SOCRADES.EU

Project Acronym:

SOCRADES

Project Full Title:

Service-Oriented Cross-layer infRAstructure for Distributed smart Embedded devices

Proposal/Contract No: EU FP6 IST-5-034116 IP SOCRADES

Deliverable D10.1b, M2 (2nd Part)
SOCRADES Exploitation Plan
(2nd Release)

Status:	FINAL
Dissemination Level[1]:	CONFIDENTIAL
Date:	15.04.2008

Organization Name of the Lead Contractor for this Deliverable: Schneider Electric

---

[1] See Annex DoW for explanation of Dissemination Levels, as defined by DoW

Status Description:

Scheduled completion date[2]:	31.03.2007	Actual completion date[3]:	15.04.2008
Short document description:	This document summarizes activities planned at the post-project exploitation of SOCRADES results, according to the strategy and the guidelines defined in the Description of Work. After first 12 year of the project an initial exploitation plan as well as a first strategy was defined. With this 2nd release it has been now updated after 18 months. The exploitation plan consolidates the reviewed partner contributions and planned activities of mainly industrial SOCRADES partners.		

Author(s) deliverable:	R. Neubert (Schneider Electric)	**Report/deliverable classification:** [X] Deliverable [ ] Three-Monthly Activity Report [ ] Six-Monthly Activity Report
[ ][ ] Partner ↓ ↓ Peer reviews Contributions	[X][X] Schneider Electric [X][ ] ABB [X][ ] APS GmbH [X][ ] Boliden AB [ ][ ] FlexLink Components AB [X][ ] Institut f. Automation und Kommunikation e.V. Magdeburg [X][ ] Kungliga Tekniska Högskolan	[X][ ] Loughborough University [X][ ] Luleå University of Technology [X][X] Politecnico di Milano [X][ ] SAP AG [X][ ] Siemens AG [X][ ] Tampere University of Technology [X][ ] Jaguar Cars Ltd. [X][ ] ARM Ltd.
Peer review approval :	[X] Approved [ ] Rejected (improve as specified hereunder)	Date: 15.04.2008
Suggested improvements:		

Version History:

Version:	Date:	Comments, Changes, Status:	Person(s)[4]:
V1.01	13.08.2007	First edition	R.Neubert, M.Taisch
V1.02	01.09.2007	Improvements on description	R.Neubert
V1.03	14.09.2007	Survey results integration	R.Neubert, M.Taisch
V1.04	24.09.2007	Comments for improvements	R.Neubert
V1.05	26.09.2007	Assessment of document	PCC
V2.01	11.12.2007	Extensions for 2nd release, Demonstrations	PCC
V2.02	14.01.2008	Improvements on description	R.Neubert
V2.03	03.03.2008	Feedback of partners for individual plans	R.Neubert
Final	15.04.2008	Final corrections	R.Neubert

---

[2] As defined in the DoW
[3] Scheduled date for approval
[4] A list of company short tags can be found in DoW

Table of Contents:

List of Figures:

List of Tables:

1. INTRODUCTION

Considering the technological and scientific SOCRADES vision of creating "a service-oriented ecosystem where intelligent networked systems are composed of wired/wireless smart embedded devices that interact with the physical environment and with the enterprise environment pursuing well-defined system goals" [1], the aim of this first initial release of the exploitation plan document is to determine and propose the most appropriate recommendations for commercialization, to describe the general exploitation management, the potential post-project activities according to the exploitation priorities derived from an initial survey of partners and the guidelines defined in the SOCRADES project proposal as well as to define finally a base for future business plan for SOCRADES considering the priorities and technological areas of the project.

The SOCRADES exploitation strategy considers the value creation to exploit business opportunities and value appropriation to define the specific ways how to attract customer's attention while enabling revenue generation throughout the complete value chain.

This exploitation policy will provide a framework and guidelines to determine an exploitation strategy for the different research results in terms of technologies, products, knowledge, software etc. and which route of commercialization is the most promising (e.g. licensing potential models) to make the best use of the results of the project by placing the different stakeholders in a position to fully exploit the investment in the project.

For this reason three different activities in the area of exploitation (planning, standardization and road mapping) have been combined and integrated in a single work package (WP10) resulting into 3 deliverables. Beside the regular updated exploitation plan the deliverable D10.2 will specify the path of industrial standardization for SOCRADES and deliverable D10.4 that will focus on the road mapping for SOCRADES technologies at long-term view will provided.

The stakeholders of the project are:

- Project partners of SOCRADES

- International industrial community and the market (the consumers) to which the task 10.2 and task 10.3 are addressed. The industrial community will take benefit from the standardization activity that will be initiated by the project.

- Customers who are part of the value-chain of the automation industry.

The exploitation activities within SOCRADES will be driven mainly by its industrial partners who will exploit the developed hardware / middleware /software in their devices / applications.

2. EXPLOITATION MANAGEMENT DESCRIPTION

This chapter describes the management of the definition, monitoring and animate the SOCRADES exploitation plan. Following items are defined to provide a framework for the exploitation management within the project:

- Challenges of SOCRADES exploitation

- Technological areas to be exploit (priorities of exploitation actions)

- Exploitation planning instruments

- Process of definition of a exploitation strategy

- Management of project activities (project internal and external)

- Identification of exploitation priorities

All project partners shared 3 basic "exploitation mantras":

- Consortia will explore and develop new (today unknown) technologies to be promoted in future.

- Consortia have to meet expectations from European Commission in terms of future business with project results.

- Exploitation for SOCRADES means competition shares competitiveness.

2.1. Exploitation Planning Instruments

To justify individual activities and to align them in the different SOCRADES technology areas as well as generating a good consistency to the project goals both project-internal and external activities are planned in this framework.

2.1.1. Project-internal exploitation planning activities

- Regular survey of SOCRADES partners (yearly)

  On yearly base the existing exploitation priorities will be monitored by a survey. The results of such survey will be analyzed, consolidated and distributed to all partners and can be used individually to adapt and justify the planned exploitation activities. Secondly it will provide an overview of potential areas of new activities as well as to identify gaps in the exploitation strategy. An initial survey has been done already to prepare the initial exploitation plan and its priorities (refer to chapter 3.2). In the next surveys the priorities will be checked and adapted if necessary.

- Standardisation (task 10.2)

  Activities planned in the area of standardisation such as definition of proposals for PAS (Publicly Available Standard) and planned work with or within standardization bodies like IEC will be synchronized in this dedicated task. Several actions to define the standardization path in particular towards DPWS and OPC-UA have been done and initialized. An approach called "DPUA" has been proposed to partners. Since some IP related questions and concerns have to be clarified between some industrial partners to finalize this approach to be introduced in the international standardization bodies.

- Road mapping (task 10.4)

  The SOCRADES roadmap [3] preliminary preparation is done by Delphi study (a first initial study has been initiated and will be continued) and several external workshops, roadmap definition and follow-up activities phase (refer to deliverable D10.4). Among the 4 SOCRADES key technology areas specific expected feature of the technology area (EFTA) are identified with project partners and shared with external experts. Based on the definitions of expected technological features, gaps between the current and future expected technological features have to be identified at long-term view. This will lead to specific trajectories how to fulfil these gaps.

  In particular workshops with international experts are planned to coincide with conferences or other events use the roadmap. As part of exploitation activities an official communication has been done to the SOCRADES EC project officer requesting the official support of the commission for organizing an international event with the participation of experts of Europe and also from outside Europe, in order to give the SOCRADES Roadmap an optimum broad spectrum under an international character.

- Regular reviews during project management (PPC) and work package meetings

  Since exploitation management activities are covered in work package 10 it is part of the periodic project review meetings. It will allow presenting and sharing the actual status of exploitation plan and activities, to solve potential issues and to agree on next steps in the area of exploitation on a regular base.

  In addition any changes or new proposals of exploitation activities will be shared and reviewed by work package meetings.

2.1.2. Project external exploitation planning activities

- Creation of or joining an industrial mirror group or network of experts dealing with the major technology areas and their industrial deployment. The first step has been done by the roadmapping activities.

  This will allow to synchronize and justify activities planned exploitation and to identify or develop new potentials of commercialization of SOCRADES project results. During the following project phase a proposal will be defined and shared with the partners.

- Gather market- and technology specific information from Marketing and Research Institutes

  Since many external market- and/or technology-specific surveys are made, the resulting information can be used to define and adapt exploitation activities and to identify additional key success factors. Trends seen by the project group can be justified.

- Synchronization with new research project proposals and other research projects

  In close cooperation with work package 9 (Dissemination) sharing and synchronizing exploitation plan for SOCRADES to assess and maximize the scope and create consistency between different exploitation activities of other research projects as well as to generate good level of differentiation too.

2.2. SOCRADES Exploitation Challenges and Technological Areas

Due to the constitution of the SOCRADES consortia with its outstanding constellation of all major European ICT players in the industrial value chain and the high-level scientific expertise of the academic and scientific institutions across Europe, a wide range of commercialisation potentials of SOCRADES project results is feasible.

Figure 1: SOCRADES industrial component providers

Basically during the definition the most appropriate exploitation strategy the potential and most promising individual exploitation activities have to be identified while considering the partly competitive nature of market access of some SOCRADES partners.

Therefore the dedicated work package (WP10) has been setup up to manage these challenges consistently.

In general different potential (post-) project exploitation activities are foreseen and will be defined during the project duration in detail. Examples of such potential commercialization actions are:

- Project exploitable result agreements

- Industrial applications

- Individual case studies

- Identification of potential cooperation between companies

- Patents and licensing models

- Potential joint venture or spin-offs

- Coordination of individual exploitation activities (industrial events, fairs etc.)

- Market watch

In order to define the SOCRADES exploitation plan, the strategy is based on the given technological exploitation areas, in particular their impact to the desired service-centric approach of SOCRADES (refer to figure 2), combined with the exploitation priorities that are identified in an initial survey [2], described in this document. This survey will be repeated regularly to track and monitor these activities.

To generate high level of synergy in principle exploitation activities are defined and coordinated where the partners are strong and where they have most interest. A regular monitoring of market trends and priorities (refer to chapter 2.2) will allow identifying and managing these.
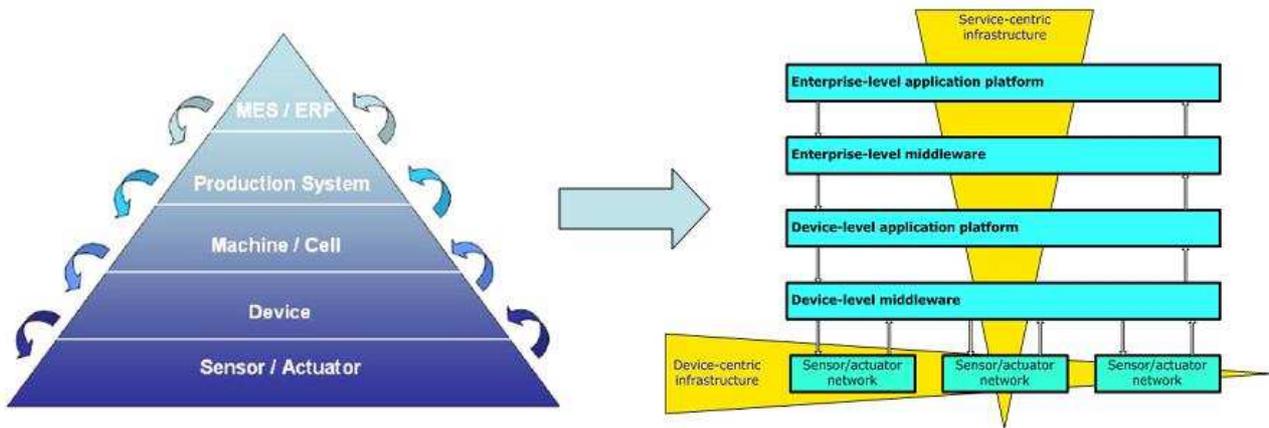

Figure 2: Service-centric infrastructure levels

The major technological areas as defined by [1] are:

- Wireless sensors and actuator networking infrastructure

- Service-centric Infrastructure

- Ad-hoc networking services platform

- System engineering and management.

3. EXPLOITATION PLAN

3.1. Identified Priorities of Exploitation

Activities and priorities in the area of SOCRADES technologies as they have been identified in the previous sections this chapter will describe a consolidated view of the exploitation plan. All activities to be planned and synchronized are based on the individual feedback during the initial survey and individual planning of the partners (refer to next chapter 5.2). A project-external survey will be defined within next project phase to proof and validate the findings as well as a project-internal update to confirm the priorities or to justify them.

While the SOCRADES technology domains of system engineering and management and service-centric infrastructure are continuously mentioned as important (refer to previous chapter) at all levels while ad-hoc networking and wireless sensor/actuator networking services have more dedicated importance according to the specific integration levels.

The combination of priorities seen by partners, their expectations of business potentials, the general view on mid-term and long-term usage of SOCRADES technologies as well as the feasibility of having products adapted to SOCRADES lead to following stepwise exploitation approach, that will be specified and reviewed in the next period of the project.

As one preliminary conclusion regarding the definition of SOCRADES exploitation actions the usage of demonstrators that will be developed within the project can be considered as important and vital element in the overall exploitation and dissemination too. Therefore a "story board" to illustrate the link between customer benefits and the potential business opportunities based on the SOCRADES results will be developed.

Phase 1 – General preparation
- Overview of SOCRADES technologies in general
- Definition of common features to be promoted as customer benefits
- Synchronize planning for demonstrators, components used and their "story boards"
- Prepare very strong exploitation activities based on demonstrators
- Definition of a project-external and second project-internal survey to confirm the planning
- Definition of commercialization potentials of most-promising SOCRADES technologies
- Identification of market acceptance (or non-acceptance)
- Validation of the priorities defined by this initial survey and, if necessary, their justification
- Building network of partners who have most interest, priorities and capabilities in the dedicated area of technology
- Preparation of dedicated exploitation actions to raise awareness of all SOCRADES technology areas
- Initiate an industrial mirror group for exchange on project-external activities

Phase 2 – dedicated actions for all SOCRADES technology domains
- Refinement and review of individual business plans
- Definition and execution of a second project-external and third project-internal survey
- Consolidation of resulting individual business plans and deployment
- Preparation of final demonstrator package (e.g. by video sequences or similar interactive presentations)

3.2. Definition of Customer Values and their promotion

The definition of common features to be promoted as customer benefits has been done with the project partners. Since demonstrators are seen as key elements in the exploitation framework and an effective planning of demonstrations as set of consistent individual or shared exploitation activities is mandatory. In order to align these actions the defined customer values are base for "story boards" for such dedicated demos/trails. Please refer to chapter 3.4 to see the planning of demonstrations/trials.

In order to enforce the integration character of the project demonstrators and trails will be developed incrementally. This will allow a stepwise integration of partner contributions and evolutions of their specific developments.

As first result following common values are shared as key among the consortia:

- Smart sensing and actuating capabilities of WSN
- Efficient system engineering
- Interoperability (middleware based on SoA) to guarantee openness
- System intelligence
- Adaptability and easy reconfiguration of systems
- Manage complexity
- Have fault-tolerant, reconfigurable, safe and secure intelligent devices.

The general promotion by trails and demonstrators of SOCRADES technologies and their corresponding common customer values is also strongly related to the list of features required [4].

Therefore the planning [5] for demonstrators and trails is characterized by following properties:

- Demonstration name
- Potential promotion by video possible
- Industrial application
- SOCRADES´s Customer Benefits
- Partners involved
- Schedule
- Location
- Products/Prototypes
- Key Features to be presented

The document [5] is considered as a living document and will be regularly updated and synchronized inside the consortia. The preparation has been already started. Some of the demonstrations with first prototypes have been already made even in early stages of the project.

3.3. Updated Schedule Planning for Exploitation Phases

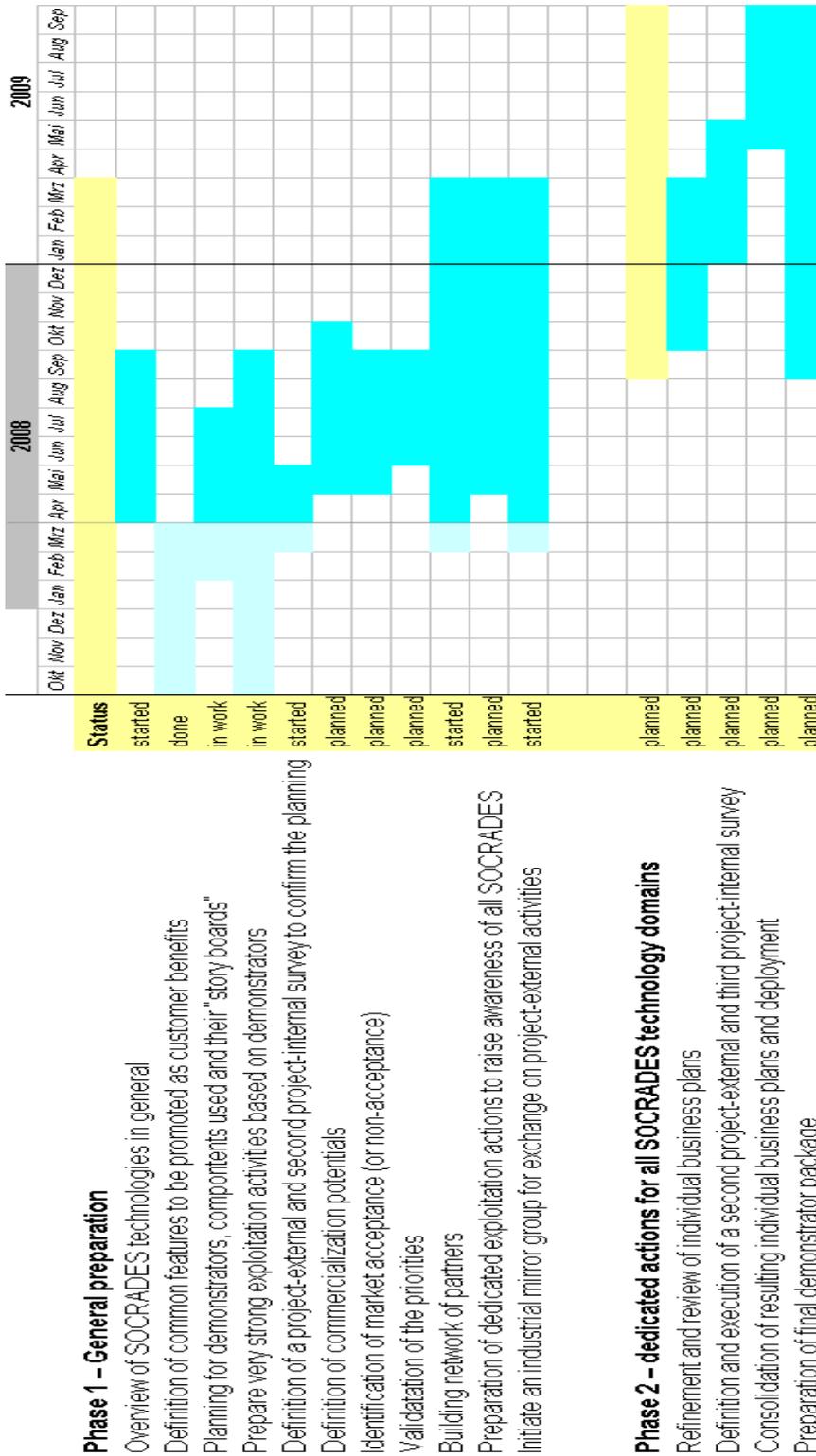| Activity	Status
Phase 1 – General preparation	
Overview of SOCRADES technologies in general	started
Definition of common features to be promoted as customer benefits	done
Planning for demonstrators, compontents used and their "story boards"	in work
Prepare very strong exploitation activities based on demonstrators	in work
Definition of a project-external and second project-internal survey to confirm the planning	started
Definition of commercialization potentials	planned
Identification of market acceptance (or non-acceptance)	planned
Validatation of the priorities	planned
Building network of partners	started
Preparation of dedicated exploitation actions to raise awareness of all SOCRADES	planned
Initiate an industrial mirror group for exchange on project-external activities	started
Phase 2 – dedicated actions for all SOCRADES technology domains	
Refinement and review of individual business plans	planned
Definition and execution of a second project-external and third project-internal survey	planned
Consolidation of resulting individual business plans and deployment	planned
Preparation of final demonstrator package	planned

Table 1: Schedule of SOCRADES exploitation activities

3.4. Overview of Exploitation Activities of Partners (updated)

3.4.1. Exploitation Activities of Industrial Partners

ABB plans to exploit the results of SOCRADES including:

- the creation of synergies with related RTD projects
- transfer results in standardization activities, as appropriate
- transferring relevant results to ABB business units for commercialisation, if successfully evaluated from a business and technology perspective
- the extension of technical and technological knowledge and know–how for follow–up research projects in the field of advanced process automation and wireless networking

While **ARM** is pervasive in embedded devices, SOCRADES offers new application domains for us: advanced manufacturing automation, embedded intelligence and ad-hoc networking. The intention is therefore to gather requirements and perform feasibility for a new generation of ARM systems, which can be developed to meet the criteria of these new application domains. If successful, it will enable ARM to penetrate new application domains and design novel intellectual property for these domains. It will contribute towards our goal of being at the heart of the digital revolution and provide continued growth of the ARM architecture.

In its exploitation of the SOCRADES results, **Boliden** will particularly focus on:

- the creation of synergies with related projects at Boliden or in ProcessIT projects.

- propose transfer of SOCRADES technologies into new industrial products and services

- industries in the ProcessIT Innovations network.

Boliden will also take a lead for the project in the ProcessIT Innovations network and to disseminating the result and knowledge to other industries. In the ProcessIT Innovations centre, "Fault tolerant network embedded systems is a prioritised area. The process industries in ProcessIT are committed to support the centre financially in time and in other resources.

For this area, several industries are interested to contribute in requirements and scenario analysis and to follow and evaluate the results of the demonstration. Through the ProcessIT Innovations organisation, the following industries will participate in the work mentioned: LKAB (Mining), Smurfit Kappa (Pulp and Paper), SSAB (Swedish Steel), SCA (Pulp and Paper). Several supplying industries like ABB and IT-SMEs are also committed to ProcessIT. It is expected that results from SOCRADES will also strengthen regional SMEs in terms of new products and services for an international market. Boliden, also committed to ProcessIT, will take a leading role for the ProcessIT network as a full project partner, providing demonstrator facilities and support but also as the disseminator of the SOCRADES results to the industries in ProcessIT. The main part of this is already financed by the partners of ProcessIT Innovations.

Flexlink *(deleted due to its withdrawal)*

SAP expects to draw benefits from SOCRADES outcomes with regard to the integration of Smart technologies in SAP's service oriented application framework. As such a long–term exploitation of project results beyond the project duration may be achieved.

SAP leads the Enterprise Integration activities within SOCRADES, and has created an IEEE ETFA 2007 award winning integration architecture. In the next months SAP will further elaborate on these issues, as this could influence future products in the direction of device integration in enterprise environments.

As such SAP is working towards a number of activities to ensure optimal exploitation of results.

SAP is looking at having technology transfer projects with several of its units, focusing on device integration approaches. The main efforts are directed at the moment towards the enhancement of the functionality of the MII product. We are also looking towards using the project work in other domains such as the utilities and automotive sector.

SAP SensorNets Enterprise Services Community: SAP officially launched the Enterprise Services Community (ESC – http://esc.sap.com) program in April 2006 – a collaborative, cross-industry program, which lets partners and customers co-define the way software is developed and deployed to solve evolving business requirements. As part of the Enterprise Services Community initiative, the Enterprise Service Community for SensorNets was launched. In the context of SAP ESC workshops are being organized. SAP brings feedback from the ESC community to the project and vice versa, in essence validating aspects of the project's ongoing concepts and results with its collaborating partners in ESC.

Efforts are ongoing, and advances will be reported in the future.

Schneider Electric plans to exploit the results of SOCRADES including:

- Support of a continuous development of open source DPWS stack

- Strong standardization activities in particular on DPWS and OPC-UA

- The creation of synergies with related RTD projects while disseminating SOCRADES results towards Network of Excellence (e.g. IPROMS)

- Evaluation of relevant results for a potential commercialisation

- Transfer of results into the Schneider Electric offer portfolio development

- The extension of technical and technological knowledge and know-how for follow-up research projects in the field of (Web-) service-oriented architectures and collaborative automation systems.

Siemens regards SOCRADES as a pre-development project which does not necessarily result in final products, but serves as a technology platform and basis for later concrete product developments. Against this background, SOCRADES will be a basis for the following products and technologies at Siemens:

- an IEEE 802.15.4 based gateway for Wireless Sensor Networks for Factory Automation with OPC UA interface to the wired world;

- State of the art Ethernet concept with communication and power over one bus interface;

- Tiny-OS based stack concept for Wireless Sensor Networks (gateway and sensors) for factory automation;

- Further development end evaluation of wireless BEROS;

- An architecture and concept for flexible distributed wireless embedded systems;

- Validation and tests of the system's communication possibilities.

Jaguar plans to evaluate and disseminate the benefits of an open control solution, which SOCRADES enables, e.g., plug-and-play connectivity and interoperability. Jaguar anticipate the utilisation of SOCRADES in prototype form on automation systems for engine assembly applications, with the potential for mainstream adoption of such technology in the longer term, in collaboration with vendors such as Schneider Electric, Siemens and ABB. Jaguar will actively disseminate the potential of the approach to its supply chain partners (machine builders and component and controls vendors) in the automotive sector.

3.4.2. Exploitation Activities of Academic Partners

APS plans to exploit the results SOCRADES with special focus on:

- the extension of technical and technological knowledge and know-how for follow-up research projects in the field of advanced manufacturing automation, collaborative control, embedded intelligence and wireless networking;

- the creation of synergies with related RTD projects;

- the transfer of SOCRADES technologies into industrial application;

- the training and education of mechatronics students;

- the set-up of a SOCRADES Trial Site for testing, feasibility studies, training, and demonstration.

Synergies with the Eureka RoboTOOL project may also be exploited to further support the SOCRADES dissemination effort.

The SOCRADES project is of major importance to **KTH**. It is planned to be continually used in other research projects and in education. Specifically, the results of SOCRADES will be disseminated through the European Network of Excellence HYCON and EURON as well as a number of national research projects on networked embedded control systems supported by the Swedish Research Council, the Swedish Strategic Research Foundation and the Swedish Agency for Innovation Systems. Many of the projects have strong industrial participation. SOCRADES will also be crucial for the undergraduate and graduate education, e.g., several PhD students will be involved in the SOCRADES research activities and a new undergraduate course has been developed closely related to the work in SOCRADES. These dissemination activities will be further explored.

Loughborough University will disseminate and exploit the results of the SOCRADES project via its research centres, i.e., feeding the results into new collaborative projects with industry. A major dissemination-related goal will be to highlight the potential of distributed embedded devices utilising SOCRADES technology to enable more efficient machine reconfigurability via a functionally modular, component-based approach to automation. Loughborough has a close working relationship with a wide range of automation vendors and users both in the UK and more widely across the rest of Europe. It will utilise these relationships to drive project exploitation. Other dissemination activities will include a well-targeted series of international publications and special conference sessions. The project results will additionally be used in lectures, seminars, and postgraduate research.

LTU is exploiting the results SOCRADES with special focus on:

- the extension of technical and technological knowledge and know–how for follow–up research projects in the field of advanced measurement and control in process industry, collaborative control, embedded intelligence and wireless networking;

- the creation of synergies with related RTD projects in particularly towards the process industry and the research excellence centre ProcessIT;

- the transfer of SOCRADES technologies into industrial application mainly through the ProcessIT and EISLAB networks where the strong links to Artemis will be explored;

- inclusion of results into Bachelor and Master programs thus giving the training and education of students at LTU;

- transfer of results to spin-off companies, a first example is EISTEC Bothnia AB

Politecnico di Milano, being the leading Technical University in Italy has a strong relationship with the economical and industrial sectors of the country economy. The link with the industry is high with a fruitful and reciprocal exchange of knowledge and competence. SOCRADES results will therefore contribute to this asset. In particular:

- Update of the courses both at undergraduate and graduate level

- Ad-hoc seminar for industry

- Publication of the SOCRADES result in the economical and technical Italian journals and newspapers

- Special dissemination activities for the SMEs.

POLIMI, being leader of the WP9 will also manage the entire dissemination plan. SOCRADES will particularly benefit from the international exposure of POLIMI in the major academic association such us IFAC and IFIP, and industrial such as IMS.

TUT will disseminate the knowledge generated in methodologies and technologies within the SOCRADES project through scientific publications in international refereed journals (e.g. IEEE Transactions on Industrial Informatics, Prof. Lastra is Associate Editor) and international technical conferences (e.g. IEEE International Conference on Industrial Informatics, Prof. Lastra is Technical Co-chair). TUT will also use the results of SOCRADES to provide input to the IEEE Technical Committee on Industrial Agents (Prof. Lastra is chair of the Architecture track). The work done on SOCRADES will also be leveraged to produce Doctoral and M.Sc. theses.

4. CONCLUSION

After a first consolidation and alignment of individual exploitation priorities and potential exploitation actions several activities have been started. First results show the strong commitment and motivation of all SOCRADES partners as well as their dedicated expectations.

Even in the early stage of project several impressive results based on early prototypes could be reached. Some demonstrations have been already presented (e.g. ITEA 2 Symposium, Berlin, October 2007) with very good feedback.

This updated release of exploitation plan confirms the exploitation capabilities of the project and its partners and continues the stepwise exploitation approach among the project duration and beyond. Partner contributions are aligned and will generate a consistent and strong exploitation performance while they providing complementary capabilities and potentials a brought area can be covered depending on the dedicated priorities of the technology domain, the availability of products and the acceptance of the customers that will have to be generated and satisfied by the SOCRADES consortia.

References

[1]   IST-5-034116 SOCRADES Annex I: Description of Work

[2]   SOCRADES 1st Exploitation Plan ANNEX A : Initial Questionnaire Forms

[3]   SOCRADES Roadmap D10.4

[4]   SOCRADES Deliverable 1.2 « Requirements of end user and component vendors/system integrators »

[5]   SOCRADES Draft Planning of Demonstrators and Trials ANNEX B

ANNEX A   CONSOLIDATED RESULTS OF INITIAL SURVEY

Question 1: What are your expectations regarding potential opportunities based on SOCRADES features and technologies?

The expectations of partners for the SOCRADES features and technologies as defined in the SOCRADES proposal are consolidated as following table shows.

SOCRADES features and technology area	Priority (average)
Smart embedded intelligence and sensing and actuating capabilities	4,6
New methodologies, technologies and tools for the modelling, design, engineering and operation (e.g. production real-time scheduling) in the area manufacturing	3,4
Smart embedded system with co-operation of smart embedded devices that interact seamlessly and intensively over a network (wired/wireless).	4,3
Middleware based on Service-Oriented Architecture (SoA)	3,4
Interoperability at the semantic level to guarantee openness	3,7
System intelligence by a large population of small and networked embedded devices at a high level of granularity	3,7
Adaptability and easy reconfiguration of systems to meet short-term business demands	4,0
Manage a vastly increased number of intelligent devices and its associated complexity, have very flexible real-time embedded devices (wired/wireless) that are	4,3

Table 2: List of expected priorities of SOCRADES technologies

Derived Priorities for Exploitation

All partners confirm the high or very high level of expectations therefore it should be common activity to promote these technologies focused on the individual priorities. Based on individual priorities gathered in this survey a review of actions within next year should be done to track the potential evolutions. All partners strongly consider SOCRADES technology as high-potential opportunity. Exploitation activities should consider following areas:

- Overview of SOCRADES technologies in general
- Promote features as customer benefits for using these technologies
- Validate the priorities by project-external survey
- Build network of partners who have most interest in the dedicated area of technology

Question 2: Please rank top 3 of SOCRADES technologies regarding your expectations in terms of potential impact in revenues (turnover)

Based on the question on what are the top 3 priorities are seen by the partners results into following ranking:

1. Seamless Networking of intelligent devices
2. Adaptation / Reconfiguration features
3. Interoperability and Openness
4. Middleware based on Service-oriented Architectures
5. Smart embedded Intelligence
6. Wireless
7. Manage distributed intelligent devices
8. System intelligence by small and networked embedded devices
9. New methodologies in manufacturing

The specific ranking of the different topics is calculated in order to consider the times where the entry is mentioned either as first, second or third priority. The sum of the dedicated priority multiplied with a certain weight given to each level of priority (first = weight 3, second=weight 2 and third = weight 1) has led to this ranking.

Derived Priorities for Exploitation

Due to the initial character of the survey this first result in terms of ranking and priorities has to be confirmed and proven by project-external view in fact. A survey should be done in the next project phase. Once the ranking can be confirmed or is justified accordingly the exploitation planning and its schedule should reflect this ranking in order to satisfy most-required needs.

This implies the need for promotion of the SOCRADES results and its vision in the dedicated area, the creation of common industrial exploitation activities considering the individual partner priorities. The business plan to be proposed is strongly related to the potential of the commercialization of most-promising SOCRADES technologies as well it has to consider the (existing or not existing) acceptance on the markets for each of the topics mentioned.

Question 3: When do you think it will be ready to be widely applied in your industry sectors where your company is active?

The expectations of SOCRADES partners are collected in this part to identify and derive the potential schedule priorities of actions among the application of SOCRADES technology areas. Figure 3 shows the consolidated result about this.

Figure 3: Application of SOCRADES technologies (mid- and long-term)

Derived Priorities for Exploitation

Since the resulting timeline with 2 major segments of application timing (less than 3-5 years and mid-term) is forcing a 2 step approach for exploitation. Nevertheless all partners consider that application of the technologies is seen in less the 10 years.

In terms of application of SOCRADES technologies the area of system engineering and management technologies are considered as first to be widely used. Secondly in a second step SoA-oriented infrastructure, wireless sensor/actuator and ad-hoc networking services exploitation activities may be planned since they're expected to be applied in mid-term range within 3-5 years or later. In particular activities to raise awareness about these mid-term SOCRADES features have to be defined in order to reduce resulting the time for application of the second step while creating a common understanding on the market.

This current view must be validated in the next project phase in fact.

Question 4: What will be the percentage of production lines using significantly SOCRADES technologies in year 2015 and 2020?

There's a strong expectation to have a high level of usage of SOCRADES technologies. As figure 4 shows the level of usage within production systems until 2020 will be between 25% and 43% in average (individually views are expecting levels until 80%).

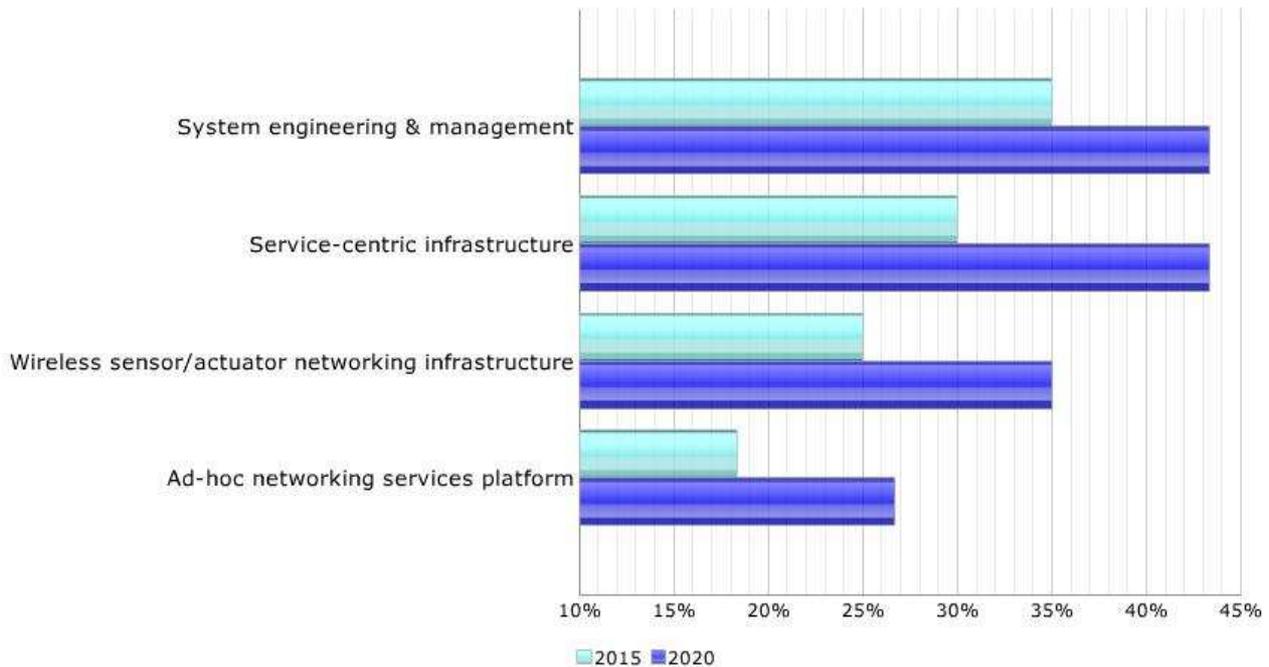The usage is forecasted to rise between 2015 and 20020 in average by 63%.

Figure 4: Long-term expectations of usage

Derived Priorities for Exploitation

As the result of question 3 already implies the application of first system engineering and management technologies are seen as most likely until 2015. Even if all major technology areas are forecasted to increase strongly until 2015 the highest growth in terms of usage between 2015 and 2020 is expected by SoA-oriented infrastructures. Both system engineering and management and service-centric infrastructures are seen as mature technologies by 2020.

Since usage of wireless sensor/actuator networking infrastructure and ad-hoc networking services are considered as less growing until 2020 but R&D investments in both technologies are already significant today this result is strongly recommended to be validated in the upcoming project phase.

For planning the exploitation activities derived from this intermediate result and to enforce the usage of SOCRADES results within production environments the benefits for customers in particular in regard to the life cycle will have to be considered.

Question 5: What type of products being SOCRADES technology enabled in your product portfolio do you expect to be introduced to your market?
Derived Priorities for Exploitation

It can be assumed that there's a good level of consistency in terms of expecting a delivery of SOCRADES-enabled products. At all levels, from service-centric towards device-centric infrastructure, products are seen as feasible. This view will be validated during the next project phase to define a potential product roadmap covering the SOCRADES technologies. The variance between minimum and maximum level of expectations is demonstrating a different level of partner priorities (and capabilities) in the specific domain and will be considered in the planning of actions.

	MES / ERP software	Machinery / assembly lines / production systems (incl. hard- and software)	Communication infrastructure devices (incl. gateways)	PLC and intelligent devices (incl. hard- and software)	Data acquisition and visualization (incl. hard- and software)	Sensors and Actuators (incl. hard- and software)
Min	0	0	0	0	3	0
Max	5	5	5	5	5	5
Average	**2,5**	**3**	**3,3**	**3,8**	**3,7**	**3,5**

Table 3: Expectation of SOCRADES-enabled products

Question 6: What is the specific importance of SOCRADES technologies at enterprise-level application platforms?

	Ad-hoc networking services platform	Wireless sensor/actuator networking infrastructure	Service-centric infrastructure	System engineering & management
Min	2	0	2	1
Max	4	4	5	5
Average	**3,1**	**2,1**	**4,1**	**3,6**

Table 4: Importance of SOCRADES technologies at enterprise-level application platforms

Derived Priorities for Exploitation

Most important for exploitation seen in this domain are system engineering and management and the service-centric infrastructure. Dedicated activities should be planned in the next project phase to answer this view seen by the partners. In addition this prioritization will be validated in next project phase too.

Question 7: What is the specific importance of SOCRADES technologies at enterprise-level middleware level?

	Ad-hoc networking services platform	Wireless sensor/actuator networking infrastructure	Service-centric infrastructure	System engineering & management
Min	1	0	2	1
Max	4	5	5	5
Average	**3,1**	**2,3**	**4,0**	**3,7**

Table 5: Importance of SOCRADES technologies at enterprise-middleware level

Derived Priorities for Exploitation

As expected the importance of service-centric infrastructure and system-engineering & management is still high. Activities of exploitation will have focus on the most-important domains to elaborate the planning in terms of effective and synchronized exploitation.

Question 8: What is the specific importance of SOCRADES technologies at device-level application platforms level?

	Ad-hoc networking services platform	Wireless sensor/actuator networking infrastructure	Service-centric infrastructure	System engineering & management
Min	0	0	0	0
Max	5	4	5	5
Average	3,1	2,3	3,4	3,4

Table 6: Importance of SOCRADES technologies at device-level application platforms

Derived Priorities for Exploitation

Nearly all domains of SOCRADES technologies have a similar importance as seen by the partners. That leads to a wider scope of exploitation activities as in the previous level that will have to be validated by next project phase too.

Question 9: What is the specific importance of SOCRADES technologies at device-level middleware level?

	Ad-hoc networking services platform	Wireless sensor/actuator networking infrastructure	Service-centric infrastructure	System engineering & management
Min	0	0	0	0
Max	5	5	5	5
Average	2,7	3,1	3,1	3,0

Table 7: Importance of SOCRADES technologies at device-level middleware level

Derived Priorities for Exploitation

The importance of wireless sensor/actuator networking infrastructure is considered as increasing while system engineering and management as well as service-centric infrastructure are stable in their level of importance. In general all domains of technologies are seen at similar value. Therefore the planning of exploitation must be composed by actions related to all 4 domains.

Question 10: What is the specific importance of SOCRADES technologies at device-centric infrastructure level?

	Ad-hoc networking services platform	Wireless sensor/actuator networking infrastructure	Service-centric infrastructure	System engineering & management
Min	0	0	0	0
Max	5	5	4	4
Average	2,7	3,7	2,9	2,6

Table 8: Importance of SOCRADES technologies at device-centric infrastructure level

Derived Priorities for Exploitation

At the lowest level of infrastructure levels the basic importance is strongly related to the networking capabilities. Nevertheless the importance of service-centric infrastructure is still seen important while for system engineering is decreased.

ANNEX B   PLANNING FOR DEMONSTRATORS AND TRIALS (DRAFT)

Demonstration	Video	Application	SOCRADES's Customer Benefits / UVPs for Users of SOCRADES results (in bold main criteria)	Partners involved	Schedule	Location	Products/Prototypes	Features/Requirements (Linked to D1.2)
Flexlink - Virtual Cell	X	Electronic assembly	**Efficient system engineering of SoA system, Interoperability (middleware based on SoA) to guarantee horizontal and vertical openness** Adaptability and easy reconfiguration of automation systems under real-time production conditions Manage complexity of production automation scenarios by aggregation/composition of automation Have fault tolerant, reconfigurable, safe and secure intelligent devices / aggregation of devices	Flexlink, SE	1.9.2007 - 01.05.2008 June PCC meeting	SG, GER	3rd party: Delmia	PC-based coordination of virtual services with PN-based Orchestration tool Decision making by "mouse-click" in PN-based Orchestration tool FlexLink cell implemented as 3D model in Delmia Delmia exposes transport services of FlexLink modules on PC as virtual services
Flexlink - Complete cell	X	Electronic assembly	**Efficient system engineering, Interoperability (middleware based on** **Adaptability and easy reconfiguration** **Manage complexity of production aut** services Have fault tolerant, reconfigurable, safe an	SE, SAP	1.3.2008 - 01.09.2008 Month 24 demo	SG, GER	3rd party: PC, SE: STB, ETG1000 (gateway), M340? Flexlink: DAS30	PC-based coordination of real services Interface to decision support system Local decision support capabilities Transport services realized on Gateway or STB Integration of shop floor orchestration with product-based orchestration (to be defined with TUT, SAP) Device access (to be defined with SAP), Access of IT-tools to shop floor coordination/orchestration-level (interfaces and content to be defined with SAP)
Flexlink full implementation	X	Electronic assembly	**Smart sensing and actuating capabili Efficient system engineering, Interoperability (middleware based on** **guarantee horizontal and vertical openness Adaptability and easy reconfiguration of automation systems under real-time production conditions Manage complexity of production automation scenarios by aggregation/composition of automation services Have fault tolerant, reconfigurable, safe and secure intelligent devices / aggregation of devices and services**	Flexlink, SE, SAP	01.06.2009 Month 30? -> complete integration until month 34		3rd party: PC, SE: STB, ETG1000 (gateway), M340? Flexlink: DAS30	STB-based coordination of real services Transport services realized on STB Integration of real and virtual services Device access (improved version) Access to coordination-level (improved version) **Show complete SOCRADES picture**
Manufacturing ("Jaguar Scenario")				Lough, SAP, SE	1.10.2007 - MACH (04/2008)	Birmingham, UK	SE: FTB	Distributed Control, ERP/MES integration
Manufacturing ("Jaguar Scenario 2")				Lough, SAP, SE	06.2007 - 03.2009	Lough, UK	SE: FTB	Integration of the 3D virtual system
Manufacturing ("Jaguar Scenario FINAL")				Lough, SAP, SE	03.2009 - 08.2009			
Trial for 2nd year				APS, SE, SAP,...	03.2008 - 09.2008 Month 24	Aachen, GER	SE: PC / M340 / STB / FTB? APS: Mechatronics (Roboter1, Roboter2, Gantry,...) Partner xy:	PC-based coordination of APS mechatronics services Scenario and process to be defined with APS RobotController (RC) by APS (Macro language) PC-based Robot WS triggers macros on RC Device access (to be defined with SAP), Access to coordination-level (interfaces and content to be defined with SAP)

SOCRADES-Demonst
rators-draft.xls