Local4Global

SYSTEM-OF-SYSTEMS THAT ACT LOCALLY FOR OPTIMIZING GLOBALLY

611538, FP7-ICT-2013.3.4

Deliverable D7.4:

Initial Exploitation Plan

Deliverable Version:	D7.4, v.1.0
Document Identifier:	local4global wp7_d7_4_ik4_v1.0.docx
Preparation Date:	June 20, 2014
Document Status:	Final
Author(s):	Itziar Alonso, Eduardo Gilabert, Christina Diakaki, Elias Kosmatopoulos, Roland Ettinger, Thomas Schild, Angelos Georghiou, Michael Krause
Dissemination Level:	PU - Public

Project funded by the European Community in the 7th Framework Programme

EU FP7 - SMALL/MEDIUM-SCALE FOCUSED RESEARCH PROJECT (STREP), FP7-ICT-2013.3.4: ADVANCED COMPUTING, EMBEDDED AND CONTROL SYSTEMS

D) FROM ANALYZING TO CONTROLLING BEHAVIOUR OF SYSTEM OF SYSTEMS (SOS)

Deliverable SUMMARY SHEET

Deliverable Details	
Type of Document:	Deliverable
Document Reference #:	D7.4
Title:	Initial Exploitation Plan
Version Number:	1.0
Preparation Date:	June 20, 2014
Delivery Date:	June 30, 2014
Author(s):	Itziar Alonso, Eduardo Gilabert, Christina Diakaki, Elias Kosmatopoulos, Roland Ettinger, Thomas Schild, Angelos Georghiou, Michael Krause
Document Identifier:	local4global wp7_d7_4_ik4_v1.0.docx
Document Status:	Final
Dissemination Level:	PU - Public

Project Details	
Project Acronym:	Local4Global
Project Title:	SYSTEM-OF-SYSTEMS THAT ACT LOCALLY FOR OPTIMIZING GLOBALLY
Project Number:	611538
Call Identifier:	FP7-ICT-2013.3.4
Call Theme:	ADVANCED COMPUTING, EMBEDDED AND CONTROL SYSTEMS
Project Coordinator:	CERTH – Centre for Research and Technology – Hellas
Participating Partners:	CERTH – Centre for Research and Technology – Hellas; ETHZ – Eidgenössische Technische Hochschule Zürich; RWTH – RWTH Aachen University; IK4 – IK4 TEKNIKER; TRV – TRANSVER GmbH; TUC – Technical University of Crete; TUM – Technische Universtität Muenchen;
Instrument:	STREP
Contract Start Date:	October 1, 2013
Duration:	36 Months

Deliverable D7.4: Short Description
Insert here a short description on the contents of this document.
Keywords: all; relevant; keywords; should; be; inserted; here

Deliverable D7.4: Revision History			
Version:	**Date:**	**Status:**	**Comments**
0.1	16/06/2014	Draft	First Draft. Inputs from IK4, CERTH, TUC, RWTH and TUM
0.2	17/06/2014	Draft	Additions from TUC
0.3	17/06/2014	Draft	Additions from TRANSVER
0.4	18/06/2014	Draft	Additions from TUM
0.5	19/06/2014	Draft	Additions from ETHZ
1.0	20/06/2014	Final	IK4

Table of Contents

List of Figures

List of Tables

Abbreviations and Acronyms

IPR	Intellectual Property Rights
L4G	Local4Global
TSoS	Technical System of Systems
C4L/L2C	Control for Learning/ Learning to Control
CPS	Cyber-Physical Systems
ISO	International Standards Organization
OSI	Open Systems Interconnect
SOA	Service Oriented Architecture
XML	eXtensive Markup Language
HTTP	Hypertext Transfer Protocol
FTP	File Transfer Protocol
WSDL	Web Services Description Language
SOAP	Simple Object Access Protocol
UDDI	Universal Description Discovery and Integration
REST	Representational state transfer
BMS	Building Management System
CEP	Complex Event Processing
SQL	Structured Query Language
NoSQL	Not Only SQL
UPnP	Universal Plug and Play
OSGi	Open Services Gateway Initiative
USB	Universal Serial Bus
EIB	European Installation Bus
API	Application Programming Interface

Executive Summary

This deliverable considers aspects relative to the potential exploitation and commercialization of the project results and the overall economic viability of the initiative in the med-term, detailing how the Consortium members intend to take forward the work of Local4Global project and exploit the outcome commercially and profitably.

A list of project results has been identified, and their relations with partner ownership and IPR management. Each partner has developed a preliminary exploitation strategy which contains a plan on how they intend to exploit the knowledge from this project. Each of the individual exploitation plans are integrated into the overall exploitation plan, taking into account the particular strategy and market positioning of those partners involved. Due to the area of TSoS is quite wide, different exploitation key areas have been identified. Moreover, according the European effort for Standardization, an identification of standards related to TSoS area has been done.

1 Introduction

1.1 Project Goal

Local4Global's main goal is to develop a generic, integrated and fully functional methodology and extensively test it in real-life highly heterogeneous Technical System of Systems (TSoS). The constituent systems of the TSoS act as fully autonomous units and operate only within their local environment. The project aims to detect and optimize the constituent systems emerging performance at a global level, without the need of costly system re-design or re-configuration, using a plug-and-play control mechanism in order to do so.

The Local4Global advances will lead to a fully-functional and ready-to-use system (Local4Global final product) - delivered in the form of an embedded, web-based, plug-and-play software system for generic TSoS, mountable locally to each constituent system of the TSoS. This system will be deployed and extensively tested and evaluated in two real-life TSoS Use Cases, a traffic TSoS use case and an efficient building TSoS use case.

1.2 Deliverable Goal

This document constitutes L4G deliverable D.7.4. "Initial Exploitation Plan" and provides the identification of L4G Exploitable Results, the blueprint for the Exploitation Strategy, and the IPR Management Rules that will guide during and after the project.

This preliminary version of the Exploitation Plan will be updated with inputs from the potential users of Local4Global System and with the first version of Local 4 Global Business Models on month 18. The final version on month 36 will include further updates and inputs of the Local 4 Global Use Cases.

L4G project provides contribution to the European effort for standardization. L4G requires the use of standards and systems that render the interfacing and connection of different embedded software systems. For this reason a special emphasis has been given on the development of such standards. In this document provides the potential standards to be used within the L4G system.

A suitable IPR Management is a key factor of every exploitation strategy. Therefore Annex 2 includes a guideline to support L4G partners for further definition of exploitation agreements.

The information collected is been provided by L4G partners by means of templates prepared by IK4 Task 7.2 Leader.

2 L4G Exploitable Results

2.1 L4G Exploitable Results

The initial exploitation plan corresponds with a first picture intended to state how the L4G project results could be exploited.Table 1 collects the exploitable results identified by the partners at this stage of the project (Month 9).

The description of each result is based on partners' contribution and should be considered from a preliminary perspective to draft the initial version of the Exploitation Strategy. Updates of this plan will include further description of each result if required.

Table 1 **Exploitable Results and partners involved.**

Results identification			
Nº	**Exploitable Result**	**Owner**	**Others Involved**
1	Local4global framework system (software + hardware)	CERTH (1) ETH Zurich (2) RHEINISCH-WESTFAELIS (3) ik4 - Tekniker (4) TUC (5) Transver (6) TUM (7)	
2	Local4global personalized to Climatic building case	RHEINISCH-WESTFAELIS (3)	
3	Local4global personalized to Traffic management case	TUC(5) Transver (6) TUM (7)	
4	Optimization algorithm	ETH Zurich (2)	CERTH (1), TUC(5)
5	Cloud services for embedded systems	IK4 - Tekniker (4)	

The following sections provide detailed information regarding each exploitable result. The information consists on the following elements: description, partners involved, application, IPR strategy, and potential end users.

2.1.1 Local 4 Global Framework System

Result nº 1	**Local4Global framework system (software + hardware)**
Description	System that can be embedded in generic Cyber Physical Systems and Systems-of-Systems producing substantial savings and Quality-of-Service improvements with the requirement of using the minimum possible infrastructure and minimum installation/operation effort. It will not be only limited to areas and systems where no sophisticated control is currently employed (due to the requirement for an elaborate infrastructure). It will also be of great significance to areas and systems where, despite that the infrastructure is there, current control and management systems "cannot do the job" such as large scale transportation, traffic and energy systems.
Innovativeness introduce	The economic and societal impact and consequences of the availability of such a system will be tremendous in literally any activity of everyday life. The main drive for "purchasing" L4G is that it does not require significant modifications in the existing infrastructure and, most importantly, its ability to optimize the overall system operations without the need for an expensive maintenance/calibration procedure.
Owner	Local 4 Global Consortia: CERTH (1) ETH Zurich (2) RHEINISCH- WESTFAELIS (3) ik4 - Tekniker (4) TUC (5) Transver (6) TUM (7)
Exploitator	ik4 -Tekniker (4)
IPR Strategy	Spin - off
Targeted Markets	Operators and authorities of generic Technical Systems-of-Systems (TSoS) including: • Companies and operators/authorities of traffic/transport management systems, • Building operators and providers/developers of Building Management Systems and Home Automation Networks, • Operators and authorities involved in energy generation and distribution, • Operators and providers/developers of industrial management systems. (large-scale manufacturing and production plants, airport and seaport terminal control operations). • Control of internet services, computer and communication networks, • Management and control of robotic teams • Control of large-scale MEMS, smart materials, etc., • Control of large-scale water distribution or sewer networks, multi-reservoir or irrigation systems, • Mega City power.

Markets Situation	L4G aims at two different types of "users": • Operators, authorities, providers and developers of management and control systems that are already in place and • Operators, authorities and providers of systems where no management and/or control system is in place (due to e.g., the requirement of the deployment of an expensive infrastructure or of expensive maintenance/calibration effort).
Customer Segment	L4G potential "buyers" are operators, authorities, providers and developers of management and control systems for generic applications.
Price Strategy	For systems that have already an elaborate infrastructure, L4G price is expected to be low (software license) as it will concern only deployment of the L4G software. For other systems, an embedded solution should be implemented locally. In such cases the price depends on the particular application.

2.1.2 Local 4 Global Personalized to Climatic Building Case

Result nº 2	**Local4Global Personalized to Climatic Building Case**
Description	Local4Global personalized to building automation technology
Innovativeness introduce	Local4Global system handling efficiently a highly heterogeneous collection of different constituent systems which are acting purely locally and are mutually interacting through a very complicated structure and hierarchy. This will be done without requiring the deployment of an "expensive", elaborate and complete sensor infrastructure. Each of the constituent systems is provided only with information about its own state and energy costs. Moreover, an "expensive to develop and maintain" model of the building dynamics will not be needed.
Owner	RHEINISCH- WESTFAELIS (3)
Exploitator	RHEINISCH- WESTFAELIS (3)
IPR Strategy	Spin - off
Targeted Markets	Operators and authorities of generic Technical Systems-of-Systems (TSoS) related to Climatic Building scenarios. • System developers, providers and operators in the field of automation systems and building technology; • Real estate managers; • Project developers in the field of city districts, buildings and decentralized energy supply systems; • Optimization of building operations regarding energy efficiency and thermal comfort.
Markets Situation	The global climate change and the future scarcity of energy resources force to develop and provide technologies that reduce the energy input for satisfying the human energy demand. The building sector as one of the main energy consumers offers a massive potential to apply such technologies. Today, energy efficiency is a core element of the building industry as well as a sales argument in real-estate business. The challenge is to unite the need on the building`s design, the thermal comfort within the building and the energy consumption whilst building operations. Therefore, operation intelligence is required to be integrated in the automation systems.

Customer Segment	Regarding the importance of an optimal operating energy system, the Local4Global product will be interesting for all parties related to automation systems. Thereby, developers and vendors of automation industry and system integrators, that unite all constituent systems within a building to an overall TSoS, as well as decision makers, responsible for real-estate relations, and system operators will be counterparts to provide the application and, by that, to introduce the Local4Global product into market.
Price Strategy	To be defined

2.1.3 Local4Global Personalized to Traffic Management Case

Result nº 3	**Local4Global Personalized to Traffic Management Case**
Description	A new traffic management and control system will be delivered applicable to conventional traffic networks as well as traffic networks employed with cooperative transport features (e.g., through infrastructure-to-vehicle communication).
Innovativeness introduce	The main advantages of such a traffic management and control system is that it does not require significant modifications in the existing infrastructure, and its ability to automatically adjust itself without the need of a tedious effort by operators as well as to be deployed even in traffic networks with "poor" infrastructure.
Owner	TUC (5) Transver (6) Owner of “others involved”? TUM (7)
Exploitator	Transver (6)
IPR Strategy	Product marketing: traffic management software, traffic information applications
Targeted Markets	Operators and authorities of traffic management and traffic control systems, traffic information platforms
Markets Situation	L4G aims at two different types of "users": • (a) Operators, authorities and providers of systems willing to improve their residing systems in order to improve efficiency, safety and environmental compatibility of road transport. • (b) Operators, authorities and providers of systems where no management and/or control system is in place (due to e.g., the requirement of the deployment of an expensive infrastructure or of expensive maintenance/calibration effort).
Customer Segment	L4G potential "buyers" are operators, authorities, providers and developers of traffic management and control systems and traffic information applications.

Price Strategy	For systems that have already an elaborated infrastructure, L4G price is expected to be low (software license) as it will concern only deployment of the L4G software. Other systems might be made suitable for L4G when accepting investment costs in infrastructure depending of the availability of detectors, traffic controllers and a traffic computer if needed. For any other systems, an embedded version of the L4G System should be implemented locally, whose price depends on the particular application.

2.1.4 Optimization Algorithm

Result nº 4	**Optimization Algorithm**
Description	The work is focused on two parts: (i) Designing near optimal adaptive policies for optimization problems affected by uncertainty; (ii) Using recent advances in decentralized optimization, in conjunction with policy design, for solving large distributed optimization problems.
Innovativeness introduce	This work will extend the scope of multistage stochastic programs involving both continuous and integer decisions resulting to a versatile modeling framework. This will allow practitioners to incorporate discrete decisions in their models, e.g., traffic light signals and on/off switching in heat pumps. In conjunction, with distributed optimization algorithms, one will be in a position to solve large scale optimization that has the following characteristics. - In the spirit of Local4Global, one can directly model multiple entities, each having their own individual characteristics such as costs and constraints, trying to optimize their own problems but together satisfying global coupling constraints that need to be respected by everyone; - Since distributed optimization algorithm allows to solve optimization problems in parallel, greater computational efficiency can be achieved.
Owner	ETH Zurich (2)
Others Involved	CERTH (1), TUC(5)
Exploitator	CERTH (1),
IPR Strategy	Spin - off
Targeted Markets	Education, Industry, Innovation & Research
Markets Situation	To be defined
Customer Segment	Potential collaborations in other research projects/contracts and research centers, Universities and Industry from different sectors.

2.1.5 Cloud Services for Embedded Systems

Result nº 5	**Cloud services for embedded systems**
Description	Architecture approach based on cloud services providing support functionalities to a network of heterogeneous embedded devices.

Innovativeness introduce	The main target of cloud services is provide a set of functionality for the exploitation of the data gathered by the embedded devices: - Network configuration management - Reasoning algorithms based on complex event processing - L4G Controller and actuation mechanisms - Big data storage & management - Visual Analytics
Owner	ik4 - Tekniker (4)
Exploitator	ik4 - Tekniker (4)
IPR Strategy	Research Contracts based on L4G Cloud services for embedded systems Know How
Targeted Markets	Education, Industry, Innovation & Research
Markets Situation	Cyber Physical System is a key research in industry and it is intended as the orchestration of networked computational resources with multi-physics. The engineering problems faced are managing dynamics, time, and concurrency in heterogeneous and interconnected systems where the amount and complexity of intelligence is growing rapidly. Research in the field is of strategic importance for business for years to come.
Customer Segment	Potential collaborations in other research projects/contracts and research centers, Universities and Industry from different sectors.
Price Strategy	To be defined

2.2 L4G Target Groups

Possible Target Groups addressed by L4G project are all players (Operators and authorities) of generic TSoS including:

- Public authorities, in particular those involved in:
  - traffic/transport management and information systems
  - energy generation and distribution, operators and providers/developers of industrial management systems
- Industrial management systems sector, including developers and operators of:
  - Traffic/transport management systems,
  - Building operators and providers/developers of Building Management Systems
  - Large scale manufacturing and production plants
  - Airports and seaports
  - Internet services, computer and communication networks
  - Robotic teams
  - Water distribution
- Automation industry and system integrators
- The Civil society

3 L4G Exploitation Strategy

Given the involvement of industry as well as of academic and research partners in L4G, an appropriate exploitation strategy must ensure that both industrial and academic interests are appropriately taken into account during the exploitation of the foreground generated by the project. The following sections will outline how the project will deal with exploitation.

The foreground generated by the project will be subject to two types of exploitation: industrial exploitation and academic exploitation. Industrial exploitation generally deals with the direct or indirect utilisation of the generated foreground for commercial purposes while the academic exploitation deals with its utilisation in further research activities other than those covered by the project. Local4Globall prospects of industrial exploitation are solid, as it will be delivering a product that meets a very basic need of a wide range of TSoS markets/users.

The initial developed exploitation strategy will allow investigating exploitation routes and paving the way to the preparation of agreements among the Partners for the use of the foreground after the project completion. Therefore at this early stage of the project both industrial and academic exploitation plans (at a global or at individual level) are preliminary versions and will be redefined in the course of the project development. Updates guarantee that project strategy is in line with project achievements and market requirements.

3.1 L4G Exploitation Strategy

3.1.1 Industrial Exploitation

The project is an industry driven initiative and as such it will bring advancements in several industrial areas where system can be embedded in generic Cyber physical Systems and Systems-of-Systems producing substantial savings and Quality-of-Service improvements with the requirement of using the minimum possible infrastructure and minimum installation/operation effort.
At this stage the partner's commercialization strategy consist of:

Table 2 Commercialization Strategy

Centre for Research and Technology Hellas CERTH	Deployment of Spin-off companies for the exploitation of the Local4Global results in various different sectors (mostly emphasizing on traffic and energy management systems).
TRANSVER GMBH TRV	Open new business opportunities (methodologies, software, applications) especially in the sector of cooperative traffic control systems, a sector that is currently "small" but will certainly "boom" in the near future.
ik4 Tekniker	Extend its existing offering in the market of embedded software systems, and include the novel Local4Global "plug-and play" technologies in the systems IK4 is providing.

3.1.2 Academic Exploitation

As academic entities or research organisations, Eidgenoessische Technische Hochschule Zurich (ETHZ), Rheinisch – Wesfaelische Technische Hochschule AACHEN (RWTH), Technical University of Crete (TUC) and Technische Universitaet Muenchen (TUM) their interest is in the increase in know-how. The know-how that they will acquire during this project will be used mostly to partner with companies or other institutions to publish joint papers and for further research activities. Furthermore they will work towards the Development of Master and

Doctoral dissertations in the areas of control systems, energy efficiency and other topics across the different engineering degrees at IST.

CERTH and ik4 Tekniker exploitation strategy will combines both activities, their aim is to commercialise L4G results in the market and develop further knowledge in the area by means of new research activities.

3.2 Partners Exploitation Strategy

3.2.1 Centre for Research and Technology Hellas CERTH Exploitation Strategy

Exploitation Plan	Time to market after project end to product Costs Financial source	Turnover next 5 years
Development of Master and Doctoral dissertations in the areas of control systems, energy efficiency and other topics across the different engineering degrees at IST.	1-2 years, use of own funds	Indirect profits (through a spin-off)
Use the research done in Local4Global to partner with companies or other institutions to publish joint papers and develop new R&D projects.	1-2 years, use of own funds	Indirect profits (through a spin-off)
Deployment of Spin-off companies for the exploitation of the Local4Global results in various different sectors (mostly emphasizing on traffic and energy management systems).	1-2 years, use of own funds	Indirect profits (through a spin-off)

3.2.2 Eidgenoessische Technische Hochschule Zurich ETHZ Exploitation Strategy

Exploitation Plan	Time to market after project end to product Costs Financial source	Turnover next 5 years
Development of Master and Doctoral dissertations in the areas of control, energy management and other topics across the different engineering degrees at ETH.	1-2 years, use of own funds	Indirect profits (through a spin-off)
Extend the research done in Local4Global to provide a unifying framework for distributed optimization. This will allow the collaboration with companies or other academic institutions to publish joint papers and develop new products.	1-2 years, use of own funds	Indirect profits (through a spin-off)

Deployment of Spin-off companies for the exploitation of the Local4Global in sections involving energy management and different branches of industrial engineering.	1-2 years, use of own funds	Indirect profits (through a spin-off)

3.2.3 Rheinisch-Wesfaelische Technische Hochschule Aachen RWTH Exploitation Strategy

Exploitation Plan	**Time to market after project end to product Costs Financial source**	**Turnover next 5 years**
Development of Master and Doctoral dissertations in the areas of buildings management and energy efficiency and other topics across the different engineering degrees at IST. Use the research done in Local4Global to partner with companies or other institutions to publish joint papers and develop new R&D projects.	1-2 years, use of own funds	Indirect profits (through a spin-off)
Use the research done in Local4Global to partner with companies or other institutions to publish joint papers and develop new R&D projects.	1-2 years, use of own funds	Indirect profits (through a spin-off)
Deployment of Spin-off companies for the exploitation of the Local4Global results in the sector of energy management systems.	1-2 years, use of own funds	Indirect profits (through a spin-off)

3.2.4 Fundacion Tekniker IK4-TEKNIKER Exploitation Strategy

Exploitation Plan	**Time to market after project end to product Costs Financial source**	**Turnover next 5 years**
Development of customized solutions in industry based on Cyber Physical systems principles.	1-2 years, use of own funds	R&D Contract
Use the research done in Local4Global to partner with companies or other institutions to publish joint papers and develop new R&D projects.	1-2 years, use of own funds	Indirect profits (through a spin-off)

Deployment of Spin-off companies for the exploitation of the Local4Global results in various different sectors (mostly emphasizing on traffic and energy management systems).	1-2 years, use of own funds	Indirect profits (through a spin-off)

3.2.5 Technical University of Crete TUC Exploitation Strategy

Exploitation Plan	Time to market after project end to product Costs Financial source	Turnover next 5 years
Development of Diploma, Master and Doctoral dissertations in the areas of traffic control and management and other topics across the different engineering degrees at IST.	Immediate, use of own funds	Non-monetary benefits
Use the research done in Local4Global to partner with companies or other institutions to publish joint papers and develop new R&D projects.	1-2 years, use of own funds	Indirect profits via involvement in future R&D projects

3.2.6 TRANSVER GMBH (TRANSVER) Exploitation Strategy

Exploitation Plan	Time to market after project end to product Costs Financial source	Turnover next 5 years
Open new business opportunities especially in the sector of cooperative traffic systems, a sector that is currently "small" but will certainly "boom" in the near future. Business opportunities can be e.g. • Provision, development, customizing and maintenance of traffic management software • Provision, development and maintenance or applications for traffic information (e.g. smart phone-apps) • Quality Assessment and evaluation of traffic management systems on the basis of L4G methodologies	1-2 years, use of own funds	Direct profit from offering service to customers

3.2.7 Technische Universitaet Muenchen TUM Exploitation Strategy

Exploitation Plan	Time to market after project end to product Costs Financial source	Turnover next 5 years
Development of Master and Doctoral dissertations in the areas of driver information by nomadic devices and long term use and acceptance of in-vehicle information systems	1-2 years, use of own funds	Indirect profits
Use the research, outcomes, rising research questions and problems encountered in Local4Global to start new industrial and public funded projects in the areas of field tests with nomadic devices, acceptance of in-vehicle information systems and cooperative/connected cars and infrastructure	1-2 years, use of own funds	R&D contracts, Project funding

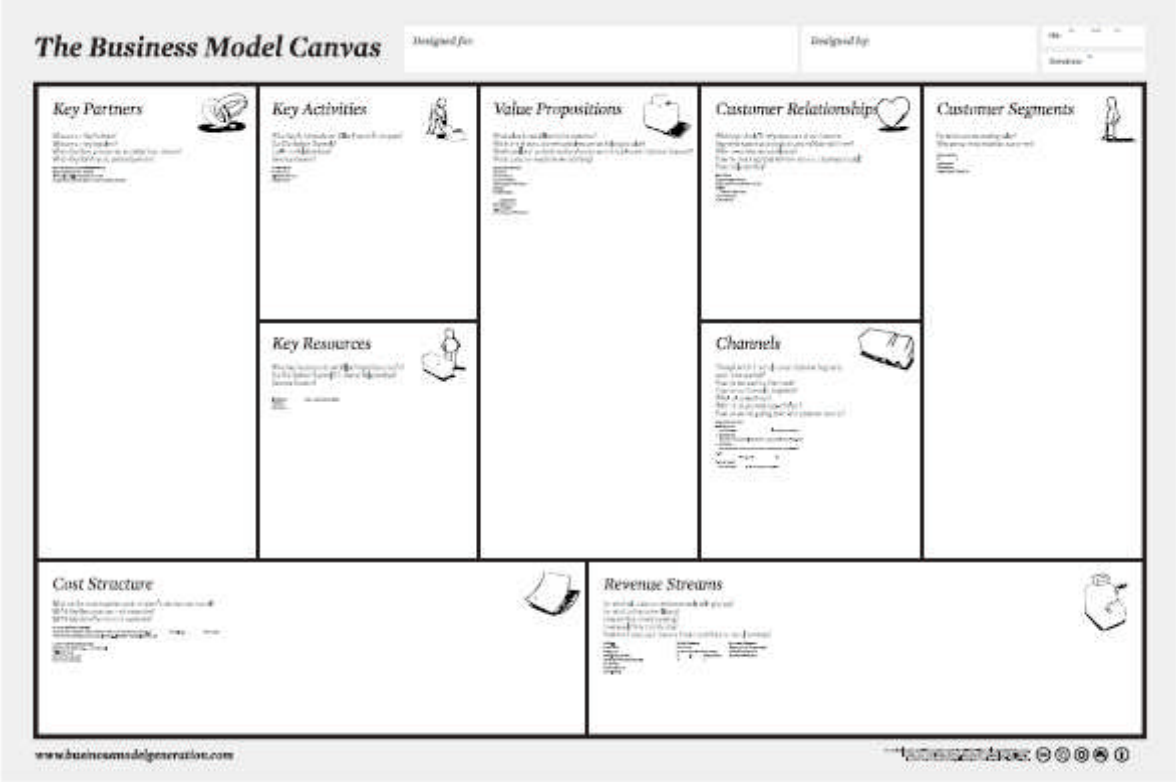
4 Next Steps

In order to exploit all the potential of L4G results in the next months the focus will be on exploring and creating business models. Each of the business models will be assessed and validated within the Local4Global stakeholders, thus being discarded or refined until the elaboration of the final plan. In addition, the task is also responsible for establishing market awareness through business oriented dissemination following the strategy associated to the devised business models. The networks of the industrial stakeholders will be used as initial channels of dissemination, along with the clusters of enterprises that are members of the living labs. As in the case of the exploitation plans, the development of the business models will focus in the key areas identified by the Local4Global partners and the developed business models will be refined and finalized based on the inputs and opinions of stakeholders of these key areas.

4.1 Methodology Approach for Business Model design

Business Model Canvas approach will be applied to describe L4G business model. This methodology developed by Alexander Osterwalder and Yves Pigneur and a community of researchers and business experts offers a structured way to describe, plan, implement, and execute the commercialization of products and services. The main goals of this methodology is that it has created a share language and a common and easily understandable framework for all the actors involved, and it works with all kinds of products and services.

Figure 1: The Business Model CANVAS



The nine building blocks of the CANVAS business model are:

- Value Proposition: The collection of products and services a business offers to meet the needs of its customers. According to Osterwalder, (2004), a company's value proposition is what distinguishes itself from its competitors. The value proposition provides value through various elements such as newness, performance, customization, "getting the job done", design, brand/status, price, cost reduction, risk reduction, accessibility, and convenience/usability.
- *Customer* Segments: The company must identify which customers it tries to serve.
- Channels: A company can deliver its value proposition to its targeted customers through different channels. Effective channels will distribute a company's value proposition in ways that are fast, efficient and cost effective.
- Customer Relationship: To ensure the survival and success of any businesses, companies must identify the type of relationship they want to create with their customer segments.
- Cost Structure: Describes the most important monetary consequences while operating under different business models.
- Revenue Streams: The way a company makes income from each customer segment.
- Key Activities: The most important activities in executing a company's value proposition.
- Key Resources: The resources necessary to create value for the customer.
- Key Partners: Other organizations that play a relevant role in the business strategy of a company.

5 ANNEX 1 Standards

L4G project provides contribution to the European effort for standardization. L4G requires the use of standards and systems that render the interfacing and connection of different embedded software systems. For this reason a special emphasis has been given on the development of such standards. In this is provided the potential standards to be used within the L4G system.

5.1 Software design

5.2 SOA

A service-oriented architecture (SOA) is the most appropriate way to implement a data capture system that interacts with various modules and distributed functionality. The following points detail what is SOA and the benefits it provides for a system of data collection.

SOA is a development paradigm based on the decomposition of monolithic applications into a set of business functions. These functions are implemented using standard technologies that facilitate interoperability. These business functions are used to quickly build applications that meet business requirements. In SOA data and business logic are encapsulated in modular business components with documented interfaces. SOA is not based on individual suppliers specific technologies or specific platforms, or specific operating systems. This "neutrality" allows reusability in heterogeneous environments.

In an SOA there are 3 levels:

- Orchestration service layer
- Business service layer
- Application service layer

Importantly, SOA is not a synonym for web services. Web Services are one of the possible technologies that can be used to implement SOA. But SOA is quickly implanted through Web services and are the most widely used standard for implementing SOA.

SOA is a concept, not a product. It is a service-oriented that enables interoperability between heterogeneous environments and applications conceived as collections of services architecture. These services communicate with each other to transfer data, perform tasks or coordinating an activity.

Service could be defined as a distinct business function, self-contained, and does not depend on the context or state of other. From an external point of view services are black boxes. The design and implementation of them do not depend on the nature of the customers.

5.3 UML

Unified Modeling Language (UML) is a well-known language for modeling systems. It is supported by the OMG (Object Management Group) and is a graphical language for visualizing, specifying, constructing and documenting a system. UML offers a standard to describe a "blueprint" of the system (model), including conceptual issues such as business processes and system functions as expressions and specific aspects of programming languages, database schemas and reusable components.

Importantly, UML is a 'language' for specifying and not to describe methods or processes. UMK is used to define a system, to detail the different elements of the system, and to document and build. It can be applied in software development to deliver a variety of ways to support a software development methodology (such as the Rational Unified Process or RUP), but does not specify what methodology itself or process use.

5.4 Services interoperability

5.4.1 HTTP

HTTP (Hyper Text Transfer Protocol) is the main protocol that is used to implement Web Services over networks.

5.4.2 WSDL

WSDL (Web Service Description Language) is used to describe the functionalities offered by a Web Service: it describes service operations, input and output parameters and how the service is bound to a protocol and where the service is deployed.

WSDL describes the public interface of a Web service and describes the form of communication, e.g., the requirements of the protocol and message formats required to interact with the services listed in its catalogue. The operations and messages are described abstractly supports and then linked to the concrete network protocol and message format.

5.4.3 SOAP

SOAP is an application protocol used to exchange Web Services data. It relies on other protocols to negotiate and transmit messages, usually HTTP, and transmit messages in XML format.

5.4.4 UDDI

UDDI (Universal Description Discovery and Integration) is an XML catalogue to register and locate Web Services: the register can be interrogated through SOAP messages to find and interact with Web Services.

5.4.5 REST

Representational State Transfer [1] is a set of architectural principles to transmit data over a standardized interface, like HTTP or FTP. Apart from XML it can use other file formats to transmit data, such as plain text or JSON. In Web Services, it uses a path to access a specific resource, in which it can use the basic HTTP set of operations: GET, PUT, DELETE, POST and HEAD.

5.4.6 BPEL

Business Process Execution Language, WS-BPEL is an OASIS standard for Web Services composition language. It is development from WSDL and XLANG, both oriented languages describing Web services. It basically consists of an XML-based language designed for centralized control of the invocation of different Web services with some logic added business that helps large-scale programming.

5.4.7 Web services

A web service is a software system designed to support interoperable machine-to-machine interaction over a network. It has an interface described in a machine-processable format (specifically WSDL). Other systems interact with the Web service in a manner prescribed by its description using SOAP messages, typically conveyed using HTTP with an XML serialization in conjunction with other Web-related standards.

5.5 Data Interoperability

5.5.1 XML

XML (eXtensible Markup Language), together with "XML Schema", is used for describing data models, formats and data types. XML is also used as the basis for specifying other standards, like WSDL.

The design goals of XML emphasize simplicity, generality, and usability over the Internet.It is a textual data format with strong support via Unicode for different human languages. Although the design of XML focuses on documents, it is widely used for the representation of arbitrary data structures, for example in web services.

Many application programming interfaces (APIs) have been developed to aid software developers with processing XML data, and several schema systems exist to aid in the definition of XML-based languages.

5.5.2 OWL

The Web Ontology Language (OWL) is a family of knowledge representation languages or ontology languages for authoring ontologies or knowledge bases. The languages are characterised by formal semantics and RDF/XML-based serializations for the Semantic Web. OWL is endorsed by the World Wide Web Consortium (W3C) and has attracted academic, medical and commercial interest.

5.5.3 SensorML

SensorML provides standard models and an XML encoding for describing any process, including the process of measurement by sensors and instructions for deriving higher-level information from observations. It provides a provider-centric view of information in a sensor web, which is complemented by Observations and Measurements which provides a user-centric view.

Processes described in SensorML are discoverable and executable. All processes define their inputs, outputs, parameters, and method, as well as provide relevant metadata. SensorML models detectors and sensors as processes that convert real phenomena to data.

SensorML does not encode measurements taken by sensors; measurements can be represented in TransducerML, as observations in Observations and Measurements, or in other forms, such as IEEE 1451.

5.6 Building/domotic standards

5.6.1 BACnet

BACnet is a data communication protocol for building automation and control networks, which provides a standard way of representing functions of any device, such as analogue and binary inputs and outputs, schedules, control loops, and alarms, by defining collections of related information called "*objects*", each of which has a set of "*properties*" that further characterize it.
One of the object's most important properties is its identifier, a numerical name that allows BACnet to unambiguously access it. BACnet presently defines 25 different object types [3]. Any given building automation device may have zero, one, or many objects of each object type with the exception of the *Device* object, which must be present in every device.
BACnet employs the Open System Interconnection (OSI) Basic Reference Model (ISO 7498) as its reference model. The following four OSI communication layers are implemented in BACnet: physical, data link, network, and application layer. BACnet is standardized by ASHRAE, ANSI and ISO organizations.

5.6.2 LonWorks

LonWorks technology is used to build non-open but guidelines have been defined to manufacture and to integrate interoperable devices. These guidelines should guarantee a smooth integration and operation of devices designed, produced, and installed by different manufacturers [4]. They include LonTalk (the communication protocol of the LonWorks technology platform) channel profiles, standard network variable types (SNVT) and functional profiles. A SNVT comprises syntactic as well as semantic information, like the associated engineering unit.
LONMARK (association formed by Echelon and a group of LONWORKS users dedicated to building interoperable products) objects are defined as a set of one or more input and/or output network variables, with semantic definitions relating the behavior of the object to the network variable values and to a set of configuration properties that specify configuration data for the object [7]. To provide for future expansion and to enable manufacturer differentiation, the LONMARK object definitions consist of mandatory network variables and configuration properties, optional network variables and configuration properties, and may consist of manufacturer-specific network variables and configuration properties.

5.6.3 EIB

EIB, the European Installation Bus is a fieldbus designed to enhance electrical installations in homes and buildings of all sizes by separating the transmission of control information from the traditional main wiring. Every component is able to send commands to other components, no matter where they are. A typical EIB network is made of electrical components such as switches, pulsers, electric motors, electro valves, contactors, and sensors. In 2004, EIB was merged with Batibus and European Home System to create a new KNX standard (European Home and Building Electronic System standard).

5.6.4 KNX

KNX is a standardized (EN 50090, ISO/IEC 14543), OSI-based network communications protocol for intelligent buildings. KNX is the successor to, and convergence of, three previous standards: the European Home Systems Protocol (EHS), Batibus, and the European Installation Bus (EIB or Instabus). The standard is based on the communication stack of EIB but enlarged with the physical layers, configuration modes and application experience of Batibus and EHS.
KNX defines several physical communication medias:
- Twisted pair wiring (inherited from the Batibus and EIB Instabus standards)
- Powerline networking (inherited from EIB and EHS - similar to that used by X10)
- Radio (KNX-RF)
- Infrared

- Ethernet (also known as EIBnet/IP or KNXnet/IP)

KNX is designed to be independent of any particular hardware platform. A KNX Device Network can be controlled by anything from an 8-bit microcontroller to a PC, according to the needs of a particular implementation. The most common form of installation is over twisted pair medium.

Central to KNX application concepts is the idea of data-points: they represent the process and control variables in the system. These data-points may be inputs, outputs, parameters, diagnostic data, etc. The standardized containers for these data-points are Group Objects and Interface Object Properties. The data-points types are defined as a combination of a data type and a dimension. It has been preferred not to define the data types separately from any dimension. This only leads to more abstract naming and identifications (Figure 2). Any data points type thus standardizes one combination of format, encoding, range and unit.

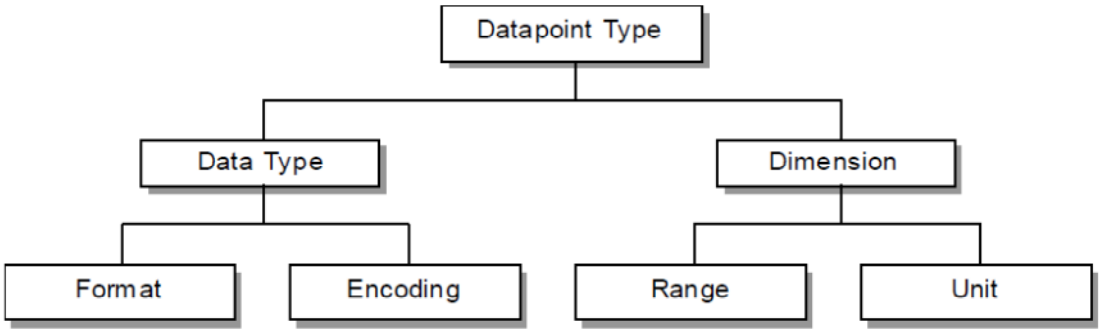


Figure 2: Structure of Datapoint Types in KNX Standard

5.6.5 OPC

OPC consists of standard interfaces, properties and methods for use in process control and manufacturing automation applications. OPC provides a common interface for communicating with diverse process-control devices, regardless of the controlling software or protocols used in the process. Recently, the OPC Foundation developed the next generation of OPC, **OPC Unified Architecture (UA)**. A new and independent stack for OPC-UA replaces COM/DCOM. The new communication stack reflects the beginning of various innovations. The OPC UA architecture is a service-oriented architecture (SOA) and is based on different logical levels.

OPC Base Services are abstract method descriptions, which are protocol independent and provide the basis for OPC UA functionality. The transport layer puts these methods into a protocol, which means it serializes/de-serializes the data and transmits it over the network. Two protocols are specified for this purpose. One is a binary TCP protocol, optimized for high performance and the second is Web service-oriented. The OPC information model is a so-called Full Mesh Network based on nodes. These nodes can include any kind of meta information. The OPC specification states that process data are made available by means of OPC *Item* objects (Figure 3). It is up to the server implementer to design relationships between OPC Items and, for instance, data items or device objects. OPC Item objects cannot be accessed directly through the OPC Data Access custom interface, but only via OPC *Group* objects. OPC Group objects are used to organize the OPC *Clients* data access. OPC Item and OPC Group objects are created by the OPC Server object on behalf of OPC Clients. OPC Item and OPC Group objects are transient objects. By settings attributes of its OPC Group objects, a client can parameterize its subscriptions.

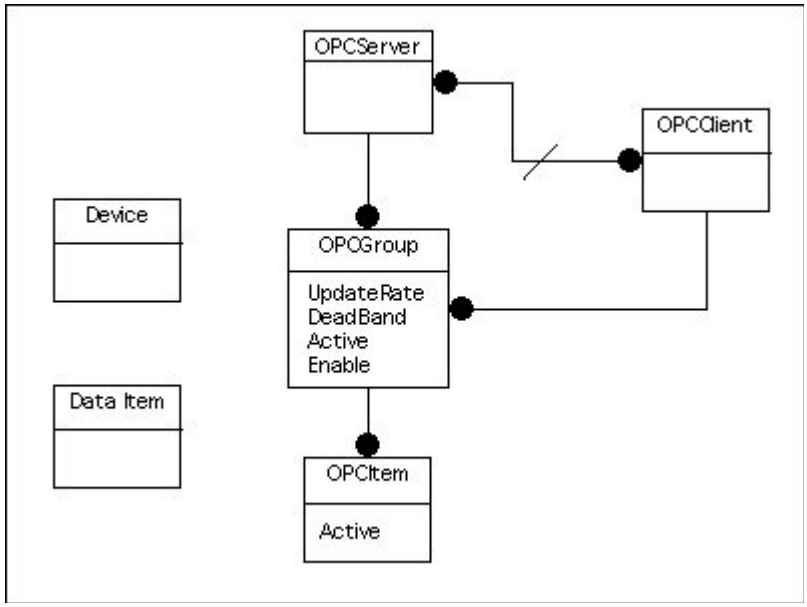


Figure 3: OPC Data Access concepts

5.7 Standards organizations

5.7.1 W3C

The World Wide Web Consortium (W3C) is an international community where Member organizations, a full-time staff, and the public work together to develop Web standards. Led by Web inventor Tim Berners-Lee and CEO Jeffrey Jaffe, W3C's mission is to lead the Web to its full potential.

W3C tries to enforce compatibility and agreement among industry members in the adoption of new standards defined by the W3C. Incompatible versions of HTML are offered by different vendors, causing inconsistency in how Web pages are displayed. The consortium tries to get all those vendors to implement a set of core principles and components which are chosen by the consortium.

5.7.2 OASIS

The Organization for the Advancement of Structured Information Standards (OASIS) is a global consortium that drives the development, convergence, and adoption of e-business and web service standards. With its headquarters in the United States, a trade association of SGML tool vendors to cooperatively promote the adoption of SGML through mainly educational activities, though some amount of technical activity was also pursued including an update of the CALS Table Model specification and specifications for fragment interchange and entity management.

5.7.3 NEXOF

NEXOF is a generic open platform, whose main objective is the creation and distribution of applications that allow the creation of ecosystems based services (SOA), where service providers and third parties can collaborate easily. This, like many others, could be a scenario in the context of an increasingly service-oriented economy.

6 ANNEX 2 IPR Management

6.1 Introduction

Intellectual property (IP) is a term referred to types of property that result from creations of the human mind (the intellect). In a broadly sense, it comprises patents, copyright and related rights, trade marks, know how, trade secrets, industrial designs, designs, drawings, reports, methods of research and developments, documented data, and description of inventions and discoveries

Creators of IP can claim certain Intellectual Property Rights (IPRs), this means the legal rights granted with the aim to protect the creations of the intellect. These rights include Industrial Property Rights (e.g. patents, industrial designs and trademarks) and Copyright (right of the author or creator) and Related Rights (rights of the performers, producers and broadcasting organizations)

The aim of this extra appendix is to support L4G partners with IP management; but it is not a binding document. Only the European rules for 7th Framework Programme, the Grant Agreement (nº611538) and the Consortium Agreement signed by the consortium are binding for the partners.

6.2 Definitions

BACKGROUND: Information and knowledge held by the partners prior to their accession to the EC grant agreement, as well as any intellectual property rights which are needed for carrying out the project or for using foreground

FOREGROUND: The results, including information, materials and knowledge, rights related to copyright, patent rights or similar forms of protection, generated in the given project, whether or not they can be protected. Results generated outside a project are not foreground.

ACCESS RIGHTS: Licenses and user rights to foreground or background owned by another partner in the project.

USE: the direct(done by the partner owning) or indirect (done by other parties through licensing for example) utilization of foreground in further research activities other than those covered by the project, as well as for developing, creating and marketing a product or process or for creating and providing a service (using the results commercially or in industry).

DISSEMINATION: The disclosure of foreground by participants through any appropriate means (i.e. press releases, conferences, scientific publications, exhibitions, workshops, websites etc) and including the publication in any form. The disclosure of foreground that results from formalities for protection (such as the patent application publication) is not considered as dissemination.

AFFILIATED ENTITY In the context of FP7, is any legal entity under the direct or indirect control of a participant, or under the same, direct or indirect control as the participant

6.3 General Rules For IP Issues

6.3.1 The Intellectual Property Rights Committee

L4G coordination and decisions activities are handled by the Consortium Bodies: the Steering Committee, the Coordinator, and the Management Board. The Consortium Bodies shall perform

the tasks assigned, as described in the Grant Agreement and the Consortium Agreement. To do so, there are 2 Consultative Bodies acting in an advisory capacity to the Consortium Bodies: The Intellectual Property Rights Committee and the Advisory Committee.

The Intellectual Property Rights Committee assists the Steering Committee and the Coordinator. The Intellectual Property Rights Committee shall perform the tasks assigned, as described in Article 6.5 of the Consortium Agreement.

The Intellectual Property Rights Committee is responsible for the resolution of disagreements between participants on sensitive intellectual property issues, such as the publication of data related to foreground or the granting of access rights to third parties.

The Intellectual Property Rights Committee is appointed by the Steering Committee in accordance with the Grant Agreement Annex I. The Intellectual Property Rights Committee shall consist of one representative of each Party. This consultative body shall meet at least once every twelve (12) months and shall also meet at any time upon written request of any member of the Steering Committee in the case of an emergency situation.

The Intellectual Property Rights Committee is in particular responsible for the following:
(i) Advising the Steering Committee and the Coordinator in approving procedures and policies in accordance with the Grant Agreement rules, Annex II General Conditions - Part C for the use, protection, and dissemination of the Foreground;
(ii) Advising the Steering Committee and the Coordinator in the implementation of measures in accordance with the Grant Agreement rules, Annex II General Conditions - Part C to rapidly resolve disagreements on the necessary character of access rights to carry on the project work;
(iii) Securing loyalty toward the project and confidentiality with regard to unpublished project deliverables and drafts.

6.3.2 Rules for IPR Management

The partners need to take reasonable actions to protect the knowledge resulting from the project, according to their own policy and legitimate interest and in observance of their obligations under the EC Grant Agreement.

In general, L4G consortium seeks to maximize the protection of the intellectual property and other results generated by Local4Global for individual, joint and European advantage.

Therefore the following rules have been defined to manage the knowledge resulting from L4G.

Ownership: Foreground is owned by the partner generating it.

Joint Ownership: Where the separate parts of some results cannot be attributed to different partners, the Foreground is jointly generated. Unless otherwise agreed, all patents and other registered intellectual property rights issued thereon, and any other intellectual property rights protecting such Foreground, shall be jointly owned by the Contributors. In such case each of the L4G joint owners is entitled:

- To use their jointly owned Foreground for internal research and educational purposes on a royalty-free basis, and without requiring the prior consent of the other joint owner(s), and
- To use their jointly owned Foreground for commercial purposes and to grant non-exclusive licenses to third parties, without any right to sub-license, subject to the following conditions:
    - at least forty-five (45) days prior notice must be given to the other joint owner(s)

- and fair and reasonable compensation must be provided to the other joint owner(s).

Transfer of Ownership: The owner transferring the foreground must ensure that its contractual obligations regarding access rights of the other partners, use and dissemination are passed on to the new owner.

Each party has identified in Attachment 4 of the Consortium Agreement third parties it intends to transfer its own Foreground. Any addition to Attachment 4 requires the acceptance of the Steering Committee.

However, each party shall inform the rest of the consortium at least 45 days before the transfer, together with sufficient information concerning the envisaged new owner of the foreground and ensure as well that the rights of the other Parties will not be affected by such transfer.

The Parties recognize that in the framework of a merger or an acquisition of an important part of its assets, a Party may be subject to confidentiality obligations which prevent it from giving the full forty-five (45) days prior notice foreseen in Grant Agreement Article II 27.2.

Any partner may object within 30 days of the notification to any envisaged transfer of ownership on the grounds that it would adversely affect its access rights.

Dissemination The party interested in developing any activity of dissemination or divulgation will inform the coordinator with a minimum deadline of 45 days before the divulgation activity takes place. If in 30 days after this communication any party has showed any objection, the approval will be tacit understood and the publication is permitted.

In the case of conflict, the objection has to include a precise request for necessary modifications and the involved Parties shall discuss how to overcome the justified grounds for the objection on a timely basis (for example by amendment to the planned publication and/or by protecting information before publication) and the objecting Party shall not unreasonably continue the opposition if appropriate actions are performed following the discussion.

A Partner shall not publish Foreground or Background of another partner, even if such Foreground or Background is amalgamated with the Partner´s Foreground, without the other Partner´s prior written approval. For the avoidance of doubt, the mere absence of an objection according to this section is not considered as an approval.

Access Rights: Licenses and user rights to foreground or background owned by another partner in the project.

Access Rights shall be granted upon written request and that decision shall not unreasonably be withheld. The requesting Party must show that the Access Rights are needed

The granting of Access Rights may be made conditional on the acceptance of specific conditions aimed at ensuring that these rights will be used only for the intended purpose and that appropriate confidentiality obligations are in place.

Each Party shall ensure that its acts within the Project do not knowingly infringe third party property rights.

Partners are also obliged to inform immediately about any restriction to the granting of the access rights to the background

Access rights don’t confer any entitlement to grant sub-licenses, unless otherwise agreed

Access rights are granted on a non exclusive basis. Exclusivity is only possible when the rest of the involved beneficiaries have waived their access rights in writing

Foreground and Background shall only be used for the purposes for which Access Rights to it have been granted.

Access Rights to Foreground and Background needed for the execution of the own work of a Party under the Project shall be granted on a royalty-free basis, unless otherwise agreed in the Consortium Agreement.

Access Rights to Foreground if needed Use of a Party's own Foreground including for third-party research shall be granted on fair and reasonable conditions. A Party who wishes to be granted such Access Rights shall make a request in writing within twelve (12) months after the end of the Project.

Access Rights for internal research activities shall be granted on a royalty-free basis.

Access Rights to Background if Needed for Use of a Party's own Foreground shall be granted on fair and reasonable conditions.

	Access Rights to Background	**Access Rights to Foreground**
For Implementing the project & Internal research	Royalty Free	
For Use Propose	Fair and reasonable condition	

References

[1] Fielding Roy, Taylor Richard. Principled Design of the Modern Web Architecture.
[2] IETF. "*RFC 2119 - Key words for use in RFCs to Indicate Requirement Levels*"
[3] Kastner W., Neugschwandtner G., Soucek S., Newman H. M. *Communication Systems for Building Automation and Control*, Proceedings of the IEEE, Vol. 93, No. 6, June 2005
[4] *Introduction to the LonWorks System, Version 1.0*, Echelon Corporation
[5] UPnP Device Architecture 1.0, UPnP forum Oct 2008
[6] *http://www.osgi.org*. OSGi Alliance.
[7] Lith Adam, Mattson Jakob. *Investigating storage solutions for large data.* Chalmers University of Technology Göteborg, Sweden, 2010