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MIDIH First Open Call
Data driven applications and experiments in CPS/IoT

Information about Competence Centers

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1 Introduction

The **Nine ICT-driven Competence Centres** are distributed centres specialized in a key aspect of IoT/ CPS domain and enabling technologies, which will offer local SMEs access to technology, to experimentations and to competencies services. Due to this specialization, each CC will have different demands and impacts depending on their region and industrial areas.

The ecosystem of CCs represents a structured network of services in terms of technology and formation, that would be accessed by SMEs and industrial partners at regional/local level but that will also benefit from the global Pan-European networking dimension of Internet-based CPS/IOT technologies.

The CCs network will improve the value proposition and the impact of ICT innovators to Manufacturing Industry and on the other side it will preserve the local approach required by Manufacturing SMEs Associations and Regional Development Agencies. CCs will also accelerate the communication between all actors in research, innovation and industries domain, encouraging an interactive "two-way knowledge exchange" and improving the spreading and adoption of innovation.

1.1 CC1 FHG FOKUS

More than two years ago Fraunhofer FOKUS established the IIoT Center. The IIoT Center is located in Berlin, Germany, which is currently attracting a lot of ICT Start-ups and Entrepreneurs. Services of the IIoT Center range from knowledge transfer to strategy development, to implementation and testing of systems and products.

The main focus of the technology-specific services of the IIoT Center are focusing on IIoT connectivity and communication, based on our 30 years of expertise as one of the biggest ICT applied research institutes having in-depth know-how with regards to market overview; standards and technologies.

The IIoT Center is equipped with a multitude of local and wide area communication technologies that interconnect a broad range of devices and cyber-physical systems, as found in Industry 4.0, automotive, smart cities, smart energy and ehealth.

Furthermore, we maintain hands-on expertise through our own IIoT infrastructures and testbeds ranging from 5G networks, Low Power Wide Area Networks to deterministic Ethernet (TSN), where our clients are provided with live demonstrations, are supported in development and integration and supported in testing and hardening their products.

1.2 CC2 Institute Mines Telecom

CC2 IMT/ TeraLab has been in operation for 4 years and supported over 50 projects in AI/Big Data Research, Innovation and Education. Unique positioning is the intersection of Big Data (ISpace BDVA label), leading data governance frameworks like Industrial Data Space and Cybersecurity.

The institute's research activities are organized into five main disciplinary themes: digital technologies, energy, materials, natural resources and the environment and economics, enterprise and society. In addition to these areas, there are two horizontal sectors of application: health and transport.

The positioning of TeraLab and fellow I Spaces should play a major role in the building of said trusted Data marketplaces at the cross roads of Big Data Technology, Cybersecurity initiatives and the "verticals" MFD4.0 being one of the first to capitalize on such advances.

TeraLab opens new opportunities to researchers by providing an optimal environment in which big data project teams can dedicate themselves entirely to the business of processing and analyzing, stimulating the production of new research which has the potential to form the basis of innovations with major scientific implications.

The platform provides data scientists with a whole catalog of tools and services devoted to statistical processing, data analysis and display, and more.

1.3 CC3 Fortiss

As a research and transfer institute for software-intensive systems, fortiss focusses on application-driven research for engineering open, cooperative and trustworthy CPS. In close collaboration with industrial partners, fortiss conducts R&D projects in various application domains, including robotics and industrial automation, and business IT and cloud systems. In its role of a MIDIH competence centre, fortiss provides expertise in a range of fields, particularly focusing on adaptive automation architectures and model-based software engineering for industrial automation and their relationship with manufacturing operations management.

Collaboration with IT startups, SMEs and entrepreneurs typically takes the form of joint project work to develop specific software solutions for automation tasks. In this regard, the fortiss competence centre offers access to knowledge and access to technology services as follows:

- **Access to Knowledge**: fortiss organizes workshops and information events related to model-based development of open-source automation software based on the IEC 61499 standard and the application of other Industrie 4.0 technologies, such as OPC UA based on established open source SDKs specifically (free services as resources allow). Training courses and consulting on individual challenges are also offered for specific needs (premium services).
- **Access to Technology:** fortiss offers its expertise in software technologies for industrial automation in small-to-medium scale contracted development or consultancy projects. The fortiss future factory, an adaptable production plant composed of various customized Festo Didactic MPS stations, is made available for testing and demonstration purposes. Promotion of the IEC 61499 standard and its 4diac implementation in a broad range of automation-related fields: Perform complementary and cross-domain showcases to support the creation of a landscape of uses for software development in automation and control systems applications.

1.4 CC4 VTT

The VTT Competence Center locates at city of Oulu Finland in facilities of VTT Technical Research Centre of Finland. VTT collaborates with SMEs and manufacturing companies and provides a full demonstration and training platform (from devices to cloud services using 5G test network) for the collaboration.

The VTT Competence Center offer the following services:

Access to Technology:

- Supports SMEs and manufacturing companies in their digitalization plans (Industry 4.0) by providing demonstration platform
- Training platform for the companies for experimentation of real-time data streaming and analytics capabilities
- Consulting services for development of customers I4.0 systems

Access to Experiments: live demonstrations where applications from robotics and machine control laboratories are in action.

Access to Competences: VTT will organizes events/workshops, laboratory tours, seminar and workshop presentations, white papers, news.

1.5 CC5 TUKE

The Competence Centre at the Technical University of Kosice (TUKE) provide support for active ICT based R&D collaboration of "academia" with SMEs or mid-caps companies (Mid-Cap). From IT Start-ups and Web Entrepreneurs point of view TUKE support and provides several types of services:

- **The pre-incubation process** (about 6 months for participants who are selected, by an expert commission, from the registered applicants through a public interview) is provided at **the Startup Center** and includes, among others: – consultancy and training services, publicity, support for business model and its implementation plan development, promoting idea to public and potential investors
- **The active incubation process** (recommended for each successful pre-incubator graduate) is provided in **the TUKE Incubator** and lasts for 1 to 3 years and includes, among others: - consolidated business programme with active coaching and training, support for a business plan implementation, assistance in obtaining appropriate investment support and premises.

From a technological point of view TUKE Competence Center can provide support and expertise on:

- **Field CPS smart systems Technology** - with a focus on industrial applications with impacts on a field level and on an enterprise level;
- **Smart sensors and IoT protocols** with a focus on industrial applications with impacts on a field level;

- **Cloud computing** with a focus on industrial applications allocated on a cloud level;
- **HPC and modelling, simulate technologies** with a focus on industrial applications with impacts on on an enterprise level and allocations on a cloud level;
- **Data architecture, exchange sharing** with a focus on industrial applications with impacts on a field level and on enterprise level.

1.6 CC6 CEFRIEL

CEFRIEL competence center will represent a one-stop shop that provides a combination of services in terms of technology and training services. One of the goals of the CC is also to accelerate the communication between all actors in research, innovation and industries domain, encouraging an interactive "two-way knowledge exchange" and improving the spreading and adoption of innovation.

Cefriel Competence Center leveraging on the availability of the "Cefriel Experience Center", an area devoted to collaboration, education and knowledge transfer:

- Supports companies in the growing of their knowledge, exploring and experimenting new trends and technologies, that potentially can be applied in their processes or products;
- Supports companies in finding the solution to a specific wicked problem they are experimenting, for which they do not know if a solution exists or if existing solutions really fit their needs and actually solve their problem;

Cefriel Competence Center offers the following services:

- **"Access to Technology":**
    - Help companies to Assess their "industry 4.0" maturity and provide advice and insights to cover the gap
    - help and support SMEs and industrial companies to find the solution to a specific wicked problem they are experimenting, leveraging on specific digital technological competences
    - support the Identification of infrastructures and resources to support the business scenario through ranking and cost models for the use of cloud infrastructure based solutions
    - ideate and design new innovative solutions and services enabled by cloud infrastructures and analytics
- "**Access to Experiments":** Cefriel will use the Experience Center to show to stakeholders the solutions and the PoC/Pilot in action
- "**Access to Competences":** Cefriel will support the growth of companies competences offering training and courses and organizing public event or workshops on specific technologies

1.7 CC7 LTU

LTU is one of the five major technology Universities in Sweden. Lulea University of Technology is experiencing strong growth with world-leading competence in several areas of research. Our research is conducted in close cooperation with companies such as Bosch, Ericsson, Scania, LKAB, SKF and leading international universities.

The LTU field of competencies in the Industry 4.0 are:

- Automation and digitalisation system architecture
    - Arrowhead Framework
    - FAR-EDGE: edge architecture
    - Productive4.0: supply chain and product life cycle management
- IoT Interoperability e.g.
    - Protocol interoperability
    - Semantics interoperability
- System of Systems, SoS, engineering
- IoT and SoS security
- IoT automation/digitalisation engineering e.g.
    - Smart Service Contracts, PlantDescription, Configuration

LTU has led the development of the Arrowhead Framework and Its main tasks are the development and transfer of knowledge concerning Service Oriented Architecture (SOA) to manufacturing stakeholders.

In this context, we envision to collaborate with IT Startups, Web Entrepreneurs and SMEs in these contexts:

- **Access to Knowledge**: collaborate to co-organize ad-hoc events, training or workshop based on specific technologies; Understanding company status versus Industry4.0, understanding company market value proposition, understanding company plans for new market value proposition
- **Access to technology**: collaborate in innovation consultancy projects when the specific competence or technologies is needed; provide support on experiments

1.8 CC8 IML

Fraunhofer IML is said to be first address for all questions with respect to holistic logistics, the employees work on all fields of internal and external logistics. At the Institute, founded in 1981, there are at the moment 260 employees as well as 250 post-graduates and students, supported by colleagues in workshops, laboratories and service areas.

The research and innovation location on logistics in Dortmund already covers a significant part of the innovation chain – from basic research, to applied research with industry partners, technology development and different innovation trajectories to bring ideas to market.

Within the Digital Product Factory companies are specifically supported with a taylor made process in developing digital products or hybrid services for Industrie 4.0 or Logistics 4.0. Beside this process companies benefit from the digital ecosystem and the community which was created threw out the decade. Finally, participating companies can use the co-working space which is located in direct neighbourhood and work in an agile way and innovative environment.

In order to support companies to be successful with the digital transformation Digital.Hub Logistics developed a novel supporting concept for start-ins. Offering working places in the individual coworking space, access to the labs and demo centres of the Fraunhofer institutes and TU Dortmund University and to testbeds of the Port of Duisburg, it includes the necessary infrastructure on the one hand. On the other hand, the hub offers a variety of innovation components that contribute to the success of the project – be it reliable concepts of the innovation management or new formats of the start-up scene.

1.9 CC9 PSCN

PSNC (Poznan Supercomputing and Networking Centre) is affiliated to the Institute of Bioorganic Chemistry of the Polish Academy of Sciences. PSNC is the major Polish academic HPC centre and broadband network services provider (NREN for Poland) as well as application and services developer and provider.

Apart from HPC Centre and Network Security Centre, PSNC runs an R&D Centre of Future Internet, e-Infrastructure, Digital Content and Portals, working e.g. on: middleware, tools and methods for HPC and distributed computing, resource management, scheduling, large scale applications, user management and accounting, infrastructure security mechanisms and policies, grid and cloud management tools, HPC and distributed storage architectures, mobile applications, Internet of Things, operating in IaaS, SaaS and PaaS modes.

PSNC has a considerable expertise in cloud HPC simulations for manufacturing companies (Lubawa is an example) as well as in construction of IoT systems, especially IoT middleware and security.