

Revolution for Comprehensive Digitalization

SUPERIOT

White Paper

"SuperIoT alliance caters world class innovative IoT companies to build end-to-end IoT solutions. This opens up an excellent opportunity for our corporate customers"
Sari Heinonen, CEO, Barrabès Napapiiri

"SuperIoT gives fast access to integrated IoT solutions enabling ascension in value chain, improving work efficiency and bringing new possibilities for monetizing gathered data."
Tero Takalo, CEO, Capricode

PROVEN TRACK RECORD

TAILORED SOLUTIONS

ECOSYSTEM

TECHNOLOGIES

HIGHLIGHTS

Cross-industry and multidisciplinary alliance with single point of contact

Latest technology innovations and research

Simple process for engagement

by SuperIoT Ecosystem and Alliance Finland

CONTENTS

Executive Summary	3
SuperIoT advantages to your business.....	4
How Does SuperIoT Differentiate?	5
(a) Connectivity.....	5
(b) IoT.....	8
(c) Analytics+	9
Means.....	10
(d) Shared Research Environments and Enablers.....	10
(e) SuperIoT Product Validation	11
The Model of Co-Operation	13
APPENDIX I: Shared Research Environments and Enablers	15
APPENDIX II: Finland Based Excellence	17

EXECUTIVE SUMMARY

SuperIoT gives fast access to integrated IoT solutions enabling ascension in value chain, improving work efficiency and bringing new possibilities for monetizing gathered data. With comprehensive digitalization we deliver the whole IoT solution from sensors to data analytics seamlessly and cyber secured with latest technology innovations, integrated into your existing processes, tools and platforms. In short, SuperIoT is a Finland based IoT alliance and development program.

FIND US:

<http://www.superiot.fi/>

Twitter: [SuperIoT Ecosystem, @Super IoT](#)

SUPERIOT COMPARED TO CURRENT IOT SOLUTIONS

	Current IoT solutions	SuperIoT
Network connectivity	<ul style="list-style-type: none"> - centralized - 2G,3G,4G, WLAN - mobile network operator (MNO) 	<ul style="list-style-type: none"> - edge computing - 5G, mesh - micro-operators
IoT platforms	<ul style="list-style-type: none"> - proprietary - vendor-lock 	<ul style="list-style-type: none"> - interoperable - cyber secure - rapid prototyping
Analytics	<ul style="list-style-type: none"> - offline/batch ETL application - basic analytics - big data 	<ul style="list-style-type: none"> - online, streaming and real time extract, transform, load (ETL) application - personalization and advanced decision making - unbounded data sets
Means	<ul style="list-style-type: none"> - internal R&D / tools - in-house prototyping and testing - off-the-shelf-materials 	<ul style="list-style-type: none"> - access to latest innovations, novel materials and research environments - R&D and test ecosystem - fail fast concepting

TABLE 1: SUPERIOT DIFFERENTIATES IN ADVANCED CONNECTIVITY AND EDGE COMPUTING, NEXT GENERATION IOT PLATFORMS THAT INTEGRATE TO THE EXISTING STANDARDS AND PLATFORMS, ADVANCED STREAMING DATA ANALYTICS AND EXCELLENT RESEARCH SUPPORT AND ENVIRONMENTS.

SUPERIOT ADVANTAGES TO YOUR BUSINESS

1) STAY UPDATED IN RAPIDLY EVOLVING TECHNOLOGIES

Continuous matching of advancing technologies to business needs is hard. SuperIoT brings in a business-technology framework and deep partnership opportunities (high-tech companies, universities, research incubators) that enable companies to see and capture the full potential of latest innovations.

2) CAPTURE VALUE FROM EDGE, CONTROL YOUR DATA

IoT is shaping the business landscape by introducing billions of devices, connectivity solutions and analytics to the edge. SuperIoT empowers companies to continuously adopt and utilize these technologies in their operations by ensuring interoperability, controlled solution behavior and business value capture.

3) MAXIMISE ROI

New technology ROI is always challenging. SuperIoT framework gives strategic tools and visibility to negotiate, evaluate and manage high-tech solution portfolio. In SuperIoT alliance, the companies can invest together to maximize the ROI, control the risks and establish delivery driven partnership networks.

KEY ADVANTAGES

- | | | |
|------------------------------|-----------|---|
| Find Best Partners | 1. | SuperIoT alliance provides tools to select the best partners for each development project |
| Tailored Research | 2. | World class high technology researchers from universities and Technical research center (VTT) are funded by the government to work as a part of development projects when needed. |
| Shared Infrastructure | 3. | SuperIoT alliance enables the use and development of shared R&D infrastructures |
| Shared Investments | 4. | The alliance enables companies to share R&D investments in development projects and get funding from government R&R support institutions |
| Drive New Innovation | 5. | The alliance provides systematic tools and processes to drive innovation between alliance members |
| Drive Own Roadmap | 6. | Building your IoT platform in a partnership with many solution providers helps avoiding vendor lock and gives the power to drive own R&D roadmap |

FIGURE 1: THE KEY ADVANTAGES OF SUPERIOT.

HOW DOES SUPERIOT DIFFERENTIATE?

Realizing the IoT requires synergetic cross-industry and multidisciplinary activities. SuperIoT delivers a versatile operator and vendor independent platform having all modules in place: sensors, devices, hubs, HW, SW, communications, security, service business applications, analytics and maintenance. By building ambitious, challenging and lucrative solutions for IoT Devices, Applications, Testing and Manufacturing areas the companies involved will demonstrate a full IoT system for global customers. SuperIoT is about seamless connectivity, advanced analytics and top-notch IoT solutions integrated (Figure 2). In Table 1, the differentiation of the SuperIoT solution compared to the current IoT solution playground is shown.

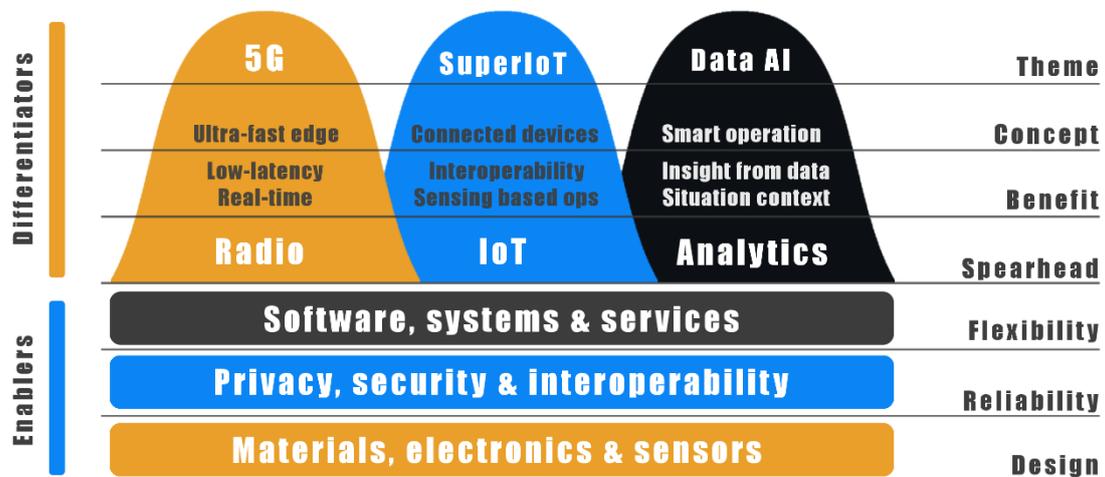


FIGURE 2: THE TECHNOLOGICAL FOUNDATION OF FINNISH IOT INNOVATION.

CONNECTIVITY

Whatever the preferred system design may be, the connectivity solution is one of the corner stones of SuperIoT. In each unique customer case employing IoT, the requirements of required spectrum and its usage, exploited energy resources for operation, device mobility patterns and communications range need to be specified. In the current wireless systems targeted for IoT, these three parameters are semi-fixed or hard to be taken into account. SuperIoT provides flexibility and adaptivity with advanced technology also in the connectivity domain.

SuperIoT builds on 5G and adaptive evolutionary versions of current connectivity solutions. 5G is not only an evolution of radio technology but a concept that constructs over the requirements of various use cases with many applications as seen in Fig. 3 of 5G usage scenarios on right adopted and promoted by International Telecommunication Union, ITU. The requirements drawn from this cross-vertical business domain thinking have set technical and application oriented requirements for the system development. 5G needs to cooperate

and internetwork seamlessly with legacy networks as long as they are in operation and provide added value to the ecosystem. These all have distinct and at least partly contradictory requirements in terms of, e.g., coverage, data rates, latency, reliability, mobility, and energy consumption, making the system concept design extremely complex. Therefore, 5G calls for such qualities as adaptation, scalability, re-configurability, virtualization, and self-organization in order to satisfy all these diverse use cases and their demands.

USAGE SCENARIOS OF IMT FOR 2020 AND BEYOND

The test networks constructed in Oulu *provide extensive test facilities in close to carrier-grade state-of-the-art network*¹. The current network architecture uses technologies including 3GPP

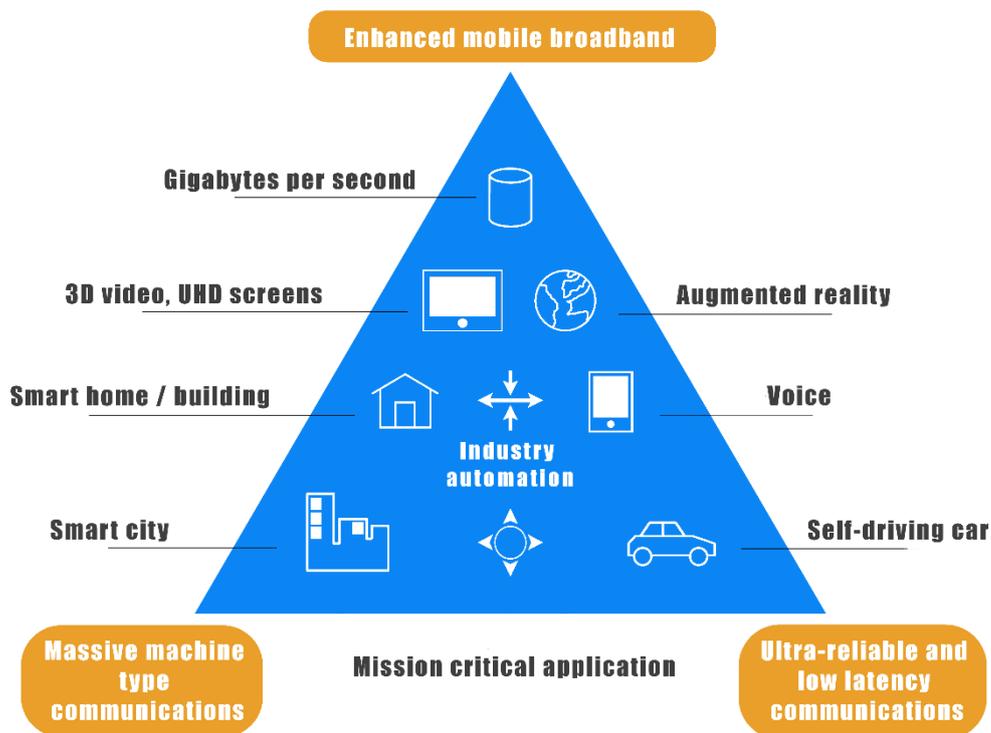


Figure 3: ITU view on 5G applicability.

specified evolved packet core elements and LTE radio access technology, with a special emphasis on small cell based solutions. The first 5G proof-of-concept devices are also integral part of the network.

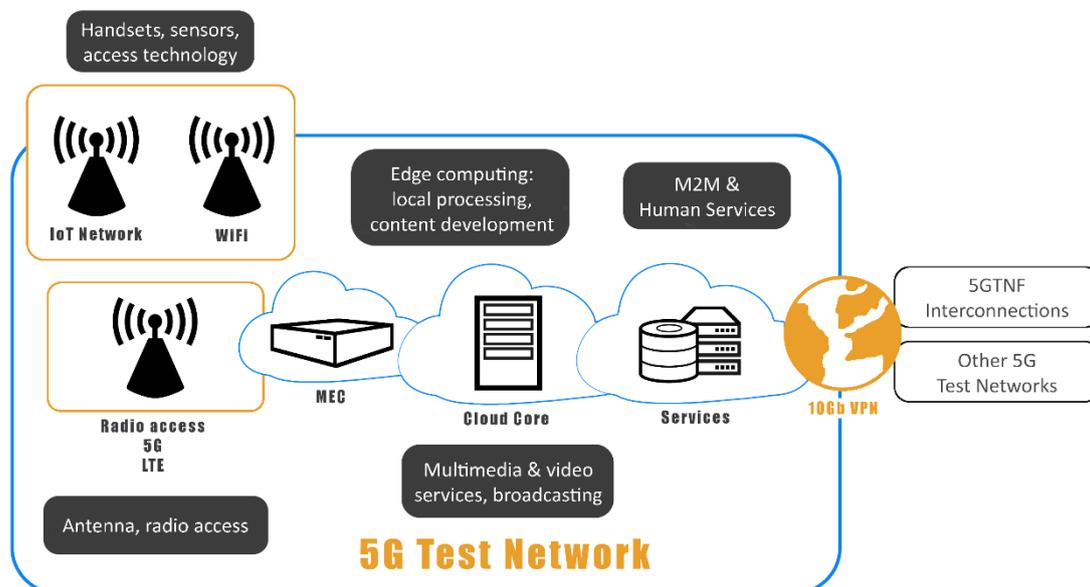
The network is controlled by operator grade EPC (Evolved Packet Core) and thus makes University of Oulu in practice a network operator. The network within the campus is being complemented by wireless sensor network (IoT, internet of things) extension with estimated

¹ Esa Piri, Pekka Ruuska, Teemu Kanstrén, Jukka Mäkelä, Jari Korva, Atso Hekkala, Ari Pouttu, Olli Liinamaa, Matti Latva-aho, Kari Vierimaa, Harri Valasma (2016): 5GTN: A test network for 5G application development and testing, Networks and Communications (EuCNC), 2016 European Conf.

1000 small form factor IoT platforms with different kinds of sensors and wireless connectivity. Furthermore, the network is being complemented by big data computing servers for network data analytics purposes. Some of these servers are distributed within the network thus allowing mobile edge computing as well as caching services.

The Nokia Airframe EPC has open application programming interfaces and virtualization environment that makes it possible to integrate new services to e.g. network management and SuperIoT applications which thus can be integrated as a part of the whole network offering the experimental environment for research also in data acquisition, cloudification, and analytics. The test network architecture is highly heterogeneous including in addition to LTE and 5G PoC technologies wireless technologies such as IEEE 802.11, ZigBee and Bluetooth Low energy, LoRa, UWB and LTE evolutions like LTE-M and LTE-U.

Our solutions include ultra-dense networks, massive-multiple-input multiple-output (MIMO), millimeter-wave communication, edge caching and device-to-device communication are the key solutions for our operation environment. Furthermore, we expect to see the emergence



of micro-operation business model, where the premises owner will be put to the driving seat.

Figure 4: 5G test network general architecture.

In this model, also tested at University of Oulu, the local-licensing based micro-operation especially indoors and with higher frequencies will offer opportunities to exciting new local service concepts, capacity and frequency scarcity solution through local licensing and thus re-use regulation policies especially in the IoT domain.

The data volumes will also increase in all mobile networks (2G, 3G, 4G, WLAN, etc.) and this capacity needs to be densified, also. Small cell mobile network implementation means higher number of cells which leads to heavier need for network maintenance. The SuperIoT Alliance automates the mobile network monitoring and thus reduces the amount of work in network operations.

IOT

SuperIoT companies provide an ecosystem of partners that master extremely wide range of IoT technologies. SuperIoT does not mean that you need to stick to one platform, but instead product will get support to a large number of platforms and systems - practically welded together into a one API layer. Data creates new value only when it is part of everyday company logic, therefore integration to IT-systems such as ERP and CRM is essential.

Important part of any IoT solution development is rapid prototyping and testing for which we have excellent capabilities and test chambers. With SuperIoT, the solutions provided to customers will be scalable to large numbers and to be used anywhere in the world, whether it is about technology, cost efficient manufacturing, device management, messaging or billing.

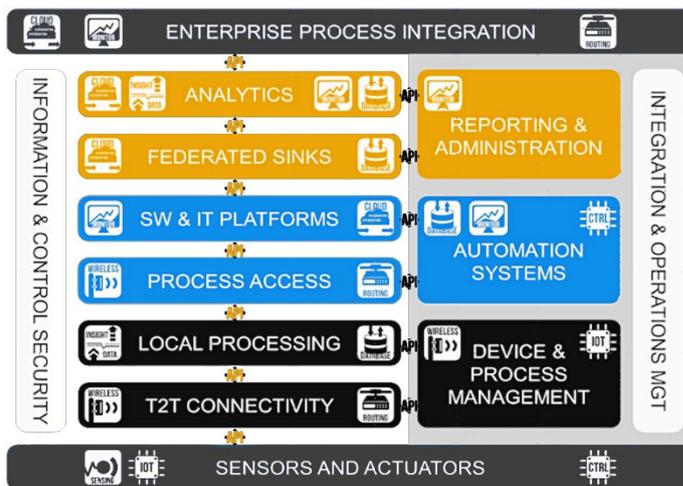


FIGURE 5: IOT REQUIRES BOTH VERTICAL- AND HORIZONTAL INTEROPERABILITY BETWEEN SYSTEMS AND TECHNOLOGIES

The innovative potential of IoT is only enabled if security of the system is on an acceptable level. From the device and system point of view, we need different levels of shielding. Under the hood, the SuperIoT takes care of advanced monitoring and diagnostics for your devices, fetches and parses log files from devices, updates firmware frequently, revocates applications, whitelists applications and processes and automates device enrollment. SuperIoT provides advanced administrative user right control

for your system, strong authentication and identification of devices also physically (e.g. USB ports), provides antivirus and other advanced threat protection applications, data encryption and strong overall control over your devices.

On the network level, SuperIoT handles network isolation and firewalls, monitors connectivity detects network anomalies, monitors and recognizes devices, limits device operation and connectivity to certain physical locations when necessary, monitors network data transfer, provide network level antivirus scanning, uses forced RSA / strong key pair authentication, provides certificate based connections, uses forced data encryption, provides location and time based access rights your system and provides proper master data management.

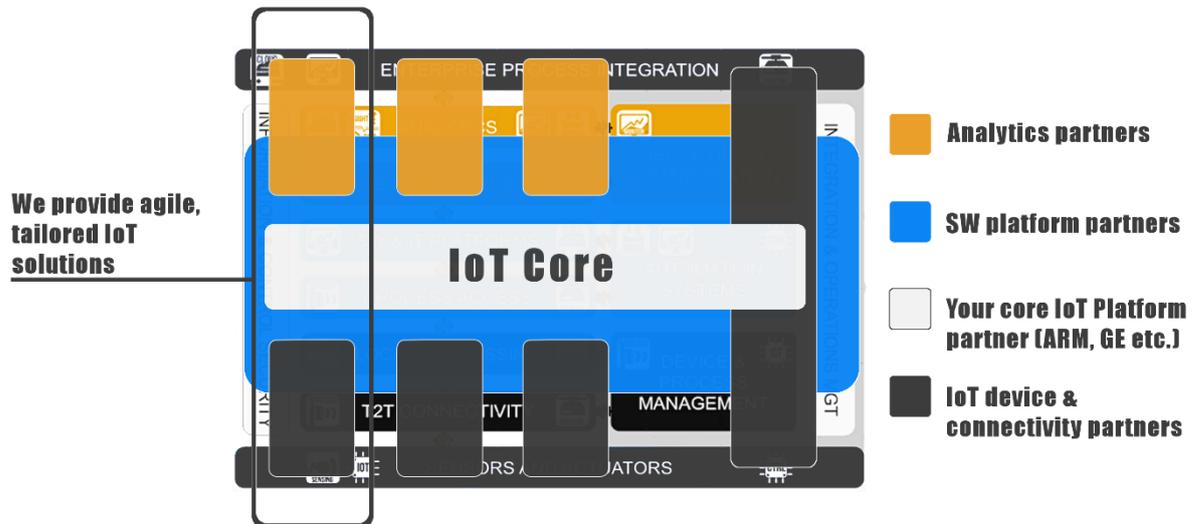


FIGURE 6: FOCUS IN SUPERIoT ALLIANCE IS IN BUILDING SPECIFIC AND TAILORED IOT BUSINESS SOLUTIONS.

ANALYTICS+

SuperIoT analytics delivers powerful data processing frameworks and versatile hardware for exploiting the streaming context to enable personalized services. Streaming data analytics is implemented in data processing pipelines tailored to handle the requirements of each customer case. Our toolkits of analytics expertise includes machine learning, artificial intelligence and deep learning, adaptive optimization, streaming reasoning, inversion problems, positioning/locationing algorithms, Blockchain optimization and many more for realizing enhanced data-intensive services.

To realize SuperIoT, it is necessary to master large-scale data management workflows in the IaaS, including cost, usability, architecture, and cyber security. SuperIoT exploits both public and private clouds and it is possible to test novel solutions with proprietary and secure hardware. SuperIoT uses both CPU and GPU processing together with edge computing (MEC) for optimal performance in data storage and data retrieval. We are able to build scalable data processing pipelines for streaming data with state-of-the-art technologies.

In SuperIoT, data analytics solutions are built by Analytics+², which is hub of Finnish private ventures, university researchers and experts all working in the field of data analytics seamlessly integrated into the SuperIoT Alliance. The products, services and research capabilities of the members are pooled together to form a comprehensive offering, catering for customers searching for analytics products and services on a wide variety of domains and complexity levels.

In total, Analytics+ currently comprises more than 1000 years of expertise, on fields ranging from deep learning to dynamic PDE models and predictive business analytics. In IoT era, all industries generate more and more data from their processes and services. Data is the new fuel for competitive businesses, and Analytics+ provides the one-stop service for all needs

² Analytics+, <http://www.analytics.plus/>

analytic. Our researchers and experts have a massive track-record of carrying out challenging customer and academic projects.

MEANS

The SuperIoT Ecosystem and Alliance provides access to shared research environments and comprehensive testing and validation facilities which enable building world class customer solutions. To connect SuperIoT into business digitalization needs and innovations the alliance also has consultation and technical service design capabilities. This way customer organizations can get objective analysis and outside help in order to get even better return of invest. The consultants chosen for each case have deep industry business and technical expertise.

SHARED RESEARCH ENVIRONMENTS AND ENABLERS

In SuperIoT, shared R&D Environments (SRE) deliver cutting edge R&D technology and associated research know-how towards companies as a service. SREs allow fast adoption of new technologies through a low-barrier access model, informing companies in making targeted investments for production systems.

SRE utilization can be planned case-by-case based on business needs, ensuring the relevance of market-oriented R&D utilization. This way, the adopted R&D know-how immediately serves value creation activities.

SREs also provide means to conduct go-to-market piloting, where customer/market attention and appetite can be assessed prior to market launch. This piloting is tailored based on the customer and the business need. In Appendix I, a more detailed listing of the available research environments is given.



FIGURE 7: SHARED RESEARCH ENVIRONMENTS (SRE) OFFER LOW-BARRIER ACCESS TO LATEST R&D INFRASTRUCTURES AND ASSOCIATED KNOW-HOW.

SUPERIOT PRODUCT VALIDATION

High customer satisfaction requires reliable products, services and applications that are easy to use. Accordingly, products have to fully meet the customer requirements. SuperIoT provides a test alliance to ensure productivity of the solutions.

The following product characteristics have to be taken in to account very carefully in product development phase

- Quality of Services (QoS) - E2E product liability
- Product reliability and performance – Quality Assurance
- Security
- Time to market

Especially in new technology development, testing takes easily 70-80% of the total work, so quality and efficiency of testing plays a crucial role in R&D phase and has a big impact to the time to market and competitiveness. SuperIoT ecosystem provides life cycle testing capability from virtual prototyping to certification covering the following testing activities.

- Virtual prototyping and Benchmarking
- Wireless performance testing (OTA)
- Certification testing (CE & FCC, PTCRB & GCG, Carrier Approvals, Accredited Hearing Aid, Bluetooth Qualification Services, Lora Certification)
- Audio, thermal and power consumption measurement
- EMC, RF, OTA and SAR testing
- SW reliability, destructive, regression, conformance and field testing
- Mechanical, reliability, environmental testing and Failure Analysis
- 4G/5G Test Network usage for product and service validation
- Test/testability research and test architecture development
- Intelligent diagnostics method and test algorithm development

ADVANTAGE THROUGH SHORT TEST CYCLE

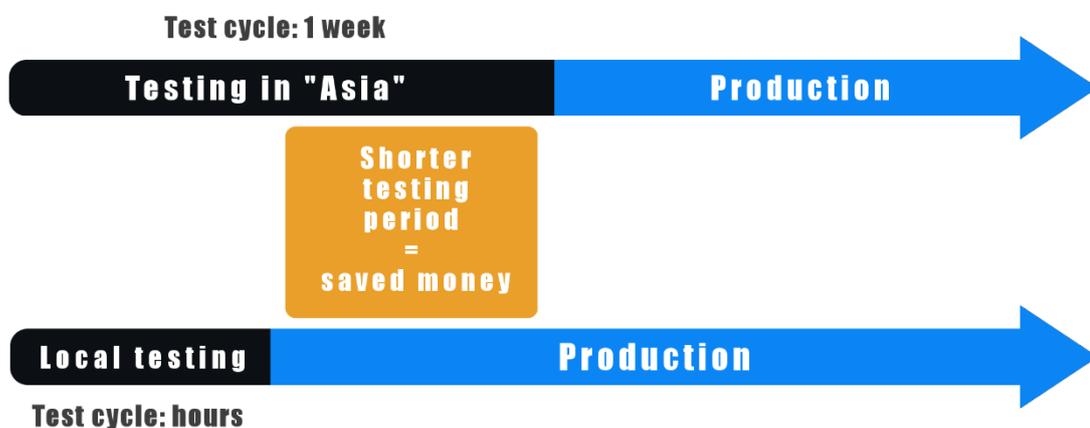


FIGURE 8: SUPERIOT PROVIDES SCALABLE WORLD CLASS E2E TEST SERVICES FOR IOT AND WEARABLE TECHNOLOGY TESTING

KSPs

- Faster Time to Market
 - Agile product development and testing is enabler for faster time to market
- R&D Cost Saving
 - Concurrent product development and testing is key for low R&D cost
- Quality²
 - High product reliability, performance, security and Quality of Services (QoS) is a clear competitive advantage.

SUPERIOT PARTNERS TEST TO FOLLOWING STANDARDS



THE MODEL OF CO-OPERATION

For customer, everything is made easy with a project leader that takes the customer through the competence pool and help throughout the whole path from the idea to product.

WE WILL:

- I) Identify the key pillars and requirements of IoT platform for partners.

Identify, prioritize and integrate the key IoT solution areas, “pillars” together with the client.

Identify the KPI targets and key requirements in business and technical level architecture for partners.

- II) Call for best partners. Build proof of concepts of IoT solutions.

Choose 3-5 IoT business cases. Call for best partners. Build proof of concepts with the best partners from SuperIoT Ecosystem and Alliance. Build the basis for the tailored IoT platform.

- III) Drive the client IoT roadmap. Lead the SuperIoT alliance partnerships and shared investments.

Build new IoT solutions and lead the development of shared investments in SuperIoT alliance with exclusivity within the industry area. Take full advantage of SuperIoT partnerships, R&D supporting tools and European level R&D programs. Find co-operation models to share investments with your local corporates.

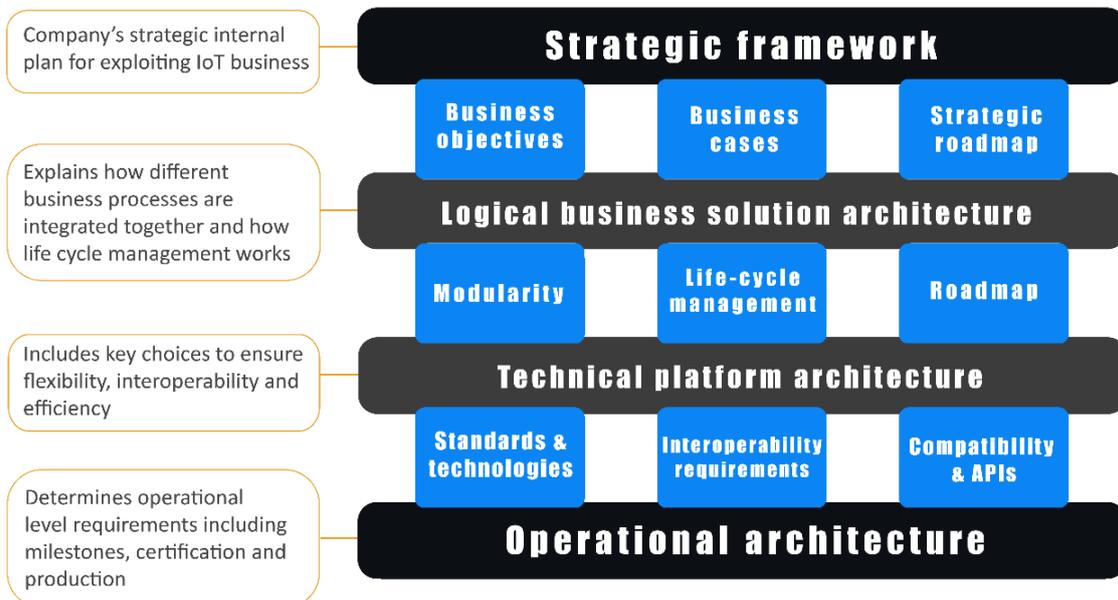


FIGURE 9: OUR STRATEGIC IOT APPROACH ENSURES LONG TERM BUSINESS BENEFITS.

ROADMAP

Our roadmap is designed to enable rapid prototyping with a clear vision of continuous development and partnerships.

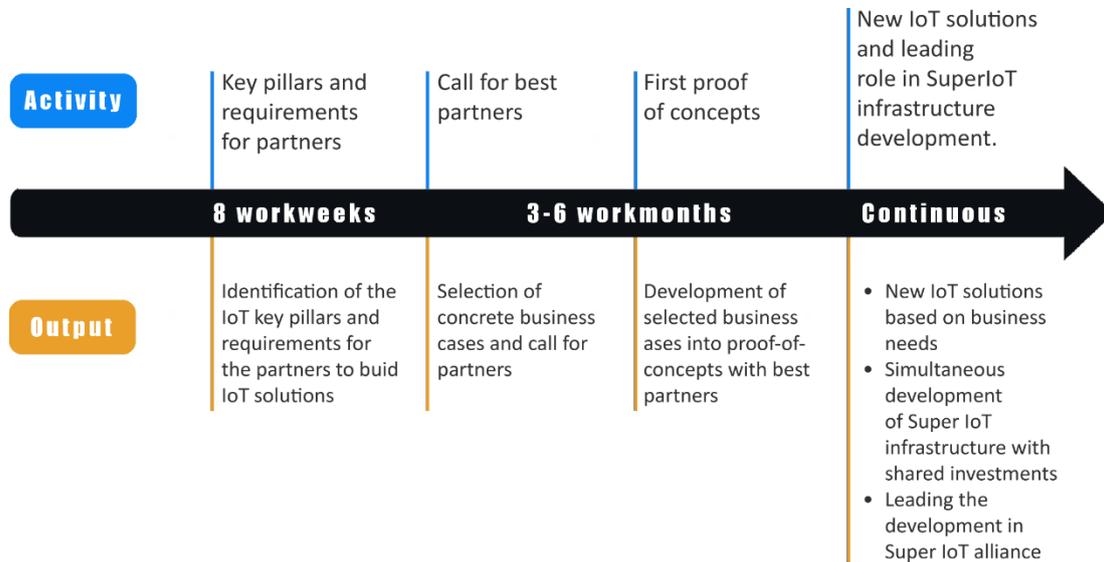


FIGURE 10: WE IDENTIFY THE IoT KEY PILLARS AND SELECT THE BEST ALLIANCE COMBINATION FOR YOU IN LESS THAN 8 WORK WEEKS. WITHIN THREE MONTHS, YOU ALREADY HAVE THE FIRST RESULTS FROM RAPID PROTOTYPING.

THE TEAM

For each customer case, the SuperIoT Ecosystem and Alliance together form a program execution team that has the required competencies and experience to make each case a success story.

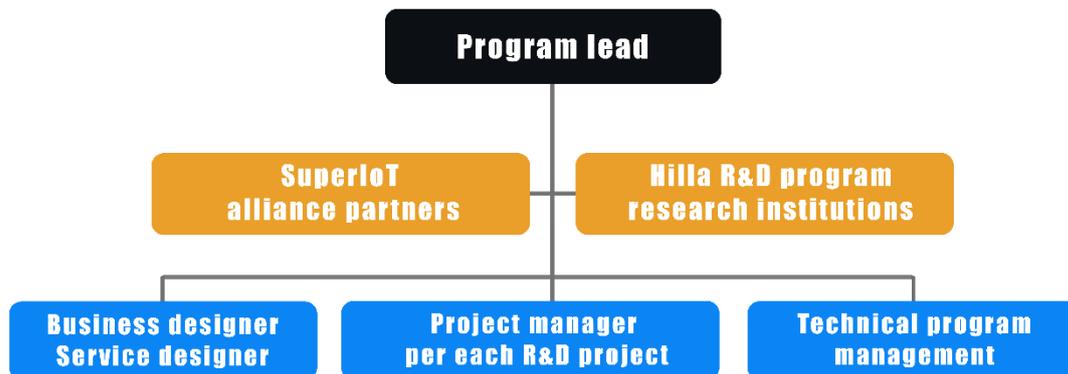


FIGURE 11: YOU WILL HAVE A SINGLE POINT OF CONTACT TO THE SUPERIoT ALLIANCE AND ECOSYSTEM.

APPENDIX I: SHARED RESEARCH ENVIRONMENTS AND ENABLERS

5G AND BIG DATA	<p>With European Regional development funding as well as private funding from Finnish companies, we have been able to secure the investment of a versatile 5G testing network as well as Big Data infrastructure. The equipment includes capability for mobile edge computing (MEC), software and development environments as well as licenses for the solutions. We provide a private, cloud-based IaaS analytics platform with OpenStack IaaS virtualization and containers on top of the platform. The servers combine SSD storage and CPU processing by default and we will add GPU cards on demand. Furthermore, we will provide Tesla servers and development workstations in the environment.</p>
OULUZONE+	<p>Ouluzone Automation is a new R&D environment and centre for car and working machinery technology and infrastructure construction automation and robotics. The owner of the facility and large land area is Oulu City. There is a company Ouluzone Operointi Oy, which operates the practical use of the centre. Currently, there are new building facilities as well as several different racecourses available for both the car racing purposes as well as for technology and process test purposes. In collaboration with Business Oulu, University of Oulu, VTT, OAMK and OSEKK, the centre has versatile available resources for car and work machinery experiments and information modeling based automation tests. For example, tens of different types of real working machines are available for research and education purposes with very reasonable costs, the current racing roads offer plenty of car and tyre testing purposes, in collaboration with invited technology companies there are possibilities to arrange very many different ICT based and automated experiments of different working processes, etc. There is also a built reference calibration point network for RTK-GNSS based surveying and machine control equipment and systems.</p>
MINIPILOT	<p>MiniPilot is a fully functional model of an ore enrichment process. It allows research and development of efficiency and sustainability of enrichment methods. Ore samples used in the MiniPilot come from real-world mines in Finland. Through SuperIoT and collaboration with companies such as Schneider Electric, MiniPilot seeks to achieve a high modularity and level of automation throughout the enrichment process.</p>
SUPERIOT TEST SIG	<p>Scalable world class E2E test services for IoT and wearable testing. The Test SIG invests in test technology research, development and services to lower testing and product development costs. Continuous testing enables faster time to market with agile product development and testing, concurrent product development and testing is a key for low R&D cost. Quality², high product reliability, performance, security, and QoS is a clear competitive advantage</p>

PRINTOCENT	PrintoCent Innovation Center commercializes the research results of Printed Intelligence and Optical Measurements. PrintoCent has wide global reach with its international member companies and partners.
INNOVATION CENTER	The awarded innovation environment – PrintoCent Pilot Factory - for Printed Intelligence research and manufacturing is located in Oulu, Finland, at the founding member sites at VTT, Oulu University and Oulu University of Applied Sciences. PrintoCent has a special focus on Roll-to-Roll (R2R) and hybrid manufacturing and optical measurements for quality assurance. Application focus areas range from rapid disposable diagnostics, smart flexible lighting, wearable products to Internet of Things with sensors and energy harvesting.

APPENDIX II: FINLAND BASED EXCELLENCE

This Appendix is constantly updated. There are more than 100 companies involved in the SuperIoT ecosystem.

APPLICATIONS AND SERVICES

refecor POLAR RDVELHO
 symbio indalgo elfgroup
 FONDIA PollenTech ARMmbed KALTIOT
 Nortala KajaPro absent 3DTECH
 Telia CAPICODE ELTEL
 SOLITA empirica RCP SOFTWARE
 espeo WIREPAS ledcom consulting
 ATR STEAMLANE

DEVICES AND R&D SOLUTIONS

Haltian loLiving POLAR
 Anite Bittium SENSEAPEX pinto
 JOT automation EXFO refecor
 OULU D.C. URJS iProtoXi KALTIOT
 NORDIC STRIPLECTRO CREOIR TACTOTEK
 valopaa. PehuTec
 TOSIBOX SOLMU NEW CABLE CORPORATION
 BRIGHTHOUSE INTELLIGENCE SATEL ioAGRI
 SOLA SENSE IDENTIFIED BY toptunniste Herman IT
 RUUVI OFFCODE

RESEARCH PARTNERS

Centria TURKU AMK APPLIED SCIENCES OF OAMK
 UNIVERSITY OF OULU VTT
 SCIENCE PARK

MANUFACTURING

JOT automation TACTOTEK SMART WELDED STRUCTURES pinto
 iProtoXi FLEXBRIGHT
 Innokas Medical PROBOT FAB LAB
 SENSEAPEX Nortala
 SANMINA PROTO HOUSE

TESTING AND CERTIFICATION

Verkotan CONVERGENTIA SAROKAL TEST SYSTEMS
 GRANT4COM orbis/systems
 TESTLABS RUGGED TESTING TESTIMATE QUALITY IN CONTROL

INDUSTRY PARTNERS



We are a Finnish high-tech company specializing in 3D technology and related solutions as well as technology development. In our solutions offering we have 3D printing, scanning, modeling, reverse engineering, visualization and consultation as well as contract manufacturing.

Thanks to our extensive partner network, we are able to offer the most suitable solution for each case in order to create the most added value for our customers and partners.

3DTECH OY

Tomi Kalpio, Co-Owner and -
Founder

tomi.kalpio@3dtech.fi



Afore offers MEMS sensor test solutions from R&D phase to high volume production and further on to system level testing. The Company addresses requirements of the, industrial, automotive and consumer end markets and is recognized pioneer in area of wafer level finaltest of sensors. Afore's mission is to help its customers to meet market requirements with better sensor performance and lower cost of test.

Ari Kuukkala

Sales Director

mobile: +358 440 848 900

<https://www.afore.fi/>



Your one-stop provider of IT and voice services

Aina is an ICT service provider catering to Finnish companies. Tens of thousands of users are already enjoying our services.

<http://www.aina.fi/>



Anicare develop new kind of IoT based sensor devices and platforms to the Animal management sector.

Our team focus is offer to our customer user friendly solution what solve real problems on field and save time and money in farming and also take care from animals needs.

IoT offer great opportunities to this kind of products; wide network coverage, long battery lifetime and tiny size.

Our platform offer also possibility to add different type to sensor to device for to other applications.

www.anicare.fi



ARM® mbed(tm) provides a secure, scalable platform for enterprise IoT, including the operating system, cloud services, tools and developer ecosystem necessary for the creation and deployment of commercial, standards-based IoT solutions at scale. By offering all the vital tools

partnership(at)mbed.com

needed to develop these IoT solutions, combined with the support of over 70 partners and a community of 200,000 developers, mbed is uniquely positioned as the leading ecosystem for IoT device creation, deployment and management.



ATR Soft is a full-service software house. Our aim is to help our customers achieve more in their field of business – we create the software to boost your business! We have extensive technological expertise and we use the most appropriate tools for each client and each project.

We are professionals in IoT and a reliable partner in the design, implementation and maintenance of the IOT solutions. Furthermore, we master the processing of data and analytics, implementation of various integrations and cloud solutions.

ATR Soft Oy, Turku, Finland

Teemu Tasanto, Vice President

+358 40 767 8920

teemu.tasanto@atrsoft.com

www.atrsoft.com



BaseN is an European IoT and Industrial Internet Platform. It's core values are unlimited scalability, excellent fault tolerance and real time operation. The Platform collects, stores, analyzes and presents the data. Solutions are offered to the partners or customers as SaaS/PaaS services from 12 data centers around the world or as an in-house for highest security demanding customers. BaseN searches actively both customers and partners that wish to develop applications on the Platform.

BaseN Oy, Helsinki, Finland

Jukka Paananen, SVP Sales

+358 50 387 0793

[info\(at\)basen.net](mailto:info(at)basen.net)



Device management need is recognized in most major IoT platforms and tools. However, comprehensive, automated and scalable ready made solutions are missing in most of the cases. SuperIoT utilizes Capricode's patented SyncShield solution that both automates the management and brings additional levels of Cyber Security in the process.

Capricode Oy, Oulu, Finland

Tero Takalo, CEO

+358 40 722 9007

[tero.takalo\(at\)capricode.com](mailto:tero.takalo(at)capricode.com)

www.capricode.com



Cloud Asset is a Cloud Computing and Big Data technology startup whose mission is to help customers adopt cloud capabilities at the heart of their operational strategy through a set of vertical industry use-case specific solution stacks. Cloud Asset's project portfolio includes utilization and development of IoT, Big Data, analytics, visualisation, streaming, and storage technologies and solutions in financial, cleantech, security, environment, and healthcare sectors.

Cloud Asset Oy, Espoo/Oulu, Finland

Hasan Malik, CEO

+358 40 740 0974

[hasan\(at\)cloudasset.com](mailto:hasan(at)cloudasset.com)

www.cloudasset.com



Codemate is an agile software development service house headquartered in Oulu, Finland.

With 75 employees and four offices internationally, we are capable of crafting advanced digital solutions from scratch for our clients.

Keywords: IoT, cloud, data analytics, web services, mobile apps, UX design.

Codemate Oy, Oulu, Finland

+358 20 755 1056

sales(at)codemate.com

www.codemate.com



CONNAX is a software company developing embedded SIM software solutions. Focus of our company is secure connectivity in IoT. We are figuring out how to get away from traditional telecom dogma and improve IoT security by using Blockchain public key infrastructure. Together with other players we do want to redesign telecommunication systems, so they will withstand billions of connected devices.

Connax Oy, Helsinki, Finland

Ilya Sokolov, CEO

ilya.sokolov(at)connax.io

Dmitrii Ivanov, CTO

dmitrii.ivanov(at)connax.io

connax.io



Convergentia offers antenna concept creation and development services. Our world-class antenna team provides customized connectivity solutions for any device and radio communication system. Our first 5G project, where we participate on the design of mmWave antenna array, started already 2016.

Convergentia Oy, Oulu, Finland

Tatu Karvinen

+358 40 535 4193

tatu.karvinen(at)convergentia.com



Creoir is a design and engineering company providing development services of wireless devices and services all the way from the product idea to manufacturing and service ramp-up. Our design and engineering references include e.g. Marshall London smartphone and MOST container monitoring/tracking IoT-solution.

Creoir Oy, Oulu, Finland

Pekka Väyrynen, CEO

+358 400 357 849

www.creoir.com



Digita is a nationwide IoT LoRaWAN network operator with a strong background in transmitting TV and radio programmes throughout Finland in company's nationwide broadcasting network.

LoRaWAN utilizes this nationwide infrastructure as well. LoRaWAN technology enables various IoT solutions for all kinds of business sectors. LoRa meters have low price and power consumption, and excellent range that make it compatible with various types of wireless data gathering and monitoring solutions with low cost scale.

www.digita.fi/iot

Especially organizations in the utilities sector, but also companies in other business areas make use of Digita's advanced IoT network.



We are ED Design, a strategic design office. Our work is to identify future success opportunities and to provide solutions that shape physical and virtual products for the digital age. Our services include industrial and service design, UI / UX design, mechanics design and user research. Our offering is complemented by an extensive partner network. We are a key strategic partner for our customers. Our expertise is reflected in the numerous design awards our customers have received.

ED Design Oy, Turku and Helsinki, Finland

Markku Oksman, CMO

+358 41 532 0015

markku.oksman@ed-design.fi



elfGROUP - Competitive advantage through cybersecurity!

elfGROUP offers business driven cybersecurity - corporate cybersecurity assessments and cybersecurity services for software engineering.

elfGROUP Cyber Security Services Oy, Oulu, Finland

Kari Halavaara, Sales Director

+358 50 553 4796

[kari.halavaara\(at\)elfgroup.fi](mailto:kari.halavaara(at)elfgroup.fi)

www.elfgroup.fi



Elinar will help knowledge-intensive organizations turn their data into business value. In the digital world, business success depends on the effectiveness and efficiency of the information processes. The amount of the data and the volume of digital transactions are growing at an exponential rate. Business processes are becoming more and more dependent on knowledge and information processing. Companies must adopt new capabilities in order to gain and maintain their competitive edge. Elinar is your strong partner, who can deliver AI assisted Content Management solutions to support your business processes. In addition we are capable of delivering solutions based on IBM market-leading set of technologies ready for the new cognitive era.

Elinar Oy Ltd

Expertise Centre Bepop, Isolinnankatu 21 E, 4th floor, FIN-28100 Pori

www.elinar.com



Eltel is a leading European provider of technical services for critical infrastructure networks in the segments of Power, Communication and Transport & Security. With operations throughout the Nordic and Baltic regions, Poland, Germany, the United Kingdom and Africa Eltel provides a broad and integrated range of services, spanning from design, implementation, maintenance and upgrade services to operations and project deliveries. Eltel has a diverse contract portfolio and a loyal and growing customer base of large network owners.

Eltel Networks Oy, Finland

Risto Jurva, Product Manager

+358 40 311 2268

[risto.jurva\(at\)eltelnetworks.com](mailto:risto.jurva(at)eltelnetworks.com)

www.eltelnetworks.com



Enhancell is a software company creating new and innovative tools for wireless network testing needs. Our team of mobile network experts and creative software designers are striving to simplify the network testing. Our headquarters is in Oulu Finland and we have offices in Boston MA and Dallas TX. We are trusted partner of several major cellular operators and network manufacturers.

Enhancell Oy, Oulu, Finland

www.enhancell.com

info(at)enhancell.com



Esju Oy is a high-technology company established in 1991.

Esju Oy, Oulu, Finland

+358 400 681 500

Our area of business comprises electronics design, consulting, research, training, and EMC laboratory services.

fax +358 8 882 1570

www.esju.com

The main business sectors are Telecommunications, IoT, Wellness and Healthcare technology, Industrial electronics, and Defence industry.



Espeo is a software house dedicated to high-quality product development. For the past 8 years, we've been successfully crafting market-leading IoT, web, blockchain/cryptocurrency and mobile solutions. We use only proven technologies that allow building reliable, high-quality software. Our areas of expertise include integrations, data analysis and developing the orchestration layer of IoT solutions.

www.espeo.eu



We offer high value-added engineering services, embedded systems and IoT as well as technical documentation solutions. Etteplan's extensive offering covers all design engineering service needs for machinery, equipment and plants including embedded systems and IoT solutions. In addition we offer technical documentation services to create, manage and distribute product related technical information to be used, for example, in product development, production and maintenance.

Etteplan, Oulu, Finland

Markus Piippola, Area Manager,
Embedded Systems & IoT

markus.piippola(at)etteplan.com

<http://www.etteplaniot.com/en>

Our contribution for IoT is to create IoT products for customers and to offer test services related on IoT.



EXFO at a glance:

EXFO Oy, Oulu, Finland

+90 % of the top 100 Communications Service Provides (Mobile Operators) use EXFO Solutions.

Jari Schroderus, Senior Product Manager

	<p>EXFO has the largest Active Service Assurance deployment in the World. In Oulu, EXFO develops Service Assurance solutions for virtualized and physical networks monitoring.</p>	<p>+358 40 30 10 202 jari.schroderus(at)EXFO.com</p>
 Fluid Intelligence	<p>Fluid Intelligence's vision is to change the way we use lubricant oils today. We help our customers to maximize their operational reliability and cut waste oil in half.</p> <p>We connect our customers' oil to Fluid Cloud and change oil from cost to asset. Fluid Intelligence - Oil Connected.</p>	<p>https://fluidintelligence.fi/</p>
 Masinotek	<p>Masinotek Oy is developing and supplying software based technologies, systems and services for industry, energy, water supply plants and for environmental research. The background of the company is based on software knowledge. We are integrating our software solutions to the customers' existing IT systems and also to the field measurement systems (loggers and sensors) supplied by Masinotek Oy.</p>	<p>Masinotek Oy, Vantaa, Oulu, Finland Juha Pohjala, Managing Director +358 50 558 2255 firstname.lastname(at)masinotek.com www.masinotek.com/en/</p>
 MPOWER	<p>We at Fibrux want to help people to get stronger with Mpower muscle activation monitor. Mpower is a unique tool for physiotherapists, sports coaches and personal trainers to save training time and increase training motivation. Mpower puts end to guesswork by showing the muscle activation power measured directly from muscles in real-time. Mpower helps to find right exercise to right muscle and shows muscle balance, fatigue and training progress.</p>	<p>Fibrux Oy, Oulu, Finland info(at)fibrux.com www.mpower-bestrong.com</p>
 FONDIA	<p>Fondia is a full service business law house that operates in Finland, Sweden and Estonia. Fondia's service philosophy is fresh and smart. We can help companies on all business legal matters, also on a global scale with our extensive partner network.</p>	<p>Fondia, Finland/Sweden/Estonia Marko Moilanen Legal Counsel, Area Director +358 20 7205 498, marko.moilanen(at)fondia.fi</p>
 GREENLED	<p>Intelligent lighting by sensor integration, lighting control, data collecting and analytics</p> <p>Smart, energy saving lighting solutions for public spaces like traffic terminals, airports, offices, schools, hospital and other public premises</p>	<p>Greenled Oy, Oulu, Finland +358201255800 http://www.greenled.com</p>

Smart, energy saving solutions for street and area lighting.

Haltian

Haltian is a visionary engineering house that brings challenging new wireless and IoT products from initial design to reality within the market. Our unique team of almost 100 top notch engineers are skilled at taking the most complex ideas and turning them into premium designs. Our Internet of Things platform, Thingsee, is an all-wireless solution including devices and connectivity. With our expertise in sensor and wireless technologies we can develop fast turnaround projects, providing ready-made solutions including HW, global connectivity and backend, as well as integration to customer's existing systems.

Haltian Oy, Oulu, Finland
 Jyrki Suutari, Sales Director
 +358 45 670 0899
www.haltian.com



As the frontrunner of the Data Center industry Herman IT leads the integration of process industry best practices, the modern global IT technologies and high skilled people into a new sustainable future. We offer software development and consultation for IoT projects and services.

We host our own ISO 27001 certified data centers in the most cost efficient place in Finland. Secure managed cloud- , GPU- and IoT platforms are also our key services."

Herman IT, Kajaani, Finland
 Veli-Antti Leinonen, Sales Manager
 +358 44 740 1010
 veli-antti.leinonen(at)hermanit.fi
www.hermanit.fi

HOUSTON INC.

Houston designs and implements world class digital services combining IoT, analytics, cognitive computing and the latest technologies. We have a solid experience in developing services for IoT and industrial maintenance businesses. The solutions are always tailored to the business needs and goals of the customer, with whom the services are developed in a close co-operation. The excellent results are gained by combining a customer vision, user experience and the comprehensive expertise of our developers.

Houston Inc. Consulting Oy,
 Helsinki, Finland
 Tomi Ruotimo, CEO
 +358 40 544 3972
 tomi.ruotimo(at)houston-inc.com

Indalgo

Indalgo – Industry of Algorithms – we build and develop analytics solutions for our customers. This covers the data integration, modeling and algorithm development, solution implementation, user interface design and solution maintenance. Our solutions have brought measurable benefits

Indalgo Oy, Oulu, Finland
 Perttu Laurinen, CEO
 +358 40 560 5616
 perttu.laurinen(at)indalgo.com

	<p>and new strategic capabilities to our customers since founding of the company in 2010.</p>	<p>http://www.indalgo.com</p>
	<p>Innokas Medical is a Finnish healthcare technology company specialized in high-quality design and product development, regulatory approvals and cost-efficient contract manufacturing of wellness, medical and IVD devices.</p>	<p>Innokas Medical Oy, Kempele, Finland</p> <p>Mikko Kangas, Account Director +358 44 562 3123</p> <p>innokas(at)innokasmedical.fi</p> <p>http://www.innokasmedical.fi</p>
	<p>iProtoXi is a design house from Finland that makes tiny, innovative, energy efficient, wireless IoT and wearable customer projects. iProtoXi offering and product platforms are used as building blocks for many kind of IoT, health and fitness solutions.</p>	<p>iProtoXi Oy, Oulu, Finland</p> <p>info(at)iprotoxi.fi</p> <p>www.iprotoxi.fi</p>
	<p>JOT is a world-class company for the automated production testing solutions for electronics industry products. JOT automated test and assembly solutions, based on the best applications and standard modules, create the smartest value by enabling ultimate designs, system integration and performance in minimal forms. And now we are making our machines across the world to talk to each other's make manufacturing smarter than ever with a data-driven approach!</p>	<p>JOT Automation Oy, Oulu, Finland</p> <p>Antti Kaihua, R&D Manager, Test Automation</p> <p>+358 40 8031127</p> <p>antti.kaihua(at)jotautomation.com</p>
	<p>Team Kaltio has developed and hosted IoT services since 2008. Kaltiot Smart IoT, a ready-to-go 24/7 hosted cloud service, is the fastest solution to build your Internet of Things. Trusted by Microsoft, passing on millions of messages every hour.</p>	<p>Kaltio Technologies Oy, Oulu, Finland</p> <p>Timo Konu, CEO</p> <p>+358408052550</p> <p>timo.konu(at)kaltiot.com</p> <p>www.kaltiot.com</p>
	<p>LED COMP Consulting is providing high quality IC design services. We are working worldwide with the biggest and smallest semiconductor companies. Our customers are operating in following areas; Networking, Audio, Automotive, Wireless and IoT.</p> <p>Our expertise is in digital ICs and we offer services for Project management, RTL development, Verification, DFT, STA and back end. We offer reliable and long-lasting partnership to our clients.</p>	<p>http://ledcomp.fi/</p>

With our strong experience and high standards, we are there to make your tape-out on time with highest quality



Masinotek Oy is developing and supplying software based technologies, systems and services for industry, energy, water supply plants and for environmental research. The background of the company is based on software knowledge. We are integrating our software solutions to the customers' existing IT systems and also to the field measurement systems (loggers and sensors) supplied by Masinotek Oy.

Masinotek Oy, Vantaa, Oulu, Finland

Juha Pohjala, Managing Director

+358 50 558 2255

firstname.lastname(at)masinotek.com

www.masinotek.com/en/



New Cable Corporation designs and manufactures SFFC (shielded flat flexible cables) for electronics industry users. Shielded cables have numerous advantages due to RF protection and weight saving compared to traditional cabling. We manufacture standard cables, ready for replace existing FFC cables and OEM cables specifically designed for the customer.

New Cable Corporation, Oulu, Finland

Tommi Rintala, CEO

+358 50 525 7616

tommi.rintala(at)newcablecorporation.com

Antti Backman, Connector

antti.backman(at)newcablecorporation.com

+358 50 598 6278

www.newcablecorporation.com



Nortal is a multinational strategic change and technology company. Nortal offers a comprehensive portfolio of medical IT products, solutions and process re-engineering to solve the challenges of our clients. Nortal solutions break down walls between ecosystem stakeholders and safely connect patients with healthcare providers. Our mission is to simplify and optimize naturally complex processes to create a seamless society.

Nortal Oy, Finland

Harri Koponen, CCO

+358 40 192 2464

harri.koponen(at)nortal.com

Sami Paatero, Director, Public Sector and Health

+358 40 510 4454

sami.paatero(at)nortal.com



Offcode's ADX product family is an open industrial class IoT Platform.

ADX offers an open solution for most distributed control and/or data collection needs. ADX is fully

Offcode Oy., Oulu, Finland

Antti Takaluoma

+358 400 599588

antti.takaluoma(at)offcode.fi

remoted managed and it is easy to integrate to any cloud based backend system.

see:www.offcode.fi/adg42



Orbis Systems is global quality control and functional testing solutions and services provider. We work closely with customers' R&D, production and after sales teams. Our key technologies are related to RF signal switching, electrical and machine vision testing. We provide engineering, prototyping and integration services for test solution, adapter and fixture development and manufacturing as well as after sales services such as maintenance and repair. Orbis Systems serve customers within 4 different time zones.

Orbis Systems Oy, Oulu, Finland

Karri Suosara, Director, Business development

+358 50 4393945

[karri.suosara\(at\)orbissystems.eu](mailto:karri.suosara(at)orbissystems.eu)



Oulun DataCenter Oy is responsible for datacenter & cloud business operations. ODC is rapidly growing company providing flexible and high quality customer driven datacenter services. ODC main customers are corporations, High tech - startups, public sector and partners/resellers. Key parameters for the service are ability and elasticity to build massive scale in secure environment. ODC offers a flexible and scalable datacenter service and various other cloud based services. Services are designed to suit for many kind of business models and company sizes.

Oulun DataCenter Oy, Oulu, Finland

Mika Lähteenmäki, CEO

+358 40 526 6171

[mika.lahteenmaki\(at\)odc.fi](mailto:mika.lahteenmaki(at)odc.fi)

Jouni Tuhkanen, Account Manager

+358 40 486 5222

[jouni.tuhkanen\(at\)odc.fi](mailto:jouni.tuhkanen(at)odc.fi)



PehuTec provides product development services for software design, electronics hardware design and mechanical engineering.

PehuTec Oy, Finland

PehuTec is building various IoT solutions and brings digitalization into new application eras, creating competitive value through better quality and accuracy of information.

Juhani Leppänen, Director, Sales and Marketing

+358 40 7673026

[juhani.leppanen\(at\)pehutec.com](mailto:juhani.leppanen(at)pehutec.com)

www.pehutec.com



This Is What We Are Good At:

Spatial Design, Product and Service Design, Commercialisation, Brand Identity, Customer Experience Design, Concept Creation, Graphic Design, Building Contracting and Project Management.

Pinto – design energy organized

Jyri Niemikorpi, Business development, Partner

+358 40 544 6042

www.pintodesign.fi



Listening to your body is one thing, understanding what it is telling you is an altogether different story. Polar helps you get under the skin of your training. We put it down to a combination of expertise in sports, physiology and electronics, coupled with a deep understanding of customer needs. It's no surprise then that we've been leading the way in technological innovations and heart rate monitors since 1977.

Polar Electro Oy
Juha Sorvala
Manager, Electronics HW R&D
juha.sorvala@polar.com



PollenTech accelerates time to revenue for IoT silicon vendors and end product manufacturers (OEM/ODM) by providing a comprehensive set of embedded software services. Leveraging years of experience in the cellular market, we will develop and/or optimize your platform for low power, secure and robust operation. PollenTech works in concert with your internal SW teams to reduce development time or even deliver complete designs. We specialize in IC platform transitions, device driver development and wireless stack design from the PHY to the app layer across the most popular MCU and WMCU platforms.

Pollentech Oy, Oulu, Finland
Pauli Ponnikas, CEO
+358 40 552 4674
[pauli.ponnikas\(at\)pollentech.io](mailto:pauli.ponnikas(at)pollentech.io)

Marko Vainio, CTO
+358 40 554 4873
[marko.vainio\(at\)pollentech.io](mailto:marko.vainio(at)pollentech.io)



Protohouse Finland Oy is full service mechanics prototype provider with 3D printing (SLA plastics), 3-and 5-axis machining and lasercutting for sheetmetal (SUS 0,03-0,50mm). We are Startup (founded 2015) from ext-Nokia R&D internal Protolab with over 120 year experience from R&D and prototyping.

Protohouse Finland Oy
Jari Surakka, Managing Director
+358 40 523 4590
[jari.surakka\(at\)protohouse.fi](mailto:jari.surakka(at)protohouse.fi)



Probot is a high-tech company in the field of robotics and automation located in Oulu, Finland. The company was established in 2006 to fulfill the gap between the academic research and industry. We have built a skilled team to design and implement traditional automation and modern robotics to various fields of business. Our aim is to release people from repetitive and heavy work to enable more resources in intelligent work like quality and design. We value your time and want to maximize the capacity of personnel by bringing robots to the team!

Probot Oy, Oulu, Finland
Matti Tikanmäki, CEO
+358 44 3333 439
contact@probot.fi

	<p>RD Velho provides various R&D and Product Development services including embedded devices and IoT-solutions for international customers.</p> <p>Areas of expertise: Industrial Design, Mechanical engineering, Software Development, UX / GUI, Electronics, Simulations, Technical Documentation and Packages.</p> <p>We're here to help you succeed!</p>	<p>RD Velho Oy, Finland Kosti Niemelä Site Manager, Oulu +358 40 766 0654 kosti.niemela(at)rdvelho.com www.rdvelho.com</p>
	<p>Refecor Oy is a wireless technology and electronics product design company located in Oulu, Finland. We also have a very strong network of manufacturing partners and we offer the product design including our manufacturing support. We have been involved in producing millions of products for biggest world class brands and now we are focusing in lean manufacturing including cost efficiency, high production quality and long term operations. We look for win-win business cases.</p>	<p>Refecor Oy, Oulu, Finland Jyrki Portin, CEO +358 40 8203987 jyrki.portin(at)refecor.com</p>
	<p>Rugged Tooling for IoT</p> <p>We provide tools to ensure the security and reliability of IP networks. Testing tools by Rugged Tooling emulate real IP network conditions and enable testing IoT signaling loads, network reliability in challenging conditions and cyber security. Our IDS platform monitors traffic in real time and detects cyber threats.</p>	<p>Rugged Tooling Oy, Oulu, Finland Hannu Saarenpää, Sales Director +358 40 4178777 hannu.saarenpaa(at)ruggedtooling.com</p>
	<p>Ruuvi's enthusiastic and agile team has a passion for beautiful open--source electronics. The company aims to be one of the top open--source hardware influencers in the Internet- of Things market by the end of the decade. This will be achieved by creating innovative and powerful open--source products that individuals and companies actually need.</p> <p>Open--source hardware is a direction most companies don't feel comfortable venturing into, but at Ruuvi this is not the case.</p>	<p>More info: https://ruuvi.com</p>

Ruuvi's main product is an open-source sensor node, RuuviTag.



Sanmina makes some of the most complex and innovative optical, electronic and mechanical products in the world. Recognized as a technology leader, Sanmina provides end-to-end design, manufacturing and logistics solutions, delivering superior quality and support to Original Equipment Manufacturers (OEMs) primarily in the communications networks, computing and storage, medical, defense and aerospace, industrial and semiconductor, multimedia, automotive and clean technology sectors.

Sanmina Corporation
 Kari Uimarihuhta, Test Engineering Manager
 +358 40 733 5139
 kari.uimarihuhta(at)sanmina.com
www.sanmina.com



SATEL is one of the world's leading experts and innovators in independent radio networking technology. We develop and sell high quality private radio technology solutions that enable secure, mission-critical connections. We also offer network design and technical support, and we have a global distributor network. The company's history extends to year 1986.

Our mission is to enhance the success of our partners and clients through our technology and expertise. At the heart of our solutions is mission-critical connectivity. We offer reliable and secure connections that keep your business running in all circumstances. It means independence through your own private radio network, and that you get the best solution, service and support.

SATEL Oy, Salo, Finland

 Marko Kempas, Head of Product Development
 +358 50 571 1931
 marko.kempas(at)satel.com
www.satel.com



OEM and manufacturability analysis partner for flexible sensors, user interface and illumination solutions for wide range of industries. We are specialized in harsh environments as example medical, pulp and paper, professional automotive industries. Our product segments are sensors, medical sensors, force sensors, user interfaces and illumination.

Screentec Oy, Oulu, Finland

 Jukka Ojala
 Tel. +358 400 280 369
 jukka.ojala(at)screentec.com

 Antti Tauriainen, CEO
 Mobile +358 44 556 5822
 antti.tauriainen(at)screentec.com



Sensoan offers tailored IoT products and engineering services. Our experienced team is technology oriented and specialized to wireless low power solutions.

Sensoan has own wireless sensors products for Wirepas based sensor network. We also develop and help customers to implement asset tracking solutions.

Sensoan team is eager to solve any IoT challenges and ready to co-operate globally.

Jari Suutari

CEO

Sensoan Oy

Joensuunkatu 7E, 24100 Salo

www.sensoan.com

+358503131084



Sharpeye Systems is a company developing products using positioning, distance and direction tracking technologies. We are applying centimetre accurate UWB (Ultrawideband) technology. We can offer whole solution from antenna design, network configuration, network design and connectivity to back-end.

Kimmo Laakkonen

Business Development Director

+358 40 757 2192

kimmo.laakkonen@sharpeyesystems.com

www.sharpeyesystems.com

<https://twitter.com/SharpeyeSystems>



Softagram offers disruptive software analysis and visualisation system for large-scale software projects. Enhance transparency, productivity and collaboration even across distributed software teams. Softagram maintains always-up-to date view of software structure, de-composition, dependencies and key metrics, all in one intuitive, visual experience. Softagram, the next level of software engineering.

Selkosoft Oy, Kempele, Finland

+358405474636

support(at)softagram.com

www.softagram.com



Solita is a Finnish digital business consultancy and digital services company. After joining our forces with Palmu, the leading service design agency in Finland, we now employ over 600 digital business professionals in Helsinki, Tampere and Oulu in Finland, Stockholm and Singapore.

Our extensive service selection includes everything you need to develop IoT solutions and transform your business. The solutions include data gathering from equipment and devices, data analysis and utilisation as well as new digital services. We can also help with digital business strategy and development, as well as change management. The common denominator in everything we do is

Solita, Helsinki, Finland

Janne Siltari, Site Manager, Oulu and Head of IoT

+358 40 8443 400

janne.siltari(at)solita.fi

<https://www.solita.fi>

always our customer and the value their customers receive.



We at Steamlane help you to utilize IoT and data analytics to develop your services and products or to form completely new services and business models. We develop IoT and data analytics cloud solution covering data collection from connected devices, integrations to other data sources and IT systems, advanced data analytics, data visualizations and the needed applications to turn the new insights to decisions and actions. We partner with sensor providers to build complete end-to-end solution. We help you through the whole life cycle from service design to implementation, pilot and operational cloud service.

Steamlane Oy, Tampere, Finland

Ari Karppinen, CEO

+358 50 541 0775

ari.t.karppinen(at)steamlane.com

www.steamlane.com



Sysart Oy is a software house located in Oulu and Helsinki. We deliver digital web-based solutions and services to our customers following these principles: We aim to understand customer needs as a whole. New projects are started with careful and detailed analysis of the case using up-to-date service design processes and tools. This leads to well prepared user interface prototypes and software architecture. Our designers see agile methods, continuous integration and test automation as a natural part of our development process. We deliver quality releases and providing easier maintenance using modern DevOps solutions. We constantly follow development of modern web technologies and tools. We are able to get started quickly and get results fast but not forgetting the quality.

<https://sysart.fi/>



At Tele2 IoT we focus on what we do best; deliver global connectivity as well as enable efficient management and other added value services needed within IoT. Our high quality IoT offering, combined with the strengths of our selected partners, truly reduce the complexity of both large- and small-scale IoT deployments in all verticals.

<https://tele2.ee/>

As Europe's fastest-growing Internet of Things (IoT) operator, connectivity is at the heart of Tele2 IoT. A global enabler of everything IoT, our business is all about expanding and forging networks, and making sure connections are optimized in ways

that grow bottom lines. Orchestrating efficient communication between devices and machines, the company supports every stage of the corporate life cycle, nurturing the seed of an idea into the fully-bloomed deployment of a large scale solution.



With a strong connectivity base, we're the hub in the digital ecosystem. When it comes to cloud, service oriented mindset or networking, that's our piece of cake. Please do not hesitate to contact and schedule a meeting.

Telia Finland Oyj, Helsinki, Finland
 Raine Jurva, Digital Solutions Lead, Sales
 +358 40 302 2415
 raine.jurva(at)teliacompany.com
www.sonera.fi



Testimate Ltd provides comprehensive and independent high-quality software testing services for small and large systems or products. Our employees are versatile testing experts with several years of experience in testing, managing and leading testing projects as well as test automation using commercial and open source tools. In our history, we have successfully completed a wide range of testing projects. We know we are good at what we do – and our clients agree!

Testimate Oy
www.testimate.fi



TESTILABS is a Finnish test company founded by Nokia veterans. Our state of the art laboratories are located in Finland and have been mainly built by Nokia Mobile Phones. TESTILABS provides test and certification services for multiple industries including wireless, healthcare, telecommunications and automotive.

Testilabs Oy, Oulu, Finland
 Hannu Juntunen
 +358 40 0547767
 hannu.juntunen(at)testilabs.com



Toptester is the expert on reliability testing. Our mission is to help our customers to conquer worldwide markets with reliable products. We test on device, module and component level during R&D, verification, validation and failure analysis. Toptester is not just a test house: we also offer consulting and planning services from the start of the R&D project.

Toptester Oy, Rovaniemi, Finland
 Esko Nevala, Managing Director
 +358 405 432 045
 esko.nevala(at)toptester.com
<http://www.toptester.com>



We believe that success in the era of the Internet of Things is simply a matter of connections. Our mission is to create the world's best and most secure remote connections between devices.

Tosibox Oy, Oulu, Finland
[sales\(at\)tosibox.com](mailto:sales(at)tosibox.com)
 +358 44 709 0100

TOSIBOX® is a masterpiece of Finnish engineering, a patented innovation, a solution that lets you forget about data security and connections. With it you will save time and money, and can concentrate on what's important: your business. The award-winning TOSIBOX® technology has taken a leadership role in establishing a new standard for VPN technology, having been sold into 114 countries with 40,000 units sold globally since 2012.



UROS – Uni-fi Roaming Solutions offers global Roaming and IoT solutions for mobile operators, corporates and consumers. UROS' bill shock free services are provisioned by the unique M2M platform providing global connectivity for static and roaming IoT devices via eSIM ecosystem. Headquartered in Finland, UROS was recently named the fastest growing company in Finland and among the most promising telecoms suppliers in the world.

UROS Ltd.

info@uros.com

<http://www.uros.com>



VALOPAA Ltd. is a provider of intelligent outdoor and industrial lighting solutions. Our offering includes LED luminaires, intelligent lighting control systems, as well as lighting technology. VALOPAA solutions create energy efficient and pleasant lighting.

Valopaa Ltd.

Kari Kananen, Product Manager,
Technology Products

+358 50 480 3429

kari.kananen(at)valopaa.com

www.valopaa.com

www.ilumnet.com



Wirepas is focused on providing the most reliable, optimized and scalable device connectivity to its customers. Wirepas Connectivity is a decentralized radio communications protocol for devices. What we offer is the protocol software that can be used in any device, with any radio chip and on any radio band. With Wirepas Connectivity there is no need for traditional repeaters, because every wireless device is a smart router of the network. The connected devices are the network – easy as that. Wirepas has its headquarters in Tampere, Finland and offices in Australia, France, Germany, South Korea, the UK and the United States. Things connected – Naturally.

Jani Vehkalahti

SVP & General Manager, EMEA
and ASIA

jani.vehkalahti(at)wirepas.com

+358 400 375 915

Research Partners



The University of Oulu is one of the biggest and multidisciplinary universities in Finland, with over 70 research focus areas. Research at University of Oulu combines the interplay of IoT-, business-, human- and development aspects with methods for continuous customer-involvement, innovation and experiment-tation of IoT systems and services with real end-users. The main topics of empirical research for software and data intensive systems and services include: modern agile software development practices, architectural and security issues, data analytics, big data, cloud software development and cloud based embedded devices and software quality assurance techniques.

University of Oulu
 Jaakko Sauvola, professor
 jaakko.sauvola(at)oulu.fi
 +358 50 383 9272

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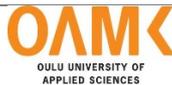
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Oamk is a strong and multidisciplinary University of Applied Sciences, which educates competent and innovative professionals and does active research and development. Oamk strength is the regional ICT competence, which helps to renew and develop the region of Northern Finland. Oamk operations are characterised by agile and experimental culture, which renews working and business life, as well as appropriately utilised digitalisation. Among Oamk focus areas are services and technologies promoting health and well-being, and energy-efficient construction for the northern climate. Oamk elaborates a concept of Smart Living by being involved in development of technology enablers (such as printed electronics, communication, energy, and other technologies) and R&D projects in a great number of application areas.

Oulu University of Applied Sciences

Vadim Kramar

[vadim.kramar\(at\)oamk.fi](mailto:vadim.kramar(at)oamk.fi)

+358 44 325 0770



TAMPERE
UNIVERSITY OF
TECHNOLOGY

Turku University of Applied Sciences is an inspiring community of 10,000 members an innovative and multidisciplinary

Turku AMK, Finland



higher education institution, which creates international competitiveness and well-being for Southwest Finland. Our graduates are practice-oriented professionals with top competencies. Research, development and innovation (RDI) activities are an important part of our collaboration with businesses and communities. Our research groups emphasise the strategic highlights of TUAS, such as digitalisation, circular economy and entrepreneurial practices, and are strongly linked with our education. We have four Research Groups which operate in the area of ICT: eHealth Technologies, Embedded Electronics, Futuristic Interactive Technologies and Telecommunications and Information Security.

Paavo Kosonen, project manager

+358 50 576 0952

paavo.kosonen(at)yrittysalo.fi

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Pekka Jokitalo, Alliance leader

pekka.jokitalo(at)vtt.fi

+358 40 500 5615

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