP ISO 10303 the Standard for the Exchange of Product Model data. Jotne EPM Technology has been developing STEP ISO 10303 Product Data Exchange software products since 1994. Jotne EPM Technology can deliver every level of data management solution. From a full Product Lifecycle Modeling server to an OAIS archiving server to specialized developer tools to integrate proprietary based applications with open standards. For an overview of Jotnes' work in the digital twin space please follow the embedded links to:  
A digital twin presentation and the Arrowhead digital twin use case.

**WPs and SCs involvement:** WP1, WP3 (SC2-SC3), WP4(SC6), WP5, WP6

**Main contact person(s):** Henrik Galtung

<https://jotneit.no>





PDM is a Portuguese SME, currently with offices in 12 countries, developing products in multiple domains, both software and hardware. We have invested heavily in the last 10 years in the fields of Cyber Security, AI, and Drone development. We work with several Government organizations, Portuguese Cyber Security Agency, Law Enforcement Agencies (LEA), telecoms, financial institutions, among many other large customers. We also manage critical services like Public Key Infrastructures for certification authorities, several CSIRTs at national level and develop Identity and Access Management (IAM) and Intelligence tools that allow large companies to secure their assets (physical and logical) as well as allow LEAs to investigate cyber-crimes and efficiently gather evidences. Two of our most successful products are: **SPA**, an IAM Platform that authenticates, authorizes and continuously monitor users' operations. It provides real-time alerts and automatic mitigation procedures, based on a set of criteria defined by the security policies of the company, and **CHIMERA**, a solution designed to safeguard access to data, enforce data privacy and simplify data sharing. It provides the anonymization of data. The information can be collected, processed, transformed and filtered, in order to discard what is not relevant, anonymizing sensitive data in order to comply with legal requirements (GDPR).

**WPs and SCs involvement:** All WPs / All except (SC7)

**Main contact person(s):** Luis Miguel Campos

[www.pdmfc.com](http://www.pdmfc.com)





Expert Analytics is a data science and analytics company with offices in Oslo (Norway) and München (Germany).

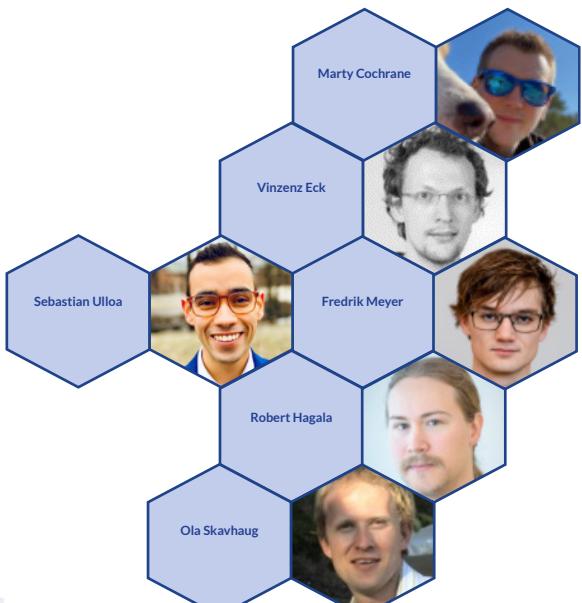
Our 40 employees have extensive hands-on programming experience from industrial applications combined with a solid background (MSc or PhD) in natural sciences, mathematics and statistics.

We offer high quality software solutions to complex challenges within data science, machine learning, scientific computing and data analysis. Applications range from anomaly detection, production optimization and predictive maintenance to root cause analysis and advanced simulations.

**WPs and SCs involvement:** WP1, WP3 (SC2-SC3), WP4 (SC6), WP5, WP6

**Main contact person(s):** Emil Løvgren and Marty Cochrane

<https://expertanalytics.no>





Data capture specialist.

As one of the main independent control system integrators in Norway, Industrial Automation is our pedigree. From 2014 and onwards we have had a strong focus on innovation, and have brought forward a range of solutions to become the go-to OT-IT data capture specialist.

All our solutions are compatible with standard industrial protocols, and the control system/EDGE IPC hardware complies with industrial demands and standards.

Our focus and drive is to enable OT-IT integration which delivers:

- Real-time data stream – high resolution data up to 1 msec
- Continuous data stream – capture all events and transients
- Local buffering of data – no loss of data
- Maintain control system integrity - remove traditional vectors of cyber attack
- Facilitate for smartness on IoT/EDGE/IPC level – real-time monitoring AND control

**WPs and SCs involvement:** WP1, WP3 (SC2-SC3), WP4(SC6), WP5, WP6

**Main contact person(s):** Daniel Wahl Bolle

<https://stepsolutions.no>

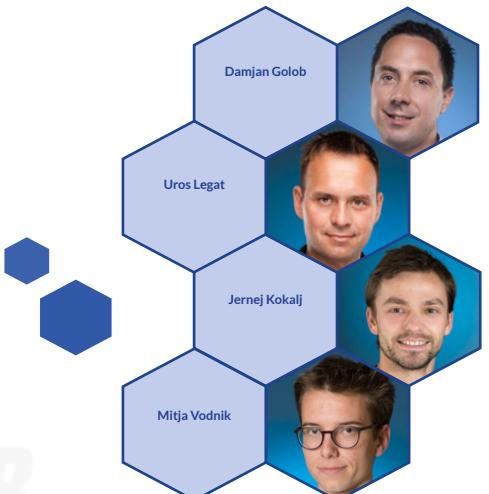


Cosylab Control System Laboratory d.d. is a global technology company that builds and integrates state-of-the-art software and electronics for the world's most complex, precise and advanced systems. It enables research organizations to discover scientific breakthroughs, hospitals to deliver better cancer treatment and organizations to improve their performance. Cosylab has more than 100 researchers, who are active in research on nuclear and particle physics, theoretic physics, control systems, medical software, medical products for proton therapy, communication, IoT, and space technologies. Cosylab also has a total of 4 registered patents. Cosylab works in a field that is highly demanding and requires the delivery of high performance control infrastructures which is fundamental to the success of experimental physics research projects. Past and present projects include some of the largest international physics projects, CERN, ESS, ITER, FAIR, ALMA, SNS, ESO and ESA.

**WPs and SCs involvement:** WP1, WP2 (SC1), WP3 (SC2), WP4(SC6), WP5, WP6

**Main contact person(s):**Damjan Golob and Uros Legat

[www.cosylab.com](http://www.cosylab.com)



TPV Automotive d.o.o. is a development supplier in the automotive industry. We develop and manufacture products that have a significant impact on vehicle dynamics, safety, ecology and driving comfort, as well as implement new technical solutions for electric vehicles (EV).

AGV department develops, manufactures AGV vehicle and installs AGV system to different companies.

**Main contact person(s):**Krunoslav Šimrak and Borut Ceh

[www\(tpv-automotive.si/en](http://www(tpv-automotive.si/en)





An RTO with core expertise in design and implementation of diverse security schemes and mechanisms for communication systems, including its integration.

- Cybersecurity solutions designed for wireless systems, optimized or customized to specific use cases, applications and scenarios according to identified requirements and security threats.

A group of researchers with expertise in secure, reliable and efficient wireless communication solutions and respective techniques.

- End-to-end security, including key management and distribution schemes, lightweight privacy-preserving authentication mechanisms, and intrusion detection and prevention systems.

Networking labs with testbeds and multiple IoT devices prototypes, including wearables, some of which resulting from previous European R&I projects.

**WPs and SCs involvement:** WP1, WP3 (SC2, SC4), WP4 (SC8), WP5, WP6, WP7

**Main contact person(s):** Firooz Saghezchi and Joaquim Bastos

[www.it.pt](http://www.it.pt)



NXP Semiconductors N.V. enables secure connections and infrastructure for a smarter world, advancing solutions that make lives easier, better, and safer. As the world leader in secure connectivity solutions for embedded applications, NXP is driving Internet of Things (IoT) innovation in the secure connected vehicle, smart connected solutions, and end-to-end security and privacy markets. NXP worldwide has approximately 30,000 employees with operations in more than 30 countries and posted revenue of \$9.94 billion in 2020.

The companies headquarter is situated in Eindhoven (The Netherlands). In Europe, other main locations are spread over The Netherlands, Germany, France, Austria, Belgium, Czech Republic and Romania. There are approximately 9,000 R&D engineers. NXP has ~9,000 issued and pending patents through 60 years of experience and expertise.

**WPs and SCs involvement:** WP1, WP2 (SC1), WP3 (SC4), WP4 (SC7), WP5, WP6, WP7

**Main contact person(s):**Marcel Geurts, Frans Widdershoven and Ton Scheepers

[www.nxp.com](http://www.nxp.com)

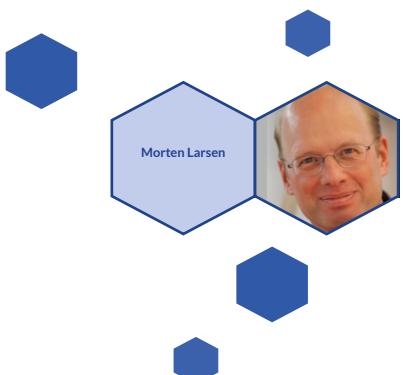


AnyWi is an SME specialized in robust, reliable and secure communication in industrial and vehicle applications. The technologies involved focus on the use of redundant communication channels to enhance the overall reliability.

**WPs and SCs involvement:** SC5, SC7

**Main contact person(s):** Morten Larsen

[www.anywi.com](http://www.anywi.com)



Danfoss was founded in 1933 by Mads Clausen in Nordborg, Denmark, where the headquarters is still located. As a privately held company Danfoss has grown from a solo enterprise into a world-leader. We employ 23,400 people and serve customers in more than 100 countries. Danfoss engineers the technologies that enable the world of tomorrow to do more with less. We meet the growing need for infrastructure, food supply, energy efficiency and climate-friendly solutions. Since 1968 Danfoss Drives (a division of Danfoss) has been dedicated to developing frequency converters to control speed, torque, acceleration, synchronization, positioning, and the overall performance of electrical motors.

**WPs and SCs involvement:** WP1, WP2, WP4, WP5, WP6, WP7 and SC6

**Main contact person(s):** Christian Uldal Graulund, Juha Kuusela

[www.danfoss.com](http://www.danfoss.com)



The WITOL® system is unique technical solution for many industrial applications. The aim of the study is to observe the possibilities of micro-electronic elements application for the new function adding.

The electronic elements implementation a new possible use of WITOL® system can caused. This study describes a geometrical and technical possibilities of electronic elements installation and CAD/CAE simulation of the mechanical behavior of the target eWITOL assembly.

The potentially used kind of electronic elements are force, torque and displacement sensors for example.

**WPs and SCs involvement:** WP1, WP4 (SC6), WP5, WP6, WP7

**Main contact person(s):** Michal Petru

[www.tul.cz](http://www.tul.cz)



BUT is a large technical university, founded in 1899. The team from the Faculty of Information Technology has participated in many relevant projects, we focus on embedded intelligence, IoT, edge-cloud computation, and applied machine learning. We are also responsible for the Master/Doctoral program in AI.

**WP and SC involvement:** WP1, WP3 (SC2), WP4 (SC6), WP5, WP6, WP7

**Main contact person(s):** Pavel Smrz, Pavel Zemcik

[www.vutbr.cz](http://www.vutbr.cz)





Octavic develops flexible industry 4.0 solutions.

Our system works on 4 "layers":

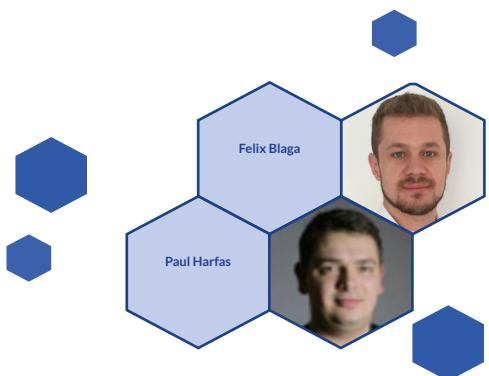
- Real-Time: Shopfloor Management
- Big Data: Process Optimization
- Smart Production Scheduling
- AI/ML



**WP and SC involvement:** WP1, WP3, WP5, SC2 and SC3

**Main contact person(s):** Felix Blaga, Paul Harfas

<https://octavic.dk/>



NXP enables secure connections and infrastructure for a smarter world, advancing solutions that make lives easier, better, and safer. NXP is driving innovation in the automotive, industrial & IoT, mobile, and communication infrastructure markets. Built on more than 60 years of combined experience and expertise, the company has approximately 30,000 employees in more than 30 countries and posted revenue of \$8.9 billion in 2019. The company's headquarter is situated in Eindhoven (The Netherlands). In Europe, other main locations are spread over The Netherlands, Germany, France, Austria, Belgium, Czech Republic and Romania. NXP Semiconductors Germany GmbH employs around 1,200 permanent collaborators in Hamburg, Dresden, Stuttgart and Munich. NXP has established its Industrial System Innovation in Hamburg, Germany. This team is working on innovations for Industrial IoT and Industry 4.0 and shall contribute to DAIS project execution with support from other NXP branches.

**WP and SC involvement:** WP2 (SC1), WP3 (SC4, SC5) & WP4 (SC8)  
WP1, WP5 & WP6

**Main contact person(s):** Kiran Shekhar, Karsten Meisberger

[www.nxp.com](http://www.nxp.com)



Headquartered in Germany, The Fraunhofer-Gesellschaft is the world's leading applied research organization. With its focus on developing key technologies that are vital for the future and enabling the commercial exploitation of this work by business and industry, Fraunhofer plays a central role in the innovation process. As a pioneer and catalyst for ground-breaking developments and scientific excellence, Fraunhofer helps shape society now and in the future. Founded in 1949, the Fraunhofer-Gesellschaft currently operates 75 institutes and research institutions throughout Germany. The majority of the organization's 29,000 employees are qualified scientists and engineers, who work with an annual research budget of 2.8 billion euros. Of this sum, 2.4 billion euros are generated through contract research.

[www.fraunhofer.de](http://www.fraunhofer.de)

Nuromedia has more than 20 years of expertise in EU-funded projects as a technical partner for software & application management.

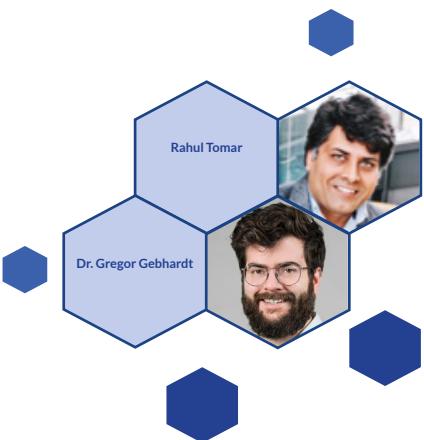
Nuromedia GmbH is a company (SME) based in Cologne, Germany.

Nuromedia reflects the strategic pillar of the commercial projects for clients of different sectors and the development of own commercial projects.

**WP and SC involvement:** WP1, WP4 (SC7-SC8), WP5, WP6

**Main contact person(s):** Rahul Tomar, Dr. Gregor Gebhardt

[www.nuromedia.com](http://www.nuromedia.com)



Giesecke + Devrient is a security technology company headquartered in Munich, Germany, and is part of the global Giesecke+Devrient Mobile Security subgroup of the Giesecke+Devrient group.

The Giesecke+Devrient Mobile Security subgroup has a workforce of 5,200 employees and generated sales of 877 million EUR in the fiscal year of 2019. More than 40 sales and partner offices as well as over 20 certified production and personalization sites and data centres ensure customer proximity worldwide. The portfolio of Giesecke+Devrient Mobile Security comprises security technologies and solutions for smart cards, software, and services for safeguarding data, identities, and a wide range of digital transactions, particularly in the fields of telecommunications, electronic payment, IoT, automotive and mobile identity. Giesecke+Devrient Mobile Security manages and secures billions of digital identities throughout their entire life cycle. The products and solutions of Giesecke+Devrient Mobile Security are used by commercial banks, mobile network operators, car and mobile device manufacturers, business enterprises, transit authorities and health insurances and their customers to secure payment, communication and device-to-device interaction.

**WP and SC involvement:** WP1, WP3(SC4), WP5, WP6

**Main contact person(s):** Georg Kramposthuber

[www.gi-de.com](http://www.gi-de.com)



ESC Aerospace was founded in 2013 with its headquarters in Munich, Germany. It has sister companies in Prague, the Czech Republic and in Orlando, US, Florida. esc Aerospace is developing solutions that leverage todays technologies to provide a clear picture of what's happening in local environments and around the world, providing systems and services that utilize these technological advances in Unmanned Systems (ground, aircraft, underwater) control and autonomy, and provide reliable, secure, accurate position, timing and communication, necessary to enable equipment control/autonomy and situational awareness. esc Aerospace has extensive experience in delivering reliable and secure UAS systems, including central parts like flight controllers, navigation and communication modules and integrating with third parties systems on our UAS platforms.

**WP and SC involvement:** WP1, WP3 (SC4, SC5), WP4(SC8), WP5, WP6, WP7

**Main contact person(s):** Petr Janous, Andreas Hausotter

<https://business.esa.int>





## THE INSTITUTE OF COMPUTER ENGINEERING OF THE UNIVERSITY OF LÜBECK (UZL)

The institute (Director: Prof. Dr.-Ing. Mladen Berekovic) deals with the architecture of hardware and software systems as well as their prototypical implementation and evaluation. The institute has more than 25 researchers working mainly on mobile autonomous robots, cyber- physical systems, edge and cloud computing, hardware-security, trustworthiness and integrated circuits in the form of SoCs (System-on-Chip). As part of these activities, UzL is working on various application related domains such as transportation, health, automotive, and manufacturing. UzL is closely collaborate with many industrial companies in Germany and Europe such as Infineon, DSI, NXP, and with public bodies. UzL is a partner in ARTEMIS and ECSEL.

**WPs and SCs involvement:** WP1, WP2, WP3(SC2, SC4), WP4(SC8), WP5(SC2, SC4, SC8)

**Main contact person(s):** Prof. Mladen Berekovic, Dr. Saleh Mulhem

[www.uni-luebeck.de](http://www.uni-luebeck.de)



Sentigrate is a Leuven (Belgium) based SME with a focus on sensor data processing and modelling. Throughout the years Sentigrate created close collaborations with several research institutes like KU Leuven, UGent and Imec.

- Founded in 2016
- Active in 8 countries
- R&D expertise
- Industries: Industry 4.0, Health, Smart City, Agriculture



Industry 4.0



Health



Smart City

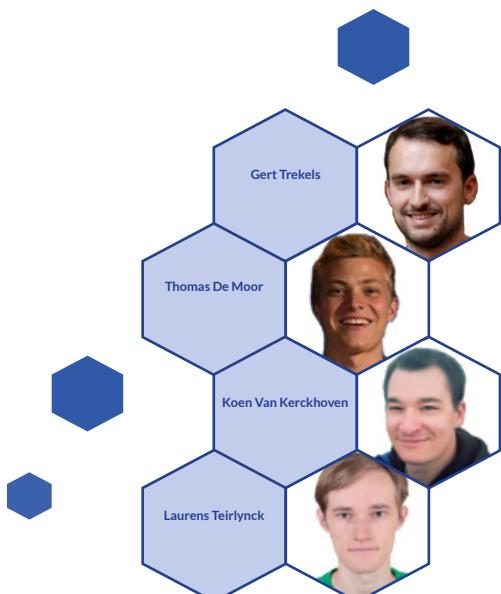


Agriculture

**WP and SC involvement:** WP1, WP3 (SC2-4), WP4, WP5, WP6, WP7  
WP7

**Main contact person(s):** Gert Trekels, Thomas De Moor

[www.sentigrate.com](http://www.sentigrate.com)





Turkey's pioneer global brand in electronics, consists of 28 companies, of which 18 are located abroad. Products manufactured at Vestel are exported to 156 countries naming Vestel as the leader exporter of Turkey in electronics for 22 years. Vestel accounts for nearly 90% of Turkey's total TV exports and 30% of Turkey's total white goods exports.

**Key Strengths:** Approximately 16,000 employees. Annual production capacity of 24 million units per year. Founded on an area of more than 1 million square meters. Production of more than 4,000 TV types per year. An annual production capacity of 18 million units in electronics and digital products, 7 million units in white goods.

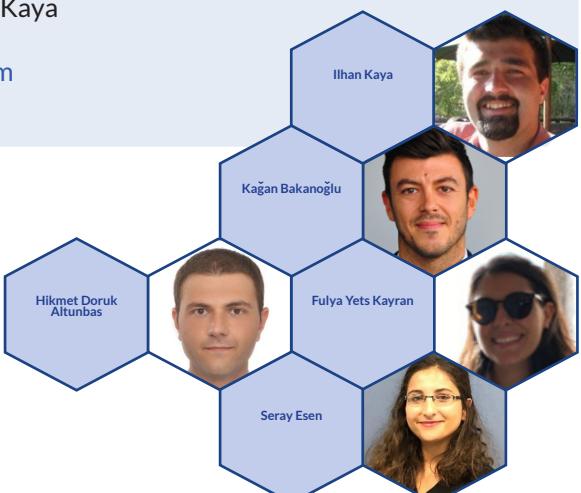
Experience in EU-framework programmes.



**WPs and SCs involvement:** WP1, WP3(SC2-SC3-SC4), WP4(SC7), WP5, WP6, WP7

**Main contact person(s):** İlhan Kaya

<https://vestelinternational.com>





Sestek is a global technology company helping organizations with Conversational Solutions to be data-driven, increase efficiency and deliver better experiences for their customers.

Sestek's AI-powered solutions depend on text-to-speech, speech recognition, natural language processing and voice biometrics technologies. Sestek helps organizations to ;

Increase efficiency and performance

Get insightful data to improve business flows and customer experience

Run more secured and fraud-free operations

**WP and SC involvement:** WP1, WP3 (SC3-5), WP4(SC6-SC7), WP5, WP6, WP7

**Main contact person(s):** Tuba Arslan, Hacer Ozmen

[www.sestek.com](http://www.sestek.com)





Total Area  
**4100 m<sup>2</sup>**

Laboratory & Testing  
Area  
**3200 m<sup>2</sup>**

Office Area  
**900 m<sup>2</sup>**

Total Personnel (R&D)  
**71**

PHD Student  
**3**

Master's Degree  
**8**

Master's Degree Student  
**9**

PATENT  
**69 APPLICATION**

DESIGN REGISTRATION  
**13 APPLICATION**

UTILITY MODEL  
**11 APPLICATION**



PAPER  
NATIONAL  
**31**  
INTERNATIONAL  
**40**

PROJECTS

TÜBİTAK PROJECTS  
**(1004, 1501, 1505, 1511, 2244)**

**32 APPROVED**

EU PROJECTS  
**2**  
(1 PROJECT MANAGER)

AGRUP Turnover  
2020-> 121 M€

AGRUP Investment  
62 M € in the last 5 years

AGRUP Personnel  
2500

Akim will contribute with design and developing enabling technologies for providing intelligence devices and products in Turkey and EU especially in Industry, Automotive, Lighting and Defence domains.

**WP and SC involvement:** WP1, WP2, WP3, WP4 (SC6-SC7-SC8), WP5

**Main contact person(s):** Gamze Demir, Cagla Uzun

[www.akimmetal.com.tr](http://www.akimmetal.com.tr)





Schneider's purpose is to empower all to make the most of our energy and resources, bridging progress and sustainability for all. We call this Life Is On.

Our mission is to be your digital partner for Sustainability and Efficiency. We drive digital transformation by integrating world-leading process and energy technologies, end-point to cloud connecting products, controls, software and services, across the entire lifecycle, enabling integrated company management, for homes, buildings, data centers, infrastructure and industries.

We are the most local of global companies. We are advocates of open standards and partnership ecosystems that are passionate about our shared Meaningful Purpose, Inclusive and Empowered values.

**WP and SC involvement:** WP1, WP4, WP5 (SC6, leader of demo 6.2), WP6 and WP7

**Main contact person(s):** Ana Lourdes Sanz, David Pampliega

[www.se.com](http://www.se.com)





## FUNDACIÓN CENTRO TECNOLÓXICO DE TELECOMUNICACIÓNS DE GALICIA (GRADIANT)

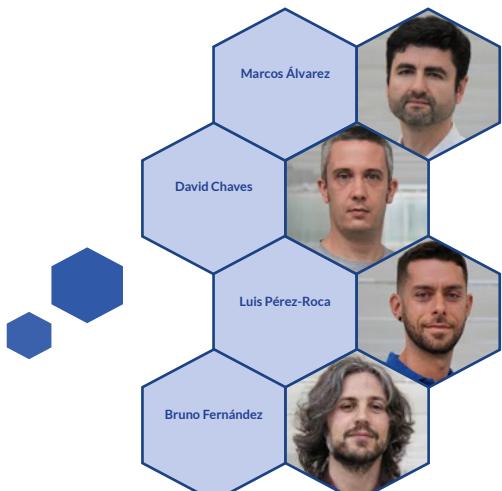
Gradiant, Spanish ICT technology centre, aims to improve the competitiveness of companies by transferring knowledge and technologies in the fields of connectivity, intelligence and security. With more than 100 professionals and 14 applied patents, Gradiant has developed more than 340 different R&D&i projects, becoming one of the main engines of innovation in Galicia. In 2020, Gradiant's turnover reached 5.2 million euros, working with more than 370 clients in 30 countries over the past 13 years.

Gradiant is positioned as a technology partner for the industry, oriented to their needs in the field of ICT, contributing their national and international experience in technologies for security and privacy; processing of multimedia signals; Internet of Things; biometrics and data analytics; and advanced communications systems.

**WP and SC involvement:** WP2(SC1), WP3 (SC2, SC3), WP4 (SC6) & WP5

**Main contact person(s):** Marcos Alvarez

[www.gradiant.org](http://www.gradiant.org)



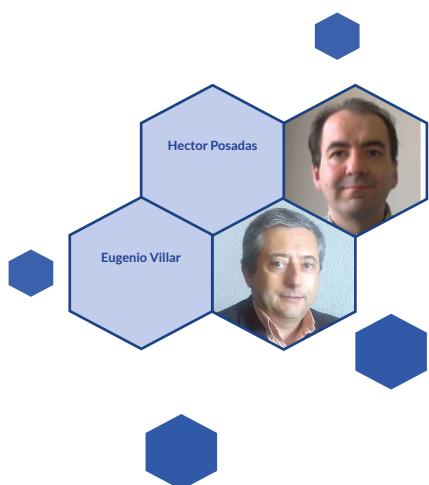


Universidad de Cantabria is a modern public institution. Its main purpose is to contribute to social progress through teaching and scientific excellence. This allowed UC to confirm the “International Campus of Excellence” label in December 2014 with the highest score. Although UC is the 44th in terms of size within the Spanish University System, it is positioned among the first three Spanish universities in terms of research performance (Ranking CYD 2019). According to its tradition and capacities, five priority specialization areas were recently established by UC in order to achieve excellence: Biotechnology, Information and communication technology, Climate action, environment, resource efficiency and raw materials, Secure, clean and efficient energy, and Advanced manufacturing and processing. UC is also a highly competitive university in terms of research funding. During the calls of H2020 (2014-2019), UC has obtained funding for around 15,2M€ in 56 projects. DAIS participation will be carried out by the Microelectronics Engineering Group (GIM). The GIM has a large experience in participation to international projects like H2020 and ECSEL.

**WP and SC involvement:** WP1, WP2, WP3 (SC2-4), WP4(SC6), WP5, WP6

**Main contact person(s):** Hector Posadas

<https://web.unican.es>





The founding of the University of Granada was granted by Papal Bull, issued in 1531, establishing a Christian university to follow in the stead of the, until then, Islamic Madrassa, dating from 1349. Since then, the UGR – drawing on its historical roots – has gradually grown and developed into what it has become today: a public higher-education institution that is committed to quality and excellence in the areas of teaching, learning and research. In line with this, the university has, throughout its history, become increasingly active in the transfer of scientific, social advancement, sustainable development and, above all, internationalization. Numerous national and international ranking agencies that evaluate higher education teaching and research have placed the UGR among the top universities in Spain, as well as including it within the top 3% of the best higher education institutions worldwide. Indeed, according to the Shanghai ranking, the UGR appears as one of the world's top 500 universities. University of Granada is one of Spain's top universities, and is also a major actor in the area of higher education both in Europe and Latin America. The study programmes available at the UGR are among the most extensive in Europe, which helps to explain our high student numbers: around 65,000, of which some 10,000 are international students. The UGR is involved in a wide range of international projects and networks, as well as internationally-renowned exchange programmes.

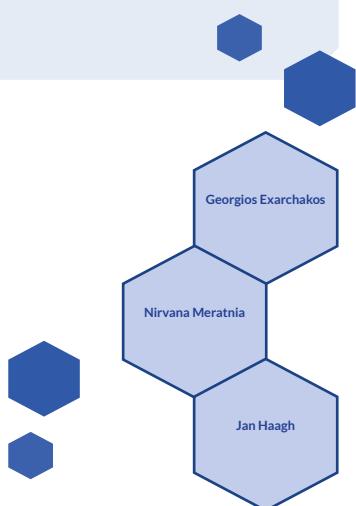
[www.ugr.es](http://www.ugr.es)

TUE is a young university, founded in 1956 by industry, local government and academia. TUE is a research-driven and design-oriented technical university with 9 departments/faculties, of which the department Electrical Engineering and the department Mathematics & Computer Science participate in this project. Electro-Optical Communications (ECO) research group participates from the Electrical engineering department, while the Interconnected Resource-aware Intelligent Systems (IRIS) cluster participates from the Mathematics and Computer Science department in this project. Research of ECO focuses on advanced network management and control, while IRIS focuses on (distributed embedded) systems performance challenges in terms of: timing behavior, dependability, programmability, reliability, robustness, scalability, energy and data computation efficiency. Research of both groups cover various aspects of IoT systems, ranging from new communication technologies, network/resource management, to in-network processing/computation, and edge AI. Both groups have successful track record in executing research- and industry-driven projects and have close collaborations with industry and end-users.

**WP and SC involvement:** WP1, WP3 (SC3), WP4(SC7), WP5, WP6

**Main contact person(s):** Jan Haagh, Georgios Exarchakos

[www.tue.nl](http://www.tue.nl)





## SEVEN SOLUTIONS (7SOLS)

Seven Solutions is a telecommunications company leader in accurate sub-nanosecond time transfer for reliable industrial and scientific applications. We have more than 15 years of expertise in embedded systems design and control (electronics, firmware, and embedded software), with a remarkable track-record in cutting-edge projects at different sectors such as fintech, avionics, telecommunications, Smart-Grid, space, defence and scientific facilities as particle accelerators and distributed radio-telescopes. We are leaders in ultra-accurate time transfer and synchronization in the Fintech and Science segments. We were born in the framework of Large Scientific Infrastructures (Industry for Science).

**WP and SC involvement:** WP1, WP3, WP4, WP5, WP6, WP7

**Main contact person(s):** Luis Medina, Marco Fuentes, Trini García and Sonia Molina

<https://sevensols.com>





ITI is a Technological Institute founded in 1994 in Valencia, Spain. ITI is composed of more than 200 professionals from different backgrounds. ITI is involved in sectors such as agriculture, industry, health, smart cities and transport, and in the last year it has conducted over 135 R&D projects and around 240 companies have relied on ITI as a “technology partner”.

## ITI Technologies:

<b>Big Data Infrastructure</b>	Intelligent Optimization Systems	Artificial Vision
<b>Cloud Computing</b>	Cyber Physical Systems	Blockchain
Internet of Things	Machine Learning	Digital Twins

ITI is a partner of AIOTI (Alliance for Internet of Things Innovation), NESSI (Networked European Software and Services Initiative) and BDVA (Big Data Value Association), and of the ARTEMIS Industrial Association and ECSEL.

**WP and SC involvement:** WP1, WP3 (SC2-3 & 5), WP4 (SC6), WP5, WP6 & WP7

**Main contact person(s):** Salva Santonja, Jordi Arjona & Paolo Calciati (Miguel Sanchis)

[www.iti.es](http://www.iti.es)



TUD is a world-class university ranked 19th for engineering and technology in the 2019 Times Higher Education World University Rankings. Established in 1842, it is the largest and oldest institute of technology in the Netherlands. TUD's eight faculties are home to over 20,000 students and some 900 academic staff and cover the entire spectrum of technology, with a combined science, engineering and design focus. Three research groups from TUD namely, Computer Engineering (CE), Circuits and Systems (CAS) and Bioelectronics (BE) will contribute to this project. The three research groups perform a multidisciplinary research spanning from devices technology, circuit (both analog and digital) all the way to application as well as sensor technology. The groups also have a long experience in leading and participating in various EU and national research projects, as well as collaborative research with the industry in the above mentioned topics including worldwide leading companies, such as IBM, ARM, Intel, Infineon, ST, Atmel, Renesas, IMEC, ABN AMRO, Port of Rotterdam, NXP, Bosch, Besi, Philips, Mapper, FEI, ASML, etc. Furthermore, several start-ups have been initiated by our members and by our alumni in the past 10 years.

**WPs and SCs involvement:** WP1, WP2 (SC-1), WP5 (SC7), WP6

**Main contact person(s):** Said Hamdioui, Anteneh Gebregiorgis

[www.tudelft.nl](http://www.tudelft.nl)



imec is a non-profit Research and Technology Organization that bridges the gap between fundamental research at universities and technology development in the industry. It is active in technology development for ultralow-power radio and digital signal processing, micro-power generation, storage and management, and sensor and actuator technology. Based on these building blocks, IMEC builds system solutions in the area of health and lifestyle that contain embedded algorithms to address specific applications. Imec's focus in DAIS is twofold. On the one hand, imec is involved in low power enabling technologies for edge nodes and builds on expertise in miniaturized AI-Accelerator technologies to enable neuromorphic computing in the nodes themselves. On the other, it focuses on the use case of human-centric office buildings and extracting relevant information from a combination of novel DAIS edge nodes and existing infrastructure.

**WP and SC involvement:** All WPs, SC1(sensor and processor), SC2(support), SC7(digital life)

**Main contact person(s):** Amirreza Yousefzadeh, Manolis Sifalakis

[www.imec.nl](http://www.imec.nl)

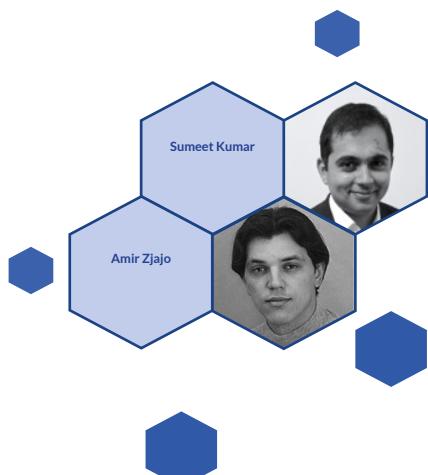


INBV is a Dutch neuromorphic processor company based in Delft, the Netherlands. Incorporated in 2018 as a spin-off from the Delft University of Technology, Innatera develops ultra-low power neuromorphic processors for AI at the sensor edge. Using a radically new approach that steers away from traditional AI, Innatera's processors relies on a new breed of analog-mixed signal computing circuits that closely mimic information processing in the brain. This unique architecture delivers an unprecedented combination of ultra-low power and ultra-short recognition latency, with up to 10,000x higher performance per watt than typical digital processors and conventional AI accelerators.

**WP and SC involvement:** SC:1, 7 WP:1, 2, 4, 5, 6

**Main contact person(s):** Sumeet Kumar

[www.innatera.com](http://www.innatera.com)



SEN is a SME product company within IoT business area. The products are Yggio horizontal IoT integration platform (multi-party network platform) and Strips which are very slim (3mm) IoT multi-sensors that blends into their environment.

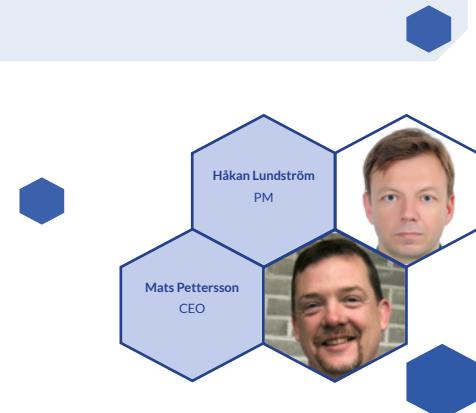
Yggio acts as a real-time integration layer between services and connected assets, sensors, and networks, enabling multiple users and services to use data generated by both shared and private IoT devices. Enterprises, cities, municipalities, property owners, service partners, and more use the Yggio capabilities to rapidly deliver new services and applications.

Sensative Zwave and LoRaWAN range of sensors in the popular Strips form factor, features ultra-slim discreet design, easy mounting, and low power consumption for long battery life (up to 10 years or longer). Strips sensors comes in different versions with unique abilities making them the ideal choice for any professional application, like Smart City or Smart Buildings.

**WP and SC involvement:** WP1, WP3 (SC2-4), WP5, WP6

**Main contact person(s):** Håkan Lundström (PM), Mats Pettersson (CEO)

<https://sensative.com>



## Machine learning

- Efficient training
- Inference on IoT

IoT, AIOT, AILOT

mesh network analysis

Digital Life (SC7)

- Human-centric employee well-being
- Happiness
- Productivity and innovation

Concept's

- Data security,
  - Availability,
  - Efficiency and usability various heterogeneous data sources
- Smart Building space

**WP and SC involvement:** WP1, WP3 (SC3, SC5), WP4 (SC7), WP5, WP6, WP7

**Main contact person(s):** Iftikhar Ahmad, David Buffoni

[www.tietoevry.com](http://www.tietoevry.com)

### Digital Advantage for businesses and societies

Bringing Global capabilities to the Nordics in Digital Consulting and Cloud & Infrastructure Services  
Scaling the Nordic mindset globally in Industry Software, Financial Services and Product Development Services

24 000 professionals globally

Serving customers in over 90 countries worldwide

Turnover of approximately EUR 3 billion  
More than 10 000 customers

Investments in technology and services more than EUR 100 million\* per year

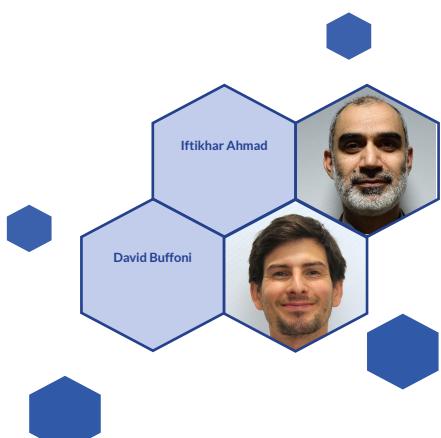
(\* incl. capital expenditure and operational costs)



The market leader in Digital Services in Norway, Sweden and Finland



tieto  
EVRY





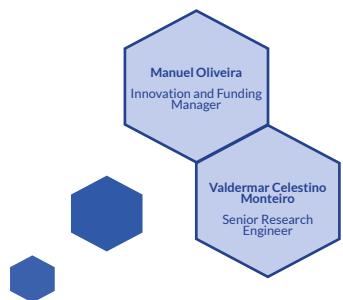
GS-LDA is an IoT motivated organisation, aiming to contribute to this fast evolving arena with new products on smart city applications and security, in an increasingly cyber-physical world. Founded in 2011, GS-LDA has an enterprise focused business plan specifically intent on delivering a new generation of tools for the design and evaluation of wireless systems and developing innovative solutions for future emerging communications.

### R&D on 5G Security

- End-user/mobile centric intrusion detection mechanisms
- Secure network coding
- Lightweight Privacy-Preserving OAuth2-based protocol for Smart City mobile apps

**Main contact person(s):** Valdermar Celestino Monteiro

<http://gs-lda.com>





KT is a young and dynamic European startup high-tech company created in October 2018 as a spinoff from Nova University of Lisbon and with the support of an investment fund (SMENT Digital), focused on the design of Radio Frequency transmitters to solve the lack of energy efficiency and security on wireless communications systems (5G and Wi-Fi 6), both public and military. KT's mission is to reduce the huge amount of wasted energy in present and future wireless communications, contributing both for reducing the operational costs and achieve eco-sustainability in telecommunications. KT's QDA (Quantized Digital Amplification) technology, is a new disruptive digital to analog converter with a Power Amplifier (PA) structure that permits an efficiency up to 75% in transmitters devices with a broad spectrum of application, from actual 4G and Wi-fi, to the new 5G, Wi-fi 6 and wired communications, together with physical layer security if needed.

**WP and SC involvement:** SC1, SC4-5, SC7-8, WP1-7

**Main contact person(s):** João Oliveira, Pedro Viegas

[www.koalatech.pt](http://www.koalatech.pt)





Arctos Labs is an SME from Sweden. Background in Telecom R&D, including 5G, from all major vendors. Since some years offering a novel SW that can optimize edge cloud networks by concluding the most optimal distribution of workloads and drive the orchestration layer. The SW take performance constraints, costs and total network topology and resource situation into consideration. Our SW has been included in Open source MANO – a ETSI led consortium to develop open source orchestration capabilities.

**WP and SC involvement:** WP1, WP3 (SC2,3,5), WP4(SC6), WP6, WP7

**Main contact person(s):** Mats Eriksson

[www.arctoslabs.com](http://www.arctoslabs.com)



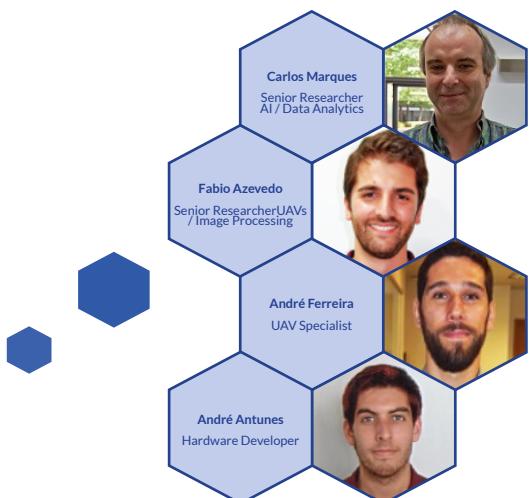


As an SME, BEV is focused on developing fully autonomous vehicles, and enabling technologies (AI, secure radio communications, collision avoidance, etc). We currently have products in three main areas: Smart-Cameras, UAVs (hexacopters and VTOLs) and RTK. We also develop an open platform for asset management with separate modules for specific solutions (precision farming, autonomous car testing, payload delivery, etc). BEV headquarters are near the city of Aveiro, with offices near Lisbon and Porto, strategically located near the top engineering universities in Portugal.

**WP and SC involvement:** All WPs / All except (SC7)

**Main contact person(s):** Carlos Marques

[www.beyond-vision.pt](http://www.beyond-vision.pt)



The Dependability cluster at MDH has a strong focus on Functional Safety and Cybersecurity for Industrial Systems. In recent years we have contributed to 11 European projects, often in leading roles.

The majority of our research is performed in close collaboration with companies within Automation and Vehicular/Transportation.

We provide scientifically grounded technical solutions, contributing to the DAIS concept & methodology, specification and design of the SW framework – specifically related to fault tolerance, safety and security.



**WPs and SCs involvement:** WPs and SCs involvement: WP1, WP3 lead and T3.1 lead, WP4, WP5, WP6 & WP7, SC3, SC4, SC5 and SC6

**Main contact person(s):** Hans Hansson, Tiziana Monfrecola

[www.mdh.se](http://www.mdh.se)

