Executive summary

All exploitation and dissemination activities which were conducted during the second period of IoT@Work are reported in deliverable D5.2. The IoT@Work website has been continuously updated, i.e., new project results were published, IoT@Work related event were integrated as part of the news section, etc. The active exchange of information with the existing stakeholder group was also continued and valuable feedback from potential end users as well as experts in the field could be gathered. In particular, a stakeholder workshop was organized which was attended by most of the stakeholder group members. They used the opportunity to provide their feedback and opinion on the results and the current status of the project. Furthermore, the special session “Internet of things technologies for adaptable and agile automation systems” will be organized at the IEEE International Conference on Emerging Technologies and Factory Automation (ETFA 2012) in Krakow, Poland. The special session will provide a forum for researchers, practitioners and developers to present and discuss new research directions in the area of Internet of Things technologies for factory automation.

Due to the research-oriented nature of the achievements, the IoT@Work consortium has mostly focused to disseminating the innovative concept of the project internally and in other R&D groups, such as in conferences, workshops, and cluster meetings. This report updates the dissemination and exploitation activities for the previously reported period and reports additionally on all activities between month 17 and month 24 of the project.
### Document History

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1 Introduction

This WP deals with the planning, design, and implementation of the dissemination and exploitation policies in the project. This deliverable is a continuation of deliverable 5.1 [1] and presents the on-going dissemination strategy of the IoT@Work project. It is a fundamental principle of R&D projects to disseminate as widely as possible the findings and achievements of the project to the research community and any other interested parties. Besides the normal scientific dissemination (participating in conferences, publishing papers, etc.), additional efforts were undertaken to implement special dissemination activities to also attract an audience from the industrial community.

The intention behind this is, on the one hand to increase the transfer of research results to the EU industry and on the other hand to gain valuable feedback about market opportunities and technical details. To accomplish this, the stakeholder group was established during the first half of the project and a first stakeholder workshop has been organized already. Details about the IoT@Work stakeholder group are provided in Section 2.1. The contents and results of the first stakeholder workshop are briefly described in Section 2.7. Additionally, to keep the IoT@Work stakeholder group informed and engage them further, the IoT@Work consortium will start to issue newsletters presenting project achievements.

In order to ensure impact on the scientific community, the academic partners and some of the industrial partners of the IoT@Work consortium are publishing research papers in national and international conferences as well as in well-known scientific journals from their activities in this project. The leading conferences in the interest area of the project have been recognized right at the start of the project, which are ETFA, WFCS, INDIN, and KommA. Possible journals would be Transactions on Industrial Informatics (TII) and Transactions on Industrial Electronics (TIE). The list of publications is provided in Section 2.1.14 and is an extension of the list provided in D5.1. In addition to this, the consortium is organizing a special session at the IEEE International Conference on Emerging Technologies and Factory Automation (ETFA 2012) in Krakow, Poland to provide a forum for researchers, practitioners and developers to review current trends in the area of Internet of Things technologies for factory automation and to present and discuss new ideas and new research directions in this field.

Finally, in order to introduce the project even more widely, to non-technical audiences, the IoT@Work website has been further maintained and updated with new project results. It is briefly described in Section 2.3 and detailed statistics of the website access are provided. The website provides a brief introduction to the project, offers information about the consortium and allows downloading the existing deliverables and publications. The rest of the dissemination activities are described in Section 2.6.

Relevant cluster activities of the IoT@Work consortium are shown in Section 3. All activities are summarized in form of a table. Finally, a revision of the exploitation strategies of all industrial partners are is given in Section 0.
2 Dissemination

The dissemination activities in the second year of the project were focussed on the dissemination of the results and findings to the scientific community as well as to selected user groups and non-technical audiences. The contacts to the experts of our stakeholder group were further used and extended, especially by means of a stakeholder workshop.

2.1 Stakeholder group

The stakeholder group together with an on-going exchange of ideas and feedback with them is an activity of high importance for our project. The stakeholder group is used to gain additional feedback and input from experts about end-user expectations in order to keep the project in-line with the needs of tomorrow’s factories. The stakeholder group activities can be summarized as follows:

- Frequent monitoring of the project and provision of continuous feedback in order to improve the project results.
- Participation in the kick-off workshop for the stakeholder group which took place in January at the CRF premises.
- First input to the KPI evaluation methodology and feedback on the identified scenarios.

Currently, the stakeholder group consists of the members listed in Table 2.1.

Table 2.1: IoT@Work stakeholder group members

<table>
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<td>AAS</td>
<td>Thilo Sauter</td>
<td><a href="mailto:thilo.sauter@oeaw.ac.at">thilo.sauter@oeaw.ac.at</a></td>
<td>Research</td>
<td>Integrated Sensor Systems</td>
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<tr>
<td>ICM electronics</td>
<td>Nenad Micic</td>
<td><a href="mailto:nenad.micic@icm.rs">nenad.micic@icm.rs</a></td>
<td>Industry</td>
<td>System integrator (Robotics)</td>
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<tr>
<td>Phoenix Contact</td>
<td>Dr. Frank Possel-Doelken</td>
<td><a href="mailto:ppossel-doelken@phoenixcontact.com">ppossel-doelken@phoenixcontact.com</a></td>
<td>Industry</td>
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<td>Germany</td>
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<tr>
<td>KW Software</td>
<td>Peter Fuchs</td>
<td><a href="mailto:pfuchs@kw-software.com">pfuchs@kw-software.com</a></td>
<td>Industry</td>
<td>Head of PROFINET business area</td>
<td>Germany</td>
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<tr>
<td>Fraunhofer IPA</td>
<td>Dr. Carmen Constantinescu</td>
<td><a href="mailto:ctc@iff.uni-stuttgart.de">ctc@iff.uni-stuttgart.de</a></td>
<td>Research</td>
<td>ActionPlant expert</td>
<td>Germany</td>
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<tr>
<td>Centimfe</td>
<td>Nuno Fidelis</td>
<td><a href="mailto:nuno.fidelis@centimfe.com">nuno.fidelis@centimfe.com</a></td>
<td>Industry</td>
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<td>Portugal</td>
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<tr>
<td>TECOS</td>
<td>Dr. Samo Gazvoda</td>
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The remainder of this section provides a short description of the represented organisations/companies/institutes represented in the IoT@Work stakeholder group.

2.1.1 Institute for integrated sensor systems - AAS (Austria)

Founded in 2004, the research Institute for integrated sensor systems follows an interdisciplinary and integrative approach to the research and development of modern, integrated sensor systems. Integration in this context comprises functional, systemic, and circuit design aspects. The institute combines three research teams with long-lasting experience in the areas of sensor technology, ASIC design, and communication technology. The focus of the research is on biomedical, environmental, and automotive sensors, integrated scalable controllers and advanced signal processing techniques for limited computing resources, and networking issues for sensors, including real-time and wireless aspects. In the area of sensor networks, particular emphasis is on security problems in large-scale ad-hoc networks with limited communication bandwidth and resource-limited nodes. Another important topic is high-accuracy clock synchronization in distributed systems. The institute for integrated sensor systems can be categorized within the stakeholder group as an academic organization.

2.1.2 ICM electronics (Serbia)

ICM electronics is the leader in automation and industrial robotics in the territory of the former Yugoslavia as well as the Middle East and former Soviet Union and Africa. ICM Electronics integrates industrial robots for various applications such as packaging, palletizing, welding and polishing. In the area of automation ICM does PLC programming, control cabinet assembly, SCADA systems and visualisation of processes. ICM offers complete hardware and software solutions for automation and robotics applications. ICM has a factory site for product development, equipped with industrial robots and flexible conveyor belt systems. In process automation ICM is
well established as a leader for food processing automation. The role of ICM within the stakeholder group can be categorized as a solution integrator.

2.1.3 Phoenix Contact (Germany)

Phoenix Contact develops and manufactures industrial electrical and electronic technology products that power, protect, connect and automate systems and equipment. The innovative products and system solutions of Phoenix Contact are found in a huge variety of industrial applications, including:

- Automotive
- Water/wastewater
- Machine building
- Power generation
- Oil and gas

Phoenix Contact has six major product lines, featuring more than 25000 different products, and every year it introduces approximately 20 to 25 product innovations. Phoenix Contact has currently 11000 employees worldwide. In the stakeholder group we will have a representative of the Phoenix Contact business unit manufacturing solutions. Thus, we can refer to Phoenix Contact being in the role of an end user.

2.1.4 KW Software (Germany)

KW-Software is an internationally leading software manufacturer of IEC 61131, SAFETY and PROFINET technologies as well as a provider for solutions and technologies in the field of industrial control and safety technology. Available products of KW Software are the Multiprog PLC programming software and the PLC runtime system ProConOS. Many innovative and worldwide leading manufacturers of automation components in Europe, Asia and the USA count on software solutions by KW-Software. Among KW Software customers are machine and system manufacturers with their own control engineering, system integrators with or without control engineering and of course suppliers with a complete range for automation engineering. KW-Software can be categorized within the stakeholder group as a solution provider.

2.1.5 Fraunhofer IPA (Germany)

The Fraunhofer IPA was founded in 1959 and incorporated in the Fraunhofer-Gesellschaft in 1971. Of the 57 institutes that make up this prestigious research organization, the Fraunhofer IPA is one of the largest single institutes, employing around 200 scientists. It has an annual budget of approximately 36 million euros, with 50 percent of its revenue stemming from industrial projects.

Finding solutions to organizational and technological challenges, particularly within the production environment of industrial enterprises, is the key focus of the research and development work carried out at the Fraunhofer Institute for Manufacturing Engineering and Automation IPA. The research group »Digital Factory« focuses on research, development and applying the methods, instruments and tools for modeling, simulation, visualization and optimization of products, factories, manufacturing resources and processes. The »Grid Engineering for Manufacturing Lab – GEMLab« is the state-of-the-art IT environment for integration and distribution of data, models, engineering tools, simulation applications and computing resources based on Grid Technologies. Fraunhofer IPA can be categorized as a research organization.
2.1.6 Centimfe (Portugal)

Founded in 1991, CENTIMFE – Technological Center for the Mouldmaking, Special Tooling and Plastic Industries – is a solution provider and technological counterpart in the development of industrial and pre-competitive projects. CENTIMFE, as a pro-active and dynamic interface organization, acts as:

- an important link towards Industrial Innovation;
- a key-partner in the development of structural and strategic projects for the Moulds, Special Tools and Plastic Sectors;
- an important node in the technology transfer between R&D and Scientific Institutions and Industrial Companies.

Through a consistent activity of applied research, experimental development, technology intelligence and networking, CENTIMFE is endowed with intervention capacities in cutting edge fields such as Rapid Prototyping and Rapid Tooling, High Speed Machining, Surface Finishing, IT & Collaborative Work or Injection Moulds Optimisation.

Nowadays it gathers more than 200 associated organisations, comprising industrial companies and public institutions such as IAPMEI (the SME and Investment Support Institute), INETI (the Portuguese Industrial Technology and Engineering Institute), IPQ (the Portuguese Institute for Quality) and the Town Councils of Marinha Grande and Batalha, as well as sector-oriented private organizations such as CEFAMOL (National Association of the Moulds Industry) and APIP (National Association of the Plastics Industry). It can be categorized as a solution provider.

2.1.7 TECOS (Slovenia)

TECOS – Slovenian Tool and Die Development Centre – is a technology centre established in 1994 whose core competence is in the fields of FEM analyses, product design, toolmaking, optical metrology, reverse engineering and specialised training. They are able to perform turn-key projects in polymer processing. Through members of our network they are able to perform larger scale projects in tooling and material processing branches. TECOS can be categorized as a solution provider.

2.1.8 TTTech Computertechnik AG (Austria)

TTTech Computertechnik AG is an international 200 employee company with headquarters in Vienna, Austria and other locations in Germany, Italy, Romania, the United States, Japan, and Korea. Product focus is on solutions for safe and reliable networks for the transportation and automation industries based on their "Time Triggered Architecture" approach. TTTech solutions are used, for example, in applications for the Airbus A380, the Boeing 787 Dreamliner and the next generation of the Audi A8. The research focus of this company is on distributed, fault-tolerant hard real-time systems. Some of their research projects can be found on the web page of their favourite partner, the University of Vienna. TTTech can be categorized as a solution provider.

2.1.9 lesswire AG, IHP (Germany)

lesswire AG is a German company which offers products and solutions for wireless data transmission and information utilization on mobile devices in "wireless worlds". lesswire AG is a market pioneer on wireless data transmission combined with

1 http://www.tttech.com/products/
2 http://www.vmars.tuwien.ac.at/frame-projects.html
location awareness and the use of mobile terminals in wireless worlds. Examples include the development of Bluetooth- and WLAN systems and modules.

lesswire AG was founded in April 1999 as a spin-off company from the Institute for High Performance Microelectronics in Frankfurt(Oder), Germany, a research institute with a focus on wireless communications systems.

Reference projects include:

- Volkswagen AG: Bluetooth firewall, Wireless Car-Diagnostic-gateway, Car-2-Car communication - standard
- Hewlett-Packard: Bluetooth/IrDA based location and identification services within the new Daimler Benz museum
- Samsonite: Intelligent Bluetooth luggage module against luggage theft
- Siemens: Car diagnostics via Bluetooth/WLAN
- WAGO: Wireless Realtime IO transmission via Bluetooth

lesswire AG can be categorized as a solution provider.

2.1.10 FGA SpA (Italy)

The FIAT Company (Fabbrica Italiana Automobili Torino) manufactured its first car in 1899 and since then it has produced more than 90 million vehicles. At the present Fiat Group Automobiles distributes its products in more than 90 Countries worldwide and the Company’s Brands are: Fiat (cars and light commercial vehicles); Lancia (cars, since 1969); Abarth (cars, since 1971); Alfa Romeo (cars, since 1987). Its global reach has increased as a result of the integration with Chrysler Group, through which its portfolio has recently been expanded to include the Jeep and Chrysler brands, with models produced in North America now being distributed in Europe through the new Lancia-Chrysler and Jeep sales networks, which together count more than 1,000 dealers.

The company’s businesses include Vehicles, Spare Parts & Accessories, After Sales Services, Financial Services, Long-Term Rental/Fleet Management. Fiat Group Automobiles can be categorized as an End user.

2.1.11 Iveco SpA (Italy)

As a major player in the global transport world, Iveco is an international leader in the development, manufacture, marketing and servicing of a vast range of light, medium and heavy commercial vehicles.

It also manufactures passenger transport vehicles and special vehicles for defence, civil protection and specific missions like fire-fighting. The vehicles adopt the latest engineering technologies, applied to a comprehensive range of engines running on diesel and alternative fuels. These include natural gas (CNG), bio-fuels, hybrid technologies and electric engines.

The product range is complemented by a range of financial and after-sales services, and used vehicle activities. Iveco can be categorized as an End user.

2.1.12 Comau SpA (Italy)

Comau is a technology and innovation leader committed to the continuous improvement of products, processes and services, through the production of advanced manufacturing systems.

Comau oversees their products from the idea and design phase, through to completion, training and maintenance. These products consistently exceed the needs and expectations of the Comau customers in industry segments such as, automotive, aerospace, heavy industry, military, and recreational.

Comau, worldwide leader in the manufacturing of automatic flexible systems, always played the role of protagonist in the evolution of Industrial Robotics. Comau Robotics is one of the worldwide leading manufacturers of high quality industrial robots. Since
1978, Comau Robotics has been engaged in the design of automated integrated solutions, offering its Customers the highest grades of performance and reliability. The continuous improvement of products, processes and services, through the application of the most advanced innovative technological solutions, allows Comau Robotics to contribute to its Customers’ competitive advantage. Comau Robotics is working alongside the Customer acting as a partner in all phases of technological process, measuring up to the challenge of assuring its future growth and that of its partners. Comau SpA can be categorized as vendor of industrial robots.

2.1.13 DFKI – German research center for artificial intelligence (Germany)

Contacts with DFKI are a result of cooperation with Siemens in the context of DFKI’s SmartFactoryKL initiative. This initiative is a manufacturer-independent demonstration and research platform in which innovative ICT technologies and their use in a realistic industrial production environment are tested and developed. The DFKI has also several contacts to both large industries and also to many small and medium enterprises operating in the field of factory automation. DFKI can be categorized as a research organization.

2.1.14 Reply SpA (Italy)

Santer Reply SpA, a subsidiary of Reply SpA, has been operating since 2002 in the private and public healthcare market in response to the growing demand for software and computer automation from its customers. In February 2009 Santer Reply SpA acquired the Motorola research and development centre in Turin, extending competences to hardware and embedded software that enable innovation in the Internet of Things. The group of highly qualified engineers has matured since its creation in 1999 until today, and has strong experience in research, design, development, prototyping, testing and validation of wireless devices with advanced technology, as well as human and economic capital by investing in setting up laboratories and state of the art equipment. Santer Reply, that today is the Reply company specialized for the R&D initiatives, focuses its development areas among others on Logistics: tracking of the value chain and infomobility and has an established clients in Business sectors such as Automotive, Energy & Utilities, IT & Telecommunications, Public Administration & Local Government, Healthcare.

Especially, in the automotive area, Santer Reply with the other companies of the Reply group (in particular Click Reply and Hermes Reply) closely collaborates with FIAT. In the context of IMAGINE, Concept Reply will locally support CRF in setting-up and running CRF’s Living Lab demonstration.

Reply SpA, the Holding, is a leading Consultancy, Systems Integration, Application Management and Business Process Outsourcing company, specialized in the creation and implementation of solutions based on new communication networks and digital media. Reply SpA is specialized in creating effective business solutions based on innovative technologies enabling communication between clients, partners suppliers and collaborators.

Reply supports the main European Industrial groups operating in Telco and Media, Banking, Insurance and Financial companies, Industry and Services, Energy and Utilities and Public Administration market segments. In 2009, Reply revenue by market segments was composed for the 20% in the manufacturing segment.

About Industries Reply supports companies in the implementation, change and management of Business IT Systems from the strategic design to the understanding and redefinition of the core Processes. Reply designs and deploys solutions aimed at
ensuring application integration supports the Extended Enterprise (ERP, CRM, SCM, BI). In the May 2005 Reply acquires a branch from the Fiat Group dedicated to the management of the —third-party customers‖ of Fiat Gesco, a company specialised in process management solutions. With this acquisition, Reply adds a new important component to its offering including Consulting, System Integration, Application Management and Process Management.

2.1.15 FIDIA SpA (Italy)

FIDIA SpA was established in 1974, FIDIA is one of the European leaders in manufacturing Numerical Controls, Servodrives and High Speed Milling Machines for mould&dies and aerospace sectors. The company has also developed and offers CAM modules suitable in particular for on line generation of part programs (HIMILL). Fidia opened a company site located in Bari (Italy) totally dedicated to research activities.

FIDIA is committed to developing solutions aiming at improving the NC and machine tools performances and related business in several directions: Dynamics, Process Control, NC Architecture, Business Management.

2.2 Publications

In order to provide a complete overview of all scientific publications, this section lists the publications in a consecutive way starting from the beginning of the project.

2.2.1 Journal publications


2.2.2 Conference publications

2010


2011


2012


[16] Sergio Gusmeroli, Salvatore Piccione, Domenico Rotondi, “IoT@Work Automation Middleware System Design and Architecture”, 17 th IEEE International Conference on Emerging Technologies & Factory Automation (ETFA 2012), Kraków, Poland, September 2012. (Accepted for publication)
2.3 Project website

The consortium of the IoT@Work project is actively maintaining the existing website which presents the project and project related content like publications, selected reports, member organizations, and people behind it. It has been continuously updated with new project results and information as well as with interesting events related to the project. The website is reachable via https://www.iot-at-work.eu. During the second year the website has been mainly maintained by the partner inIT and a screenshot of its first page is shown in Figure 2.1.

With the help of the website analysis tool Google analytics an overview of the page hits can be generated. Main focus is put on the source of visitors and how they reached the website and which content was of interest for the visitors. Current statistics cover the period from November 2011 until May 2012. During this period some enhancements of the content have led to increased number of visitors around the update dates. Peaks around the publishing times of deliverables and publications show interest of visitors in project progress and technical details discovered. As well as technical data and descriptions the persons behind the project were in the focus of...
the visitors. Both topics cover the majority of page hits on the IoT@Work project website.

The average number of pages viewed per visit shows a purposive handling of the website. Typical visitors are heading directly to the documents of interest which is possible by direct navigation on the website. The following three graphs show the location of visitors, the traffic sources and the page views, respectively (cf. Figure 2.2, Figure 2.3, and Figure 2.4).

Since the last reporting, we had more than 1000 visitors from more than 60 different countries. However, the majority of visitors are located in Europe as shown in Figure 2.2.

![Location map](http://www.iot-at-work.eu)

**Figure 2.2: Location of visitors of www.iot-at-work.eu**
Figure 2.3: Traffic sources of www.iot-at-work.eu

Figure 2.4: Page views of www.iot-at-work.eu
2.4 Project leaflet

In order to be able to inform a broader audience about our project, the IoT@Work consortium has created a leaflet, which summarizes the main vision of the project, along with its objectives and other important facts and figures about the project. This activity is considered to be very important, especially when exhibiting on trade fairs, conferences, and other similar events. The project leaflet is shown in Figure 2.5.

![Figure 2.5: IoT@Work project leaflet](image-url)
2.5 Project newsletter and video

In order to inform the IoT@Work stakeholder group and other interested parties, the IoT@Work consortium will start to distribute a newsletter, which summarizes the achievements of the project. The first newsletter is currently in production. It will be available in the next few weeks and distributed accordingly.

Furthermore, a project video is presently being produced which will be used for exhibitions and trade fairs to show the project goals and achievements in a very compact and easy to follow format.

2.6 Other dissemination activities

A selection of different other dissemination activities during the first 24 months of IoT@Work is given in Table 2.2.

*Table 2.2: Other IoT@Work dissemination activities*

<table>
<thead>
<tr>
<th>Dissemination Action and Location</th>
<th>Partner</th>
<th>Type</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>KommA 2010 – Kommunikation in der Automation (Lemgo)</td>
<td>inIT</td>
<td>External</td>
<td>Presentation of the project.</td>
</tr>
<tr>
<td>Embedded World (Nuremberg)</td>
<td>Siemens</td>
<td>External</td>
<td>Project presentation.</td>
</tr>
<tr>
<td>Presentation of findings to other interested Siemens business units</td>
<td>Siemens</td>
<td>Internal</td>
<td>A multitude of meetings with Siemens Business Units (Siemens Industry, Siemens Cities and Infrastructure, Siemens Corporate Technology) to discuss exploitation strategies of project results.</td>
</tr>
<tr>
<td>Presentation of findings to other interested teams within the company</td>
<td>EMIC</td>
<td>Internal</td>
<td>Meetings and interactions with potentially relevant teams across the company, in order to disseminate project activities, and particularly expose requirements and trends.</td>
</tr>
<tr>
<td>Education and teaching</td>
<td>inIT</td>
<td>Internal</td>
<td>Introducing the IoT@Work concepts and scenarios in the education of M.Sc. and Ph.D. students at the department of electrical engineering and computer sciences of the Ostwestfalen-Lippe University of Applied Sciences in Lemgo.</td>
</tr>
<tr>
<td>Project presentation to visitors</td>
<td>inIT</td>
<td>External</td>
<td>Presentation of the IoT@Work concept in the context of the &quot;Lemgo model factory&quot; to visitors of inIT.</td>
</tr>
<tr>
<td>IoT International Forum, Berlin</td>
<td>TXT</td>
<td>External</td>
<td>Contribution on capability</td>
</tr>
<tr>
<td>Event Type</td>
<td>Organiser</td>
<td>Location</td>
<td>Details</td>
</tr>
<tr>
<td>------------</td>
<td>-----------</td>
<td>----------</td>
<td>---------</td>
</tr>
<tr>
<td>Presentation of findings to other interested teams within the company</td>
<td>CRF</td>
<td>Internal</td>
<td>Meetings with potentially relevant and interested teams in different sectors of FIAT group, in particular with FGA (FIAT Group Automobiles) – ICT Division, COMAU – Powertain Systems. These meeting were carried out in order to disseminate project activities and vision, discuss exploitation and share requirements.</td>
</tr>
<tr>
<td>Siemens Internal Workshop</td>
<td>Siemens</td>
<td>Internal</td>
<td>“Future Internet Community”</td>
</tr>
<tr>
<td>NESSOS Industry Forum Panel (28 October 2011) of the Service Wave</td>
<td>TXT</td>
<td>External</td>
<td>NESSOS Workshops organised within the Future Internet Week held in Poznan</td>
</tr>
<tr>
<td>Siemens Internal Workshop</td>
<td>Siemens</td>
<td>Internal</td>
<td>“Industrial Ethernet Working Group”</td>
</tr>
<tr>
<td>IoT@Work stakeholder meeting</td>
<td>All</td>
<td>External</td>
<td>General organization and hosting of the meeting was done by CRF</td>
</tr>
<tr>
<td>Hanover Fair 2012</td>
<td>inIT</td>
<td>External</td>
<td>IoT@Work was part of the inIT booth and presented the project to a very broad industrial audience</td>
</tr>
<tr>
<td>Meeting held in the Reply SpA premises in Turin</td>
<td>TXT</td>
<td>External</td>
<td>Presentation of IoT@Work and corresponding TXT developments to Reply and FIDIA SpA (<a href="http://www.fidia.it">http://www.fidia.it</a>)</td>
</tr>
<tr>
<td>University of Murcia - IoT6 cooperation</td>
<td>TXT</td>
<td>External</td>
<td>In April 2012 TXT has agreed with the University of Murcia (Spain) to provide them the IoT@Work capability based access control software to be experimented in the FP7 IoT6 project (<a href="http://www.iot6.eu/">http://www.iot6.eu/</a>). Currently TXT has provided the sources for the client library (the code to be used by a client to manage access control using access capabilities) and</td>
</tr>
</tbody>
</table>
the source for the wizard necessary to create access capabilities. It is planned to provide the ENS Authorization Service, the Policy Decision Point Service and the Capability Revocation Service as soon as they are debugged and finalised. All these components are being provided under the terms of the Apache Public License 2 conditions. University of Murcia plans to adapt the client library and the ENS Authorization Service to manage access control of HTTP and/or CoAP based services.

| Invited presentation at University of Magdeburg | inIT | External | Invited speech about IoT@Work concepts during the research seminar of the real-time systems and communications group |
| Workshop on Factory Communication Systems (WFCS 2012) | Siemens | External | Invited talk at the industry day about IoT@Work concepts and solutions |

Some impressions of the other dissemination activities are shown in Figure 2.6 and Figure 2.7.

Figure 2.6: inIT booth at the Hanover Fair 2012 where an inIT employee explains the IoT@Work concepts based on our leaflet to an interested audience
2.7 Showcasing and workshop activities

The first IoT@Work stakeholder workshop was organized by CRF in their facilities in Orbassano. All IoT@Work partners joined the workshop and most of the stakeholder group members participated. Since many stakeholder workshop outcomes are of a confidential nature, more details are provided in the confidential Appendix. Furthermore, the consortium has organized two sessions at the IoT Week in Venice and has been able to get a special session at the major IEEE conference for factory automation accepted. The contents are described in section 2.7.1 and 2.7.2 respectively.

2.7.1 Organized Sessions at the IoT Week 2012, Venice

The IoT Week 2012 in Venice provides insights into recent IoT developments and a unique opportunity to network and meet IoT experts from all over the world. Featured presentations will be from high-level representatives of industry, academia and politics which are complemented by workshops and panel discussions around the Internet of Things. IoT@Work will actively contribute to this major IoT event by means of organizing two different sessions within the program.

2.7.1.1 Demo Session “Implementing IoT”

The demo session “Implementing IoT” is organized by the IoT@Work consortium and introduces the demonstrators and pilots from project members of the IERC. In addition, external IoT projects are invited to share their experience with implementing real-life IoT systems for experimental or even commercial deployment of both IoT applications and platforms. The participants to this session get a chance to learn about the background of the project pilots, and are welcome to roam through the exhibition hall where the physical pilots are displayed. The program of the session is as follows:

16:30–16:35 Welcome remarks, Amine M. Houyou (Siemens AG – IoT@Work)
16:35–17:55 IoT Pilots & Invited Talks

Supporting Agile and Smart Manufacturing
IoT@Work: Enabling IoT applications in automation environments
Amine M. Houyou (Siemens AG – IoT@Work)

IOT–A: using the reference architecture for fusing IoT technologies and solutions.
The demonstrated use cases are concentrated in the areas of health care and
retail.
Martin Fiedler (Fraunhofer IML – IOT-A)

IOT-A: IBM Mote Runner
Development and Run-Time Platform for Wireless Sensor Networks
Demonstrating the development process of WSNs applications based on the Mote Runner platform.
Marcus B Oestreicher (IBM – IOT-A)

ELLIOIT: San Raffaele Hospital Living Lab Use-Case.
The healthy interactive vending machine.
Gabriella Monteleone (kit-digital – ELLIOIT)

SmartSantander: Experimenting IoT at a city scale.
Reporting on IoT use-cases in the cities of Santander, Belgrade, Guildford, and Lübeck.
Jose Manuel Hernandez Muñoz (Telefonica I+D, SmartSantander)

IoT6: Demonstrating the role of IPv6 in IoT deployment.
This first demonstration will present several uses cases of possible IoT interactions based on IPv6.
Sébastien Ziegler (Mandat International, IoT6)

PROBE-IT: Validating IoT using an Open & Standardised Testing Methodology: the 6LoWPAN case.
The demonstration shows how to use an open & standardised methodology for a range of tests on IoT building blocks.
Pedro Maló (UNINova, PROBE-IT)

From DACAR to MUNICH. IoT in healthcare, wellness and ambient assisted living.
Prof. Christoph Thuemmler, Edinburgh Napier University

Inteligoo: Catch the drops, make an ocean.
Invited talk for Smart City use cases, Dr. Morja Volk (University of Ljubjana)

17:55–19:00 Closing remarks going through the exhibition hall, Amine M. Houyou (Siemens AG – IoT@Work)

2.7.1.2 Session “IoT Exploitation”
The session “IoT Exploitation” is also organized by the IoT@Work consortium in cooperation with the project “ebbits” and aims at fostering discussion on how the Internet of Things paradigm is going to be realized in everyday-life, permeating the whole economy and society. During the session, major IERC projects will present how far they are in realizing their vision of IoT and its impact in different application fields, also highlighting current limitations and constraints to the adoption of IoT technologies. First, an overview on the adoption of IoT for business purposes will be provided, with a major focus on industrial environments. Second, application scenarios related to the smart life concept as well as emergency and crisis management will be analyzed. The view on the application domains enabled by IoT will be completed by presenting initiatives promoting a common vision of IoT and supporting its exploitation, from both technical and non-technical perspectives. The program of the session is as follows:

16:30–16:45 - Welcome remarks, Amine Mohamed Houyou, (Siemens AG – IoT@Work)

16:45–17:45 - IoT application domains, Moderator: Maurizio Spirito (ISMB – ebits)
IoT for business purposes
ebbits: towards the integration of IoT into mainstream enterprise systems (focus on traceability and car manufacturing), Peter Rosengren (CNet – ebbits)

Supporting Agile and Smart Manufacturing: an IoT-Centric Approach
IoT@Work: vision and focus on industrial and automation environments., Amine Mohamed Houyou (Siemens AG – IoT@Work)

IoT for a Smart Life
BUTLER: IoT as an enabler for smart life application scenarios, Bruno Cendón (inno, BUTLER)

An IoT-based solution for large-scale emergency management
BRIDGE: adoption of IoT technologies to support crisis and emergency management, Andreas Zimmermann (Fraunhofer FIT, BRIDGE)

17:45–18:00 Coffee break

18:00–18:45 Towards a common vision and a wider acceptance of IoT
Moderator: Amine Mohamed Houyou, (Siemens AG – IoT@Work)

Towards a common vision of the Internet of Things
IoT-i: analysis of IoT impact on European economy and society. Steps towards the definition of a common vision. (Srdjan Krco, Ericsson, IoT-i)

A unified IoT architectural reference model
IoT-A: creation of an architectural reference model and key building blocks fostering the future IoT, Martin Fiedler (Fraunhofer IML, IoT-A)

Supporting IoT exploitation
PROBE-IT: benchmarking of IoT deployments and analysis of less technical aspects including user acceptance, market and policies, Sophia Vallet-Chevillard (inno TSD, PROBE-IT)

18:45–19:00 Closing remarks Maurizio Spirito (ISMB – ebbits) and Amine Mohamed Houyou (Siemens AG – IoT@Work)

2.7.2 ETFA 2012 Special Session

To enhance the technical program and focus on specific topics and areas, ETFA 2012 conference offers the organization of special sessions, in addition to regular tracks. Special sessions can be compared to workshops, but have fewer papers which are included. They always cover specific topics belonging to one track of the conference. To attract a larger audience, the IoT@Work consortium has sent a proposal for the special session that is closely related to the research area of IoT@Work. The proposal has been accepted and is described below.

Title of the session
“Internet of things technologies for adaptable and agile automation systems”

Organizers
M.Sc. Henning Trsek
Institut Industrial IT, Ostwestfalen-Lippe University of Applied Sciences

Prof. Dr. Juergen Jasperneite
Fraunhofer IOSB-IN, Application Center Industrial Automation

Dr. Amine M. Houyou
Siemens AG, Corporate Technology
Conference technical track

Information Technology in Automation, Co-Chairs: Georg Frey (georg.frey@aut.unisaarland.de) and Marga Marcos (marga.marcos@ehu.es)

Technical area focus of the session

Industrial automation systems need to become adaptable and agile, and operate in a self-* manner - especially in the context of demand driven production processes. The factory of tomorrow will consist of flexible production lines that will be able to adapt quickly to a completely new manufacturing process. The adaptability requirement is due to a consumer driven market that demands customized goods in smaller production batches, usually down to lot sizes of one.

Today’s deployment and commissioning of production systems is very rigid and relies heavily on a static offline engineering for planning, designing and configuring the manufacturing system. Thus, changing or extending the system is very hard and time consuming. Therefore new technologies and paradigms are needed for self-organization, self-configuration of the network and the application which preserve the factory floor requirements in terms of latency, jitter, high reliability, etc. Internet of Things (IoT) technologies and mechanisms are allowing devices, machines, and objects to interact with each other without relying on human intervention to set-up and commission the automation system. Hence, they are well suited to address the challenges of a highly flexible automation system by means of providing a plug and work functionality.

This Special Session deals with all aspects related to Internet of Things technologies in the context of industrial automation systems, such as wireless and wired communication systems, middleware for automation systems, security aspects, and all other topics related to this field. It should serve as a discussion forum for experts dealing with Internet of things technologies in the context of manufacturing environments, pointing out directions for future research, and seek collaboration opportunities on all aspects of the IoT in industrial environments.

TOPICS of the special session include, but are not limited to:

- Internet of Things architectures and components for industrial automation
- Wired/Wireless communication technologies for IoT
- Middleware for industrial communication systems
- Performance assessment and management (QoS, scalability, reliability, etc)
- Advanced naming and addressing schemes
- IoT self-* techniques for system organization and management
- Model driven development (MDD) for IoT systems
- Network management, planning and engineering in automation systems
- IoT applications and important services
- Security architecture and issues for devices and services
- IoT test beds and validation

The titles of all six contributions to the session are:

1. **Towards Autoconfiguration of Industrial Automation Systems: A Case Study Using PROFINET IO**
   Lars Dürkop, Henning Trsek, Juergen Jasperneite

2. **A Generic Synchronized Data Acquisition Solution for Distributed Automation Systems (from outside the project)**
   Florian Pethig, Björn Kroll, Oliver Niggemann
3. Agile Manufacturing: General Challenges and the IoT@Work Perspective
   Amine Houyou, Hans-Peter Huth, Christos Kloukinas, Henning Trsek, Domenico Rotondi

4. IoT@Work Automation Middleware System Design and Architecture
   Sergio Gusmeroli, Salvatore Piccione, Domenico Rotondi

5. Security Architecture Elements for IoT enabled Automation Networks
   Kai Fischer, Jürgen Gessner

6. Employing Internet of Things Technologies for Building Automation (from outside the project)
   Dimitrios Amaxilatis, Vasileios Georgitzikis, Dimitrios Giannakopoulos, Ioannis Chatzigiannakis
### 3 Cluster activities

The consortium has been actively participating in cluster activities, especially the IERC and related projects. All relevant events are shown in Table 3.1.

*Table 3.1: IoT@Work cluster activities*

<table>
<thead>
<tr>
<th>Cluster activity and location</th>
<th>Partner</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>HYDRA programming workshop</td>
<td>Siemens</td>
<td>Evaluate the possibilities of using the HYDRA middleware platform.</td>
</tr>
<tr>
<td>ICT conference 2010, Brussels</td>
<td>Siemens</td>
<td>Contacts to other related projects and activities have been maintained and strengthened.</td>
</tr>
<tr>
<td>Future Internet Assemblies, Budapest</td>
<td>Siemens</td>
<td>Contacts to other related projects and activities have been maintained and strengthened.</td>
</tr>
<tr>
<td>Organization of the IERC meeting (activity chains application scenarios and exploitation), Bonn</td>
<td>Siemens</td>
<td>Kicking-off the activities within those activity chains, consolidating their structures and defining their goals.</td>
</tr>
<tr>
<td>IOT-A Stakeholder meeting</td>
<td>Siemens</td>
<td>Some elaborated scenarios and requirements have been provided to IOT-A.</td>
</tr>
<tr>
<td>IOT-A Stakeholder meeting</td>
<td>CRF</td>
<td>Contribution to IOT-A scenario definition.</td>
</tr>
<tr>
<td>Collaboration with IoT-A</td>
<td>Siemens</td>
<td>Coordination and know-how transfer, for instance feedback at several instances to the IOT-A team on the IoT reference model has been provided.</td>
</tr>
<tr>
<td>IERC AC04-AC05 meeting, Brussels</td>
<td>TXT</td>
<td>Presentation of the capability based authorization approach.</td>
</tr>
<tr>
<td>IoT-Week 2011, Barcelona Spain</td>
<td>Siemens/TXT</td>
<td>Active participation to IoT Week with focus on smart cities and IOT-A Architecture feedback.</td>
</tr>
<tr>
<td>Invited as stakeholder to the EU Project ActionPlant (a project of the Private-Public Partnership “Factories of the Future”)</td>
<td>Siemens</td>
<td>Presentation of the IoT@Work approach to agile manufacturing and enabling IoT technologies.</td>
</tr>
<tr>
<td>IERC meeting, Budapest</td>
<td>TXT</td>
<td>Presentation of the IoT@Work project.</td>
</tr>
<tr>
<td>Provision of details on the capability based authorization approach to the ETSI TC M2M chairman (Mrs. Marylin Arndt)</td>
<td>TXT</td>
<td>Result of the attendance of the IERC AC04-AC05 meeting.</td>
</tr>
<tr>
<td>Event</td>
<td>Participant(s)</td>
<td>Remarks</td>
</tr>
<tr>
<td>----------------------------------------------------------------------</td>
<td>----------------</td>
<td>-------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Future Internet Week – Internet of Things: Workshop (Poznan 27/10/2011)</td>
<td>Siemens-TXT</td>
<td>AC11 session organization.</td>
</tr>
<tr>
<td>Future Internet Week – Internet of Things: Workshop (Poznan 27/10/2011)</td>
<td>TXT</td>
<td>Workshop attendance and AC11 session chairing and presentation.</td>
</tr>
<tr>
<td>1st IoT International Forum</td>
<td>TXT</td>
<td>IERC Meeting held in Berlin within the IoT International Forum.</td>
</tr>
<tr>
<td>IERC AC1 Meeting held in Trento (Italy) (February, 16th)</td>
<td>TXT / Siemens</td>
<td>In this meeting TXT held a presentation on some issues and approaches it is pursuing on: semantics, directory service, event processing, access control. Siemens gave a talk about the IoT@Work architecture</td>
</tr>
<tr>
<td>IERC AC2 workshop on IoT Interoperability held in Paris (March, 26th)</td>
<td>TXT / Siemens</td>
<td>Two presentations; about semantics as a way to face interoperability issues and the architecture</td>
</tr>
<tr>
<td>Future Internet Week – Internet of Things: workshops and discussions (Aalborg 09-11/05/2012)</td>
<td>Siemens</td>
<td>Workshop attendance and participation to IERC coordination meeting.</td>
</tr>
</tbody>
</table>
4 Exploitation strategy

4.1 Siemens AG (SAG)

The SAG exploitation strategy is mainly unchanged compared to D5.1 and is repeated here for convenience. The only difference is added in the last paragraph.

Siemens AG provides a broad spectrum of offerings for industry, energy control and building automation where the IoT@Work results can be applied.

Most prominent among these offerings are the PROFINET based products, covering industrial Ethernet, I/O modules and the software needed to program and manage installations of those products.

The PROFINET technology is driven by the European-centred organisation PI (PROFIBUS & PROFINET International), which comprises more than 1400 members worldwide, where Siemens has been heavily engaged from the very beginning. The PI uses the ISO standardization body to recommend a standard and members of the working groups have also been active in several standardization bodies such as IEEE. The IEEE Ethernet and QoS standardization work attempts to influence the QoS extensions to standard Ethernet to include industrial requirements. More concretely, and during the first year, the standardization work on IEEE 802.1aq known as “Audio Video Bridging” have been influenced by results and further investigations in IoT@Work. The ideas of defining an industrial communication profile in a standard originally destined for providing QoS for home-entertainment Ethernet network, is defended by the Siemens industrial business units. However, the evaluation of the scenarios and use cases where such a standard might be useful and its possible extensions can be influenced by IoT@Work results.

The application areas of interest for Siemens include manufacturing, SCADA systems, networks in ships, buildings, energy distribution networks, and more. Siemens also offers remote services for maintenance and support for the relevant products, as well as planning support and tools for the latter. Constantly improving these products and the service and planning business is vital for the company. There is a trend that unique selling points of products are not so much hardware or software quality or costs of single devices, but more the intelligence needed to adapt to different application domains and the intelligence to cut operational costs. The Siemens teams involved in the IoT@Work project have also successfully applied for EU projects destined at using IoT technologies in specific application areas such as smart grid. The Future Internet PPP project “Future Internet for Smart Energy” (Finseny), as an example, includes not only the research departments from Siemens but also business units investigating the aspects of connecting renewable energies and smart things to a future internet infrastructure.

On a longer term, we expect significant knowledge and improved core technologies for the future generations of solutions for industrial automation in general and specifically for PROFINET-based concepts and products. While the first candidate for applying the results might be in the area of factory and process automation, dissemination into other areas as mentioned before is also planned – already today PROFINET technologies are heavily used, e.g., for energy substation automation. As the success of the European PI organisation proves, a competent mix of partners is required to cover a reasonable broad range of requirements and to develop mature and innovative solutions. Thus IoT@Work brings together major European players in the area of industrial communication and automation to push for Plug&Work concepts, to feed them back into the PI and of course to be able to offer outstanding products and solutions in the mid-term future.
New exploitation topics include the rising interest of SAG business units in flexible and low-cost, yet powerful, Ethernet technologies. Here specifically IoT@Work will intensify the work regarding Shortest Path Bridging (SPB), designated as a major enabler of the IoT@Work slice concept augmenting the AVB work. The slice concept on its own is also gaining more interest (for allowing an automatic control and management in the network) and will be a prominent part of internal dissemination.

4.2 European Microsoft Innovation Center (EMIC)

EMIC’s exploitation strategy in IoT@Work is aimed at impacting Microsoft product roadmaps and future offerings. Microsoft is a leading provider for software technology and platforms. This covers the entire lifecycle of software and system development, such as design, implementation, monitoring, and control. Specific targets of Microsoft businesses include the Windows Embedded Business and the Server and Tools Business. The Windows Embedded Business in particular tries to bring smart devices towards service oriented devices, which could be used for industrial automation, home automation or process monitoring and control. The integration of heterogeneous infrastructures and the investigation of how various devices and actuators can be connected with the backend, such as MS Dynamics or SQL Server, are furthermore key aspects for Microsoft and are meant to support the flexible and easy integration of large-scale heterogeneous environments. This also includes monitoring and management of such infrastructures as in scope of the System Center suite of products inside the Server and Tools Business.

EMIC exploitation activities in the second period of the IoT@Work project continued on keeping internal relevant groups informed with project scenarios, technology requirements, and Plug&Work and IoT trends. Technology-wise these activities targeted groups around large-scale system management and service monitoring.

In addition, the close collaboration with universities pushes an early exposure of industry perspective and insights towards the academic world, enabling uptake in research and education.

4.3 TXT e-solutions (TXT)

TXT’s IoT@Work exploitation is mainly focused on the market segments in which its TXT Next Business Unit operates. These are specifically:

- The Aerospace & Defense market segment for TXT Next activities on Digital manufacturing and Managed Service & Consulting: in this market segment manufacturers have to face increasing complexity of production equipment and systems, as well as increasing relevance of production delocalization and/or co-design and co-production on new products (e.g. Boeing 787 Dreamliner), with more stringent constraints on timeliness, cost control, safety measures, production processes and plant monitoring, etc.;
- The High Tech Manufacturing market segment, where companies have to face a progressively increasing challenging and dynamic scenario that envisages shorter products life cycles, the need to optimize and maximize the usage of the production systems, and to readapt the production systems to new productions or to dynamically share these systems to concurrently produce different products according to real-time demand.

TXT Next solutions often have to be designed and developed according to specific software development standards (e.g.: MIL-STD-498, RTCA/DO-178B, DO-200/201, CMMI).

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3 http://www.txtgroup.com/txtnext/int/industries.shtml
Obviously, ICT solutions for these market segments have to be able to provide a high level of reliability, adaptability and re-configurability, have to heavily reduce human intervention, (re-)configuration time and error rates, provide a wider and more controlled access to production data and systems and offer extensive support for all manufacturing phases and departments (Engineering, Manufacturing, Support, etc.).

The IoT@Work research areas and prototypes fit therefore in the TXT Next strategies and market needs, both as a way to improve its knowledge and know how, for exploring new approaches and technological solutions, and to validate in real contexts these approaches and solutions, so that they can be engineered and embedded in TXT Next solutions and technical expertise.

The following IoT@Work R&D areas are of particular relevance for the TXT Next business unit:

- Device self-configuration and self-adaptability features;
- IoT awareness (which means taking into account the availability of network and production devices having more intelligence and connectivity capability);
- Technologies for production plant data collection, management and provision;
- Technologies for advanced access control systems that are able to operate in production environments envisaging many internal and external subjects (e.g. suppliers, maintainers, etc.), and to scale and reduce management overhead;
- Applications for near-real-time production data analysis;
- Resiliency and security features.

Finally, IoT@Work focuses on high features and research areas that are relevant for the TXT Corporate Research division, which is the TXT division actually involved in the IoT@Work project, in its R&D activities, especially in view of the need to experiment with new technological trends and approaches in the area of IoT, Agile Manufacturing, Distributed Manufacturing and Virtual Factories and Enterprises.

The TXT Corporate Research plans to exploit IoT@Work outcomes on new R&D projects. For example, synergies with IoT@Work and NMP CORENET and the Factories of the Future PPP MSEE (Manufacturing Service Ecosystem) projects are under evaluation currently.

The exploitation of IoT@Work activities within the TXT Next division is being performed with internal periodic meetings, currently focused on demonstrating IoT@Work partial achievements and prototypes, to finally focus on transferring outcomes, knowhow and expertise. Specific internal informal meetings were held in Milan on Sept 2011, Nov. 2011, Feb. 2012, Apr. 2012, and May 2012.

4.4 FIAT Research Center (CRF)

System trials based on CRF’s manufacturing scenario will showcase the technology and prepare the way for further exploitation. The target of CRF’s exploitation is then expected to be based on specialized and customized solutions towards the FIAT Group’s different companies. CRF is engineering leader in manufacturing technologies and its size and visibility will ensure a great visibility of project results in the manufacturing area and their additional transfer to other sectors. Exploitation will be achieved by demonstration of CRF’s pilot case to FIAT group’s ICT manufacturing experts. In order to encourage the exploitation of the results into FIAT group, CRF will involve FIAT group’s experts in the stakeholder meetings. This will focuses the project’s results to test cases of interest improving thus the acceptability of the research lines of the project towards FIAT group’s sectors.
5  Glossary

DFKI  German research centre for artificial intelligence
ETSI  European Telecommunications Standards Institute
ICT   Information and communication technologies
IEEE  Institute of Electrical and Electronics Engineers
IERC  IoT European Research Cluster
INDIN IEEE International Conference on Industrial Informatics
IoT   Internet of Things
KommA Kommunikation in der Automation
KPI   Key performance indicator
LMF   Lemgo Model Factory
MDD   Model driven development
QoS   Quality of service
WFCS  IEEE International Workshop on Factory Communication Systems Communication in Automation

6  References