



BEMO-COFRA

Brazil-Europe Monitoring and Control Framework

(Project No. 288133)

D8.1 Report on the business strategies and exploitation plan

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1. Executive summary

The BEMO-COFRA consortium is dedicated to ensure that the results of the BEMO-COFRA project will be exploited after the project's lifetime. The effective exploitation of the results of the BEMO-COFRA project depends on an accurate understanding of the core competencies and resources of partners, and matching these to exploitation roles.

At the present stage of the BEMO-COFRA project (end of year 1) it is possible to define two types of exploitable results: 1) Consultancy Services and Academic course material (university level) and 2) BEMO-COFRA technologies, either as a whole, i.e. the BEMO-COFRA Distributive Framework or as individual technologies, i.e. modular, reusable software components.

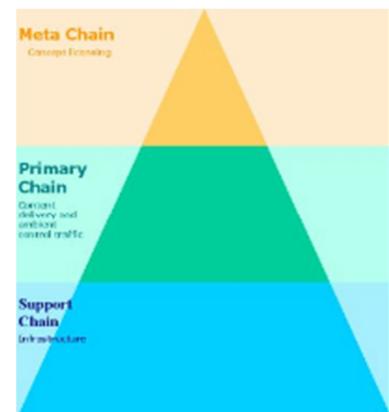
The industrial partner COMAU possesses special expertise in car manufacturing, in particular power train machining and assembly processes and body welding and assembly processes. The exploitation planning will thus in the first instance be directed towards this market.

Modern day Industrial Automation Systems control highly complex networks of high performance machine systems executing multi-parameter control of variables like precision motion, force, temperature, flow rate, pressure, etc. There is increasing pressure that these complex controls with extremely high throughputs and miniaturisation are implemented with cost-effective electronics and robust software. The manufacturing industry is therefore increasingly focusing on energy consumption optimization, safety and remote monitoring and data collection. The BEMO-COFRA Framework can address these challenges and needs.

Other potential market segments for the exploitation of the BEMO-COFRA results include Siderurgy and Oil & Gas.

The general business model framework for marketing the BEMO-COFRA Distributed Framework can be seen as a pyramidal structure as shown in the figure. At the top (the Meta level) we find the business activities of providing conceptual solutions to support the BEMO-COFRA platform. At the middle (Primary Chain) level we find the actors actually engaging in exchanging value-added services based on the BEMO-COFRA platform and services.

At the lowest "Support Chain" level, we find the support actors engaged in delivering network infrastructure, devices and terminals and other support functions. These actors will not be analysed in detail, since they do not directly enter into the business model.



The BEMO-COFRA project has adopted an ontological perspective on the exploration of innovative service concepts and for quantifying value creation. When the value network has been established, process modelling will be used to define an implementation strategy for the BEMO-COFRA services followed by various profitability analyses based on different pricing models.

Further work on defining a business model and exploitation plan will be carried out in relation to task T8.3 Innovation Transfer and the results will be reported in the deliverable D8.3 Report on innovation transfer activities.

2. Introduction

The BEMO-COFRA project is a 32 month EU-Brazil collaborative project that aims to develop an innovative distributed framework which strengthens networked monitoring and control of large-scale complex systems. The integration of heterogeneous smart objects, legacy devices and sub-systems will increase the overall system efficiency with respect to the usage of energy and raw materials and support holistic manufacturing management.

The BEMO-COFRA framework will be tested and demonstrated in COMAU's test bed where dependability of the system is of utmost importance and where a very large number of devices, systems, and wireless sensor and actuator network (WSAN) components interact and actively cooperate with each other. In this setting, BEMO-COFRA will allow highly accurate observation of a range of real-time production processes and feed them to the appropriate decision support systems.

The potential impact of the BEMO-COFRA framework on industrial productivity and processes is envisioned to include:

- overall increase of flexibility, performance and re-configurability of new agile manufacturing systems: today the investment cost spent in average for reconfiguring existing production facilities is indicated as up to 40% of initial investment
- an optimal maintenance programme despite varying operating conditions
- an improvement in equipment efficiency of at least 25%, greater equipment uptime (to at least 95%) and more flexibility in cases of major variations/uncertainties in process parameters and/or in cases of frequent changes in the production setup.

2.1 Background

The European manufacturing industry suffers a deep crisis due to an overcapacity of production, while in Brazil there is a steady economic growth that is pushing manufacturing companies to increase their production rates. Despite these differences, in both the geographic areas there is an increasing need for flexibility in production activities that must adapt to a continuously changing world market demand.

According to medium to long term European and Brazilian research roadmaps, ICT will enhance any real world object, even the simplest one, with sensing, actuation, embedded processing and communication capabilities. The resulting smart objects will be in principle heterogeneous with respect to energy, sensing/actuation capabilities as well as processing and communication resources. They will interact with each other and will get even smarter through cooperation, forming in such a way communities of self-organizing heterogeneous networked cooperative elements.

The main envisaged outcomes and results will provide a highly relevant industrial impact, by improving factories productivity through the adoption of distributed control architectures and innovative MES (Manufacturing Execution Systems).

2.2 Purpose, context and scope of this deliverable

The BEMO-COFRA consortium is dedicated to ensure that the results of the BEMO-COFRA project will be exploited after the project's lifetime. Each project partner has a unique interest in exploiting the project results and this deliverable presents the projects' business strategies and exploitation plans with the aim to facilitate a successful exploitation of the BEMO-COFRA framework, its components and the knowledge gained during the project.

This deliverable presents the business model framework while further work on defining a business model and exploitation plan will be carried out in relation to task T8.3 Innovation Transfer and the results will be reported in the deliverable D8.3 Report on innovation transfer activities.

Hence, the present deliverable will first of all define the BEMO-COFRA exploitable products and services in chapter Three. Chapter Four gives an overview of the market which includes the identification of stakeholders and market analysis. In chapter Five, the business framework and the stakeholders are described. In Chapter Six the exploitation plans are presented.

3. Products and services

This chapter will define the main products and services resulting from the BEMO-COFRA project and highlight their features and unique selling points.

3.1 Exploitable products and services

On the basis of the achieved project results so far, it is already possible to identify two kinds of exploitable results: tangible and intangible results.

Intangible results encompass Consultancy Services and Academic course material (university level).

Tangible results may be exploited in two ways:

As *complete solutions* made of all technologies developed under the project; the BEMO-COFRA Distributive Framework.

Individually, in which each independent technology (e.g. modular, reusable software components) can be considered as a single product to be exploited.

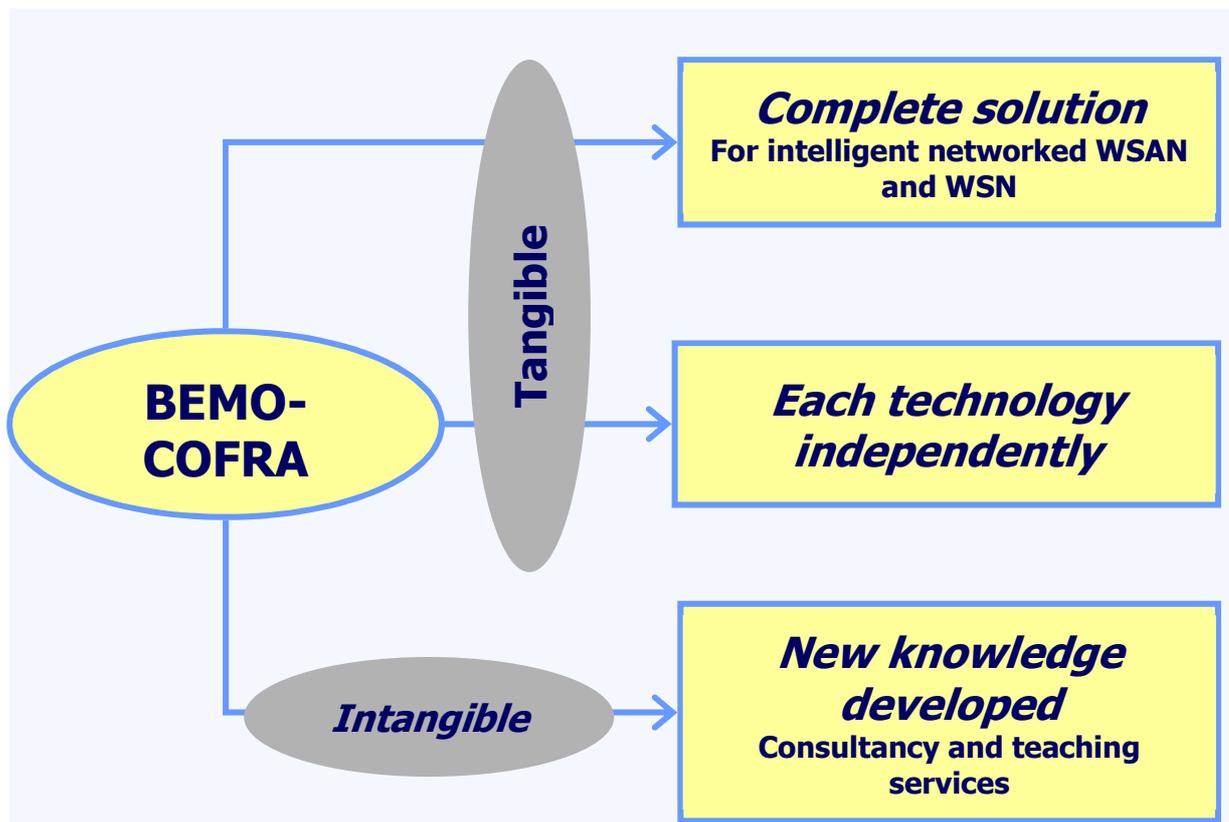


Figure 1 BEMO-COFRA exploitable results

3.2 The BEMO-COFRA Distributed Framework

The BEMOCOFRA Distributed Framework will enable networked production monitoring and quasi real-time control and monitoring of large-scale complex systems which will provide sophisticated context and knowledge management capabilities. It will be deployable on both new and existing communication networks and enable easy, quick and flexible re-configuration of sensor-actuator networks. The BEMO-COFRA Framework will be adoptable to different industry domains including harsh production environments.

As mentioned above, the BEMO-COFRA Framework consists of various components that can be defined as exploitable products, and which may be exploited individually or in combination. These include:

- WSAN software components, e.g. WSAN management protocols, administration tool for WSAN administration, and WSAN architecture. The BEMO-COFRA Distributive Framework will be highly flexible and will deploy a comprehensive distributed system architecture that is capable of integrating and interconnecting large-scale WSANs.
- Embedded wireless systems technologies, e.g. specific Wireless Sensors Networks (WSNs) extensions which will be available as Open Source.
- Manufacturing device drivers that will enrich the capability of Linksmart Middleware.
- Wireless industrial smart cameras that can function as sensors too. Representing the variety of sensors that can be integrated in BEMO-COFRA framework, a wireless camera will provide ways to send data directly related to monitoring tasks through image analysis. The device can send commands, status of the processes, and warnings to workers as well as instructions on how to act correctly after the occurrence of an unforeseen event.

3.2.1 Features and Unique Selling Points

BEMO-COFRA will feature an innovative distributed framework allowing networked monitoring and control of large-scale complex systems in order to ease the supervision and the optimization of physical processes. The project also aims to promote a wider adoption of large-scale networked monitoring and control solutions by addressing technological aspects and user needs.

The BEMO-COFRA framework will be able to support and enhance the lifecycle and interoperability of wired and wireless sensor-actuator networks by building on smart energy management and using semantic models as the backbone for interoperability. BEMO-COFRA will also offer a middleware design that facilitates rapid and flexible re-configuration of such networks.

In order to achieve the efficiency and interoperability objectives, the BEMO-COFRA framework will:

- Contain novel mechanisms to enforce dependability in WSANs operating in harsh environments and serving heterogeneous application constraints by taking advantage of context awareness, self-configuration and self-adaption concepts.
- Be able to adopt distributed and decentralized approaches to provide WSANs with scalable monitoring, control and self-diagnosis capabilities.
- Feature a Service Oriented Architecture (SOA) and a middleware that, by exposing smart objects capabilities as web services, makes it possible to execute the innovative WSAN applications developed within the project.

The BEMO-COFRA framework will further be able to:

- Enable dependable, flexible domain-specific monitoring and control operation based on large-scale WSAN infrastructure.
- Support an effective management at both device and networking level of large-scale WSANs adopted for monitoring and control purposes.
- Enable interoperability and interaction among heterogeneous sub-systems.
- Promote complex systems' efficiency by leveraging on the physical processes information and on the networked actuating capabilities.

Production systems, which implement the BEMO-COFRA distributed framework, will typically build on a standard hardware and software architecture, be easy to be installed and composed by modular "plug & play" mechatronic sub-systems, which do not require complex setup other than general system configuration.

3.2.2 Customers' benefits

Industrial manufacturers handle many details in order to monitor the processes they work with. To accomplish that, tools are used and integrated to aid workers and managers to take the proper decisions. In order to monitor the events, users generally rely on an integrated system, capable of showing all relevant occurrences of events and processes, and they need to act as fast as possible when a problem appears. Also, it is a common knowledge that the easier the installation of these tools is, the more acceptable it will be to the market.

In this way, the elimination of cables and WSA and WSN capabilities as featured by the robust BEMO-COFRA wireless communication platform, appear to be a competitive advantage which many manufacturing operators will pursue. Another important feature is the integration of multiple devices with different specifications into the network in a unified way, thus reducing the costs of training operators and maintenance crews as well as mitigating recurrent problems in the production line.

An accurate data management and shop floor monitoring system are equally important in improving production performance. A number of production floors are utilizing manual methods of data collection for producing reports. Where there is human intervention on the recording or collection of data, the truthfulness of the collected data is no longer 100% reliable. An automated data collection and automated reports significantly improve the accuracy of the valuable reports for management purposes. The BEMO-COFRA Framework aims to ease the supervision and the optimization of physical/production processes.

The actual monitoring and control systems are based on the principle of stopping work immediately when a problem occurs. It increases the downtime and production losses. These systems work with four steps of abnormality handling:

- Detect the abnormality
- Stop
- Fix or correct the immediate condition
- Investigate the root cause.

A real time production monitoring system should provide the right information to the respective personal at the right time. Presenting too much production information to the production workers or operators is not essential to their task. With too much unfocused information thrown at them, workers and operators are not able to digest what is necessary to modify on their current production outcomes. Each group of staff/team on the industrial shop floor plays a role in ensuring that the set goals are met. The BEMO-COFRA framework will deliver the right information to the right person according to the mapped team workflow.

The most important requirement of any data collection and reporting system is that the system is economical, accurate and easy to set up on a production line. Supervisors generally have an aversion to computer based systems because of on-going headaches with custom made software and other solutions. If the true production data can be automatically captured and presented in a simple, understandable way to the operators, they will become a more integral part of the improvement process.

The BEMO-COFRA distributed framework will be characterized by standard hardware and software architecture easy to be installed and composed by modular "plug & play" mechatronic sub-systems which do not require setup operations other than configurations. This tool will be easy to understand by non-technical staff and will provide user-friendly reports of monitored data, which will help the operators, supervisors and line managers to reach the production goals. The support departments, such as the Engineering team and Maintenance team, will receive custom reports what will help them to improve the production according to the goals. For example, the Engineering team will receive a report with information about the production energy consumption per machine/station/line and all important information to decide on a new line layout according to the goals, change the machinery, and improve the production. The Maintenance team will be informed when a problem occurs with a message indicating the machine position and its historical behaviour, helping them to

fix the problem and find the root cause faster. The manager will have the necessary information to review the production goals and to plan the next activities on the shop floor.

The BEMO-COFRA framework is an effective monitoring system and it is comprised of the following three important elements:

- **Collection:** collect data with minimal or no human intervention
- **Display:** presents relevant information back to operators, line leaders, supervisors, the support departments and the management delivered to not only their PC but also to their mobile devices
- **Analysis:** sufficient data for the management to conduct relevant analysis at all level in the shop floor.

3.3 Consultancy services

During the project each partner will gain considerable knowledge and expertise which can be exploited as consultancy services. Academic and industrial partners may choose to cooperate in delivering external consultancy services. Consultancy Services may thus be exploited for several issues such as:

- related to the adoption and implementation of the BEMO-COFRA framework
- related to green manufacturing, e.g. energy management and efficiency monitoring
- related to WSA technologies, e.g. deployment strategies, integration to existing systems, and selection of WSA technologies.

3.4 Academic course material

The research and development undertaken in the BEMO-COFRA project will generate new knowledge and new concepts which may be exploited to design new university courses or supplement existing taught courses. Such courses may focus on the following topics:

WSAN architecture: Research and development of the technologies stemming from of the proposed WSA architecture can stimulate students' interests to produce new components for this new architecture as a means of improving their training. Dependability and scalability issues that still hinder wide adoption of WSAs for monitoring and control large-scale complex systems must be covered in the WSA courses. Undergraduate students may also have interests in studying environments where network components have the capability of interacting with monitored elements, especially as this will create new challenges and responsibilities for software developers and researchers working in this area.

Wireless communications: The achievements of the BEMO-COFRA project will be demonstrated deploying the BEMOCOFRA framework in a manufacturing plant where dependability of the system is utmost importance. A result of the project will be the opportunity to update the content of wireless communication courses to cover the dependability concept. This will encourage students to define novel mechanisms to enforce dependability in wireless networks operating in harsh environments and serving heterogeneous application constraints by means of context awareness, self-configuration and self-adaption capabilities.

4. Market opportunities

The industrial partner COMAU possesses special expertise in car manufacturing, in particular power train machining and assembly processes and body welding and assembly processes. The exploitation planning will thus in the first instance be directed towards this market. When the proper business strategies have been developed for exploiting this market, other industrial market will be considered.

4.1 Market description – automotive manufacturing

Automated car production is generally divided in areas dedicated to specific activities. On the whole, car makers retain only part of the production process in-house as the complete car manufacturing process requires large investments and a great deal of space and manpower.

The majority of car manufacturers concentrate their efforts on the following parts of the manufacturing process:

- Power train plant: where engines are machined and assembled
- Body welding (also called 'body in white shop'): where the body of the car is assembled and welded
- Painting shop: where the body in white is prepared for painting and finally painted and cocked
- Final Assembly: where the painted body is fitted with engine, suspension, trim and all the other parts.

Modern day Industrial Automation Systems control highly complex networks of high performance machine systems executing multi-parameter control of variables like precision motion, force, temperature, flow rate, pressure, etc. Not only is the control and monitoring of all these parameters important, transfer of control signals to and from these Distributed Control Systems to central controllers must be seamless, which makes networking a major component in successful implementation of these open systems. The reason why networking capabilities are needed in industrial Automation systems is threefold:

- To provide connectivity to different machines
- To enable data sharing and gathering
- To define a flexible solution facilitating integration of future advances in technology.

Industrial Automation is commonplace in most conventional manufacturing units. There is increasing pressure that these complex controls with extremely high throughputs and miniaturisation are implemented with cost-effective electronics and robust software. Though high-end machines for advanced industries are built in relatively smaller volumes compared to consumer goods, the need to curtail capital expense on them is borne out of the need for cheaper end products, and hence the need for each successive generation to perform at higher levels and lower cost. Combinations of high-speed data bus and fast embedded processors enable new cost-effective, high-performance architectures for advanced machine design and other real-time automation tasks. The industrial adoption of components originally designed for higher volume consumer applications are a certainty for the next generation of industrial controls.

The main weaknesses of present manufacturing systems, which highly affect overall efficiency and reduce competitiveness, basically refer to the following aspects:

- Process integration: limited integration among the processes involved in the engineering and management of the plants
- Flexibility: inadequate flexibility of the production plant, with limited capability for handling variations in product mix and volumes
- Scalability and re-configurability: production systems are not designed to be easily reconfigurable

- Manufacturing efficiency: the monitoring of productivity is affected by low diagnostics capacity; there are usually no efficient instruments to detect engineering errors and to prevent installation problems, as well as efficient data logging to enable predictive maintenance
- Ramp-up time: the time to reach full production capacity is often too long and therefore too costly.

Current solutions in Industrial Automation Controls can be characterised as Centralised Controls Architecture. Backplane Based controllers were considered to be natural choices for the designers of yesterday as it was assumed that they could provide the high communication speeds needed for Industrial processes like synchronising motion, synchronising images and data acquisition. The rack-mounted backplane which is the standard implementation for most Industrial and Laboratory Automation controllers uses bus solutions like VME, VXI, and PXI in addition to proprietary buses like Modbus. In recent times PCI buses have gained popularity in this market segment owing to the penetration of Windows based PCs.

In the conventional architecture, all sensors, motors, digital inputs and outputs and analogue signals are cabled from the point of use and converge at the centralised controllers with individual backplane cards designed to handle each specialised function. All signals are brought to the physical location of the system controller using multi-wire cable bundles.

Machine Systems typically use several specialised backplanes to implement different control functions. Bus to bus communication between various subsystems is often through traditional RS-232/422/485 serial communication channels or through bus converters. This centralised approach limits reliability and configurability as hundreds of conductors are required to route signals to the central control chassis.

Overall, this traditional approach is cumbersome, relatively large and more expensive. Another big problem is the software used for controllers. Due to the lack of standard interfaces, different vendors have different software approaches for the development of various subsystems, and to integrate them has proved to be expensive and time-consuming.

To avoid the use of a centralised backplane based system, it is important to localise control of devices performing similar functions. This Distributed Control System (DCS) architecture uses some form of serial or parallel cable to link already digitised information from point of use. In DCS analogue signals are quickly digitised, and functions that do not need to be centrally supervised are localised. The advantages of using DCS are as follows:

- Greater Signal integrity (S/N) by reducing the distance that analogue signals must travel before they are digitised, important in applications where signal-to-noise ratio maximisation is demanded
- Cabling can be simplified and functional sub-systems can be modularised. These sub-systems can be then plugged into bigger and more complex networks hence simplifying system configuration
- Remote monitoring of signals or control functions over a local area or public network is simpler with DCS architecture as it is inherently packet driven.

Many distributed control schemes have been developed and implemented for industrial applications over the past three decades. The oldest ones were based on Fieldbus and its derivatives with newer technologies like DeviceNet, Can or Profibus taking over. These buses had data transfer rates in the range of only a few MB/s which was far lower than backplane buses like VME or PCI. This hampered the adoption of DCS-based architecture by a majority of system designers even though distributed control systems were far more efficient compared to backplane based industrial automation systems.

Additionally, the car manufacturing industry has to continuously adapt to market dynamics; the market is constantly changing and customers are becoming more and more demanding. The manufacturing plants must therefore be flexible and able to quickly adapt to market changes and demands.

4.2 Market needs

The manufacturing industry is increasingly focusing on energy consumption optimization, safety and remote monitoring and data collection. The BEMO-COFRA Framework can address these challenges and needs. In order to achieve this, the BEMO-COFRA Framework and its components must fulfil the following requirements:

Reliability: The framework should provide wireless solutions as a manner to eliminate problems related to wired infrastructure, such as disconnections due broken cables

Flexibility: Without cables the energy consumption can be optimized and physical space on plant floor can be utilised more economically and be more easily change to accommodate for changes in the productivity level.

Energy Consumption: This is an important aspect because we can detect some points that have a very high consumption of energy. These points may be bottlenecks in the processes indicating poor functioning of some devices. If a device recurrently performs poorly, the cost of the process increases as processes are repeated until the device produces a satisfactory result. Moreover, the demand for sustainable solutions is very high today thus indicating that energy consumption issues are increasingly important.

4.2.1 Energy efficiency

The price of energy has dramatically increased during the last years. The availability of electrical energy is reduced because of the limitation of natural resources. Energy is now one of the most expensive raw materials used in the production process and it is used on a large scale.

The following two graphs show how the energy prices have increased during the last years for the Brazilian industrial consumers and how the electricity prices have increased for European industrial consumers.

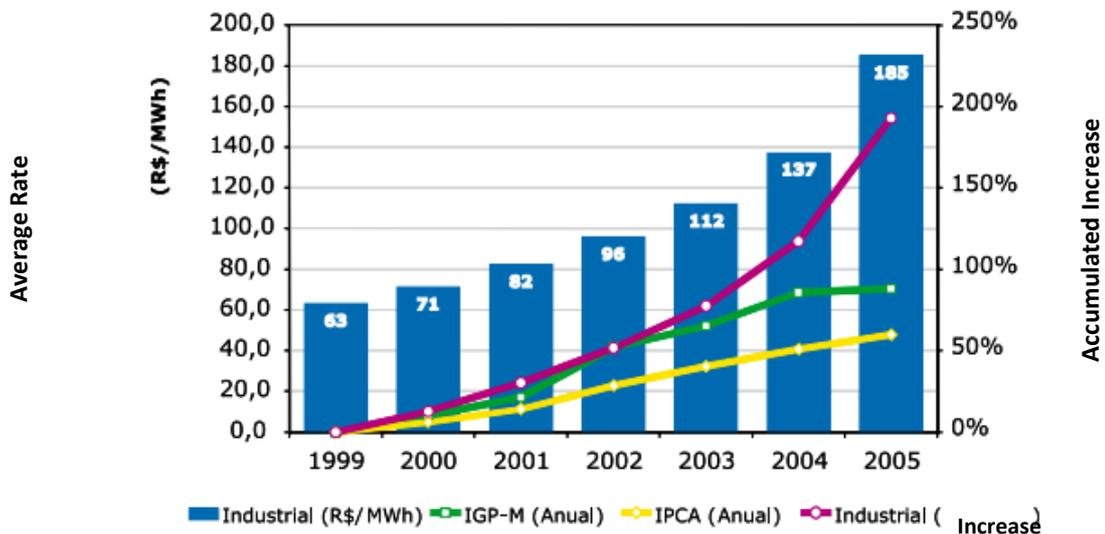


Figure 2 Energy prices for Brazilian Industry¹

¹ Source: Matriz Energética: Cenários, Oportunidades e Desafios. Brasília, 2007. CNI, Confederação Nacional da Indústria

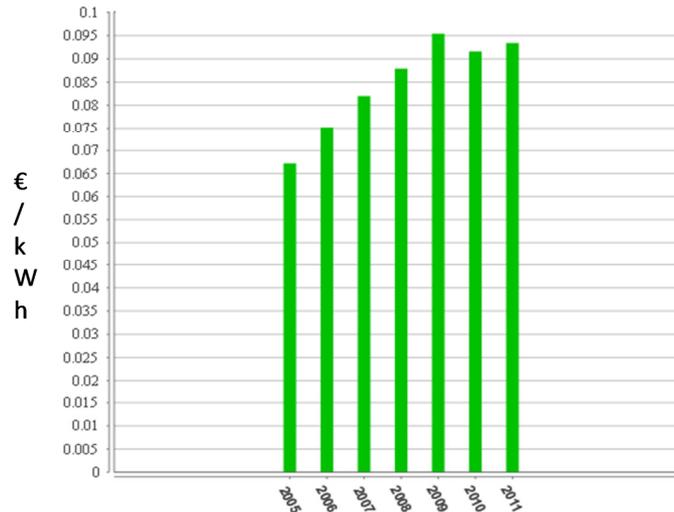


Figure 3 Electricity Prices for European Industrial Consumers²

In order to make products more competitive and respect the energy restrictions, the industry managers want and must control the energy consumption in the factories by creating a plan of how to reduce energy consumption. Hence, the monitoring of energy consumption has become an important factor in manufacturing and is actually being demanded by some governments.

The BEMO-COFRA Framework enables managers to receive energy consumption information from different factory locations across the world. This could help them compare energy consumption of different factories and identify energy optimization potentials.

In relation to reducing costs, the communication technology in a factory is decisive on the installation costs. When for example a framing station uses a wired network it costs about 60.000 Euros only in cables. In addition to the huge cable costs, a cabled network is more difficult to manage and restructured if for example a new device is included or excluded. It requires a lot of specialized manpower hours to install or modify this kind of wired network. Wireless sensor and actuator networks, WSAAN, are an alternative in order to be able to reduce the cable costs and improve the production line's flexibility. However, traditionally they have not been designed to fulfil the reliable enough to be installed in a harsh industrial environment like a car factory.

The BEMO-COFRA framework proposes a reliable WSAAN tested in a harsh industrial environment, guarantying the communication between the devices on the entire production line. Remote administration of the network will be possible and the framework will enable a seamless switching between wireless and wired connections as necessary. The framework will have modular structure, which will facilitate modifications at the network, reducing the need of several hours of specialized man power and in consequence the costs.

4.2.2 Intelligent manufacturing

The whole set of solutions that will be developed in the BEMO-COFRA project can be seen as a categorization of the main demands:

Quality Control: The industry demands products with high quality. In this way the wireless solutions and tools developed by BEMO-COFRA can be used to indicate if a product was made correctly according to the specification by, for example, using an automatic detection process. The devices used for this purpose could be a wireless sensor or a wireless camera that can send a signal if a problem is detected during the production process.

Intelligent Monitoring Process: Complementary to the situation just described we can imagine that some processes can be monitored remotely, especially if the location harmful to humans or difficult to access, e.g. due to extreme temperatures or high buildings;

² Source: <http://epp.eurostat.ec.europa.eu/tgm/graph.do?tab=graph&plugin=1&language=en&pcode=ten00114&toolbox=type>

Smart Maintenance: In a production line with a high level of autonomy, the production process can run without the intervention of workers. If a problem occurs, or even before it occurs, workers can be advised to take the correct action;

Safety: This benefit can be obtained from the conjunction of the two above points. As the monitoring and maintenance can be done remotely, the environment thus becomes safer for the workers as they will not need to be present on the production floor for monitoring and maintenance tasks.

These demands define the market segments that are described in the next section.

4.2.3 Market segments

Among the market segments that may benefit from the outcomes and results of the BEMO-COFRA project we can cite:

Automotive: In this sector it is important to monitor the energy consumption of robots, devices and PLCs and provide a manner to send this type of information to high level monitoring tools. This kind of smart maintenance is of extremely importance given the production capacity of millions of cars per year and to attain the requirements of quality control.

Siderurgy/The Iron and Steel Industry: In this industry the processes are often very dangerous, such as in Steelworks in which melted metals are carried by big reservoirs.³ By using wireless devices connected to monitoring system the intelligent monitoring of heated metals can be done remote and thus increase the safety of the workers.

Oil & Gas: Many production processes are done in inhospitable locations or with difficult access such as structures on a sea shore. This is the case with the production and extraction of mineral fuel that is done in large reactors. These reactors should stay free of cracks or other defects to prevent accidents. The utilization of a framework to integrate the devices that can inspect the environment and issue warnings when a problem is detected will enable the remote operation of the reactors, thus saving time ensuring better safety.

4.3 Actors

For a manufacturing platform to be successful it needs to provide added value for all actors in the automotive assembly process. There are a great many actors involved in the automotive assembly process:

The complex network of sub-suppliers in the supply chain is delivering parts and components for the assembly process.

A large group of suppliers of machinery and assembly equipment are not only supplying equipment and parts and integrating them into the plant. They are increasingly also providing services for the running, maintenance and upgrade of the assembly plant.

Finally, the manufacturer and owner of the assembly plant have a large organisation managing the complex processes. A typical organisation diagram for a car manufacturer is shown in Figure 4 below.

³ An Ironwork is a building site where iron is smelted and where heavy iron and/or steel products are made. The processes carried out at ironworks are usually described as ferrous metallurgy, or sometimes siderurgy (<http://en.wikipedia.org/wiki/Ironworks>)

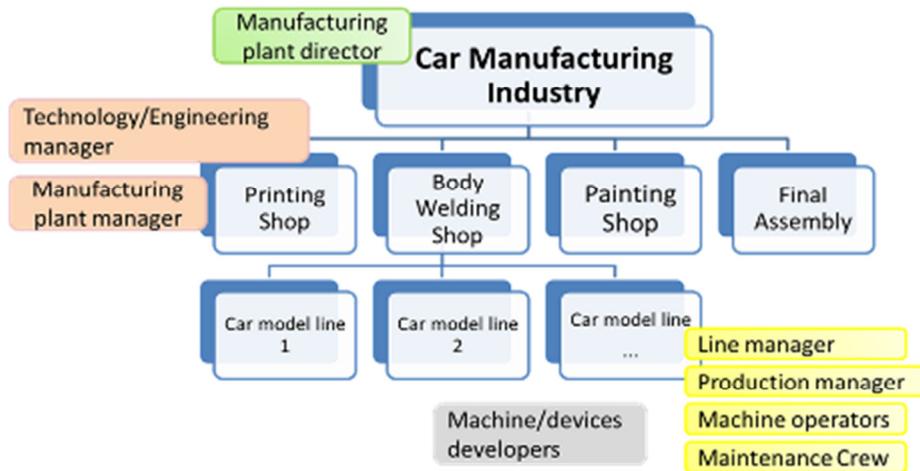


Figure 4 Typical car manufacturer's organisation diagram

In the following, the actors directly involved in the automotive manufacturing plant are identified and described:

Manufacturing Staff / Plant manager

This actor is responsible of the overall plant production. He is responsible for the whole plant, the awareness of the production trends of the company, the management of the raw materials and the energy consumptions are the main information requested. He is one of the key decision makers for the adoption of new production systems and standards inside the plant.

Area/line supervisor

All the production lines that affect the production on the same sub-product (i.e., for the car body frame: the moving parts, the underbody, the body sides, the roof, etc.) are grouped in a single area. The responsible supervisor of each area or each line must have easy access to the production status and progress in the part of the plant that is under his responsibility.

Manufacturing Staff / Machine operator

This actor usually operates the machine inside the manufacturing plant and is involved in the production process of the final product. Normally, machine operators need to gather information regarding the steps of the production process that are related to the loading of the elements to be produced and the unloading of the final products with few manual operations.

Manufacturing Staff / Maintenance crew

The maintenance crew shall act promptly when a fault on a machine occurs. Their requirements of the production process are wider than the machine operators and the line supervisor. Maintenance crews normally have access to a wide range of information on a HMI (Human-Machine Interface) and are able to execute operations that are needed for the restoring of the correct functioning of the machine; actions that normally are not allowed to the operators.

System integrator

The implementation of production systems for an automotive manufacturer is done by a system integrator (the system integrator in the project-related manufacturing environment is COMAU and its suppliers such as Siemens, Rockwell, SMC). The work is divided into several steps that include research, design, development and testing of the final production system. The information required by system integrators basically consists of the specification provided by the customer. The output is usually the production system requested and the documentation that certifies the quality and the compliance to the requests.

5. Business framework

The general business model framework for marketing the BEMO-COFRA Distributed Framework can be seen as a pyramidal structure as shown in with three value levels. At the top (the Meta level) we find the business activities of providing conceptual solutions to support the BEMO-COFRA platform.

At the middle (Primary Chain) level we find the actors actually engaging in exchanging value-added services based on the BEMO-COFRA platform and services.

At the lowest "Support Chain" level, we find the support actors engaged in delivering network infrastructure, devices and terminals and other support functions. These actors will not be analysed in detail, since they do not directly enter into the business model.

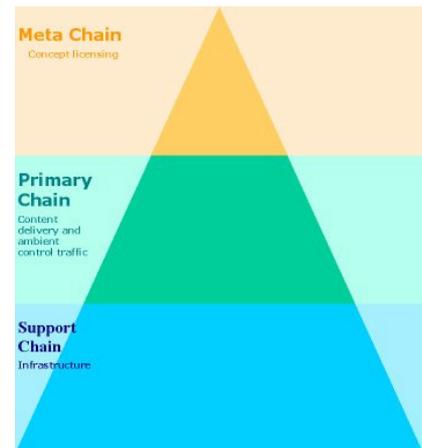


Figure 5 Business framework

As an introduction for some further considerations about potential business opportunities in the selected user domains, in this chapter we briefly introduce the business model concept that was developed in other projects and that will also be used in the BEMO-COFRA project. For further information we refer to the work reported in the ebbits project and reported in: *D3.6 Business model concepts* and in the eu-DOMAIN project: *D6.4 Validated business models and business cases*, which give an overview of a potentially sustainable business models and cases in industrial markets.

Each stakeholder has a certain business environment that will determine the most appropriate business model to be used in each case. This chapter will provide an overview of the generic roles of the stakeholders composing the business environment in which the BEMO-COFRA platform is going to be exploited. The scope of this chapter is to introduce the stakeholders to be involved in setting up, providing and buying BEMO-COFRA services.

5.1 Business modelling

The basic questions to be answered in the business model are the fundamental questions of any business: What do we offer to the customer, who are they and how do we operate to deliver the product or service so that we can create a profitable and sustainable business? In other words, we need to identify and analyse the value proposition in the BEMO-COFRA platform and services, to which customer group the service is targeted and how Service Providers organise themselves to deliver the service in the most efficient way. The business model can take two very different approaches: The value model and the process model.

As the name indicates, value modelling focuses on value creation; how value is created, by whom and for whom. It is thus foremost a strategic tool with the aim of identifying new business opportunities and how the firm can position itself strategically to derive maximum benefits from new and emerging opportunities, which may or may not require substantial redefinition of the enterprise infrastructure.

Process modelling is in many ways different from value modelling. Process modelling refers to business procedures of the same nature that are classified together into a model. One possible use of a process model is to prescribe how things must/should/could be done in contrast to the process itself, which is really what happens. The process models are thus best suited to provide an architectural overview in the implementation of business strategies in established infrastructures.

The value model and the process model reveal only superficial information about the profitability (quantification of revenues and costs) of the proposed service. In most cases the financial information can be very useful for evaluating and prioritising various instantiations of the model, but a serious analysis of revenue streams and pricing models and associated costs needs special modelling work. For this purpose, a series of revenue and pricing model methodologies exists.

5.2 The BEMO-COFRA business model framework

The BEMO-COFRA project has adopted an ontological perspective on the exploration of innovative service concepts and for quantifying value creation. When the value network has been established, process modelling will be used to define an implementation strategy for the BEMO-COFRA services followed by various profitability analyses based on different pricing models.

Based on the use cases and the identified actors, a value modelling approach will be used. The value model represents various abstraction levels for value activities, stakeholders, individual actors, aggregating actors, and market segments and allows us to model and experiment with different combinations of service constellations and stakeholders and calculates a first approximation of potential revenue streams in order to evaluate the sustainability of the model. The implementation of the BEMO-COFRA services can then be performed using process models. The process model will be built on the value model and it will represent an instantiation of the value model (a business case). It will include detailed stakeholder description.

Finally, the revenue modelling method will be used to provide financial assessment of the BEMO-COFRA business case and its sustainability. A further purpose is to bring together pricing models and associated revenue models and try to perform a profitability analysis for the stakeholders involved under different pricing assumptions.

The value models and revenue models will be further analysed and developed by the partners in their final, individual exploitation plans after the project ends. The purpose here is to report on a viable business model framework for BEMO-COFRA which individual partners may adopt.

Further business model work will be carried out in relation to task T8.3 Innovation Transfer and the results will be reported in the deliverable D8.3 Report on innovation transfer activities.

5.3 Stakeholders at the Meta level

The following Meta level stakeholders have been identified:

5.3.1 Concept Owner

The Concept Owner licenses the right to use the BEMO-COFRA platform to one or more Service Providers. The Concept Owner develops the concept in a suitable form, based on customer requirements. The Concept Owner may develop specific domain models for the customers or he may provide the necessary development kits for the customers to program their own applications. The customer pays an initial license fee plus a usage fee for the right to use the concept. In addition, the customer may pay development and customisation costs for the Concept Owner to develop specific solutions. The BEMO-COFRA technical partners will initially all be operating as Concept Owners.

In some cases, the BEMO-COFRA results such as radio interference studies, software prototypes, WSA deployment best practices may be regarded as different concepts and sold as products. In such case, the customer will buy from the Concept Owner and install the desired BEMO-COFRA platform, perform integration with specified legacy systems, define and setup device networks, program appropriate applications and services and maybe even operate the platform in its entirety.

5.4 Stakeholders at the Primary chain level

In the primary chain we find the actors actually engaging in exchanging value-added services based on the BEMO-COFRA infrastructure. This could e.g. be actors in and around the car manufacturing industry. Some stakeholders are delivering services directly to end-users in a traditional supplier-customer relationship. Other stakeholders are providing the services as Application Service Providers, working on behalf of the supplier. Yet other stakeholders are enriching the basic services with additional services.

The flow of services in a generic primary chain is visualised in the following figure:

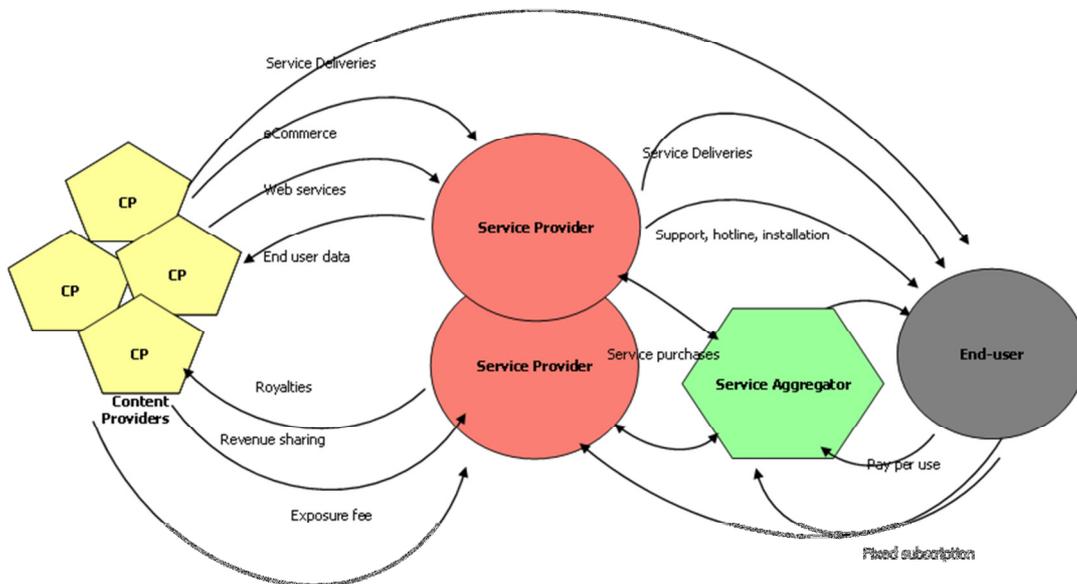


Figure 6 Actors and service flow in a generic primary chain network

In the following, we will look bit closer on the primary chain stakeholders:

5.4.1 End-users

End-users (or actors) are individuals (operators, plant managers, technicians, etc.) that consume one or more services provided via the BEMO-COFRA platform.

Typically, the end-user can also consume bundles of services from one Service Provider with each service coming from a specific Content Provider.

End-users are typically not buyers of the services. Services are bought by organisations where the end-users are employed. In some cases (free agents, independent maintenance people, consultants) the end-user may also be buyers of individual services provided by a Service provider.

5.4.2 Content Providers

Content Providers are "owners" of the "content" which the end-users are going to be engaged in. This could be the monitoring objects such as a production cell, a manufacturing line, or an entire plant. The "content" is the subject of the services such as for example energy data delivered to an energy monitoring services, machine condition data in an on-line maintenance of technical installations. Content Providers benefit from the end-users' usage of the services because the end-users can provide instruction or advise, which will optimise its operation. Or they can compensate the additional costs of the services by obtaining higher efficiency and lower operational costs.

In many cases the end-users will be employed by the Content Provider, e.g. the production line manager is employed by the car manufacturing plant, which is the content provider. In some cases, the end-user is employed in an outside organisation, for example the end-user is a maintenance engineer of a supplier of production robots installed in a car manufacturing plant which is the Content Provider. The service is provided in order to have the robot manufacturer perform online maintenance and condition monitoring of his products inside the manufacturing plant.

5.4.3 Service Providers

A Service Provider is a firm that establishes the BEMO-COFRA platform and offers the functionality of the BEMO-COFRA infrastructure to end-users as Platform-as-a-Service or Software-as-a-Service. One

could imagine that COMAU would be a Service Provider. The Service Provider will use one or more sub suppliers such as network operators, hosting companies as backbone and last mile delivery platform to the end-user.

Typically, a Service Provider will offer the services to a customer such as the Content Provider or to an owner of the Content Provider. The Service Provider can thus operate several concurrent but separated cloud services for various Content Providers.

The Service Providers generate revenue streams in the form of service fees from the Content Provider or the owners of the Content Provider and possible subscription and usage fees incurred by end-users depending on the contractual framework. If fees are paid by the end-users (e.g. external consultants) a part of the fee can be passed back to the Content Providers so that the stakeholders enter into a true value constellation scheme.

To manage the quality of service delivered by a BEMO-COFRA Service Provider, Service Level Agreements (SLA) must be agreed. The Service Level Agreement define the legal status and responsibilities of the BEMO-COFRA Service Provider and what kind of contracts are required between service providers (e.g. healthcare provisioning bodies or industrial domains), customers or patients, and the BEMO-COFRA Service Provider.

5.4.4 Domain Service Providers

In the case where a car manufacturing company wants to operate the BEMO-COFRA service exclusively for its own purpose and across its manufacturing plants and cooperation partners, with customised, dedicated services specific to its own domain, we use the term Domain Service Provider. The Domain Service Provider does not purchase the BEMO-COFRA concept. Rather the Domain Service Provider orders specific services developed and consumes the services as Platform-as-a-Service or Software-as-a-Service.

The services can be extracted from a Service Provider's service portfolio, but they are completely customised and secluded and fully integrated in the Domain Service Providers service offering.

The Domain Service Provider may pay the Service Provider by a revenue/cost sharing schemes or directly for the services provided, with the main revenues typically comprising the following items:

- Initial charges for installation and hardware (e.g. service gateways, devices, etc.)
- A periodic (e.g. monthly) subscription.
- Content usage fees (i.e. proportional to the quantity or quality of the content delivered).

Alternatively, the Service Provider may collect the revenues directly from the end-users.

5.4.5 Service Aggregators

When the Service Providers separate themselves completely from the services delivered and specialise in just operating the BEMO-COFRA platform on various network infrastructures, e.g. for a series of Service Providers or Domain Service Providers, we use the term Service Aggregators.

Service Aggregators can be likened to network operators (and are often such) that offer capabilities for value-added services on their networks. They only take responsibility for the technical operations of the service and front-end customer support is always directed to the Content Provider or to the Service Provider.

Service Aggregators derive their revenue streams from network traffic fees from end-users or from fixed service fees from the Content Providers or Domain Service Providers or both.

6. Exploitation plans

During the project, the consortium will join effort in exposing and generating interest in the project's progress and results through various dissemination activities (as described) above in section 5.2 Dissemination which will help the future exploitation of BEMO-COFRA.

The effective exploitation of the results of the BEMO-COFRA project depends on an accurate understanding of the core competencies and resources of partners, and matching these to exploitation roles. The Consortium represents a true involvement from SMEs and industrial companies with an ideal combination of research and commercial expertise. The exploitation of the project's result will differ depending on whether the partner represents academia or industry.

6.1 Consortium Exploitation

The partners in the consortium come from different sectors covering multidisciplinary industrial, academics and technology providers; leading researchers in semantics, ontologies, and interoperability; renowned experts in distributed intelligence and sensor networks; system integrators and suppliers of manufacturing systems; software developers; and business development experts and economists. This will ensure that the project will provide highly relevant and directly applicable results of significant economical and societal impact, in particular:

- Software provider CNET is well known for their expertise in software architecture, XML based content and web service applications, semantic annotation, knowledge management and system integration.
- In distributed networks, FIT is one of Europe's leading institute on distributed network intelligence and security (together with its sister institute SIT). ISMB's Pervasive Technologies Lab is experts in short-range wireless communication networks and systems. VTT is world renown for their work in ICT Industrial systems.
- In the manufacturing area, leading industrial companies and research organisations with high innovation capabilities will ensure that innovative solutions are developed and utilised and that the results will be exploited in the academic area. COMAU is a world recognised leader in development of industrial automation equipment and robotics and full maintenance activities for equipment and plant.
- CNET, IN-JET and IVISION are innovative SME technology providers, who will gain leading technology developments in their respective areas of software, WSA and control system development in manufacturing. They will greatly benefit from cooperation with the large companies, research institutes, universities and system integrators, in order to secure rapid uptake of their new technologies.
- The Computer Science Centre at UPFE is one of the most prestigious and renowned computing centres in Brazil and its Networking and Telecommunications Research Group is leading research of advanced topics in computer network and telecommunication areas. It has well-established connections with the regional energy company Chesf (Companhia Hidro Elétrica do São Francisco) and other Brazilian companies and industries.
- The research group Emerging Technologies and System Security (ETSS) at UFAM has core competence in wireless communications and system security. The group has well-established links with and conducts research for national industries and the Brazilian government.

There are five technological research institutions and universities involved in the project. For the research institutions, the project provides excellent opportunities for participating in multidisciplinary research work and creates excellent networks of industrial partners for uptake of their network and internet technologies. The industrial involvement in the project assures a professional, experienced and knowledgeable platform for direct application of their research results.

Exploitation on consortium level includes those activities and plans made jointly, either as consortium as a whole or different groups of partners. Generally, exploitation will take place on a bilateral basis and agreements among subsets of partners.

6.2 Individual Partner Exploitation

Partner	Exploitation
FIT	<p>FIT's goal is to achieve a showcase of intelligent monitoring and control system based on WSA and mobile devices as a tool to acquire industry projects from the car makers in Germany and Italy.</p> <p>FIT will contribute on developing the demonstrators and prototypes in BEMO-COFRA specifically in developing mobile applications.</p> <p>We will show this demonstrators in the exhibitions where the major player from the automotive industry will participate such as Hannover Messe.</p>
CNET	<p>CNET plans to exploit LinkSmart extensions with a focus on the Scandinavian market. Towards the end of the project we will attend industrial fairs, demonstrate prototypes, and produce press-releases.</p>
IN-JET	<p>IN-JET's objective is to deliver components of the BEMO-COFRA platform in Denmark to be integrated into our general home control and internet service platform for homes. The new functionality of BEMO-COFRA components will allow us to also handle integration and interoperability with complex systems; firstly in the area of energy management and later in general manufacturing environments with main focus and small manufacturing companies. The exploitation will form the onset focus on global markets in cooperation with global partners.</p>
ISMB	<p>ISMB exploitation objectives are:</p> <ul style="list-style-type: none"> • to leverage on the competence acquired into the project to improve the effectiveness of relevant technologies transfer services • to propose innovative technology solutions or new R&D projects to its industrial partners. • to use the competences created in the project for post-graduate students training and projects (higher education) • to use dissemination activities to promote ISMB research activities at an international level, possibly allowing to widen ISMB network of partners. • to use competences acquired during the project to identify new applied research directions in the manufacturing domain (or in other relevant domains). • to make process innovation. <p>The exploitation could mainly relate the manufacturing market segment but would include also home/building automation and energy. The target countries relate to both Italy as well as other European countries.</p>
VTT	<p>Licensing and industrial cooperation.</p>
COMAU	<p>COMAU key objective is to improve its image of an innovative and high technology company in the automotive field, consequently widen its market share and the participation in the upcoming new investments for production plants and efficiency improvement plans in the segment. Being able to implement a practical industrial test bed for the BEMO-COFRA project COMAU will have conditions to implement the project findings and outcomes in the new Body Shop solutions for auto manufacturing markets in Brazil and globally.</p> <p>The execution of the project will also provide COMAU Brazil personnel involved in the technical activities with a more robust knowledge on the monitoring and control systems used in industrial applications.</p>

UFPE	Proposing new research projects with other industries for expand our experience in applied WSA's.
UFAM	Licensing and industrial cooperation.
IVISION	Main objective is to exploit the wireless camera which can work as wireless sensors in the markets that Invent Vision already works with.

7. References

- (ebbits 2012) ebbits Consortium (2012), D3.6 Business modelling concepts v1.1
(eu-DOMAIN 2006) eu-DOMAIN Consortium (2006), D6.4 Validated business models and business cases

8. Appendix A – Partner Exploitation Questionnaires

8.1 FIT

Exploitable products	<p>List exploitable products and services that will be delivered by the BEMO-COFRA project. Indicate if it is jointly owned or individually owned. In case it is jointly owned, please indicate which other partner/s is/are involved. Also indicate your plans to protect this ownership (patent, license, etc.), which kind of Intellectual Property Rights (IPR) will be applied.</p>	<ol style="list-style-type: none"> 1. The knowledge gained on how to monitor energy consumption of the manufacturing processes can be exploited for providing consultancy services for manufacturers and certification bodies that want to promote green manufacturing. Our exploitation focus will be on the integration of industrial energy sensors and presentation of the energy data to the users. 2. Reliable WSAN for harsh environment is a big challenge at the moment. The lesson learned and prototype developed in BEMO-COFRA could help FIT and other partners providing a consultancy services for car manufacturers that want to use WSAN with possible theme such as the selection of WSAN technology, deployment strategies, and integration to existing systems. 3. As smartphones and tablet becomes more pervasive in the recent years, car industry has shown some interest to use them providing the executive employees flexibility to monitoring their businesses while they are on the move. FIT could exploit this opportunity by providing service to build and evaluate prototypes of mobile solutions.
Market opportunity	<p>For each product or service, describe what are the high level potential market segments, customers, market size and income that can be generated from such target markets. What are the risks and barriers to entry? (References to data sources are welcome)</p>	<ol style="list-style-type: none"> 1. The potential market for FIT is the car makers in EU & Brazil that seek ways to increase energy efficiency and reduce cabling costs in order to reduce the manufacturing costs or to comply with new environmental regulations and to exploit the marketing potential of sustainability. To pursue this market, cooperation with standardization and certification organizations need to be established e.g.: TÜV, Department of energy, Verband der Automobilindustrie or similar bodies. 2. Market Size: 24 car assembly plants in Germany⁴. 9.8% of passenger cars in the world is produced in Germany, 4.23% are in Brazil and 23.27% in the EU countries⁵.
Stakeholders	<p>Please identify all stakeholders relevant for your business exploitation.</p>	<p>Car makers managers, IT operators, shop floor operators, certifying</p>

⁴ <http://oica.net/category/production-statistics/>

⁵ <http://www.eurofound.europa.eu/emcc/automotivemap/#car>

		bodies, Manufacturing equipment suppliers,
Partner business	Describe your business and its core competences relevant to the exploitation of BEMO-COFRA results	<p>FIT is a research institute whose goal is to transfer technology from research to industry in Germany. UCC, the group involves in the Bemo-Cofra focuses on doing research in developing ubiquitous solutions for working environments.</p> <p>Our main expertise includes:</p> <ul style="list-style-type: none"> • Mobile application prototyping • Internet of things and wireless sensor integration into existing system • Service oriented middleware for integrating devices. • User evaluation & usability studies • Requirements management • Research Project Management
Consortium level exploitation	How might the Consortium work at a collective level to exploit the BEMO-COFRA results? Can you describe a commercial model? Would you, as partner, take part in this and how? Would additional stakeholders be needed to operate this model?	<p>In-Jet, UFPE, COMAU will help FIT to establish contact to the car makers in Europe and Brazil. Conduct a business analysis and develop business offers. ISMB, VTT and FIT will develop technical design and proposals of monitoring using reliable WSAN.</p> <p>The service offered by the consortium covers an energy monitoring solutions for manufacturing and assembly processes.</p>
Competitive position	How do you think the market will change over the next 5 years? Describe what you see as the likely competition to the BEMO-COFRA proposition. Describe implications and risks and how BEMO-COFRA can maintain its competitive position (Taking into account the external context, describe the strengths, the weaknesses, the opportunities and the threats of the BEMO-COFRA product/service)	<p>Manufacturing and car assembly in Europe already have faced a strong competition from the manufacturers located at BRIC and developing countries. As Manpower costs are higher in Europe, they will need to cut down the costs in other sectors such as energy and raw materials.</p>
Partner level exploitation	What are your exploitation objectives as a partner? Describe how you plan to meet the objectives, which products, market segments and countries you will deal with	<p>FIT's goal is to achieve a showcase of intelligent monitoring and control system based on WSAN and mobile devices as a tool to acquire industry projects from the car makers in Germany and Italy.</p> <p>FIT will contribute on developing the demonstrators and prototypes in BEMO-COFRA specifically in developing mobile applications.</p> <p>We will show this demonstrators in the exhibitions where the major player from the automotive industry will participate such as Hannover Messe.</p>

8.2 CNET

Exploitable products	List exploitable products and services that will be delivered by the BEMO-COFRA project. Indicate if it is jointly owned or individually owned. In case it is jointly owned, please indicate which other partner/s is/are involved. Also indicate your plans to protect this ownership (patent, license, etc.), which kind of Intellectual Property Rights (IPR) will be applied.	Extended LinkSmart Middleware for industrial applications, CNet, FIT, ISMB, and VTT. Available as Open Source. Specific WSN extensions (Contiki) for LinkSmart. CNet, FIT, ISMB, VTT, UFPE, and UFAM. Available as Open Source. Knowledge to be exploited in consultancy services.
Market opportunity	For each product or service, describe what are the high level potential market segments, customers, market size and income that can be generated from such target markets. What are the risks and barriers to entry? (References to data sources are welcome)	Energy efficiency offerings in industrial applications. WSN offerings for different markets.
Stakeholders	Please identify all stakeholders relevant for your business exploitation.	--
Partner business	Describe your business and its core competences relevant to the exploitation of BEMO-COFRA results	CNet is a software house specialised on middleware for Internet of Things applications. Exploitation will be done both through software offerings but also through consultancy and system integration.
Consortium level exploitation	How might the Consortium work at a collective level to exploit the BEMO-COFRA results? Can you describe a commercial model? Would you, as partner, take part in this and how? Would additional stakeholders be needed to operate this model?	A joint exploitation is probably unrealistic due to the geographical spread of partners and their competencies. Exploitation will take place on a bilateral basis and agreements among subsets of partners.
Competitive position	How do you think the market will change over the next 5 years? Describe what you see as the likely competition to the BEMO-COFRA proposition. Describe implications and risks and how BEMO-COFRA can maintain its competitive position (Taking into account the external context, describe the strengths, the weaknesses, the opportunities and the threats of the BEMO-COFRA product/service)	The market for industrial automation embedded software will change from proprietary highly application specific solutions to use of generic technologies like "Internet of Things". This opens up opportunities for BEMO-COFRA offerings.
Partner level exploitation	What are your exploitation objectives as a partner? Describe how you plan to meet the objectives, which products, market segments and countries you will deal with	CNet plans to exploit LinkSmart extensions with a focus on the Scandinavian market. Towards the end of the project we will attend industrial fairs, demonstrate prototypes, produce press-releases.

8.3 IN-JET

Exploitable products	List exploitable products and services that will be delivered by the BEMO-COFRA project. Indicate if it is jointly owned or individually owned. In case it is jointly owned, please indicate which other partner/s is/are involved. Also indicate your plans to protect this ownership (patent, license, etc.), which kind of Intellectual Property Rights (IPR) will be applied.	The BEMO-COFRA software components for WSAN can be used in emerging strategic product areas for IN-JET. The BEMO-COFRA results will expand the usability areas of the LinkSmart middleware, which is already a key component in IN-JET's products for interoperability of Internet services. In-JeT thus intends to use the BEMO-COFRA WSAN concepts in emerging products for energy management in Smart Grids where control of complex systems such as heat pumps, wind turbines etc. is crucially important. In-JeT aims to exploit the project results together with software partners FIT, CNET and ISMB.
Market opportunity	For each product or service, describe what are the high level potential market segments, customers, market size and income that can be generated from such target markets. What are the risks and barriers to entry? (References to data sources are welcome)	The most potent market segment for In-JeT to be address is the rapidly growing Danish market for Smart Grid solutions for demand control, i.e. up and down regulation of power consumption by the energy distributor for the purpose of stabilizing power networks. This market segment is becoming increasingly important with the rapid rise in renewable energy sources and energy storage units in the low voltage grid (heat pumps, solar panels, electrical vehicles). Assuming a constant ratio between losses and utilization in the future, an increase in power demand of 10% would lead to an increased energy loss in the low voltage network of around €2m per year per grid. If there is a linear relationship between maximum power and network losses can be assumed, controllable heat pumps can lead to overall savings in Denmark of approx. €45m per year. These numbers justify massive investments in technologies and solutions for interoperable solutions for complex systems connected to the grid. Since renewable energy resources are crucial for the national energy plan, the barriers remain manageable and mainly related to establishing a suitable partnership that allows an SME to deliver solutions to this market dominated by big players. In-JeT aims to utilise current cooperation partnerships with operators and suppliers in the energy business.
Stakeholders	Please identify all stakeholders relevant for your business exploitation.	The actual stakeholders will depend on the products and services to be marketed containing the BEMO-COFRA components and the applications. This cannot be determined until more details of the outcome of the project is known. A priori, IN-JET will aim to deliver BEMO-COFRA components as a part of a larger solution to be marketed with partners, which is our standard business model. These partners will be sought in the energy and in the manufacturing area.
Partner business	Describe your business and its core competences relevant to the exploitation of BEMO-COFRA results	IN-JET's core business is to develop and market concepts and platforms for internet based applications delivered to homes. Our present applications cover consumer areas such as eParticipation,

		eHealth and energy efficiency. The platform for WSAAN and components for integration with complex systems offered by BEMO-COFRA will allow us to expand into small manufacturing market segment and is thus completely in line with our company strategy. With a permanent representation in Brazil, we can more easily follow developments on the Brazilian market and identify future business opportunities. Forming partnerships and communication with Brazilian companies are also made easier not only due to the geographical location but also due to a better understanding of the Brazilian business culture.
Consortium level exploitation	How might the Consortium work at a collective level to exploit the BEMO-COFRA results? Can you describe a commercial model? Would you, as partner, take part in this and how? Would additional stakeholders be needed to operate this model?	IN-JET will act as the supplier and first level contact to customers in Denmark and other European countries. In order to deliver fully developed solutions we will make partnerships with other BEMO-COFRA partners for technology components such as distributed control logic (COMAU, ISMB) and multi-radio WSAAN (ISMB and FIT) and 6LowPAN technologies (CNET, ISMB). For the market access and integration of components, IN-JET will use its existing network of system integration partners.
Competitive position	How do you think the market will change over the next 5 years? Describe what you see as the likely competition to the BEMO-COFRA proposition. Describe implications and risks and how BEMO-COFRA can maintain its competitive position (Taking into account the external context, describe the strengths, the weaknesses, the opportunities and the threats of the BEMO-COFRA product/service)	The market for solutions that enable interoperability of systems on the Internet of Things and enable physical entities for cloud services is already growing very fast and the growth is expected to accelerate in the coming years. Some analysts predict 20 per cent or more CAGR. The functionality and flexibility provided by BEMO-COFRA in combination with the LinkSmart middleware will provide strong technological advantages for the products and services and IN-JET will be extremely well positioned in this area. The detailed market and competitor analysis will be completed once more information about the actual BEMO-COFRA components resulting from the project.
Partner level exploitation	What are your exploitation objectives as a partner? Describe how you plan to meet the objectives, which products, market segments and countries you will deal with	IN-JET's objective is to deliver components of the BEMO-COFRA platform in Denmark to be integrated into our general home control and internet service platform for homes. The new functionality of BEMO-COFRA components will allow us to also handle integration and interoperability with complex systems; firstly in the area of energy management and later in general manufacturing environments with main focus and small manufacturing companies. The exploitation will form the onset focus on global markets in cooperation with global partners.

8.4 ISMB

<p>Exploitable products</p>	<p>List exploitable products and services that will be delivered by the BEMO-COFRA project. Indicate if it is jointly owned or individually owned. In case it is jointly owned, please indicate which other partner/s is/are involved. Also indicate your plans to protect this ownership (patent, license, etc.), which kind of Intellectual Property Rights (IPR) will be applied.</p>	<p>- Single-radio and multi-radio WSANs The partners mainly involved in the design and development of dependable WSANs are ISMB, UFPE and UFAM. Supporting reliable and robust wireless communication in harsh industrial environment is a major challenge. More specifically, the multi-radio approach proposed within the project represents a novel solution that could be suitable and adopted in different application scenarios (including home and building automation, smart grids, environmental monitoring). The lessons learned and the knowledge acquired during the project as well as the prototypes developed would allow ISMB to improve the effectiveness of relevant technologies transfer services. More specifically, ISMB will use BEMO-COFRA results to propose innovative technology solutions or new R&D projects to its industrial partners. In addition, since higher education is one of the missions of the institute, ISMB will use the competences created in the project for post-graduate students training and projects.</p> <p>- WSAN Management The partners mainly involved in the definition of WSAN Management solutions are ISMB, VTT, FIT and CNET. In fact, one of the main issues hindering a wider adoption of WSANs is related to their management. The knowledge acquired will be used to propose new solutions to ISMB partners or propose new projects.</p> <p>- Interoperability System for manufacturing environment Within the project, LinkSmart will be extended to integrate the defined single-radio and multi-radio WSANs as well as PLC/SCADA systems. This would allow all project partners to exploit these results and the competences acquired in different R&D projects.</p> <p>- Simulation tools Within the project, simulation tools will be developed especially to analyse scalability aspects of BEMO-COFRA solutions. The competences acquired could be easily reused in other projects.</p> <p>In general - BEMO-COFRA results and dissemination activities will be used to promote ISMB research activities at an international level, possibly allowing to widen ISMB network of partners. - Competences acquired during the project in terms of knowledge of the manufacturing process and of capability to design new green</p>
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		solutions to improve and optimize product process will help ISMB to identify new applied research directions in the manufacturing domain.
Market opportunity	For each product or service, describe what are the high level potential market segments, customers, market size and income that can be generated from such target markets. What are the risks and barriers to entry? (References to data sources are welcome)	<p>The main potential market segment that could be considered to exploit BEMO-COFRA results is related to automotive manufacturers. In fact, BEMO-COFRA is addressing issues typical of manufacturing environment and the exploitation could be performed in Italian, European and Brazilian markets.</p> <p>Moreover, the same technology solutions could be applied in other market segments i.e., solutions for building and home automation, solutions for microgrids and smart grids. The last two markets are still in the early stage, at least in Italy. However, they are growing and are expected to be more and more important in the near and far future.</p> <p>The main barrier to enter such markets and propose new technology transfer services mainly relates to the current economic crisis that leads SMEs and big industries to actually lower the investments in R&D projects. However, with respect to this issue, European calls could represent an incentive.</p>
Stakeholders	Please identify all stakeholders relevant for your business exploitation.	<p>The stakeholders will be the ones involved in the above mentioned market segments. First, companies dealing with production environment (producers, suppliers, production managers, ...) and with the design and development of innovative solutions for production monitoring and control are to be considered.</p> <p>Other stakeholders could be further identified according to the selected application domain. For instance, with respect to home and building automation area, manufacturers of automation solutions could be taken into consideration.</p>
Partner business	Describe your business and its core competences relevant to the exploitation of BEMO-COFRA results	<p>Istituto Superiore Mario Boella (ISMB) is a research & innovation center operating in the Information and Communication Technologies (ICT) domain. Founded in 2000 by Compagnia di San Paolo and Politecnico di Torino, today ISMB relies on technological and process competences of around 150 researchers working in close cooperation with companies, academia and Public Administration.</p> <p>ISMB is organized in Research Areas focused on core sectors of ICT. The areas are capable of managing the whole value chain, from basic technology up to its practical implementation (proof-of-concept).</p> <p>Since 2010, after ten years from its foundation, ISMB has extended its activities to process innovation, orienting its focus on priority themes of the European agenda. Such an evolution aims at employing excellences and results of Research Areas into Strategic Programs that</p>

		<p>are interdisciplinary by nature. Smart Energy, Smart City and Smart Health are the strategic programs tackled by ISMB and they represent the first step of a broader action aimed at high-value social projects. Consistently with process innovation goals, the Institute has developed a strong competence in new business models that represent a necessary component for the economic sustainability of innovative solutions.</p> <p>The Institute is involved in several industrial cooperations with both large enterprises and SMEs, as well as in various higher-education initiatives in partnership with academic institutions.</p> <p>The exploitation of BEMO-COFRA results will help to further strengthen ISMB competences, following the current strategies, and to define new partnerships with both Brazilian and European companies and research centers/universities.</p>
Consortium level exploitation	How might the Consortium work at a collective level to exploit the BEMO-COFRA results? Can you describe a commercial model? Would you, as partner, take part in this and how? Would additional stakeholders be needed to operate this model?	<p>All the BEMO-COFRA partners could act locally in their relevant countries and then leverage on other project partners to deliver a more complete solution.</p> <p>In addition, the competences acquired in this project could be used by the same consortium to propose new R&D or industrial projects.</p>
Competitive position	How do you think the market will change over the next 5 years? Describe what you see as the likely competition to the BEMO-COFRA proposition. Describe implications and risks and how BEMO-COFRA can maintain its competitive position (Taking into account the external context, describe the strengths, the weaknesses, the opportunities and the threats of the BEMO-COFRA product/service)	<p>The solutions being delivered within BEMO-COFRA are still at research level. Within next 5 years, more and more focus will be put on the issues addressed by BEMO-COFRA and some companies could propose their own solutions. However, the competences acquired and the solutions developed could still represent an advantage for the consortium partners.</p> <p>A more detailed analysis could be performed later in the project when all results will be achieved.</p>
Partner level exploitation	What are your exploitation objectives as a partner? Describe how you plan to meet the objectives, which products, market segments and countries you will deal with	<p>As mentioned above, ISMB exploitation objectives are:</p> <ul style="list-style-type: none"> - to leverage on the competence acquired into the project to improve the effectiveness of relevant technologies transfer services - to propose innovative technology solutions or new R&D projects to its industrial partners. - to use the competences created in the project for post-graduate students training and projects (higher education) - to use dissemination activities to promote ISMB research activities at an international level, possibly allowing to widen ISMB network of partners. - to use competences acquired during the project to identify new applied research directions in the manufacturing domain (or in other

		<p>relevant domains).</p> <ul style="list-style-type: none">- to make process innovation <p>The exploitation could mainly relate the manufacturing market segment but would include also home/building automation and energy. The target countries relate to both Italy as well as other European countries.</p>
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8.5 VTT

Exploitable products	List exploitable products and services that will be delivered by the BEMO-COFRA project. Indicate if it is jointly owned or individually owned. In case it is jointly owned, please indicate which other partner/s is/are involved. Also indicate your plans to protect this ownership (patent, license, etc.), which kind of Intellectual Property Rights (IPR) will be applied.	<ul style="list-style-type: none"> - WSAN management protocol (together with ISMB), probably open source - Administration tool for WSAN administration (together with FIT), license-based exploitation
Market opportunity	For each product or service, describe what are the high level potential market segments, customers, market size and income that can be generated from such target markets. What are the risks and barriers to entry? (References to data sources are welcome)	Monitoring protocol and administration tool <ul style="list-style-type: none"> - Home / building automation - Industrial manufacturing
Stakeholders	Please identify all stakeholders relevant for your business exploitation.	VTT, ISMB, FIT
Partner business	Describe your business and its core competences relevant to the exploitation of BEMO-COFRA results	Research institute for applied sciences with core competence in ICT - Telecommunications
Consortium level exploitation	How might the Consortium work at a collective level to exploit the BEMO-COFRA results? Can you describe a commercial model? Would you, as partner, take part in this and how? Would additional stakeholders be needed to operate this model?	Integrated BEMO-COFRA solution
Competitive position	How do you think the market will change over the next 5 years? Describe what you see as the likely competition to the BEMO-COFRA proposition. Describe implications and risks and how BEMO-COFRA can maintain its competitive position (Taking into account the external context, describe the strengths, the weaknesses, the opportunities and the threats of the BEMO-COFRA product/service)	Wireless solutions will fulfil dependability requirements from industry and replace error-prone wired networks to increase flexibility. Strength: Integrated approach, supporting from network to application layer Risk: Wireless link not reliable enough, possible solution: use multi-radio platform that is capable of transmitting in different frequency bands
Partner level exploitation	What are your exploitation objectives as a partner? Describe how you plan to meet the objectives, which products, market segments and countries you will deal with	Licensing and industrial cooperation

8.6 COMAU

Exploitable products	List exploitable products and services that will be delivered by the BEMO-COFRA project. Indicate if it is jointly owned or individually owned. In case it is jointly owned, please indicate which other partner/s is/are involved. Also indicate your plans to protect this ownership (patent, license, etc.), which kind of Intellectual Property Rights (IPR) will be applied.	BEMO-COFRA provides the resources for technology transfer and successive autonomous development of monitoring and control systems infrastructures based on the use of wireless sensors devices and on the interface with the process PLC. For FIAT customer it means the further development of the "Borderò" architecture, with the possibility to collect data from WSN. For other customers, it means to develop a set of tools to create the appropriate "tailored" monitoring and control application. COMAU plan is to develop and apply the BEMO-COFRA output initially to the Car Manufacturing Body Shop environment, and investigate the patents that can be applied to the integrated solution with the current COMAU technology for this market.
Market opportunity	For each product or service, describe what are the high level potential market segments, customers, market size and income that can be generated from such target markets. What are the risks and barriers to entry? (References to data sources are welcome)	The main target market for COMAU is the Automotive industry, customers being FIAT and other global automakers, we cannot precise the additional income for COMAU that can be generate but we foresee a better recognition of the company as the market leader in the new technologies development being part and exploiting the results of the BEMO-COFRA project. The main barrier the we should consider is the industry level of acceptance of new technologies in replacement of traditional and long term proven existing solutions as the Automotive industrial manufacturing environment is more resistant to apply and try just born technologies than other segments.
Stakeholders	Please identify all stakeholders relevant for your business exploitation.	The actual relevant stakeholders will depend so much on the solutions to be marketed comprehending the BEMO-COFRA modules and applications. Although COMAU will object to deliver BEMO-COFRA solutions as a part of the current company portfolio for automotive industry. In a long term perspective, COMAU could also find new partners interested in marketing these same applications and/or products outside the auto industry manufacturing area.
Partner business	Describe your business and its core competences relevant to the exploitation of BEMO-COFRA results	COMAU business and the core competences that are related to the BEMO-COFRA project are in the Automotive Body Shop manufacturing solutions. Due to the great electromagnetic pollution of electric motors and welding guns that happens on this field on-site installations, this is an extremely harsh environment to connect, develop and safety operate wireless networks. The BEMO-COFRA achievements will drive the best application of an alternative framework capable to deliver a reliable performance on such industrial environment.
Consortium level exploitation	How might the Consortium work at a collective level to exploit the BEMO-COFRA results? Can you describe a commercial model? Would	COMAU will act as the supplier and first level contact to customers in the Brazilian Automotive Industry. In order to deliver fully developed

	you, as partner, take part in this and how? Would additional stakeholders be needed to operate this model?	solutions we will make partnerships with other BEMO-COFRA partners for technology components such as distributed control logic (IN-JET, ISMB) and multi-radio WSAAN (ISMB and FIT) and 6LowPAN technologies (CNET, ISMB). For the market access, design, program development and integration of components for Body Shop welding and assembly lines, COMAU will use its existing network of system integration partners and other companies in the control logic segment.
Competitive position	How do you think the market will change over the next 5 years? Describe what you see as the likely competition to the BEMO-COFRA proposition. Describe implications and risks and how BEMO-COFRA can maintain its competitive position (Taking into account the external context, describe the strengths, the weaknesses, the opportunities and the threats of the BEMO-COFRA product/service)	<p>In the next 5 years an increased request for new cars means that the existing production plants need to increase the level of efficiency when manufacturing cars and the new investments on green field facilities would have to be very efficient to be competitive. With the BEMO-COFRA output of a new framework solution for wireless networks, the current or new plants would be able to increase the overall flexibility of the line, greatly improving the simplicity of implementing new lay-out designs. Wired stations can be reconfigured automatically. A new lay-out requires various robots to be moved to new areas. This would then be possible without changing the network and everything could be reconfigured automatically.</p> <p>Safety will be more important when robots are moved; the system automatically defines the new parameters and the defined security range.</p> <p>Once the lay-out is in place, the production line will be instantly up and running again. The BEMO-COFRA framework will change the way the production line is monitored and controlled.</p> <p>The functionality and flexibility provided by BEMO-COFRA in combination with the LinkSmart middleware will provide strong technological advantages for the Body Shop solutions and COMAU will be well positioned in this area. The key market will be automotive industry and competitors will need to follow the new technology tendency, a more detailed analysis will be completed when actual BEMO-COFRA components resulting from the project are in place.</p>
Partner level exploitation	What are your exploitation objectives as a partner? Describe how you plan to meet the objectives, which products, market segments and countries you will deal with	<p>COMAU key objective is to improve its image of an innovative and high technology company in the automotive field, consequently widen its market share and the participation in the upcoming new investments for production plants and efficiency improvement plans in the segment. Being able to implement a practical industrial test bed for the BEMO-COFRA project COMAU will have conditions to implement the project findings and outcomes in the new Body Shop solutions for auto manufacturing markets in Brazil and globally.</p> <p>The execution of the project will also provide COMAU Brazil personnel involved in the technical activities with a more robust knowledge on the monitoring and control systems used in industrial applications.</p>

8.7 UFPE

Exploitable products	List exploitable products and services that will be delivered by the BEMO-COFRA project. Indicate if it is jointly owned or individually owned. In case it is jointly owned, please indicate which other partner/s is/are involved. Also indicate your plans to protect this ownership (patent, license, etc.), which kind of Intellectual Property Rights (IPR) will be applied.	<ul style="list-style-type: none"> - WSAN architecture (together with UFAM), open source - Factory monitoring tool (together with IVISION), license-based exploitation
Market opportunity	For each product or service, describe what are the high level potential market segments, customers, market size and income that can be generated from such target markets. What are the risks and barriers to entry? (References to data sources are welcome)	Apply the WSAN's architecture in order to secure opportunities with energy and oil production partners. Strengthening the university's profile in WSAN's research area thus creating new funding opportunities, following Brazil's industrial growth.
Stakeholders	Please identify all stakeholders relevant for your business exploitation.	UFAM, IVISION, ISMB, FIT
Partner business	Describe your business and its core competences relevant to the exploitation of BEMO-COFRA results	UFPE is a public university represented by GPRT, a research group with core competence in Telecommunications
Consortium level exploitation	How might the Consortium work at a collective level to exploit the BEMO-COFRA results? Can you describe a commercial model? Would you, as partner, take part in this and how? Would additional stakeholders be needed to operate this model?	As Brazilian's consortium coordinator, UFPE will act as leader in order to contact customers expanding research partnership with other industries such as naval and aerospace conglomerates.
Competitive position	How do you think the market will change over the next 5 years? Describe what you see as the likely competition to the BEMO-COFRA proposition. Describe implications and risks and how BEMO-COFRA can maintain its competitive position (Taking into account the external context, describe the strengths, the weaknesses, the opportunities and the threats of the BEMO-COFRA product/service)	Wireless solutions will fulfil dependability requirements from industry and replace error-prone wired networks to increase flexibility. Strength: Integrated approach, supporting from network to application layer Risk: Wireless link not reliable enough, possible solution: use multi-radio platform that is capable of transmitting in different frequency bands
Partner level exploitation	What are your exploitation objectives as a partner? Describe how you plan to meet the objectives, which products, market segments and countries you will deal with	Proposing new research projects with other industries for expand our experience in applied WSAN's.

8.8 UFAM

Exploitable products	List exploitable products and services that will be delivered by the BEMO-COFRA project. Indicate if it is jointly owned or individually owned. In case it is jointly owned, please indicate which other partner/s is/are involved. Also indicate your plans to protect this ownership (patent, license, etc.), which kind of Intellectual Property Rights (IPR) will be applied.	<p>The BEMO-COFRA aims to analyse dependability and scalability issues that still hinder wide adoption of WSANs for monitoring and control large-scale complex systems. For UFAM, through Emerging Technologies and System Security Research Group (ETSS), it means the possibility to develop innovative solutions that support dependability by leveraging on communication technology heterogeneity, self-configurability and context awareness, such as:</p> <ol style="list-style-type: none"> 1. Context-ware data transmission algorithms (patent possibility) 2. Algorithms for self-organization to manage multi-radio communications (patent possibility) <p>UFAM aims to exploit the project results together with software partners UFPE, ISMB and VTT.</p> <p>In addition, the knowledge gained with the WSAN architecture design and the lesson learned with the prototype developed in BEMO-COFRA could help UFAM and other partners providing a consultancy services for industries that want to integrate WSAN with its legacy systems</p>
Market opportunity	For each product or service, describe what are the high level potential market segments, customers, market size and income that can be generated from such target markets. What are the risks and barriers to entry? (References to data sources are welcome)	Cognitive aspects handled in this project such as context-aware data transmission algorithms and mechanisms to manage multi-radio communications can be used in any ad hoc wireless communication scenario. So far, most of these aspects remain unexplored and usually can be deployed in today's ubiquitous computing scenarios.
Stakeholders	Please identify all stakeholders relevant for your business exploitation.	The actual stakeholders will depend on the products and services to be marketed containing the BEMO-COFRA components and the applications. A priori, many companies can integrate the solutions of multi-radio communications developed during the project in its devices (routers, mobile phone, others smart mobile device) such as Cisco, Deutsche Telekom, Ericsson, Motorola, Nokia and Siemens.
Partner business	Describe your business and its core competences relevant to the exploitation of BEMO-COFRA results	UFAM is a public university represented by ETSS (Emerging Technologies and System Security), a research group with core competence in wireless communications and system security.
Consortium level exploitation	How might the Consortium work at a collective level to exploit the BEMO-COFRA results? Can you describe a commercial model? Would you, as partner, take part in this and how? Would additional stakeholders be needed to operate this model?	UFPE, VTT, ISMB, and others partners will discuss joint with the UFAM means to conduct a business analysis offering the solutions produced during the time life of project. Many of algorithms, protocols, and mechanisms can be easily suitable and embedded in others platforms such as routers, cellular, and PDA's.

Competitive position	How do you think the market will change over the next 5 years? Describe what you see as the likely competition to the BEMO-COFRA proposition. Describe implications and risks and how BEMO-COFRA can maintain its competitive position (Taking into account the external context, describe the strengths, the weaknesses, the opportunities and the threats of the BEMO-COFRA product/service)	The future network architectures will be measured by its capacities to offer to users mobility, adaptability, and availability. All these characteristics are covered in all solutions to be developed and integrated to BEMO-COFRA framework. As previously mentioned, all solutions can be easily suitable to others ubiquitous communications scenarios. For example, the management of multi-radio communication is of current interest to both policy makers and technologists because of the potential for order-of-magnitude gains in spectral efficiency and network performance.
Partner level exploitation	What are your exploitation objectives as a partner? Describe how you plan to meet the objectives, which products, market segments and countries you will deal with	Licensing and industrial cooperation

8.9 IVISION

Exploitable products	List exploitable products and services that will be delivered by the BEMO-COFRA project. Indicate if it is jointly owned or individually owned. In case it is jointly owned, please indicate which other partner/s is/are involved. Also indicate your plans to protect this ownership (patent, license, etc.), which kind of Intellectual Property Rights (IPR) will be applied.	Wireless camera owned by Invent Vision. In the beginning the camera is going to work as a wireless sensor, processing the information and sending only the results of the analysis. In the future the camera will send the whole image, making possible to the system realize the processing. As the others iVision cameras, (V100, V200 and V300) this one will be also protected by patent.
Market opportunity	For each product or service, describe what are the high level potential market segments, customers, market size and income that can be generated from such target markets. What are the risks and barriers to entry? (References to data sources are welcome)	The industry market is a great customer for the wireless camera. Its a way to avoid the usage of cables and offer a product that can be placed in any place. As said, the target market is the industry, but it can be used in many other sectors, such as the residential market, as a way to detect intruders. The size of the market is difficult to estimate, but our company has already worked with 35 clients in the Oil & Gas, metallurgical, electronics and automotive sectors. The income is another difficult factor to estimate by the fact that the camera is commonly sold as part of the vision system, with includes the software, hardware and installation.
Stakeholders	Please identify all stakeholders relevant for your business exploitation.	As an additional stakeholder, we have one of the owners of Invent Vision is Nansen, an electronic company based in Contagem (MG, Brazil), but the development of this product is relevant for all the partners, clients and employees.
Partner business	Describe your business and its core competences relevant to the exploitation of BEMO-COFRA results	Invent Vision develop vision and image system to the industry, providing customized solutions for each problem. We have experience in working with the Oil & Gas, metallurgical, electronics and automotive sectors and we are always looking for develop new technologies. The company has a great relationship with UFMG, one of the best universities in Brazil, and receives students even from abroad. The company develops its own camera and use them to create applications to answer the needs of the clients. Normally, the system must be integrated with the automation line and interfere in the production line. And that is why they must be robust and reliable.
Consortium level exploitation	How might the Consortium work at a collective level to exploit the BEMO-COFRA results? Can you describe a commercial model? Would you, as partner, take part in this and how? Would additional stakeholders be needed to	The BEMO-COFRA project will compose de portfolio of the all stakeholders. So, it can be used to show to potential clients the relevance of products developed. In the specific case of iVision, as we have a strong relationship with Universities, the BEMO-COFRA can be presented in industrial events promoted by Universities.

	operate this model?	
Competitive position	How do you think the market will change over the next 5 years? Describe what you see as the likely competition to the BEMO-COFRA proposition. Describe implications and risks and how BEMO-COFRA can maintain its competitive position (Taking into account the external context, describe the strengths, the weaknesses, the opportunities and the threats of the BEMO-COFRA product/service)	Nowadays the usage of vision systems is a need in the industry. They act in the optimization of the processes, and that is why we think that in the next 5 years the market for these products will present a high growth. The preoccupation with the employee safety is another reason for believing in this growth of the market, by the fact that, in most cases, the vision systems can replace the operator doing dangerous tasks.
Partner level exploitation	What are your exploitation objectives as a partner? Describe how you plan to meet the objectives, which products, market segments and countries you will deal with	As said, the wireless camera has many solutions to be part of in all markets that Invent Vision already works with.