Institut für angewandte Systemtechnik Bremen GmbH

RESEARCH REPORT 2017

TABLE OF CONTENTS

PREFACE

In 2017 the Institute for Applied Systems Technology Bremen GmbH (ATB) successfully continued its strategy for the implementation of applied research. Among others, the following indicators clearly show the effectiveness of the approach:

- ATB successfully acquired two additional important research projects in the calls of the current EU research framework programme HORIZON 2020. These new projects - Cross-CPP and IoF2020 - address the themes of "ICT Big Data: Creation of an open and vendor-independent Data Marketplace" and "IoT: Further Developing the Digital Networking of all actors in the EU Agricultural Sector" explored by ATB in recent years. This is a clear indication that the approach taken by ATB to define RTD activities, taking into account both industrial needs and advanced technology developments, proves to be appropriate in accomplishing ATB's mission and promises which are well-suited for the current EU programme. Major R&D topics that emerged in the last years – Context Awareness, Mobile & Collaborative Services and Intelligent Middleware as well as Big Data Analytics – continue to be highly relevant for both industrial and research communities.
- ATB successfully acquired and carried out nine projects directly funded by industry, in which the Institute is solving short and medium-term problems of its industrial partners based on advanced application-oriented research such as advanced software engineering methods, innovative knowledge management, Internet-based solutions and mobile services.
  The Institute has successfully continued or started work on nine research projects within the scope of the previous 7th Research Framework programme of the EU or the latest programme HORIZON 2020. The ProSEco project was successfully completed in 2017.

These achievements can be attributed to the powerful, Europe-wide network of more than 60 industrial partners, both large and small, including over 40 research organizations, with whom ATB has established long-term cooperations.

The successes clearly indicate that ATB is excellently equipped to continue fulfilling its strategic mission, defined in 1991 by the initiators and shareholders, the Free Hanseatic City of Bremen and several industrial companies from Bremen: to provide highly innovative technological solutions for industrial applications, based on top-level research in close cooperation with industrial companies from the Bremen area and Germany, as well as with its Europe-wide network of research and industry partners. ATB, as a public, non-profit organisation, continues to successfully acquire and realise both publicly and industrially funded research projects.

This annual research report includes, besides an update of the overall RTD strategy and key RTD activities, descriptions of five long-term research projects, highlighting ATB's key research topics and application domains: The previously mentioned Cross-CPP project, which cross-sectorial aims to create a system solution (big data marketplace) for the automotive industry and the smart home sector, to make sensor data available to other service providers and the projects Automat und Diversity in which methods and tools for the development of product extension services for the manufacturing industry were engineered. Furthermore, the newly launched IoF2020 project, which further generates technological development along the entire food production chain in the European Union, and the ProSEco project, completed in 2017, which develops a novel methodology and comprehensive ICT solution for collaborative design of product services. Several industrially funded research projects are also briefly presented.

The research achievements of the Institute and its scientists, plus the associated support of small, medium and large companies in Germany and specifically the Bremen region, would not be possible without the basic funding by the Free Hanseatic City of Bremen and the support by various governmental and industrial funding institutions. They also require sustained support by a number of persons directly associated with ATB, who contribute to the success of the Institute. All of them deserve special thanks.

Particularly to be mentioned albeit this, are of course unique researchers of the Institute, who make a key contribution to development of research at the ATB Institute with their personal commitment, their high motivation and their passion for science.

They all contribute to the fact that ATB has become a regionally based and internationally radiating research and innovation nucleus. It will be important for the years ahead, to continue along this path and be open for new challenges and tasks.

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Daniel Obreiter

General Manager

ATB'S RESEARCH STRATEGY

ATB implements its research strategy in the scope of regional, national and European funding programmes as well as in direct cooperation with industry. With more than 29 completed or ongoing research projects within the EU's 7th framework programme and the current Horizon 2020 EU framework programme in which ATB cooperated with more than 80 European industry partners, including a vast number of industry-funded projects, ATB's research strategy and range of research topics addressed appeared to be successful.

In order to further harmonize its research activities, especially with regard to current EU research framework programme HORIZON 2020, and at the same time to meet the needs of the industry, ATB continuously analyses and refines its research strategy. The Institute particularly focuses on the requirements of industrial partners, aiming to intensify research that is directly funded by industry. The conclusion of the latest analysis was that ATB's strategy seems to be well-adjusted to both HORIZON 2020, with presently six successful project proposals on topics that are of the highest research priority to ATB, and current industrial needs, therefore the current situation does not require fundamental modifications of the strategic approach.

Consequently, strategy of the Institute will continue to focus on development of innovative cross-sectorial technologies for industrial applications (application-specific solutions, modular systems etc.). The Institute specifically targets manufacturing companies in the automotive and machine tool sectors, but also the process industry, other industrial sectors and societal domains. ATB's research activities can be grouped into three large, complementary areas described in the following:

KNOWLEDGE MANAGEMENT

Development of methods and tools for knowledge management solutions in industrial processes, e.g. using context-sensitive approaches / solutions, combination of social software and enterprise solutions, big data analytics, Web 3.0 solutions with special emphasis on the semantic web.

SYSTEMS ENGINEERING & DESIGN

Development of methods and tools for the improvement of business processes through the application of modern information technologies as well as advanced approaches to process automation and control in the manufacturing and process industry with a special focus on mobile and collaborative services, cloud computing technology, etc.

SOFTWARE SYSTEMS ENGINEERING

Research on advanced software engineering methods for development of highly customized software systems.

During the last few years, the Institute has increasingly turned its activities towards research regarding highly challenging topics that are relevant for industry and society in the 21st century. Within the above described areas, the following major R&D topics emerged in the last years:

- Context sensitive solutions and services
- Mobile & collaborative services
- Intelligent middleware
- Big data analytics.

These topics are examined within various application areas such as maintenance & diagnostics, energy efficiency, electrical vehicles, software engineering, applications of future internet technologies in food value chains and in the construction industry. Research activities in the application of big data analytics to the development of product services in the manufacturing and process industries have been further expanded. Summarizing, the main research activities in 2017 included:

- Context sensitive embedded services in manufacturing industry (Industry 4.0)
- Context sensitive services to support energy efficient manufacturing, based on cyber physical system features
- Big data analytics in product service development, process optimization, home automation and process and manufacturing industries
- Services for cloud manufacturing and collaborative development of product service systems (PSS)
- Context sensitive services to support software engineering
- Services for cyber-security-solutions in critical industrial infrastructures
- Future-Internet enabled B2B collaboration & event processing
- Product, knowledge management and mobile services for the food value chain
- Tools for innovation management

The table on page 7 provides an overview of addressed research topics, grouped by various application fields including the industrial sectors and societal domains.

An important aspect of ATB's strategy is to acquire projects that are directly funded by industry. In these projects the Institute solves short and medium-term problems concerningits industrial partners based on advanced, application-oriented research, such as advanced knowledge management methods and tools, latest software engineering methods, data analytics tools, innovative Internet solutions and mobile services.

ATB places the utmost attention on publishing results of its research by participating in various activities such as:

- Membership in national and international bodies, active participation with various clusters and networks. For example, since 2011 ATB has been involved in the Future Internet Public Private Partnership initiative, with interaction of more than 200 organisations at European level, which addresses fundamental questions of a Future Internet, aiming to develop Internet-based functionalities that can be applied cross-sectorial.
- Marketing and public relations activities, e.g. a dynamic web presentation with up-to-date information on research projects, workshops, events, publications etc.
- Organisation of workshops and seminars for regional industry.
- Active participation at symposia and conferences on topics related to ATB's research activities such as product service system development, context sensitivity, Future Internet platforms, advanced methods for software engineering and Big Data Analytics.

MEDIUM-TERM RESEARCH STRATEGY

In the years to come ATB, will continue to align its research activities with topics from the HORIZON 2020 programme focusing on requirements of industry, such as the Public Private Partnership (PPP) programme (Factory of the Future, Green Car, Energy Efficiency, Future Internet, Food Industry), in addition to research topics related to information technology and manufacturing industry, especially those in the area „Digitising and transforming European industry and services".

Additional research areas, where ATB is already active, are likely to stay highly relevant in the next years, such as the development of digital security solutions to secure critical infrastructures, addressed in the CITADEL project, including big data strategies and concepts in the Factories of the Future for cloud-based data analysis, to reconfigure products and production processes, currently being researched within the SAFIRE project.

On national level, research will continue to target BMBF and BMWi programmes, national foundations and regional support schemes.

Continuous update of its research strategy will aim at strengthening competitive advantages of the Institute, especially the know-how achieved in the range of long-term research projects along with industrially funded projects:

- Investigation of advanced information and communication technologies addressing various specific problems in industry and societal domains.
- High success rate in acquisition and implementation of research projects in different national and European programmes, due to focusing on a strong bottom-up approach based on identification of real-life industrial and societal requirements.
- Established Europe-wide cooperation network with strong long-term contacts to more than 40 research organisations, e.g. WUR (The Netherlands), Uninova (Portugal), SINTEF (Norway), VTT (Finland), Polimi (Italy) and many more.
- Intensive and long-term cooperation with industrial partners in Bremen (e.g., OAS, Armbruster Engineering, CONTACT, OHB, ATLAS Elektronik), Germany (e.g. Volkswagen, DESMA, EuroPool System, J.W. Ostendorf, Kühne & Nagel) and other countries (e.g. The Open Group, IBM, RENAULT, Electrolux, ATOS), which besides joint research activities often includes also support in realisation/management of research projects.

Focus in the future will be on further strengthening projects directly funded by industry, in which ATB will use its know-how and expertise for advanced technology, gained within previous research projects, solving various challenging problems of its industrial partners. A vast engagement in technology transfer activities will continue to be one of the strategic goals for the next years.

The above listed competitive advantages, plus the further strengthening of industry-funded projects and technology transfer activities, guarantee that ATB will successfully continue fulfilling its strategic mission, as defined in 1991 by the shareholders: to provide top-level research on highly innovative technological solutions for industrial applications, along with supporting industry in addressing key societal challenges. The Institute will continue offering access to system technology research and services for a wide range of companies and organisations, aiming to increase their competitiveness and strengthening the economy of the Free Hanseatic City of Bremen and northern Germany as a whole.

RTD Topics	Application areas					Sectors		
	Maintenance & Diagnosis	Product Service Systems (PSS) / Product Lifecycle Management	Energy Efficiency	Supply Chain Management	B2B Collaboration	Automotive	Machine Tool	Others Construction, Food, Software, Process Industry, Healthcare
Knowledge Management **Context Awareness**	Embedded Services Web Solutions	Eco-innovative PSS Design Services for Cloud Manufacturing and PSS (Industry 4.0)	Services for Energy Efficiency in Manufacturing	Open PLM Platform	Services for Collaborative Learning	PSS Design Energy Efficiency in Manufacturing	Embedded Services in Machines (Industry 4.0) Energy Efficiency in Manufacturing	Context Aware Quality Assurance in Software Development Context Aware Internet solutions in Healthcare Cyber Security in Process Industry
Mobile and Collaborative Services	Services for Predictive Maintenance (Industry 4.0)	PSS Design Innovation Processes in SMEs	Energy Optimisation for Electric Vehicles Smart Grid	Collaborative Services for PSS Development in Supply Chains	Future Internet-based Mobile and Collaborative Services for B2B	Services for Electric Vehicles Mobile Services within PSS	Innovation Processes in Industry (SMEs) Services for Predictive Maintenance (Industry 4.0)	Internet Services in Construction Industry Services for Food Chains Knowledge based Management of Social Innovation Processes Energy Efficiency in Process Industry
Intelligent Middleware	Middleware & Embedded Services	PSS based on CPS Monitoring	Middleware for AmI-based Monitoring	Future Internet	Event Processing		Middleware and Embedded Services	Future Internet in Food Industry
Big Data Analytics	Big Data for Predictive Maintenance	PSS based on Big Data Analytics				PSS based on Big Data Analytics	Big Data Solutions for PSS	Product and Process Configuration Services based on Big Data Analytics (Industry 4.0)

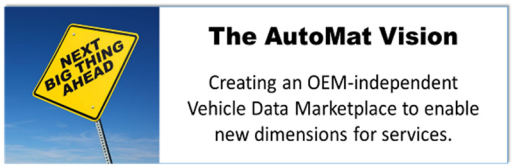
SELECTED RESEARCH PROJECTS

AUTOMAT

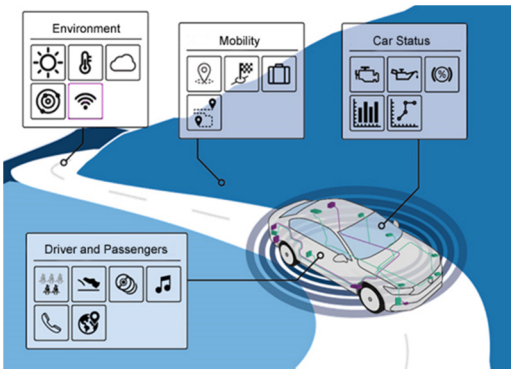
AUTOMOTIVE BIG DATA MARKETPLACE FOR INNOVATIVE CROSS-SECTORIAL VEHICLE DATA SERVICES

Work Programme	Horizon 2020
Partners	Volkswagen AG - Coordinator, Renault, CRF (Fiat), ATB, ERPC, TUDO, ATOS, Meteologix, IMT, Trialog, Here
Duration	April 2015 – March 2018
Contact	Christian Wolff, ATB
Website	http://www.automat-project.eu/
Role of ATB	Scientific coordination, realization of OEM backend services

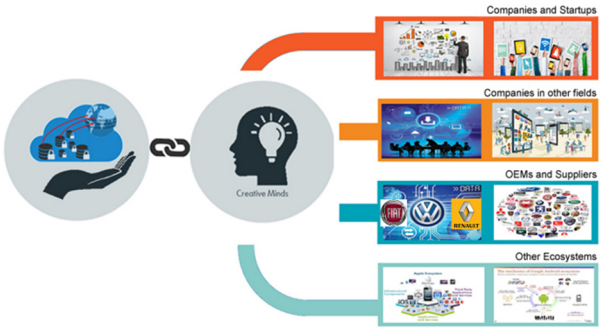
Key motivation of the AutoMat project was to give cross-sectorial industries access to continuously gathered vehicle data, enabling to use the big data potentials, which can be summarized as follows:



- Vehicles move in its surroundings, perceiving various aspects (Environment, Mobility, Driver and Passengers, Vehicle Status) via on-board sensors
- Connected sensors in vehicles provide a mobile sensor network producing over 4000 signals per vehicle
- Number of on-board sensors is strongly increasing and thereby the amount of data useable in near future



As opposed to today's proprietary systems, which primarily focus on the drivers bringing services and content into the vehicles, the AutoMat project focuses on what vehicles and their data can bring to the outside world. This big amount of vehicle data represents a high value and New Business Potentials:



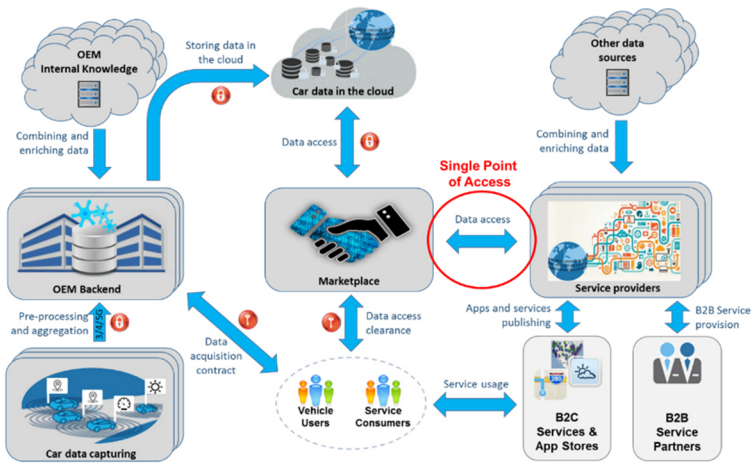
- The vehicle data enables new and innovative business ideas for many stakeholders
- Great spectrum of vehicle data allows new dimensions of services
- Large amount of continuously aggregated data contains significant Big Data business potential

However, today this major business potential is still locked, since automotive industry has not built an open vehicle data marketplace - inspired by the smart phone and mobile internet industry domain - that leverages such potentials. Current situation can be characterized as follows:

- Vehicle data is not provided in a brand-independent format
- Proprietary OEM solutions render business potentials uneconomical
    - Negotiation with different OEMs/data suppliers/partners
    - Individual interfaces to different proprietary systems
    - Costs of realizing and providing services are to high
- No service can cover all costs of the value chain

The defined AutoMat Solution Approach overcomes several obstacles by establishing a **brand-independent vehicle big data platform**, providing the following outcomes:

- An open ecosystem for provisioning of manufacturer and service provider independent vehicle data
- Single point of data access for service providers via a standardized and open interfaces of the Marketplace
- Common Vehicle Information Model (CVIM), that enables harmonized, generic and brand-independent datasets
- Broad spectrum of collected data due to different participating OEMs



- Mechanisms to guarantee of data security, integrity and privacy
- A win-win-based value-chain

The project was driven by three key European car makers (Volkswagen, Renault and FIAT) and two Service Providers (HERE and Metelogix) creating innovative high value services based on provided vehicle data. In this context HERE Technologies mission was to increase freshness of Road Roughness indications and extend coverage of roads with a Road Roughness classification by help of vehicle data. Instead of collecting data from cars that drive all roads once a year, using standard car sensor data of thousands or even millions of cars to generate an almost 'digital representation of reality' for a much more accurate map. Meteologix used weather information delivered by vehicles (temperature, humidity, pressure), which have a unique potential to improve the quality of weather prediction models, enabling them to build a new dimension of very precise and local forecasts. For further information see also the following videos:

https://www.youtube.com/watch?time_continue=61&v=uRjvnahJ-9o

https://www.youtube.com/watch?time_continue=1&v=W3kxHd3CdL0

CROSS-CPP

ECOSYSTEM FOR SERVICES BASED ON INTEGRATED CROSS-SECTORIAL DATA STREAMS FROM MULTIPLE CYBER PHYSICAL PRODUCTS AND OPEN DATA SOURCES

Work Programme	Horizon 2020
Partners	ATB - Coordinator, Volkswagen AG, Siemens SRO, Meteologix, Atos Spain SA, The OpenGroup, Universidad Politecnica de Madrid, Vysoke Uceni Technicke V Brne
Duration	December 2017 – November 2020
Contact	Christian Wolff, ATB
Website	https://cross-cpp.eu/
Role of ATB	Project coordination, Scientific management

Cross-CPP project is a successor of the AutoMat project, which has for the first time established a novel and open Ecosystem in form of a cross-border Vehicle Big Data Marketplace that leverages currently unused information gathered from connected vehicles, will be used as a basis for further development. In contrast to AutoMat project, which was focused exclusively upon automotive industry, a key mission of Cross-CPP is to analyse and extend the AutoMat concept with regard to the integration of data streams coming from other CPPs than vehicles. Thus, Cross-CPP project is targeting to give cross-sectorial industries access to great spectrum of sensor data coming from high volume products from various industrial sectors (vehicles, smart home devices, etc.). With the increasing number of connected sensors and actuators within such mass products, this number will rise in short-term. This enormous amount of data continuously generated by mass products will represent:

- a NEW information resource to create new value, allowing the improvement of existing services or the establishment of diverse new cross-sectorial services, by combining data streams from various sources.
- a major big data-driven business potential, not only for the manufacturers of Cyber Physical Products (CPP), but in particular also for cross-sectorial industries and various organisations with interdisciplinary applications.

However, these business potentials are currently still locked since manufacturing industry producing mass products has not established clear models and tools for such cross sectorial collaborations. Current solutions and offerings in the CPP data domain are driven by OEM specific business approaches that are almost solely focused on their own products and are realized by

proprietary solutions. The resulting brand-specific solutions frequently do not provide CPP data to the outside world, hindering long-term value creation by service providers due to fragmented environments and lack of brand-independent representation of CPP data.

In contrast to today's sporadic proprietary CPP ecosystems, which are in most cases restricted to CPP manufacture specific services and which are not open for third parties interested in these CPP data, the Cross-CPP project focuses on what CPP and their sensor data can bring to the outside world. Therefore, as key challenges, Cross-CPP has to overcome several obstacles by establishing a CPP Big Data Eco-system, which should develop the following main characteristics:

- Brand independent concept, open for integration of diverse CPP data providers coming from different industrial areas, also providing a standardized cross industrial CPP data model which needs to be flexible enough to incorporate data coming from various industrial sectors.
- CPP Big Data marketplace delivering service providers a single CPP data access point with just one interface ("One-Stop-Shop"), support functionalities for easy data mining/analytics. By these means, data customers (Service Providers) just need to set-up and maintain one interface to gather diverse CPP data from different CPP providers.
- Controlled access to diverse CPP data streams and optimal management of data ownership and data rights, applicable to various cross CPP data streams.

According to those challenges, the envisaged **major projects outcomes** of Cross-CPP are:

Standardized Cross Industrial Data Model
One of the most important objectives of this project is to come up with a standardized cross industrial data model. This model needs to be flexible enough to incorporate data coming from various industrial sectors.

Data Marketplace with Analytics Toolbox
The envisaged "One-Stop-Shop" Marketplace will provide Service Providers a single point of access to data streams from multiple mass products. The marketplace will also offer a data analytics toolbox, which will provide easy to use big data analytic functionalities for Service Providers with low big data expertise and knowledge.

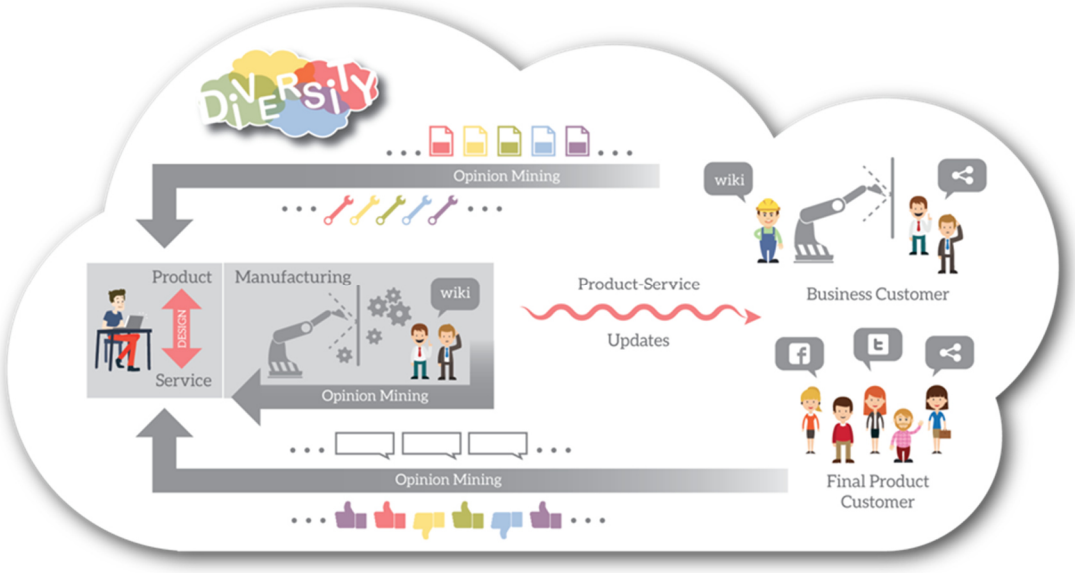
Cross Industrial Services
Cross industrial data streams represent new information resources enabling new and innovative business ideas. In the scope of the Cross-CPP project, the consortium partners will develop innovative cross-sectorial services

DIVERSITY

CLOUD MANUFACTURING AND SOCIAL SOFTWARE BASED CONTEXT SENSITIVE PRODUCT-SERVICE ENGINEERING ENVIRONMENT FOR GLOBALLY DISTRIBUTED ENTERPRISE

Work Programme	Horizon 2020
Partners	UNINOVA - Coordinator, ATB, DESMA, UNIBG, Carel, LMS, Bazigos, EKA, SILO
Duration	February 2015 – January 2018
Contact	Ana Correia, ATB
Website	https://www.diversity-project.eu
Role of ATB	Development of Product Service System (PSS) Ontology (including standardization activities), realization of context sensitivity (context monitoring and extraction) of the PSS engineering environment, realization of knowledge acquisition services and social knowledge provision services

Modern manufacturing enterprises, acting at the global market, are radically changing their business strategy: instead of delivering only products, they provide a set of services together with their products. To support dynamic building of such Product Service Systems (PSS), there is a need for collaboration among various actors across the value chain. Therefore, enterprises need powerful engineering environments to allow for multi-directional exchange of knowledge between product design, service design and manufacturing including customers and suppliers. The exchange of knowledge has to be assured along the whole life cycle of PSS. The project's ambition was to support companies that are changing their business model by extending their products to offering services and are adopting new mass-customization paradigm. For machine industry it is especially important to exploit combined feedback from users (business customers) of machine services and consumers of the final mass customised products, manufactured by the machines, in order to create or update the product-services (see the following figure).

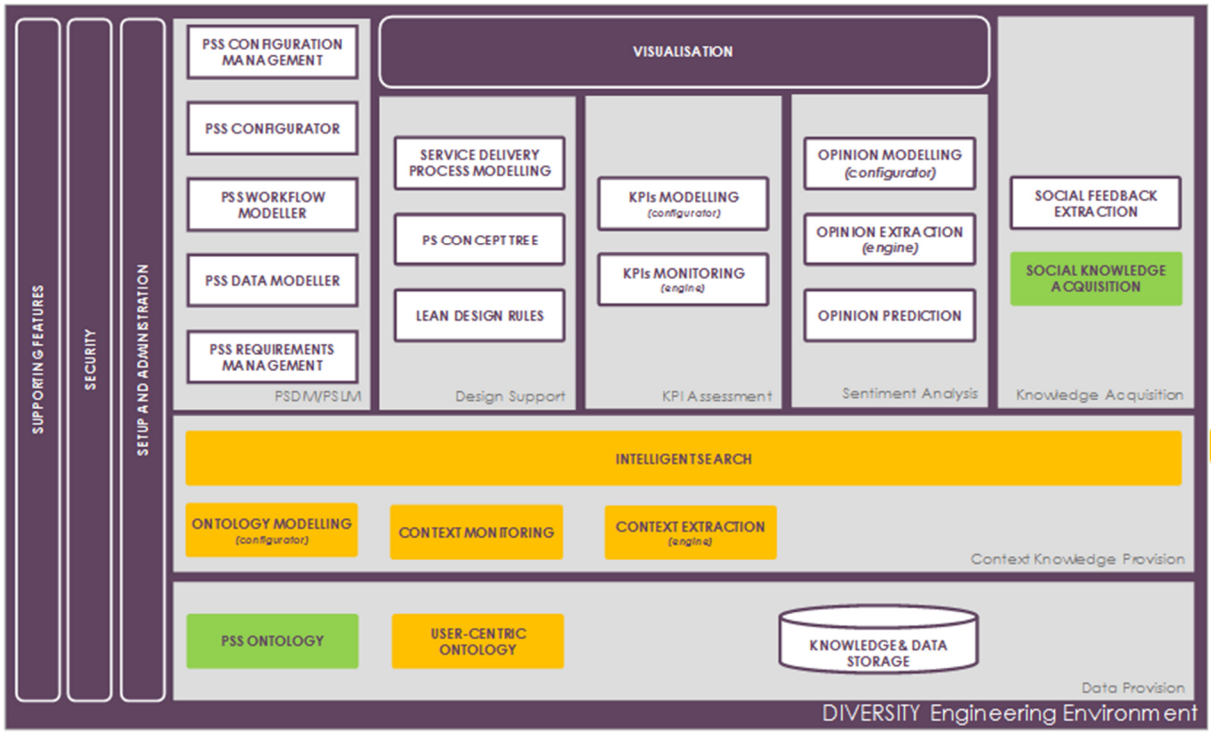


DIVERSITY results rely on a combination of classical product engineering tools, cloud technologies and social software solutions to meet the requirements of distributed manufacturing enterprises to allow for an effective PSS engineering, utilising manufacturing intelligence and experience of all actors in the value chain, including both business customers and consumers. On top of that,

the large amount of knowledge gathered and shared under dynamically changing conditions, and diffused to a wide spectrum of actors involved, having different expertise and working conditions/cultures, has sparked development of effective context sensitive solutions for knowledge capturing, analysis and diffusion. To achieve an overall objective, the following research topics were addressed.

- Combination of classical Product Data Management/Product Lifecycle Management (PDM/PLM) tools with social software tools for PSS design – connected via a PSS ontology
- Lean design rules provision to support PSS development and implementation
- Social media feedback, including topics on sentiment analysis of consumer feedback and Wiki-based tools for collaboration within the value chain
- Context sensitivity of the PSS engineering environment supported by an appropriate ontology
- Intelligent search for knowledge provision needed for PSS development
- Definition and assessment of Key Performance Indicators (KPI) for PSS.

The following figure presents the project architecture, an overview of the components developed within the DIVERSITY project.



The main innovations achieved for the tools where ATB had the main responsibility are:

- PSS Ontology: Definition of a new PSS ontology, focusing on machine/equipment industry and aiming at standardization
- Context Sensitivity: Development of a generic solution for different tools
- Social Knowledge Acquisition (Wiki): Wiki in combination with cloud infrastructure in business environment, solving the problem of confidentiality and privacy.

The project was operated by three companies from machine and equipment sectors. The three manufacturing companies involved with the DIVERSITY consortium, are producing machines as well as equipment and delivering them to the global market in various mass production sectors (DESMA in shoe sector, Carel in HVAC/R and Bazigos in food packaging), require new solutions for effective collaboration and knowledge exchange among various actors as a critical part of the PSS design process.

DESMA

CAREL

NB

IOF2020

INTERNET OF FOOD AND FARM 2020

Work Programme	Horizon 2020
Partners	Stichting Wageningen Research - Coordinator, ATB, in total 71 partners, e. g. Biosense Institute, Schuttelaar & Partners, Kühne Logistics University GmbH, 365 FarmNet GS1 Germany, NXP, Stiftelsen Sintef
Duration	January 2017 – December 2020
Contact	Harald Sundmaeker, ATB
Website	https://www.iof2020.eu/
Role of ATB	Leader of the Internet of Things work package; Developing the reusable service monetization component as well as end user applications for the intelligent fruit logistics use case.

The Internet of Things (IoT) has a revolutionary potential. A smart web of sensors, actuators, cameras, robots, drones and other connected devices allows for an unprecedented level of monitoring, control and automated decision-making. The project Internet of Food & Farm 2020 (IoF2020) explores the potential of IoT-technologies for the European food and farming industry.

The goal is ambitious: to make precision farming a reality and to take a vital step towards a more sustainable food value chain. With the help of IoT technologies higher yields and better-quality produce are within reach. Pesticide and fertilizer use will drop and overall efficiency is optimized. IoT technologies also enable better traceability of food, leading to increased food safety.

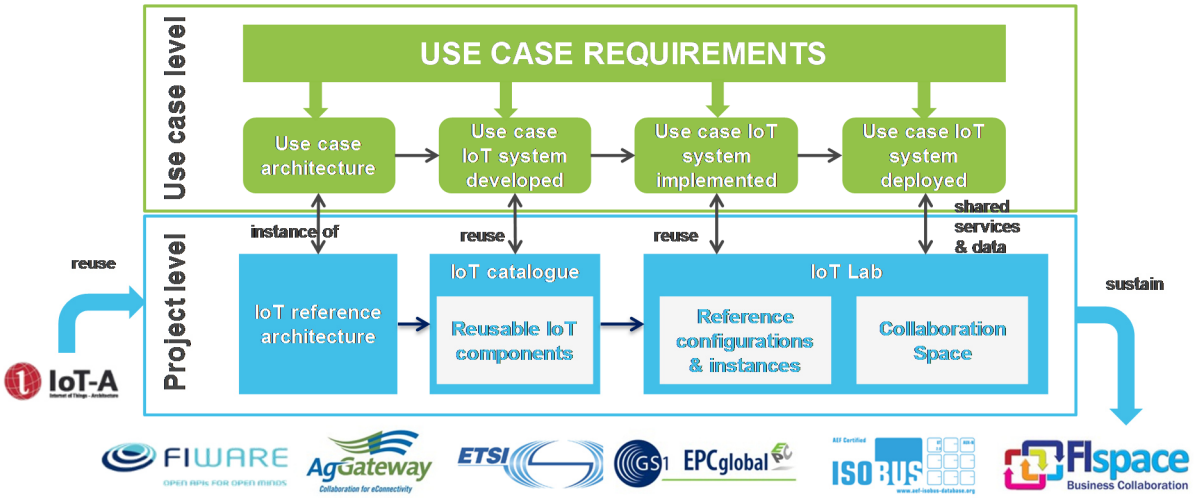
Over 30 use-cases organised around five trials (arable, dairy, fruits, meat and vegetables) develop, test and demonstrate IoT technologies in an operational farm environment all over Europe, with the first results available in the first quarter of 2018.

IoF2020 uses a lean multi-actor approach focusing on user acceptability, stakeholder engagement and development of sustainable business models. IoF2020 aims to increase the economic viability and market share of developed technologies, while bringing end-users' and farmers' adoption of these technological solutions to the next stage. The aim of IoF2020 is to build a lasting innovation ecosystem that fosters the uptake of IoT technologies. Therefore, key stakeholders along the food value chain are involved in IoF2020, together with technology service providers, software companies and academic research institutions.

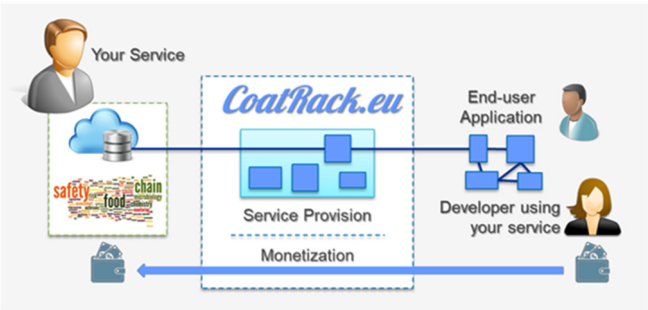
Led by the Wageningen University and Research (WUR), the 70+ member consortium includes partners from agriculture and ICT sectors, and uses open source technology provided by other initiatives (e.g. FIWARE). IoF2020 is part of Horizon2020 Industrial Leadership and is supported by the European Commission with a budget of €30 million.

Each of the IoF2020 use cases does an autonomous implementation of an IoT system, which provides a dedicated solution for a specific domain challenge. However, for a large-scale uptake it is important to maximize synergies across multiple use case systems. Therefore, a core concept

of IoF2020 is that the use case systems function as nodes in a software ecosystem. As a consequence, much attention is paid to ensuring the interoperability of multiple use cases' systems and the reuse of IoT components across them. The following figure shows the architectural approach to achieve this during design, development, implementation and deployment.



The use case architectures are based on a common technical reference architecture to create a shared understanding and to maximize synergies across multiple use case systems. Each use case within a trial designs a specific instance of the reference architecture to address its specific user requirements. ATB leads the work package on Internet of Things, representing the project level perspective, providing a set of reusable components, which can be integrated in the IoT systems of multiple use cases to facilitate large-scale uptake. Several reusable components are already being developed in IoF2020, namely the IoT catalogue and CoatRack. The IoT catalogue provides access to IoF2020 results not only to all use cases but to a wider audience. This enables a connection point between end users and solution providers, where developments and respective validations can be shared. ATB is also responsible for developing CoatRack, a component for service monetization and business collaboration between service providers, service users and developers.



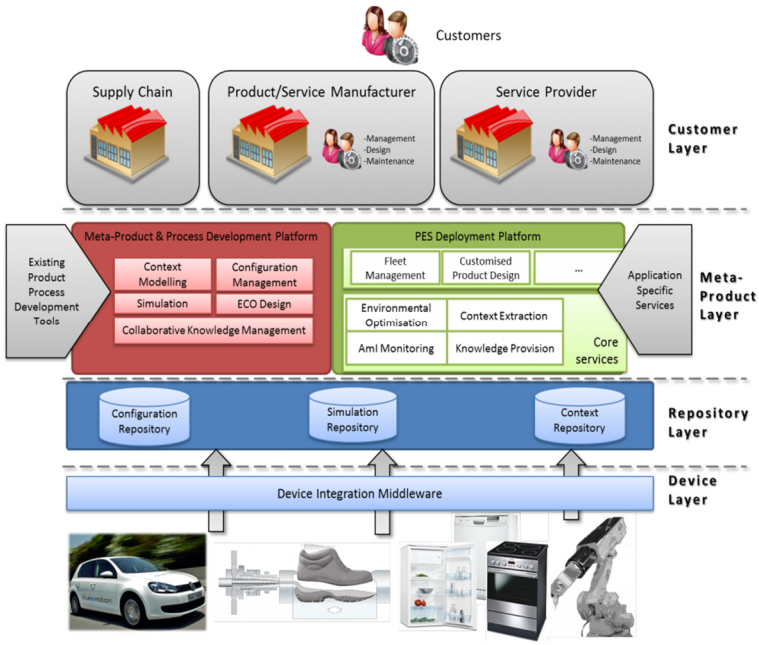
ATB also participates in one of the nineteen use cases, namely the one about "Intelligent Fruit Logistics". The strategic objective is to connect IoT-enabled Returnable Trade Items (RTIs) with smart applications, to open a new dimension of added value services in multi-actor fruit and vegetable supply networks. The main stakeholder and use case leader is Euro Pool System, European market leader for returnable packaging in the fruit and vegetable sector. Existing Euro Pool System RTIs will be equipped with IoT devices, enabling them to transmit information during their transport and usage by Euro Pool System's customers. ATB participates as research and ICT development partner, developing new end user applications based on the data gathered by IoT-enabled trays, e.g. an application for an intelligent management of tray and customer locations.

PROSECO

COLLABORATIVE ENVIRONMENT FOR ECO-DESIGN OF PRODUCT-SERVICES AND PRODUCTION PROCESSES INTEGRATING HIGHLY PERSONALISED INNOVATIVE FUNCTIONS

Research-program	7th Framework Programme
Partners	Tecnalia - Coordinator, ATB, Volkswagen, Desma, Uninova, The OpenGroup, Semantics, University of Salford, Cluj-Napoca University, Electrolux, VTT, ONA Electroerosión, Alberdi Mekanizatuak S.L. Spain, Lean Enterprise Institute
Duration	October 2013 – September 2017
Contact	Sebastian Scholze, ATB
Website	http://www.proseco-project.eu/
ATB's role	AmI Selection tool, AmI based Monitoring, Context modelling and Context Extraction specification and implementation. Support DESMA and Volkswagen in their Business Case.

The objective is to provide a novel methodology and a comprehensive ICT solution for collaborative design of product-services (Meta Products). The effective extension of products with new services in different sectors (automotive, home appliances, automation equipment etc.) will be achieved by means of combining Ambient Intelligence (AmI) technology integerated in products and processes, Lean and Eco-design principles and Life Cycle Assessment techniques. New Meta Products will be capable of acquiring knowledge in order to add highly personalized innovative functions, and thus enabling new business models. The project applies a Cloud Manufacturing approach for effective collaborative design of product-services and their production processes, and effective implementation of innovative services around products. As a result new eco-innovative Meta Products will be offered, which integrate highly personalised innovative functions with minimal environmental footprint along the overall Life Cycle. Four industrial application scenarios, addressing different aspects of creating services and business, as well as product / process development, drive the project, in order to assure that the means for collaborative service generation and product-service design - to be developed - in the project will be relevant for industry. The solutions were first applied at five manufacturers in the consortium, serving as demonstrators of the project results.



The ProSEco project provides a means for collaborative product-service and production process design.

A Collaborative Environment for design Meta Products and production process and deployment of PES involving various actors was developed and is being finalised by the ProSEco project consortium. The main results are identified, being the combination of Engineering Tools, Core Services and Methodologies:

- ProSEco Colaborative Development Platform: the platform provides a technical framework that can be used to integrate a variety of dynamic engineering tools and core services.
- Eco Tool & Lean-based PES Methodology: This new framework brings together eco and lean principles for holistic understanding of enterprise sustainability and competiveness to guide conceptualization and design of new service solutions to reduce the environmental footprint and the resources consumption.
- Market Simulation tool: This solution supports PES designers in addressing the broad range of market factors that can determine success. These include functional criteria, brand criteria, financial criteria, and promotional criteria.
- AmI Selection tool, monitoring services and Methodology: This solution is composed of an engineering tool to be used in the PES design phase to support PES designer in selection/definition of AmI systems/sensors and a set of core services to be deployed and used to monitor products or processes within a PES.
- Context Modelling tool, extraction services and Methodology: This solution is composed of an engineering tool to be used in the PES design phase to support PES designer in Context Modelling and a set of core services that allow to Monitor and Extract the context of the situation where the PES is being used and by this improve the performance of PES.
- ProSEco Deployment Solution: This solution combines several components inside Deployment Platform that provide coordinated usage and management of resources in order to perform execution of designed PESs.
- Data-mining Tool and Services: This solution is composed of an engineering tool to be used in the PES design phase for designing and developing algorithms capable of analysing and predicting data related to user or equipment behaviour, respectively from a core service capable of running such a process on a data set.
- Knowledge Provision core service: Knowledge provisioning core service is set of components designed to enable gathering of relevant knowledge about costumer that can be used for developing new and more accurate PES solutions.
- Security Tool/Enforcement services: A solution to the security problem consists of mechanisms, policies, and procedures to safeguard assets in the system's operational environment against threats. ProSEco entails security problems for both the development environment and for developed PES in the deployment environment.

Typical examples of product extension services which will be developed by the ProSEco tools are:

- Business Case 1 (Volkswagen): Personalised support to drivers to optimise energy use (classical, hybrid and electrical cars)
- Business Case 2 (Electrolux): Support remote condition-based maintenance of household appliances
- Business Case 3 (DESMA): Support remote condition-based maintenance for shoe manufacturing machines
- Business Case 4 (ONA and Alberdi): Lean – based design of eco – driven services around machines

RANGE OF RESEARCH AND SERVICES

The Institute offers a wide range of services, from direct research services in terms of consultancy to development of customised software systems. Based on the specific problem of a client, a concept and a solution are developed, supported by selection of optimal application-relevant systems engineering methods and procedures, including efficient software engineering tools.

Core competencies are:

- Use of the most up-to date and innovative technologies.
- Development of prototypical software solutions based on modern development methods.
- Realising interactive Web and mobile applications.
- Realising wiki-based information and expert systems, also supporting companies in their implementation
- Intense use of open source software.
- Adaptation of solutions to present problems and circumstances of our clients, in order to enable the best possible integration into existing systems.

ATB has several years of practical experience in various industries (e.g. machinery and equipment suppliers, automotive and construction, forestry, food, etc.). In all areas, the main focus is on the successful technical collaboration with our partners.

SELECTED INDUSTRIALLY FUNDED RESEARCH PROJECTS

CONTACT GLOBAL

Aim of the project, which was supported by the Bremen Economic Development Agency, was to identify strategic approaches that appear to accelerate the internationalization of CONTACT software. In line with this strategic objective, it was the task within context of the CONTACT- Global project to develop an internationalization strategy. For this purpose, relevant topics were identified and further analyzed in order to identify which topics appear suitable for inclusion in CONTACT's products and market strategies. Furthermore, a prioritization was made in order to be able to estimate which topics should be tackled in the short or medium term and which topics should be addressed in the long term. In addition, the analysis identifies which topics initially require research activities before they can be transposed into CONTACT's existing marketing strategies and products.

EPS SOLUTION

Within this project, the existing EPS Solution for recording and displaying scans of pallets was extended. The solution supports mobile and manual scanning using Android-based mobile devices, to track single (or pallets of) returnable trade items (RTIs). The mobile app also allows to manually review and record additional information on recorded pallets/RTIs. To enable reviewing and further editing of data that was recorded with mobile devices, the existing web application was extended accordingly.

OHB-KOM-SERVER

The goal of the project is the conception and development of an IoT solution to realize an innovative container tracking. The essential functionality of the solution is acquisition of data transmitted by mobile devices (visioboxx) to the IoT backend. These mobile devices are distributed throughout the world and transmit their data cyclically. For this reason, the IoT solution is supported by use of modern cloud technologies (e.g. docker, kubernetes), designed for a very high scalability. An additional component of the solution is a web portal, enabling online tracking of the status of mobile devices. Reports, alarms etc. can also be viewed or configured via the portal.

LIST OF ALL PROJECTS RUNNING IN 2017

RESEARCH PROJECTS

AUTOMAT

Automotive Big Data Marketplace for Innovative Cross-sectorial Vehicle Data Services, H2020-ICT-2014-1, Apr. 2015 – March 2018, http://www.automat-project.eu

CITADEL

Critical Infrastructure Protection using Adaptive MILS, H2020-DS-2015-1, June 2016 – May 2019, http://www.citadel-project.org

CROSS-CPP

Ecosystem for Services based on integrated Cross-sectorial Data Streams from multiple Cyber Physical Products and Open Data Sources, H2020-ICT-2017-1, Dec. 2017 – Nov. 2020, https://cross-cpp.eu/

DIVERSITY

Cloud Manufacturing and Social Software Based Context Sensitive Product-Service Engineering Environment for Globally Distributed Enterprise, H2020-FoF-2014, Feb. 2015 – Jan. 2018, https://www.diversity-project.eu/

IOF2020

Internet of Food and Farm 2020, H2020-IOT-2016, Jan. 2017 – Dec. 2020, http://www.iof2020.eu/

MAESTRI

Energy and Resource Management Systems for Improved Efficiency in the Process Industries, H2020-SPIRE-2015, Sep. 2015 – Aug. 2019, http://www.maestri-spire.eu

PROSECO

Collaborative Environment for Eco-Design of Product-Services and Production Processes Integrating Highly Personalised Innovative Functions, FP7-2013-NMP-ICT-FOF, Oct. 2013 – Sep. 2017, https://www.proseco-project.eu/

SAFIRE

Cloud-based Situational Analysis for Factories providing Real-time Reconfiguration Services, H2020-IND-CE-2016-17, Oct. 2016 – Sep. 2019, http://safire-factories.eu

SOCRATIC

Social Creative Intelligence Platform for achieving Global Sustainability Goals, H2020-ICT-2015, Jan. 2016 – Feb. 2018, http://www.socratic.eu

INDUSTRIALLY FUNDED RESEARCH PROJECTS

BEVERLAND DISPO III

Dirk Boll – Eventveranstalter GmbH — November 2016 – June 2017

CONTACT GLOBAL

CONTACT Software GmbH — June 2016 – January 2017

ELAM 4.0 MOBILE

Armbruster Engineering GmbH& Co. KG — April 2017 – July 2017

EVALUATOR

Daimler AG — December 2016 – April 2017

MOBILITY S IV MOBILE

Giscon Systems GmbH — January 2017 – December 2017

OHB KOM-SERVER

OHB Logistic Solutions GmbH — July 2016 – September 2017

SF OTI 2.0 DEV

OAS AG — July 2017 – September 2019

PROJECTS' PUBLIC REPORTS AND PUBLICATIONS IN 2017

AUTOMAT

D3.3 Full Prototype of Vehicle & OEM Data Products & Services	September 2017
D4.3 Full prototype of Vehicle Big Data Marketplace	December 2017
D4.4 Software Development Kit	March 2017
D4.5 Software Development Kit	December 2017
D5.3 Full Prototype of Cross-Sectorial Vehicle Data Services	December 2017
D6.2 Publication of Open Service Contest	March 2017
D6.3 Open Service Contest: Evaluation Report	September 2017

CITADEL

D3.1 CITADEL Modeling and Specification Languages	February 2017
D5.1 Interfaces and workflow definition for AM-ETB	May 2017
D5.5 Methodology for Industrial Evaluation and Readiness Assessment	November 2017

CROSS-CPP

D8.4 Project Website	December 2017

DIVERSITY

D2.3 DIVERSITY Methodology	July 2017
D2.4 Full prototype of Lean Design & Visualisation Tool	July 2017
D3.3 Full prototype of PSS engineering environment	July 2017
D4.3 Full prototype of Context sensitive tools for search, stakeholders' feedback analysis and KPIs	July 2017
D6.3 DIVERSITY Full Prototype Testing and Assessment Report	October 2017

IOF2020

D1.4 Data Management Plan	June 2017
D2.2 Trial Implementation Plan	December 2017
D2.3 Installation, Customization and Integration Report	December 2017
D2.4 Annual Implementation and Performance Monitoring Report	December 2017
D3.1 Guidelines for Use Case Analysis & Design	September 2017
D3.2 The IoF2020 Use Case Architectures and overview of the related IoT Systems	September 2017

D4.1 KPI Catalogue for each use case	June 2017
D4.2 Methodology to assess market outlook and social impact for each use case	June 2017
D4.3 Taxonomy of business models relevant to IoT applications	December 2017
D5.1 Project Identity	April 2017
D5.2 Project website	June 2017

MAESTRI

D1.6 Lessons Learned and Updated Requirements Report2	October 2017
D2.5 Efficiency Framework Testing Results	February 2017
D3.2 Management system framework for Continuous Improvement in process industries	February 2017
D4.2 Prototype library of case studies linked to a waste database	February 2017
D4.3 Toolkit for industrial symbiosis	August 2017
D4.4 User guide for getting started with industrial symbiosis	November 2017
D5.2 Final MAESTRI Platform Architecture Design & Specification	February 2017
D5.9 MAESTRI platform Documentation and installation guidelines – preliminary release	November 2017
D7.5 Pro-active Standardization Strategy	February 2017
D8.3 Report on communication activities – 2nd year	August 2017
D8.10 Reports on stakeholders observatory- – 2nd year	August 2017

PROSECO

D200.52 Development of Simulation Tools for Product Process Design Full Prototype	January 2017
D500.4 Integrated ProSEco Early & Full Prototype and ProSEco Methodology	September 2017
D700.1 Demonstrator 1-4	September 2017
D800.5 Training Report	September 2017
D800.62 Report on Standardisation Activities (M48)	September 2017

SAFIRE

D1.2 Optimisation Metrics and Benchmarking	March 2017
D1.5 Public SAFIRE Concept	June 2017
D7.1 Open Data Use Plan	March 2017
D7.2 Early Project Presentation and Brochure	January 2017
D7.6 Intermediate Project Website	June 2017
D8.1 Quality Management Plan	March 2017

SOCRATIC

D2.2 SOCRATIC Methodology Workbook Final Version	December 2017
D2.4 SOCRATIC Design Specifications Final Version	December 2017
D3.3 Socratic Validated Full Prototype	December 2017
D4.3 Assessment Methodology	June 2017
D4.4 Assessment Report	December 2017
D5.5 Demonstrators	December 2017
D5.6 Project Presentation and Brochure Final Version	June 2017
D5.8 Project Website Final Version	June 2017

A.R. CAMPOS, D. MOURTZIS, A.T. CORREIA, A. MARGARITO, D. NTALAPERAS

Engineering Environment to support Product-Service Design using Value Chain Data
ICE International Conference on Engineering, Technology and Innovation, June 27-29, 2017, Madeira, Portugal

S. SCHOLZE, A.T. CORREIA, K. NAGORNY

Services for Development of Situational Aware Intelligent PSS
ICE International Conference on Engineering, Technology and Innovation, June 27-29, 2017, Madeira, Portugal

A.T. CORREIA, D. STOKIC, R. SIAFAKA, S. SCHOLZE

Ontology for Colaborative Development of Product Service Systems Based on Basic Formal Ontology
ICE International Conference on Engineering, Technology and Innovation, June 27-29, 2017, Madeira, Portugal

A.T. CORREIA, D. STOKIC, S. SCHOLZE

Context Sensitive Collaborative Product Service System Development Environment
IEEE 15th International Conference of Industrial Informatics INDIN'2017, July 24-26, 2017 Emden, Germany

C. SASSANELLI, G. PEZZOTTA, R. SALA, A.T. CORREIA, S. TERZI

Testing the methodology to generate Design for Product Service Supportability (DfPSS) Guidelines and Rules: an application case
The 9th CIRP IPSS Conference: Circular Perspectives on Product/Service-Systems (IPSS 2017) June 19-21, 2017, Copenhagen, Denmark

C. VERDOUW, S. WOLFERT, G. BEERS, H. SUNDMAEKER, G. CHATZIKOSTAS

IOF2020 Fostering business and software ecosystems for large-scale uptake of IoT in food and farming
PA17 – The International Tri-Conference for Precision Agriculture in 2017, October 2017, New Zealand

S. GUILLÉN, P. SALA, G. FICO, M.T. ARREDONDO, A. CANO, J. POSADA, G. GUTIÉRREZ, C. PALAU, K. VOTIS, C. VERDOUW, W. SJAAK, G. BEERS, H. SUNDMAEKER, G. CHATZIKOSTAS, S. ZIEGLER, C. HEMMENS, M. HOLST, A. STÁHLBRÖST, L. SCUDIERO, C. REALE, K. SRDJAN, D. DRAJIC, M. EISENHAUER, M. JAHN, J. VALIÑO, A. GLUHAK, M. BRYNSKOV, O. VERMESAN, F. FISCHER, O. LENZ

IoT European Large-Scale Pilots – Integration, Experimentation and Testing
Cognitive Hyperconnected Digital Transformation: Internet of Things Intelligence Evolution Chapter 8, page 221-282, June 2017

O. VERMESAN, M. EISENHAUER, H. SUNDMAEKER, P. GUILLEMIN, M. SERRANO, Z.E. TRAGOS, J. VALIÑO, A. VAN DER WEES, A. GLUHAK, R. BAHR

Internet of Things Cognitive Transformation Technology Research Trends and Applications
Cognitive Hyperconnected Digital Transformation: Internet of Things Intelligence Evolution
Chapter 3, page 17-95, June 2017
ISBN
978-87-93609-11-2 (hardcover)
978-87-93609-10-5 (e-book)

H. SUNDMAEKER

Food Chain Innovation
Reviewing 35 Use Cases to Identify Business Model Success Patterns
11th International European Forum on System Dynamics and Innovation in Food Networks
February 13 – 17, 2017 Innsbruck-Igls, Austria

E. FERRERA, R. ROSSINI, A.J. BAPTISTA, S. EVANS, G. GROßE HOVEST, M. HOLGADO, E. LEZAK, E.J. LOURENÇO, Z. MASLUSZCZAK, A. SCHNEIDER, E.J. SILVA, O. WENER-KYTÖLÄ, M.A. ESTRELA

Toward Industry 4.0: Efficient and Sustainable Manufacturing leveraging MAESTRI Total Efficiency Framework, KES-SDM 2017, International Conference on Sustainable Design and Manufacturing, April 26-28, 2017, Bologna, Italy

S. SCHOLZE, J. BARATA, D. STOKIC

HOLISTIC CONTEXT-SENSITIVITY FOR RUN-TIME OPTIMIZATION OF FLEXIBLE MANUFACTURING SYSTEMS, Sensors 17 (3), 455, February 2017

K. NAGORNY, S. SCHOLZE, A.W. COLOMBO

A REAL-WORLD APPLICATION SCENARIO FOR A NOVEL COLLABORATIVE ICT ENGINEERING PLATFORM
2017 IEEE 15th International Conference on Industrial Informatics (INDIN), July 24-26, 2017, Emden, Germany

O. MATEI, C. ANTON, S. SCHOLZE, C. CENEDESE

MULTI-LAYERED DATA MINING ARCHITECTURE IN THE CONTEXT OF INTERNET OF THINGS
2017 IEEE 15th International Conference on Industrial Informatics (INDIN), July 24-26, 2017, Emden, Germany

S. SCHOLZE, K. NAGORNY, K. STÖBENER, D. BRÜCKNER

AN APPROACH FOR CONTEXT SENSITIVE PRODUCT EXTENSIONS SERVICES
2017 IEEE 15th International Conference on Industrial Informatics (INDIN), July 24-26, 2017, Emden, Germany

S. SCHOLZE, K. NAGORNY, R. SIAFAKA, K. KRONE

AN APPROACH FOR CLOUD-BASED SITUATIONAL ANALYSIS FOR FACTORIES PROVIDING REAL-TIME RECONFIGURATION SERVICES
PRO-VE 2017, Working Conference on Virtual Enterprises, 118-127

NETWORKS AND COOPERATION

Since several years, ATB is actively involved in diverse networks and clusters. This involvement is facilitating cooperation with international partner organisations and provides tangible benefits based on a mutual experience exchange. The following sub-sections provide three examples of ATB's involvement in international clusters/groups.

IERC CLUSTER

The Internet of Things (IoT) is a paradigm that considers pervasive presence of a variety of things/objects in the environment and their ability to connect through wireless and wired communication channels. Unique addressing schemes are used to enable bidirectional interaction context related cooperation of those things/objects. New applications, services and business models can be created, allowing to reach common goals in related business or private environments. Nevertheless, research and development challenges to create such a smart world are enormous. A world where real, digital and virtual are converging to create smart environments that make industrial, business and personal areas more intelligent.

In a time span of over 10 years, the European Research Cluster on the Internet of Things (IERC – http://www.internet-of-things-research.eu/) was represented by over 50 European research projects. They addressed different research topics to exploit the large potential of IoT-based capabilities in Europe and to coordinate the convergence of on-going activities. Since foundation of the cluster a wide range of European research and application projects have been set-up in different application fields. Communication between these projects is a necessary prerequisite for a competitive industry as well as for a secure and data protecting application of the Internet of Things in Europe. ATB was one of the founding members in January 2007 and supported the cluster work in the scope of different research projects, namely AMI-4-SME (Ambient Intelligence for manufacturing SMEs), CuteLoop (intelligent interaction based on mobile devices), SmartAgriFood (Future Internet for safe and healthy food), FIspace (Future Internet Business Collaboration Networks in Agri-Food, Transport and Logistics) and IoF2020 (Internet of Food and Farm 2020). Moreover, ATB was co-editing the first cluster book, which was published in 2010 (http://www.internet-of-things-research.eu/pdf/IoT_Clusterbook_March_2010.pdf), and supported its regular update especially with contributions to the IERC strategic research agenda.

The latest update of strategic research and innovation agenda was published in 2016 and is available via the cluster website:

- Next Generation Internet of Things, Distributed Intelligence at the Edge and Human Machine-to-Machine Cooperation
  IERC Cluster Book 2018
  http://www.internet-of-things-research.eu/pdf/Next_Generation_Internet_of_Things_Distributed_Intelligence_at_the_Edge_IERC_2018_Cluster_eBook_978-87-7022-007-1_P_Web.pdf

In March 2015, the cluster work also triggered the realisation of the Alliance for Internet of Things Innovation (AIoTI - https://aioti.eu/) and was also further promoted in the scope of the IoT-European Large-Scale Pilots Programme (https://european-iot-pilots.eu/). ATB is still an active member of this initiative and combines its activities with its involvement in the Internet for Food and Farm 2020 project (IoF2020). This is also offering to join forces with other stakeholders that are active in business domains smart cities, autonomous driving, ageing well and wearables. ATB considers this inter-sectorial cooperation as an excellent environment to validate research results and also to initiate new activities for innovation and technological development.

FUTURE INTERNET PUBLIC PRIVATE PARTNERSHIP - FIWARE

With over a billion users world-wide, the Internet is one of history's great success stories. Its global, integrated communications infrastructures and service platforms underpins the fabric of economy and society. Yet today's Internet was designed in the 1970s, for purposes that bear little resemblance to current and future usage scenarios. Mismatches between original design goals and how Internet is being used today are beginning to hamper its potential. Many challenges in areas of technology, business, society and governance will have to be overcome if future development of the Internet is to sustain a networked society of tomorrow.

To answer these challenges, the European Commission launched the Future Internet Public Private Partnership Programme (FI-PPP). The main goal was to advance a shared vision for harmonised European-scale technology platforms and their implementation, including the integration and harmonisation of the relevant policy, legal, political and regulatory frameworks.

The FI-PPP, also called FIWARE, followed an industry-driven, holistic approach encompassing R&D on network and communication infrastructures, devices, software, service and media technologies. In parallel, it promoted their experimentation and validation in real application contexts, bringing together demand and supply and involving users early in the research lifecycle.

In three programme phases (starting in 2011), technological results were elaborated – so called "FIWARE" technologies – offering solutions that can be reused as basis for the implementation of Internet applications.

In this programme ATB was member of the projects SmartAgriFood and FIspace which were elaborating new solutions with a focus on supporting business to business collaboration in complex and dynamically interacting business networks. Technological developments were realised, verified and validated by both business end-users as well as software developers.

In the third FIWARE phase (2014-2016), 80 million Euros were provided to startups and SMEs via open calls, competitions, awards also hackathons, to enable the following:

- Wide uptake of FIWARE results by startups, SMEs and web-entrepreneurs, by the use of FIWARE technologies – innovative, open source based software tools for cost-effective creation and delivery of Future Internet applications and services
- Development of innovative services and applications in different business sectors, based on the technologies and platforms developed in the public private partnership.

ATB supported the uptake of FIWARE technologies by startups and SMEs in the scope of the FInish Accelerator Framework with about 5 million Euro. Technology transfer from research to business was simplified and the realisation of successful business models to support the creation of wealth and jobs was promoted.

Since the end of the third phase of the FIWARE research programme, activities are facilitated by the FIWARE Foundation (established in Berlin as a non-profit association). This shall ensure the availability of FIWARE software components, support of related standards and continuation of testbeds for a wide range of software developers and related end-user organisations. In the scope of biannual FIWARE Summits for the FIWARE community, most recent developments are presented and innovation potentials are discussed. As member of the IoF2020 project, ATB is supporting usage and validation of FIWARE based solutions continuously supporting partners with software development and standardisation of accompanying data formats and APIs.

EUROPEAN PROJECT LEADERS (EPL)

ATB is a founding member of the EPL (European Project Leaders' Network Society), a network of entities who are leading European RTD Projects. Objective is to extend collaboration beyond the European scope into the Middle East, Africa, East Asia, and Commonwealth of Independent States. Historical importance as well as the growing interest and influence from institutions in those regions will drive the objective of consolidating a substantial network of contacts and will lead to a deep understanding of the market needs that are usually outside of consideration. Europe cannot neglect any longer social and economic unrest outside its immediate borders. Understanding of these needs, as well as the social urgency that we (EPL founders) observe in many societies, leads us to the effort to connect industrial and research communities, with respective educational efforts, supporting the evolvement of individual qualities for improving the economic and societal situation.

The European Project Leaders Network Society as a non-profit group aims to support global sustainable development by creating a bridge between academic and industrial entities from all around the world. EPL believes in Education as an effective solution to inspire generations for paradigm shifting for a better world. Academic and industrial engagement are the main streams to achieve our goal. Sharing European knowledge and experience as a result of more than two decades of cooperation could strengthen relations, tackle cultural barriers and facilitate understanding of each other. EPL is trying to make a difference in the world, by benefiting from synergetic cooperation of international project leaders from the Academia, Non - profit Organisations and Industries (Large & SMEs).

LEADING STAFF MEMBERS

DIPL.-BETRIEBSWIRT (FH) DANIEL OBREITER

Studied Economics at the University of Applied Sciences of Bremen, Germany. From 1998 up to 2015 Financial Manager at ATB and since 2015 General Manager of the Institute. More than 20 years' experience in financial managing of large CEC and national research projects including industrially funded research projects. Since the 4th Framework Programme of CEC involved and leading financial management on ca. 60 RTD and industrial projects, in charge for financial reporting and controlling/monitoring of RTD activities. Financial coordination of several projects where ATB was the Coordinating partner (e.g. IntelLEO, Self-Learning), or as Financial Coordinator, e.g. SmartAgriFood, eDASH etc. Since 1998 involved in defining the financial strategy of ATB, is in acquisition/planning of EU, national or industrially funded research projects.

DIPL.-INF. SEBASTIAN SCHOLZE

Studied Computer Science at the University of Bremen. Since 2000, he is working as scientific staff member at ATB. He is Involved in diverse CEC funded RTD projects since the 5th FP. Furthermore, long term project experience in several fields (e.g. Automotive, Manufacturing, Logistics and Healthcare). He has excellent IT skills in programming languages (Java, C/C++, Perl, Python), relational database systems and development methodologies (RAD, XP, RUP, OOP). Active in researching on context aware approaches and systems, object-based software models and methodologies for optimising the software development process for distributed, SOA, agent-based and interoperable and context aware systems and web-based applications. He is working as project coordinator (e.g. Self-Learning, U-Qasar, AsKoWi, EngineeringWiki) and local project manager (e.g. K-Net, EPES) in several EU and direct research projects. He is also founding member and treasurer of European Project Leaders' Network Society (EPL), which is a network of entities who are leading European RTD Projects. He has more than 40 publications on technical and research topics.

DR. DRAGAN STOKIC

Has more than 40 years' experience in industrial and research projects on the control of robots, modelling and control of large-scale systems, flexible manufacturing systems, knowledge management and collaborative work. From 1991 to 2009 senior researcher at ATB, responsible for research on advanced ICT systems and KM solutions for production systems. From 2009 up to 2015 General Manager of the Institute for Applied System Technology, Bremen. Active in several FP7 EU projects on TEL (IntelLEO – project coordinator), on KM for product (LeanPPD), on context awareness for embedded services in industry (Self-Learning), development of product extension services, context awareness for product/process design (ProSEco) regarding energy efficiency etc. Since 1991 project manager of more than 30 EU projects, e.g. technical project manager of the ESPRIT project QUETA, IST project PICK on the application of knowledge based systems in manufacturing companies, including training of employees on complex knowledge management issues, local manager of the IST projects AIM, InAmI, InLife, AmI@Netfood, K-NET as well as TRAMCAR, eBEP and ALCVET projects on multimedia and Internet based training systems for employees in SMEs. Author and co-author of more than 200 papers. Co-author of four monographs and two textbooks, published by Springer-Verlag, Berlin, as well as of chapters in three monographs on KM. Evaluator and reviewer of a number of EU projects.

DIPL.-WI.-ING. HARALD SUNDMAEKER

Graduated economic engineer, working between 1994 and 1997 as CO at the German Federal Armed Forces as platoon leader and head of a maintenance company. During 1997, working for the business unit of integrated Telco Systems at Alcatel SEL AG, division Business Systems. Since 1998 Harald is working as scientific staff member at ATB in consultancy and funded research projects. Involved in national research activities (e.g. BMWi, Stiftungen, regional programmes) and in several international research programmes since the 4th FRP. He is managing projects and overtakes the role as project coordinator of international research projects. He was recently acting as project coordinator of CuteLoop, as administrative coordinator of SmartAgriFood, and as coordinator of the FIspace & FInish research projects. Most recently, he overtook the role of work package leader of the IoT WP in the IoF2020 large scale IoT project. He is contributing to the European Research Cluster on the Internet of Things (IERC) and the FIWARE initiative. He is also treasurer of the FIspace Foundation that was founded as spin-off from the FIWARE public private partnership. Evaluator of EU projects, for industrial open calls and jury member at startup open pitch events. Researching on topics related to the Internet of Things, energy efficiency in industry, collaborative work and innovation in complex supply networks. Experienced with projects in agri-food, manufacturing and automotive industry. Author and co-author of over 40 technical and scientific publications.

DIPL.-ING. CHRISTIAN WOLFF

Studied Production Engineering at the University of Bremen. Since 2000 he works as a scientific staff member in ATB. He is involved in projects in the area of specification and implementation of user driven telematics approaches and middleware concepts/cooperation platform solutions for automotive industry (Cross-CPP, AutoMat, ELVIRE, e-DASH, MODELISAR, ACDC), optimising energy performance in manufacturing companies by development of innovative context aware and ambient intelligent monitoring approaches (LifeSaver), process optimisation in industry and public domain organisations (CostWorth, Mit-KMU, Mobility@forest etc.), requirements engineering, KM and software development to support KM in industry (AIM). Within the scope of work he has gained valuable experience in management of national and international (EU) projects and maintains the responsibility for several industry and EU projects.

SUPERVISORY BOARD

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MANAGING DIRECTOR

DANIEL OBREITER

General Manager of ATB – Institute for Applied Systems Technology Bremen GmbH

SHAREHOLDERS

LEGAL INFORMATION

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