

Institut für angewandte Systemtechnik Bremen GmbH

RESEARCH REPORT 2016



PREFACE

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PREFACE

In 2016 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 CITADEL and SAFIRE address the topics "Digital Security: Critical Infrastructure Protection" and "Factories of the Future: Cloud-based analysis for the reconfiguration of products and production processes", which were already explored by ATB in the last few 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 to accomplish ATB's mission and promises to be 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 twelve projects directly funded by industry, where 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 the work on nine research projects in the scope of the previous 7th Research Framework programme of the EU or the latest programme HORIZON 2020. Two projects, namely CREDITS4HEALTH and Flnish, have been finalized successfully in 2016.

These achievements can be attributed to, among other things, the powerful, Europe-wide network of more than 60 industrial partners, both large and small ones, as well as over 40 research organisations, 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, the descriptions of five long-term research projects, highlighting ATB's key research topics and application domains: The already mentioned project SAFIRE, which develops cloud-based analysis services as the basis for (automated) re-configuration of products and production processes in the manufacturing industry, the SOCRATIC project, which develops methods and tools for a knowledge-based Internet platform to support the entire "social innovation" project life cycle, the FINISH project, in which new and promising B2B solutions for commercial cooperation in Food supply chains were developed, the project CREDITS4HEALTH, which developed methods and tools for intelligent monitoring and decision support to improve a sustainable healthy lifestyle and the CITADEL project, in which an innovative platform, methodologies and tools for the





development and certification of adaptive MILS systems (Multi Independent Layered Security) for critical infrastructures are investigated and applied. Several industrially funded research projects are briefly presented as well.

The research achievements of the Institute and its scientists, as well as the associated support of small, medium and large companies in Germany and especially 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 the sustained support by a number of persons directly associated to ATB, who are contributing to the success of the Institute. All of them deserve special thanks.

Particularly to be mentioned albeit this, there are of course the unique researchers of the Institute, who make a key contribution to the 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 to be open for new challenges and tasks.

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 20 completed or ongoing research projects within the EU's 7th framework programme - in which ATB cooperated with more than 80 European industry partners - as well a vast number of industry-funded projects, ATB's research strategy and the range of research topics addressed appeared to be successful.

In order to further harmonize its research activities, especially with regard to the 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 up-to-now six successful project proposals in topics that are of the highest research priority to ATB, and the current industrial needs, therefore the current situation does not require fundamental modifications of the strategic approach.

Consequently, the strategy of the Institute will continue to focus on the 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 as well as other industrial sectors and societal domains. ATB's research activities can be grouped into three large, complementary areas, as 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 to improve business processes by using modern information technologies and advanced automation and process control approaches in production.

SOFTWARE SYSTEMS ENGINEERING

Research on advanced software engineering methods for the 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, construction industry as well as in health domain. The research regarding application of big data analytics for the development of product services in the manufacturing industry, launched in 2014 and 2015 were extended by ATB to research fields in the process industry in 2016. Summarizing, the main research activities in 2016 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
- Context sensitive internet based services in the health domain
- 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 the addressed research topics, grouped by the various application fields as well as 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 of its 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 the results of its research by participating in various activities such as:

- Membership in national and international bodies, active participation in 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 the fundamental questions of a Future Internet, aiming to develop Internet-based functionalities that can be applied cross-sectorial. This partnership has been extended in the timeframe 2014 - 2016 by 16 accelerator projects, which are funding small innovative software development companies.
- 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 the 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 the industry, such as the Public Private Partnership (PPP) programme (Factory of the Future, Green Car, Energy Efficiency, Future Internet, Food Industry), as well as 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, as well as 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, the research will continue to target BMBF and BMWi programmes, national foundations and regional support schemes.

The continuous update of its research strategy will aim at strengthening the competitive advantages of the Institute, especially the experience and know-how achieved in the scope of long-term research projects as well as industrially funded projects:

- Investigation of advanced information and communication technologies to address 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 the 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 the research projects.

The focus in the future will be on further strengthening projects directly funded by industry, in which ATB will use its know-how and expertise on advanced technology, gained within previous research projects, to solve 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, as well as 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, as well as to support 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.



ATB'S RESEARCH STRATEGY

		Ap	oplication area	S			Sectors	
RTD Topics	Maintenance & Diagnosis	Product Service Systems (PSS) / Product Lifecycle Management	Energy Efficiency	Supply Chain Management	B2B Colla- boration	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 Manu- facturing 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 Inter- net-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 Aml-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

CREDITS4HEALTH

CREDITS-BASED, PEOPLE-CENTRIC APPROACH FOR THE ADOPTION OF HEALTHY LIFE-STYLES AND BALANCED MEDITERRANEAN DIET IN THE FRAME OF SOCIAL PARTICIPATION AND INNOVATION FOR HEALTH PROMOTION

Research programme	7 th Framework Programme	
Partners	Firenze University (coordinator), Ioannina University, Euro Mediterranean Scientific Biomedical Institute, Fundación para la Investigación Nutricional, ATB , Ludwig-Maximilians- Universität München, Fondazione Raffaella Becagli, Hellenic Health Foundation, FU Berlin, Labor SRL., Looking for Value SRL, ADN Kronos, C3 Collaboration for Health, Ministero della Salute, Agenzia Regionale Sanitaria Puglia	
Duration	September 2013 – August 2016	Credits 4 HEALTH
Contact	Stefan Faltus, ATB	
Website	http://www.credits4health.eu/	
ATB's role	Development of a context-sensitive reasoning software module to provide decision support in the health domain.	

CREDITS4HEALTH was a social innovation and health promotion project run by a consortium consisting of national and local government bodies, enterprises, non-profit organizations, universities and research centres. It aimed at defining and testing a system effective in engaging, nurturing and keeping people committed in the adoption of personalised wellness paths and healthy life-styles. The main goal of the C4H project was to develop a sustainable system based on the "credits for health" concept that encourages people living in Euro-Mediterranean countries to enhance their level of physical activity as well as participation in social life, and to adopt healthy eating habits by means of a person-centric approach and a variety of incentives. In three consecutive, incremental pilot trials the model was being simultaneously tested in Greece, Italy, and Spain, with the long-term objective of validating the C4H approach and extending it to the entire Europe.

THE C4H CONCEPT

The C4H concept was based on one fundamental idea that needs to be implemented in order to

foster the transition to a new approach towards health and wellbeing: people engagement or, in other words, people empowerment. This represents a radical shift from a one-way delivered healthcare to a multi-stakeholder approach, in which people play the pivotal role, being actively involved in maintaining and improving their health status. The C4H vision was to have people directly acting for their health and wellbeing, thus contributing to the



prevention of chronic diseases and enhancing the quality of their lives.



PROJECT OBJECTIVES

The C4H experts in nutrition, physical activity and psychology have carried out in-depth analyses on similar projects, with the aim of capitalising on best practices in the health sector, especially methodologies and standards for clinical and social field tests. Based on those analyses the questionnaires have been created targeting at determining people's dietary, physical activity, and social habits as well as their motivation to change those habits. To assess the nutrition baseline, key performance indicators (KPIs) for various food groups such as meat, cereals, fruit and vegetables have been developed, and for physical activity, the General Practice Physical Activity Questionnaire (GPPAQ) has been adopted. This baseline assessment is complemented by a series of interventions to improve motivation for change, dietary and physical activity habits. For instance, physical activity goals and a series of different progressive paths to reach those goals have been defined. All of this was supported by educative and motivating multimedia contents.

Subsequently, the C4H ICT experts have implemented a web-based platform, as the tool to achieve the envisioned changes i.e. to enhance the quality of the C4H participants' lives by reduction of sedentary behaviour, active participation in social life, and the adoption of a healthier diet. This platform provides participants with a number of functionalities such as the creation of a personal profile, dietary and exercise suggestions, nutrition plans, and personalized plans aimed at giving psychological and social support to help participants reach their goals. The platform enables participants to track their compliance with the health-regime agreed with the C4H staff, based on self-reporting, periodic questionnaires, and the data recorded by a physical activity tracker.

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Ļ	User control	panel		Expert co	ntrol pane	
		Authentica	tion modul	e	_	
	DB interface module			Cre	edits mana	gement
	Data mining module		nodule	Soc	ial networl	ks plugin

At the "heart" of this platform resides a decision support system (DSS) developed by ATB, which is based on algorithms defined by the C4H experts in nutrition, physical activity and psychology. It evaluates the user data and inputs. For nutrition, the DSS determines the KPIs for which the participant is underperforming and suggests nutrition goals accordingly. For physical activity, taking the baseline assessment result and the level of motivation into account, the DSS suggests physical activity goals and an appropriate progressive path towards achieving those goals. On detection of systematic failure to achieve the self-set goal(s), the DSS triggers the provision of motivational support.

In the course of the three pilot trials, people living in four cities in Greece, Italy, and Spain have been recruited and given access to the C4H platform.





FUTURE INTERNET ACCELERATOR - FOOD INTELLIGENCE AND INFORMATION SHARING FOR BUSINESS COLLABORATION ENABLED BY THE FUTURE INTERNET

Research programme	7 th Framework Programme
Partners	ATB – Coordinator, Wageningen Economic Research, EuroPoolSystem, CentMa, iMinds, Campden Hungary, Democenter, EBILTEM
Duration	September 2014 – August 2016
Contact	Harald Sundmaeker, ATB
Website	http://www.finish-project.eu/
ATB's role	Coordinator, Flspace & FIWARE training, open call management and realisation, technology facilitation for SMEs and startups, test environment support, technology verification & validation

The European Commission was launching FIWARE, which represents an open initiative aiming to create a sustainable ecosystem to grasp the opportunities that will emerge with the new wave of digitalization caused by the integration of recent Internet technologies. Especially the FIWARE platform provides a rather simple yet powerful set of APIs (Application Programming Interfaces) that ease the development of smart applications in multiple vertical sectors. The specifications of these APIs are public and royalty-free. Besides, an open source reference implementation of each of the FIWARE components is publicly available, so that multiple FIWARE providers can emerge faster in the market with a low-cost proposition.

At the same time the FIWARE Acceleration Programme was launched, aiming at promoting the take-up of FIWARE technologies among solution integrators and application developers, with a special focus on SMEs and start-ups. Linked to this programme, the EU launched an ambitious campaign in September 2014, mobilizing 80M€ to support SMEs and entrepreneurs who will develop innovative applications based on FIWARE technologies.

A key objective of FIWARE is to combine needs stemming from an ICT application related view with the technological potentials that can push the solution development in different vertical sectors, not differentiating needs from a technological perspective, but highly focusing on an

integrated usage of enabling technologies. ATB joined FIWARE in its early days, starting with the coordination of the SmartAgriFood project, a 7 Mio Euro initiative to elaborate the basic concepts for a B2B oriented initiative to improve collaboration in complex supply networks. In 2014, ATB took over the coordination of the 20 Mio EUR project Flspace (www.fispace.eu), which was developing an Internet based platform for B2B collaboration. The FIspace



platform was realised in close collaboration of international project partners like Kühne+Nagel, IBM and Atos. New solutions for transport and logistics as well as for trade and the food chain are under development. So called "apps" that build upon the Flspace platform were realized, taking



advantage of the platform's basic functionalities such as security, communication and system integration.

Following the FIWARE paradigm of an open collaboration and offering an environment for smart application development, FIspace highly facilitates the app development and reduces the effort to establish interfaces and design required workflows. On top of that, features of different software applications can be combined within workflows, allowing a reuse of apps' functionalities already available in the FIspace ecosystem. Combined with the FIspace platform core features, app developers can use a dedicated software development kit. It is important to note that this should not replace existing solutions, but rather supplement these with complementary apps within the scope of business workflows.



In 2014, first apps were developed in close collaboration with end-users from different application fields. ATB developed the so-called "Product Information App", which allows food chain companies to share product quality related information. Basic driver for this development were the reoccurring crises in the food chain over the last years that were imposing severe risks on the consumers and causing immense financial damages for the different supply chain actors. Additional apps are under development that will further complement the customer needs and offer a large variety in combining features for orchestrating related workflows.

In total, FIWARE mobilises an amount of 300 Mio EUR of funding for European research and industry during 3 phases. Open and free software developed in the first 2 phases is offered within the FIWARE software catalogue (https://catalogue.fiware.org/). Interested software developers



can download the software as basis for their own development. This also linked the initiative with its third phase, which was equipped with some 80 Mio EUR that were dedicated to SME type organisations and specifically startups. Within a period of some 30 months, 16 accelerators active in all parts of Europe were addressing different verticals and offered a large variety of support to developers. The following figure gives an overview of the FIWARE accelerators, addressing a large variety of business domains.



ATB coordinated the so-called Flnish accelerator (<u>www.finish-project.eu/</u>). 6.1 Mio EUR were raised to support the development of solutions within the domains of transport and logistics, manufacturing and smart agri-food. Partners from Belgium, Germany, Hungary, Italy, the Netherlands and Turkey were managing open calls for proposals, opening a promising opportunity, also open for regional software developers. By reducing efforts for proposal preparation, accelerators eased the participation of especially startups as well as small and medium sized enterprises. At the same time, the international dimension of FIWARE allowed that also local teams were able to join, without a need to immediately team-up with partners from other EU regions. From a European perspective, this enabled a new funding pattern, while on top of project type developments, the programme organized hackathons as well as challenges. For example, ATB was preparing a developer challenge awarding the winning finalists with some 75,000 EUR, collocated with the NetFutures Conference that attracted even over 1,000 European participants.

In the scope of 2 open calls (Autumn 2014 and Spring 2015), startups and SMEs were selected to realise their developments in projects with a duration between 6 and 12 months. The Flnish accelerator was giving a financial support of up to 150 kEUR to each of those projects. On top of that, experts from different domains helped with diverse expertise during software and business model development. Feedback was collected to also improve the underlying FIWARE technology.

FIWARE became a new European brand for Internet related software development, accessible via <u>www.fiware.org</u> and <u>https://catalogue.fiware.org/</u>. The overall FIWARE ecosystem is presented via <u>http://map.fiware.org/actors/smes</u>. This lists the different activities and organisations from diverse areas such as energy, gaming, health, logistics, food, multi-media, manufacturing, smart city and environment as well as opportunities for diverse cross-cutting topics.



SAFIRE

CLOUD-BASED SITUATIONAL ANALYSIS FOR FACTORIES PROVIDING REAL-TIME RECONFIGURATION SERVICES

Research programme	HORIZON 2020	
Partners	ATB – Technical coordinator, OAS, Electrolux, Ikerlan, The Open Group, ONA, University of York	
Duration	October 2016 – September 2019	
Contact	Sebastian Scholze, ATB	
Website	http://www.safire-factories.org/	SAFT
ATB' role	Technical coordinator. Services for situational aware data processing.	Cloud-based Situational An providing Real-time Recont

The SAFIRE project will develop technologies and infrastructure to enable "Reconfiguration-as-a-Service" for dynamic smart factory systems and manufactured smart products that exploit cloudbased services and computing power to continually optimise performance of production systems and products focusing on throughput, power consumption, usage, maintenance, utilisation levels, and other factors.

SCOPE

Manufacturing of products has become increasingly complex and driven towards greater flexibility due to an increasing diversity of product portfolios, demand for more customised products, and shorter time-to-market requirements. To face these challenges there is a need for rapidly adaptive smart manufacturing systems with features for intelligent reconfiguration of production processes and of smart products.

In traditional models of manufacturing, the information flow from product design, through production processes, to the manufactured product has been unidirectional as information flows from the product and process design tools into planning tools and on to production equipment control systems.



In order to improve the manufacturability and re-configurability of products, the product designers need to have more information about how product use affects the lifecycle of a product, and how product design affects the production processes. Currently, product use and production activities are often separated, leading to low efficiency and higher costs for both users and manufacturers. Some of these required optimisations can be carried out by adjusting production control parameters (e.g. improve production quality by adjusting parameters), while others require the reconfiguration of manufactured products.



PROJECT OBJECTIVES

The primary objective of the SAFIRE project is to develop cloud-based analytics and reconfiguration capabilities that provide:

- Both reactive and predictive reconfiguration for both production systems and smart products
- Flexible run-time reconfiguration decisions during production rather than pre-planned at production planning time
- Real-time reconfiguration decisions for optimisation of performance and real-time production and product functions

The advanced analytics and reconfiguration capabilities will be based on mastering Big Data Challenges associated with manufacturing (sensor and process data), enterprise data and smart product data to provide advanced analytics that allow manufacturers to address production system behaviour forecasting and to establish optimisation methods that are integrated in the design and product chain.

TECHNOLOGY INNOVATIONS

The SAFIRE project targets two related technology challenges for smart factories presenting new opportunities for improving production, products and services:

- Interconnected Systems of Production Systems (SoPS) within smart manufacturing environments where production systems have hardware and software requirements to be addressed to achieve specific business objectives such as scheduling, power usage, throughput and maintenance.
- Connected Product Networks (CPNs) where networked smart products collect data, can be adapted in the field, and can deliver extended services to through optimisation of smart product parameters and customisation of products to environments, usage

patterns and other dynamic factors.

SAFIRE will master the Big Data Challenges within manufacturing (sensor and process data), enterprise data and smart product data to provide advanced analytics that allow manufacturers to address production system behaviour forecasting and establish optimisation methods that are integrated in the design and product chain. The Big Data Analytic capabilities will meet real-time requirements so dynamic reconfiguration decisions are made during production time



rather than pre-planned at production planning time.

INDUSTRIAL DEMONSTRATORS

In order to assure that the methods and tools to be developed meet the needs of European manufacturers, the project will be driven by three industrial business cases from Electrolux, OAS and ONA within globally distributed enterprises, who participate in the consortium and will validate the technologies in multiple manufacturing and product scenarios.



SOCRATIC

SOCIAL CREATIVE INTELLIGENCE PLATFORM

Research programme	HORIZON 2020	
Partners	Cibervoluntarios Foundation (coordinator), ATB , FARAPI, NTNU, SINTEF	
Duration	January 2016 – December 2017	SOCRATI
Contact	Christian Wolff, ATB	
Website	http://www.socratic.eu/	
ATB's role	Architectural platform design as well as development and implementation of the SOCRATIC platform prototype	

SOCRATIC will be a knowledge-based internet platform offering a set of tools and services to support the whole "Social Innovation Project" life cycle from problem identification and awareness and creative solution ideas to collective decision-making, design and implementation of the best ideas.

THE SOCRATIC CONCEPT

SOCRATIC is proposing to integrate already existing validated technologies to create a platform that allows individuals, organized collectives or organizations to collaboratively ideate and

implement projects that try to impact on the Global Sustainability Challenges.

The main focus is on an integrated solution for the innovation process rather than separate items or services, enabling agile social innovation Each activity will processes. be supported by a specific service in the platform. SOCRATIC will also implement Global Observatory about а Sustainability challenges.

The main goal of the SOCRATIC project is to provide citizens and organizations with a collaborative space where they can identify innovative solutions to achieve the Sustainable Development Goals set by the United Nations.



PROJECT OBJECTIVES

The main objective of SOCRATIC is to facilitate a platform so that citizens and/or organisations can collaboratively identify specific innovative solutions for achieving the desired Global Sustainability Goals, as defined by the United Nations. SOCRATIC will also implement a Global Observatory on Sustainability Challenges with a double objective: (1) Measuring the impact of SOCRATIC actions on Global Sustainability Challenges by monitoring social networks, (2) Using the data about Global Sustainability Challenges gathered in social media as a source of information to launch challenges in the SOCRATIC platform.



SELECTED RESEARCH PROJECTS

The SOCRATIC project has a deep user-centric approach, implementing gamification techniques to engage users in the sustained use of the platform. The project involves one European NGO (CiberVoluntarios) and a group of Young Social Innovators from the "Experts in Team" programme of the Norwegian University of Science and Technology (NTNU-EiT). Both collectives perform actions in different fields, but with a common tool, the use of IT to empower citizens and achieve specific sustainability goals. The pilots will be initially focused on three specific challenges: "Ensuring healthy lives and promote wellbeing for all at all ages (UN's Goal 3)", "Ensuring inclusive and equitable quality education and promote lifelong learning opportunities for all (UN's Goal 4)", and "Promoting sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all (UN's Goal 8)".

The SOCRATIC's platform will be used by citizens and organizations to:

- propose new challenges oriented to solve specific sustainability issues.
- invite individuals or organizations to participate with innovative ideas that solve these issues.
- collectively select and implement the most promising ideas.

Challenges are the targets that the United Nations have set in order to achieve their Global Sustainability Goals (GSG). The group of young social innovators will identify



SOCRATIC Platform architecture

challenges and propose solutions regarding the UN's sustainability goal number 3, which is "Ensuring healthy lives and promote well-being for all at all ages".

Within the SOCRATIC project, ATB is responsible for the

- definition of the SOCRATIC concept,
- modelling of knowledge and definition of ontologies,
- architectural platform design and
- development and implementation of the SOCRATIC platform prototype.

The project's consortium consists of five partners from three European countries (Spain, Norway and Germany), among them one NGO, one SME and three RTD partners.





CITADEL

CRITICAL INFRASTRUCTURE PROTECTION USING ADAPTIVE MILS

Research programme	HORIZON 2020	
Partners	The Open Group (coordinator), ATB , atsec Information Security, Fondazione Bruno Kessler, Frequentis, IK4-IKERLAN, J.W. Ostendorf, Kaspersky Lab, OAS, SYSGO, Eindhoven University of Technology, TTTech, UniControls, Université Grenobles Alpes	CITADE
Duration	June 2016 – May 2019	CRITICAL INFRASTRUCTURE PROT USING ADAPTIVE MILS
Contact	Sebastian Scholze, ATB	
Website	http://www.citadel-project.org/	
ATB's role	Context-sensitive decision support service for security domain. Supporting the development of the manufacturing demonstrator	

CITADEL leverages the technology advances from the D-MILS and EURO-MILS projects to develop innovative extensions to the MILS approach for protecting critical infrastructures by adding dynamic reconfiguration to the MILS platform, and monitoring and adaptation systems that enable resilience to adversity while preserving vital system properties.

SCOPE

Critical infrastructures rely on complex safety and security critical ICT systems often deployed in unpredictable environments and forced to cope with unexpected events and threats while exhibiting safe and adaptive behaviour. Recent security trends stress continuous adaptation to increase attacker work factor and to confound reverse engineering.

Before operational deployment, critical infrastructure systems must undergo extensive and costly scrutiny under diverse certification regimes. Improved, effective and affordable development and certification methods are essential for maintaining the high levels of security and reliability that are demanded from critical infrastructure systems today.



CITADEL Project Ecosystem

PROJECT OBJECTIVES

CITADEL is based on MILS, an approach featuring modular construction and compositional assurance, reducing the time and cost for development, certification, and maintenance of dependable systems. The MILS platform, based on a separation kernel, manages physical resources while establishing and enforcing a verified application architecture.

Leveraging advances from the D-MILS and EURO-MILS projects, CITADEL will extend the MILS approach by adding dynamic reconfiguration to the MILS platform, and monitoring and adaptation systems enabling resilience to adversity while preserving vital system properties. CITADEL supports certification of Adaptive MILS systems by analysing configuration change mechanisms, adaptation system, configuration properties, and configuration change policies with automated verification tools, and by providing an innovative runtime.

The CITADEL project is targeting the core of the security challenge of allowing a system to react to a changing environment while continuously providing safety and security critical services.

TECHNOLOGY INNOVATIONS

The CITADEL project will go beyond the state-of-the-art in critical infrastructure protection by developing the following innovations:

- An architecture description language able to express dynamic architectures and essential properties for verification
- Applying well-established resilience techniques from Aerospace to fault/attack detection in communication channels of critical infrastructures
- Integrated formal compositional verification framework to verify functional, safety and security properties of reconfigurable systems
- Assurance framework integrating language for dynamically changing architectures with runtime assurance of on-going operations and maintaining of certification objectives during configuration change
- Reconfigurable MILS platform including platform software and networking
- Target configuration generation to achieve desired properties and synthesis of reconfiguration plans that maintain necessary conditions
- Foundations for certification of adaptive systems in critical infrastructures

INDUSTRIAL DEMONSTRATORS

The CITADEL project is working closely with several industrial partners that develop critical infrastructure applications exposed to potentially malicious environments, such as air-traffic control systems, subways in major cities, and manufacturing plants. Industrial partners in the project from each of these domains will validate the project technologies within the context of specific critical infrastructure protection scenarios and demonstrate its readiness for broad industrial deployment.

The CITADEL project will standardise its high-profile achievements in open standardisation groups for the targeted domains, as well as in the high-assurance MILS standardisation group. This will provide European industry with a time-to-market advantage, as well as a springboard for developing new modular and adaptive high-assurance applications in related domains.



RANGE OF RESEARCH AND SERVICES

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

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 the 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 the 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.

BEVERLAND

The goal of this project is to extend the functionality of an existing software solution, which was developed by ATB in the past. It supports the resource planning and staff assignment for different types of events (e.g. business meetings, weddings) and for individually planned group trips. During the planning work, the software assists the user by automatically checking the qualification and availability of staff members, when they are assigned specific tasks. The solution comprises interfaces for data exchange with propietary software systems, as well as a smartphone app for staff members, allowing them to get a mobile update about the latest planning information during events. Applying innovative software development methodologies, the existing solution is flexibly adapted to evolving requirements.





Within this project, the existing Mobility@Forest system is extended and adapted to new requirements that result from its nationwide application. Improvements concerning the usability were applied to accelerate and simplify the input of data. Moreover, optical improvements and adaptions of the user interface were carried out to live up to current hardware. In addition, the data model was extended for a more detailed classification of the stock of trees.

EPS SOLUTION

Within this project, the existing EPS Solution for recording and displaying scans of pallets shall be extended. The extensions include mobile and manual scanning using Android-based mobile devices, to track single or pallets of returnable trade items (RTIs). Similarly, it shall be possible to manually review and record additional information on recorded pallets/RTIs using mobile devices. For reviewing and further editing the data that was recorded in a mobile way, the existing web application shall be adapted accordingly.





LIST OF ALL PROJECTS RUNNING IN 2016

RESEARCH PROJECTS

AUTOMAT

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

CITADEL

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

CREDITS4HEALTH

Credits-based, people-centric approach for the adoption of healthy life-styles and balanced Mediterranean diet in the frame of social participation and innovation for health promotion, FP7-HEALTH-2013-INNOVATION-1, Sep. 13 – Aug. 16, <u>http://www.c4h.it</u>

DIVERSITY

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

FINISH

Food Intelligence and Information Sharing for Business Collaboration enabled by the Future Internet, FP7-2013-ICT-FI, Sep. 2014 – Sep. 2016, <u>http://www.finish-project.eu/</u>

MAESTRI

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

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, <u>https://www.proseco-project.eu/</u>

SAFIRE

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

SOCRATIC

Social Creative Intelligence Platform for achieving Global Sustainability Goals, H2020-ICT-2015, Jan. 2016 – Dec. 2017, <u>http://www.socratic.eu</u>





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 ERW. II	
Armbruster Engineering GmbH & Co. KG	January 2016 – March 2016
ELAM 4.0 ERW. III	
Armbruster Engineering GmbH& Co. KG	April 2016 - May 2016
EMAS REPLIKATIONS- UND DRUCKOPTIMIERUNG	
Gabco Kompostierung GmbH	June 2016 – September 2016
EPS PILOT II ERW.	
Euro Pool System International (Deutschland) GmbH	August 2015 – February 2016
EVALUATOR	
Daimler AG	December 2016 – April 2017
Daimler AG MOBILITY S III	December 2016 – April 2017
Daimler AG MOBILITY S III Giscon Systems GmbH	December 2016 – April 2017 January 2016 – November 2016
Daimler AG MOBILITY S III Giscon Systems GmbH NEMAS 10B ERW 17	December 2016 – April 2017 January 2016 – November 2016
Daimler AG MOBILITY S III Giscon Systems GmbH NEMAS 10B ERW 17 Thales Defence Deutschland GmbH	December 2016 – April 2017 January 2016 – November 2016 October 2015 – March 2016
EVALUATOR Daimler AG MOBILITY S III Giscon Systems GmbH NEMAS 10B ERW 17 Thales Defence Deutschland GmbH OHB KOM-SERVER	December 2016 – April 2017 January 2016 – November 2016 October 2015 – March 2016
EVALUATOR Daimler AG MOBILITY S III Giscon Systems GmbH NEMAS 10B ERW 17 Thales Defence Deutschland GmbH OHB KOM-SERVER OHB Logistic Solutions GmbH	December 2016 – April 2017 January 2016 – November 2016 October 2015 – March 2016 July 2016 – June 2017
EVALUATOR Daimler AG MOBILITY S III Giscon Systems GmbH NEMAS 10B ERW 17 Thales Defence Deutschland GmbH OHB KOM-SERVER OHB Logistic Solutions GmbH UCES-3 LOGFILE PARSER	December 2016 – April 2017 January 2016 – November 2016 October 2015 – March 2016 July 2016 – June 2017
EVALUATOR Daimler AG MOBILITY S III Giscon Systems GmbH NEMAS 10B ERW 17 Thales Defence Deutschland GmbH OHB KOM-SERVER OHB Logistic Solutions GmbH UCES-3 LOGFILE PARSER Olympus Europa SE & Co. KG	December 2016 – April 2017 January 2016 – November 2016 October 2015 – March 2016 July 2016 – June 2017 March 2015 – February 2016



Unicar GmbH



January 2016 - September 2016

PROJECTS' PUBLIC REPORTS AND PUBLICATIONS IN 2016

AUTOMAT

D1.7 Project presentation and brochure	September 2016
D2.3 Public system concept	March 2016
CITADEL	
D2.1 Requirements for Frequentis Communicaton Services Demonstrator	August 2016
D2.2 Requirements for UniControls Demonstrator	August 2016
D2.3 Requirements for J.W. Ostendorf Demonstrator	August 2016
D6.1 Website and dissemination materials	August 2016
CREDITS 4 HEALTH	
D6.1 Cost benefit analysis	August 2016
D6.2 Final project assessment	August 2016
DIVERSITY	
D1.4 Public system concept	January 2016
D6.1 Assessment methodology	July 2016
D7.6 Project presentation and brochure 2	July 2016
D7.7 Project website 3	July 2016
FINISH	
D100.10 Dissemination and exploitation plan – final version	September 2016
D400.1.3 Third version of the helpdesk for SMEs and WEs	February 2016
D600.1.3 Flnish platform configuration and maintenance	February 2016
MAESTRI	
D1.4 Initial requirements report	February 2016
D1.5 Lessons learned and updated requirements report 1	October 2016
D2.1 Efficiency framework concept description	February 2016
D2.2 Methods for efficiency framework for resource and energy efficiency description	August 2016
D2.3 Simulation and decision support approach for sustainable manufacturing	November 2016

D3.1 Internal challenges and barriers for energy and resource management February 2016



PROJECTS' PUBLIC REPORTS AND PUBLICATIONS IN 2016

D4.1 Report on challenges and key success factors and gap analysis for industrial symbiosis	May 2016
D8.2 Report on communication activities – 1st year	August 2016
D8.6 Project website and social Networks pages	February 2016
D8.9 Reports on stakeholders observatory – 1st year	August 2016
PROSECO	
D200.1 Methodology for collaborative product services & process design final version	September 2016
D300.1 Methodology for lean-based ECO-driven product service & process design final version	September 2016
D400.1 Methodology for Aml-based & context sensitive product services final version	September 2016
D800.1 Project presentation	September 2016
D800.2 Project website	September 2016
SAFIRE	
D7.3 Initial project website	December 2016
D7.3 Initial project website SOCRATIC	December 2016
D7.3 Initial project website SOCRATIC D1.1 State-of-the-Art update	December 2016 March 2016
D7.3 Initial project website SOCRATIC D1.1 State-of-the-Art update D1.2 Pilot scenarios specification	December 2016 March 2016 March 2016
D7.3 Initial project website SOCRATIC D1.1 State-of-the-Art update D1.2 Pilot scenarios specification D1.3 Requirements analysis	December 2016 March 2016 March 2016 May 2016
D7.3 Initial project website SOCRATIC D1.1 State-of-the-Art update D1.2 Pilot scenarios specification D1.3 Requirements analysis D1.4 SOCRATIC concept	December 2016 March 2016 March 2016 May 2016 May 2016
D7.3 Initial project website SOCRATIC D1.1 State-of-the-Art update D1.2 Pilot scenarios specification D1.3 Requirements analysis D1.4 SOCRATIC concept D2.1 SOCRATIC design specifications version 01	December 2016 March 2016 March 2016 May 2016 May 2016 December 2016
D7.3 Initial project website SOCRATIC D1.1 State-of-the-Art update D1.2 Pilot scenarios specification D1.3 Requirements analysis D1.4 SOCRATIC concept D2.1 SOCRATIC design specifications version 01 D2.3 SOCRATIC methodology workbook V1	December 2016 March 2016 May 2016 May 2016 December 2016 December 2016
D7.3 Initial project website SOCRATIC D1.1 State-of-the-Art update D1.2 Pilot scenarios specification D1.3 Requirements analysis D1.4 SOCRATIC concept D2.1 SOCRATIC design specifications version 01 D2.3 SOCRATIC methodology workbook V1 D5.1 Open data use plan	December 2016 March 2016 May 2016 May 2016 December 2016 December 2016 June 2016
D7.3 Initial project website SOCRATIC D1.1 State-of-the-Art update D1.2 Pilot scenarios specification D1.3 Requirements analysis D1.4 SOCRATIC concept D2.1 SOCRATIC design specifications version 01 D2.3 SOCRATIC methodology workbook V1 D5.1 Open data use plan D5.2 Project presentation and brochure version 01	December 2016 March 2016 May 2016 May 2016 December 2016 December 2016 June 2016 June 2016
D7.3 Initial project website SOCRATIC D1.1 State-of-the-Art update D1.2 Pilot scenarios specification D1.3 Requirements analysis D1.4 SOCRATIC concept D2.1 SOCRATIC design specifications version 01 D2.3 SOCRATIC methodology workbook V1 D5.1 Open data use plan D5.2 Project presentation and brochure version 01 D5.3 Project website version 01	December 2016 March 2016 May 2016 May 2016 December 2016 December 2016 June 2016 June 2016 March 2016
D7.3 Initial project website SOCRATIC D1.1 State-of-the-Art update D1.2 Pilot scenarios specification D1.3 Requirements analysis D1.4 SOCRATIC concept D2.1 SOCRATIC design specifications version 01 D2.3 SOCRATIC methodology workbook V1 D5.1 Open data use plan D5.2 Project presentation and brochure version 01 D5.3 Project website version 01 D5.7 Project website version 02	December 2016 March 2016 May 2016 May 2016 December 2016 December 2016 June 2016 June 2016 March 2016 December 2016
D7.3 Initial project website SOCRATIC D1.1 State-of-the-Art update D1.2 Pilot scenarios specification D1.3 Requirements analysis D1.4 SOCRATIC concept D2.1 SOCRATIC design specifications version 01 D2.3 SOCRATIC methodology workbook V1 D5.1 Open data use plan D5.2 Project presentation and brochure version 01 D5.3 Project website version 01 D5.7 Project website version 02 D6.1 Quality management plan	December 2016 March 2016 May 2016 May 2016 December 2016 December 2016 June 2016 June 2016 March 2016 December 2016





D. MOURTZIS, S. FOTIA, M. GAMITO, R. NEVES SILVA, A. CORREIA, P. SPINDLER, G. PEZOTTA, M. ROSSI

Product-Service Systems across Life Cycle PSS Design Considering Feedback from the Entire Product-Service Lifecycle and Social Media Procedia CIRP (2016), Vol. 47, pp. 156-161 (also available online at www.sciencedirect.com)

H. SUNDMAEKER

Accelerating System Development for the Food Chain: a Portfolio of over 30 Projects, Aiming at Impact and Growth; Proceedings in System Dynamics and Innovation in Food Networks 2016 International Journal on Food System Dynamics (pp. 371 – 381) July 2016 (also available online at www.centmapress.org)

O. VERMESAN, P. FRIESS, P. GUILLEMIN, M. SERRANO, M. BOURAOUL, L. PEREZ FREIRE, T. KALLESTENIUS, K. LAM, M. EISENHAUER, K. MOESSNER, M. SPIRITO, E. Z. TRAGOS, H. SUNDMAEKER, P. MALO, A. VAN DER WEES

Internet of Things Digital Value Chain Connecting Research, Innovation and Deployment Chapter 3: Digitising the Industry – Internet of things Connecting the Physical, Digital and Virtual Worlds

Editors: Ovidiu Vermesan and Peter Fries, River Publishers, (pp. 15 - 128) July 2016

H. SUNDMAEKER, C. VERDOUW, S. WOLFERT, L. PEREZ FREIRE

Internet of Food and Farm 2020.

Chapter 4: Digitising the Industry – Internet of Things Connecting the Physical, Digital and Virtual Worlds

Editors: Ovidiu Vermesan and Peter Fries, River Publishers, (pp. 129 – 151) July 2016

S. SCHOLZE, A. CORREIA, D. STOKIC, K. NAGORNY, P. SPINDLER

Tools for Human-Product Collaborative Development of Intelligent Product Service Systems Working Conference on Virtual Enterprises, 373-384

S. SCHOLZE, A. CORREIA, D. STOKIC, K. NAGORNY, P. SPINDLER

Product-Service Systems across Life Cycle Novel Tools for Product-Service System Engineering Procedia CIRP (2016), Vol. 47, pp. 120-125 (also available online at www.sciencedirect.com)

S. SCHOLZE, J. BARATA

Context awareness for flexible manufacturing systems using cyber physical approaches Doctoral Conference on Computing, Electrical and Industrial Systems, 107-115

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

An approach for implementing ISA 95-compliant big data observation, analysis and diagnosis features in industry 4.0 vision following manufacturing systems Doctoral Conference on Computing, Electrical and Industrial Systems, 116-123

G. DI ORIO, O. MATEI, S. SCHOLZE, D. STOKIC, J. BARATA, C. CENEDESE

A platform to support the product servitization Int. J. Adv. Comput. Sci. Appl. (IJACSA) 7 (2)



NETWORKS AND COOPERATION

Since several years, ATB is actively involved in diverse networks and clusters. This involvement is facilitating the 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 as well as context related cooperation of those things/objects. New applications, services and business models can be created, allowing to reach common goals in the 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 the last nine years, the European Research Cluster on the Internet of Things (IERC – <u>http://www.internet-of-things-research.eu/</u>) was represented by over 50 European research projects. They were addressing different research topics to exploit the large potential of IoT-based capabilities in Europe and to coordinate the convergence of on-going activities. Since the 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) and FIspace (Future Internet Business Collaboration Networks in Agri-Food, Transport and Logistics). Moreover, ATB was co-editing the first cluster book, which was published in 2010 (http://cordis.europa.eu/fp7/ict/enet/cerp-iot-clusterbook-2010.pdf), and supported its regular update especially with contributions to the IERC strategic research agenda.

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

 IoT Digital Value Chain Connecting Research, Innovation and Deployment IERC Cluster SRIA 2016. <u>http://www.internet-of-things-</u> <u>research.eu/pdf/IoT Digital Value Chain Chapter 03 SRIA IERC 2016 Cluster eBook</u> <u>978-87-93379-82-4 P Web.pdf</u>

In March 2015, the cluster work also triggered the realisation of the Alliance for Internet of Things Innovation (AloTI) and was also further promoted in the scope of the IoT-European Platforms Initiative (IoT-EPI <u>http://iot-epi.eu/</u>). ATB is still an active member of this initiative and combines its activities with its involvement in the upcoming Internet for Food and Farm 2020 project





(IoF2020). This is also offering to join forces with other stakeholders that are active in the business domains smart cities, autonomous driving, ageing well and wearables. ATB considers this inter-sectorial cooperation as an excellent environment to validate research results as well as 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 the original design goals and how the Internet is being used today are beginning to hamper its potential. Many challenges in the areas of technology, business, society and governance will have to be overcome if the future development of the Internet is to sustain the 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, as well as 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 Flspace 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 as well as 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.

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. The objective is to extend collaboration beyond the European scope into the Middle East, Africa, East Asia, and the 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 the social and economic unrest outside its



immediate borders. The 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, to support the evolvement of individual qualities for improving the economic and societal situation.

EPL is a combination of Research Centres, Companies, Universities, Non-profit entities and Professionals who are working as a network to support the European Union's vision and to satisfy the European Commission's mission, particularly in European RTD frameworks (such as HORIZON 2020), including innovation and delivering economic growth faster. It is time to use the momentum as well as the experience of our European collaborative model and further European ethical discourse to open new doors toward the world. It starts with sharing achievements and results. Being engaged in European RTD projects for more than two decades helps us improve in different dimensions and although we have good project results, one of the most difficult tasks of those projects is to perform the exploitation and to promote them.



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 18 years' experience in financial managing of large CEC and national research projects as well as 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 definition of the financial strategy of ATB, as well 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, he has 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), database systems (Oracle, Informix, MySQL), 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 (e.g. Self-Learning, U-Qasar, AsKoWi, EngineeringWiki) and local project manager (e.g. K-Net, EPES) in several EU and direct research projects. Currently, he is involved in the following EU-projects: ProSEco, CITADEL, SAFIRE. He was acting as coordinator of the FP7 Self-Learning and the U-Qasar project. He is currently acting as Technical Director of current H2020 project SAFIRE. 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 Flspace & Flnish research projects. He is contributing to the European Research Cluster on the Internet of Things (IERC) and the FIWARE initiative (FI-PPP). 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 agrifood, 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 (AutoMat, ELVIRE, e-DASH, MODELISAR, ACDC), optimising the 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 the work he has gained rich experience in the management of national and international (EU) projects and has the responsibility for several industry and EU projects.





SUPERVISORY BOARD

OTTO ANTON SCHWIMMBECK

Chairman OAS AG, Bremen, Board Chairman

ULRICH BACHER

Production Manager at Daimler AG, Bremen, Deputy Chairman (until December 2016)

DR. DIPL.-ING. MARTIN HEINLEIN

Head of UniTransfer at University Bremen, Bremen

DIPL.-PHYS. HOLGER KLINDT

Director Civil Programmes at ATLAS ELEKTRONIK GmbH, Bremen

DR. KARIN NACHBAUR

Advisor for the Senator of Education and Science, Free Hanseatic City of Bremen (until December 2016)

ULRICH SCHULZ

Member of the Board of Directors of OHB SE, Bremen

HANS-GEORG TSCHUPKE

Head of the department innovation promotion at WFB Wirtschaftsförderung Bremen GmbH, Bremen

MANAGING DIRECTOR

DANIEL OBREITER

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













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LEGAL INFORMATION



ATB - Institut für angewandte Systemtechnik Bremen GmbH

Address:	Wiener Straße 1 D-28359 Bremen, Germany
Telephone:	+49 (421) 22 092 - 0
Fax:	+49 (421) 22 092 - 10
Internet:	www.atb-bremen.de
E-Mail:	info@atb-bremen.de

General Manager Daniel Obreiter

Legal Form GmbH Register: Amtsgericht Bremen HRB 13969 Cooperate Headquarters: Bremen Tax No.: 60-14513106 VAT Reg. No.: DE114417522





