



Local4Global

System-of-systems that act locally for optimizing globally

611538, FP7-ICT-2013.3.4

Deliverable 7.1:

Local4Global Website

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Dissemination Level:	PU - Public



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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

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Project Coordinator:	CERTH – Centre for Research and Technology – Hellas
Participating Partners:	Eidgenössische Technische Hochschule Zürich (CH); Rheinisch-Westfaelische Technische Hochschule Aachen (DE); Fundacion Tekniker (ES); Technical University of Crete (GR); Transver GMBH (DE); and Technische Universitaet of Muenchen (DE)
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Duration:	36 Months

Deliverable 7.1: Short Description

This deliverable depicts the development of the Local4Global project web site, accessible via <http://local4global-fp7.eu>, a brochure and a project cd-rom. It focuses on the goal of the three instruments, its structures, and its general look.

Keywords: Local4Global; Website; Brochure

Deliverable 7.1: Revision History

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Executive Summary

This deliverable depicts the development of the Local4Global project web site, accessible via <http://local4global-fp7.eu> and a project brochure. It focuses on the goal of the three instruments, its structures, and its general look.

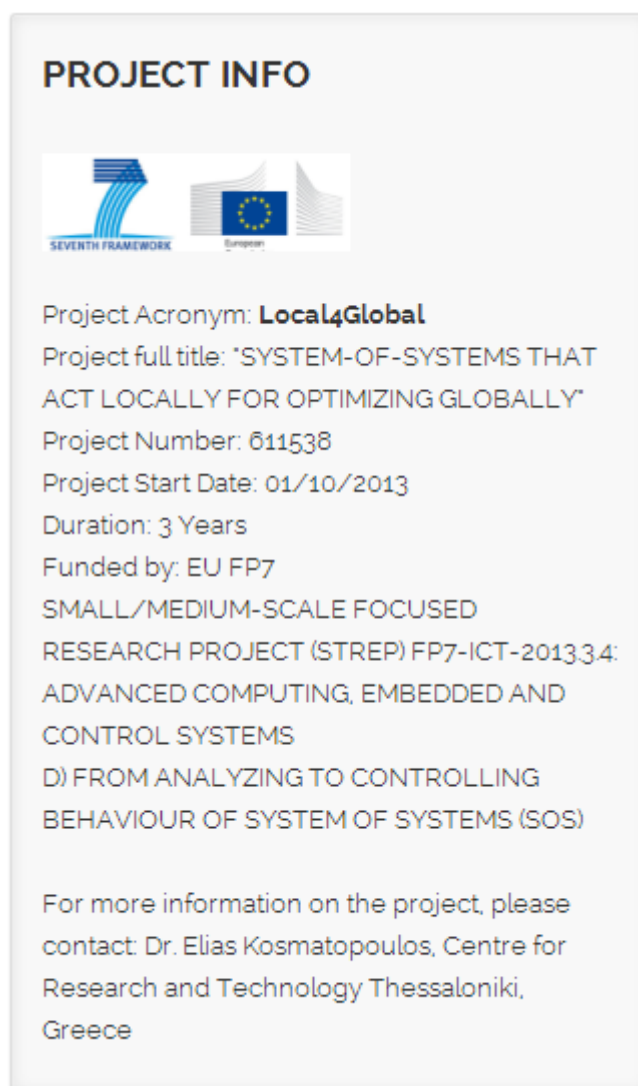
1 Website

1.1 The aim of the website



The website is a key tool for internal and external communication. It provides information about the current status of the project (Figure 1). Public results of the project can be obtained. Dissemination material like the brochure and also the content of the project CD-ROM are propagated to all interested parties.

The website is set up as content management system. The usage of a readily available open source solution which also includes a number of tools for online WYSIWYG editing, and its adaptation to the project needs, helped to keep the development costs low.

The website will be kept online for at least one year after the end of the project.



PROJECT INFO

Project Acronym: **Local4Global**
Project full title: "SYSTEM-OF-SYSTEMS THAT ACT LOCALLY FOR OPTIMIZING GLOBALLY"
Project Number: 611538
Project Start Date: 01/10/2013
Duration: 3 Years
Funded by: 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)

For more information on the project, please
contact: Dr. Elias Kosmatopoulos, Centre for
Research and Technology Thessaloniki,
Greece

Figure 1 : Project information

1.2 Description of the website

The website is available under <http://local4global-fp7.eu>. It is managed by the project coordinator.

Figure 2 shows the whole opening page of the Local4Global website.

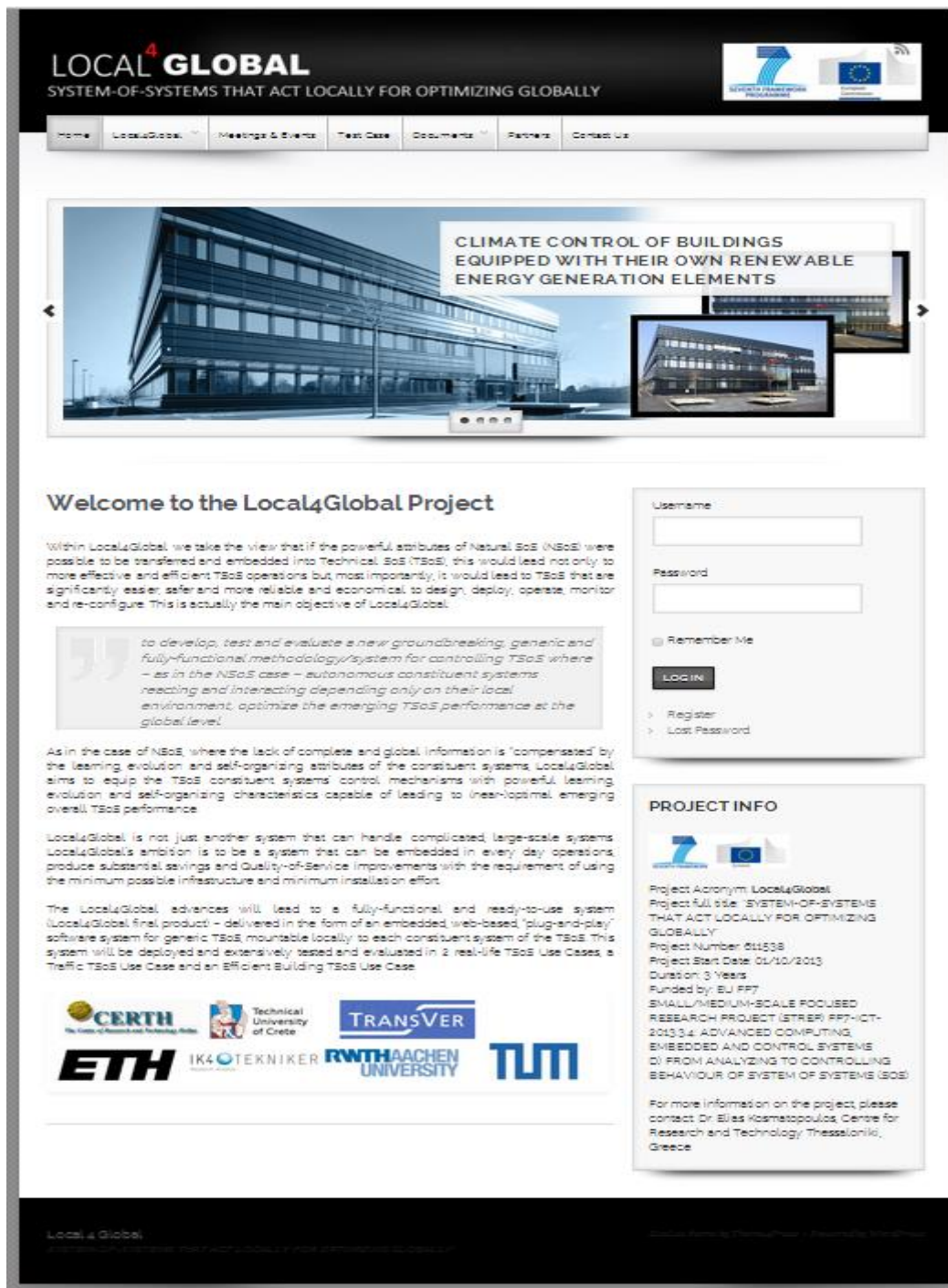


Figure 2: Opening page of the Local4Global website

The opening page gives access to the following links in Figure 3:

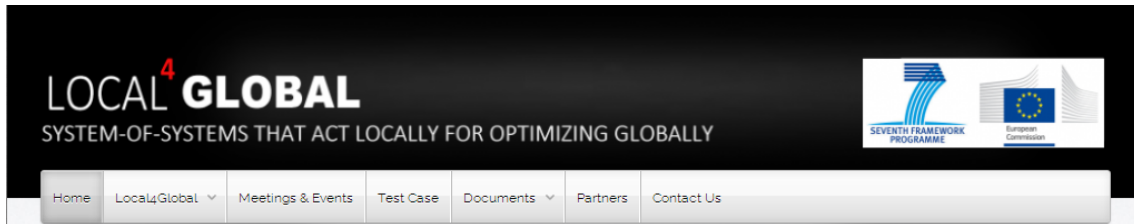


Figure 3 : Tab selection

Beside this public section the website consists of a private section. The public section comprises all material accessible to the general public, whereas the private section has some additional pages intended for internal organization of the project. The internal organization also includes the exchange of documents and modelling libraries.

The content of the private section is only viewable after performing a login via username and password entry.

The whole website uses a content management system so that changes can be easily integrated by different authors. It also supports the frequently storage and change of documents.

The website has been checked successfully for accessibility for all popular web browsers

1.3 Description of each tab

As we mentioned above, the main page of the Local4Global project consists of numerous tabs. Each tab, give more information about different needs-aspects of the project:

1. Local4Global Project: It gives a short overview about the whole project, the key parts of Local4Global and also detailed information about the single work packages. It also presents related projects, state of the art methods and the progress beyond that point.

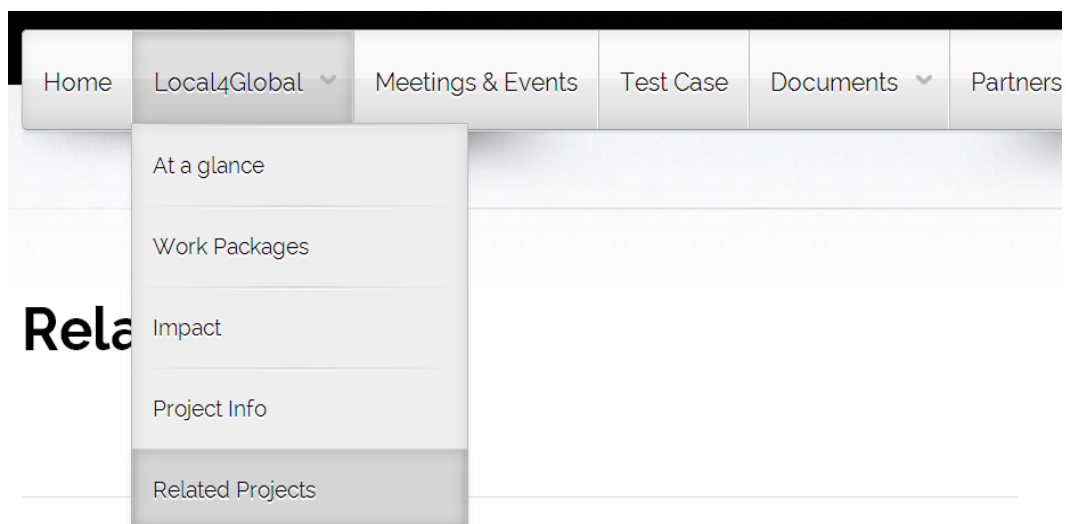


Figure 4 : Zoom in Local4Global tab

2. Meetings & Events: Latest news and next events will be presented. What is more, for each project meeting, presentations are provided.

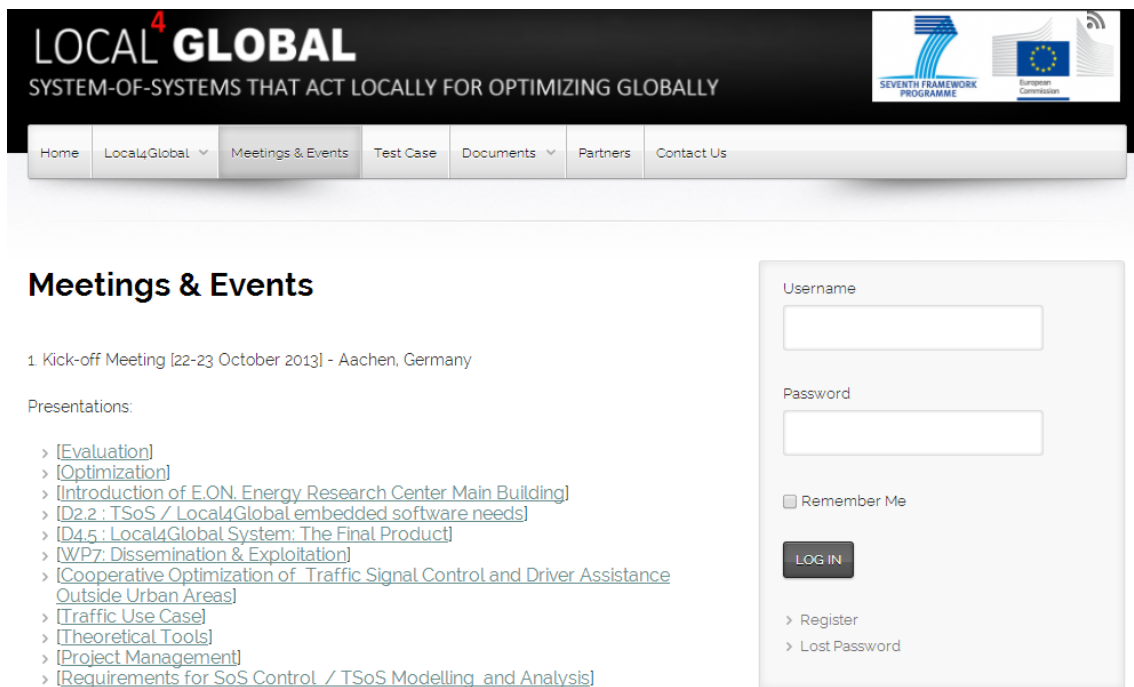
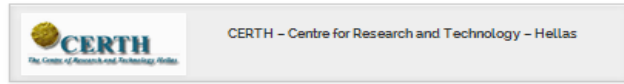


Figure 5 : Meeting and Events tab

3. Test Cases : Presentation of each test case of the project. This system will be deployed and extensively tested and evaluated in 2 real-life TSoS Use Cases, a Traffic TSoS Use Case and an Efficient Building TSoS Use Case.
4. Documents: The brochure, deliverables, scientific papers, conference papers, the newsletter and other dissemination materials can be achieved and downloaded in this section.
5. Partners: Short information and link to the external homepages of all project partners is given.
6. Remote optimal control client : A secondary/auxiliary webplace is incorporated in the L4G website, dedicated for remote L4G methodology client application which will be developed within upcoming tasks framework (see WP4, WP5, WP6) - L4G tools implementation and lab validation tests.
7. Contact us: Contact to the project coordinator through a friendly-user form.

Partners



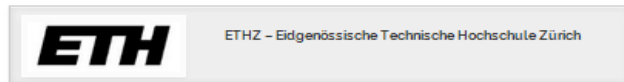
The Information Technology Institute (ITI) of the Centre for Research and Technology - Hellas (CERTH) was founded in 1998 as a non-profit organization under the auspices of the General Secretariat of Research and Technology of Greece, with its head office located in Thessaloniki, Greece. Since 10.3.2000 it is a founding member of the Centre of Research and Technology Hellas (CERTH) also supervised by the Greek Secretariat of Research and Technology. ITI-CERTH is one of the leading Institutions of Greece in the fields of Informatics, Telematics and Telecommunications, with long experience in numerous European and national R&D projects.

^ Read More

ITI-CERTH has participated in more than 60 research projects funded by the European Commission (IST FP5-FP7) and more than 85 research projects funded by Greek National Research Programs and Consulting Subcontracts with the Private Sector (I&T Industry). Only in 2006, the Informatics and Telematics Institute attracted an income of 5.6 M€ from National and European competitive R&D projects. For the last 10 years, the publication record of ITI includes more than 150 scientific publications in international journals, more than 400 publications in conferences and 45 books and book chapters. The development of the infrastructure of ITI-CERTH was financed by the National Research fund EPET II with € 2.3 million in the period 1998-2000.

The particular team of CERTH that will carry the work within Local4Global has profound knowledge and broad experience in intelligent and learning control and optimization of large-scale, complex systems and their practical application in real-life large-scale systems such as swarms of robots, intelligent traffic and transportation systems, and energy efficient systems control. Theoretical research activities resulted in the development of popular intelligent control & optimization methodologies with many different real-life, large-scale implementations worldwide. Currently the team of CERTH that will work within Local4Global coordinates 3 FP7 projects (PEBBLE on sensor/actuator networks for Energy Efficient Buildings, AGILE on rapidly deployable, and fault tolerant, large-scale control systems and NOPTILUS on Swarms of Autonomous Underwater Vehicles) and participates in 2 more FP7 projects (FLY on swarms of Flying Robots and BAAS on sensor/actuator networks for Energy Efficient Buildings and Neighbourhoods).

website: www.convcao.com



The Swiss Federal Institute of Technology, ETH Zurich is a community of 20,000 people from 80 nations who study, do research or are employed there. The ETH team will involve researchers at the Automatic Control Laboratory (ifa, <http://control.ee.ethz.ch/>) in the Department of Information Technology and Electrical Engineering.

Username

Password

Remember Me

LOGIN

> Register
> Lost Password

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Figure 6 : Partner Tab

Contact Us

Name: *

Email Address: *



Subject: *

Message: *

SUBMIT

Figure 7 : Contact Form

SYSTEM-OF-SYSTEMS THAT ACT LOCALLY FOR OPTIMIZING GLOBALLY

Home
Local4Global ▾
Meetings & Events
Test Cases
Documents ▾
Partners
Remote Optimal Control Client
Contact Us

1: Cooperative Traffic TSoS Use Case

Problem:

Despite the fact that the problem of real-time signal control at the junctions of urban traffic networks has been studied for many decades, and many different urban traffic control strategies have been developed, tested and are operational in a number of cities around the world, it is today a well-accepted fact that urban traffic control systems are not able to cope effectively with the constantly increasing problem of congestion. According to the American FHWA (Federal Highway Administration) *"No current generally available tool is adequate for optimizing [signal] timing in congested conditions"* (2008). Moreover, the problem of designing effective urban traffic control strategies will become significantly more complicated with the introduction of *cooperative traffic/transport systems*, whereby vehicles will be enabled to communicate directly with each other and with the infrastructure. **Thus, apart from controlling the traffic signals in the junctions, the control system is also called to optimize the routes and speeds of the cooperative vehicles.**

An urban traffic network may seem, at first view, to have a steady and constant structure with respect to its subsystems (i.e. the junctions). However, the functional interdependencies between these subsystems are, in reality, subject to change. When traffic conditions are non-saturated (i.e. when vehicle queues forming during the red phase are cleared during the next green phase), then upstream flows (released from upstream traffic signals) influence the downstream junctions and their traffic signals. On the other hand, when the links start building increasing vehicle queues (e.g. during the daily peak period congestion), then the outflow from upstream junctions is hindered due to existing long queues in the downstream links, hence an

Username



Password

Remember Me

LOG IN

[> Register](#)
[> Lost Password](#)

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Figure 8: Test Cases Tab

2: Efficient Building TSoS Use Case

Problem:

The second Use Case of Local4Global concerns the climate control of buildings equipped with their own renewable energy generation elements (such as e.g., photovoltaic arrays, wind turbines, geothermal energy, etc) along with a collection of automatic control elements for affecting the building thermal characteristics such as e.g., automatically control the HVAC system set points, window and blind openings, heat pumps and central radiator set points, etc. The problem at hand is a quite challenging problem where the control system attempts to exploit "as much as it can" the renewable energy so as to reduce the demand for non-renewable energy (coming from the grid) or during time-slots of low-cost tariffs, while maintaining user comfort (i.e. making sure that the building occupants are "satisfied" with the in-building temperature and other thermal conditions). One frequently adopted procedure for developing control systems for building climate control is to first model the building dynamics using one of the existing building modelling tools (e.g., TRNSYS, EnergyPlus, Modelica, etc) and then develop a model-based control using the model for the building dynamics. Unfortunately, such an approach suffers from several disadvantages:

1. First of all, *developing and maintaining a reliable model for the building dynamics is "very expensive"*: a tedious and time-consuming effort is required to develop, calibrate and validate such a model. Moreover, such a model should be continuously tuned so as to take care of changes in the building infrastructure. All these factors render the "luxury" of developing a reliable model for building dynamics prohibitive for most of the buildings (in some cases, the cost of developing and constantly tuning the building model will be more expensive than all the other operating costs of the building!).
2. Moreover, even if a very accurate and reliable model for the building is available such a model *must be accompanied by an expensive sensor infrastructure* in order for the model to be able to accurately predict the building dynamics performance: real-life experience has shown that the building models may produce quite inaccurate results or even completely fail in cases where they are not accompanied by a complete set of real-time sensor measurements: for instance, if there are no sensors for detecting whether a room is occupied or not or whether a window is open or not, the overall model may produce totally erroneous predictions.
3. Last but not least, even if the above two problems/shortcomings were not present, model-based approaches face the so-called "*curse-of-dimensionality*" problem: even if the perfect model and a complete sensor infrastructure are used, the current state-of-the-art in control system design is unable to compute the best (optimal) controller as this is a

Figure 9: A second caption of Test Cases Tab

2 Project Brochure

2.1 The aim of the brochure

The project brochure supports the dissemination of the project. It gives a general overview of the project activities together with a listing of project partners and contact information. It generates interaction with all interested persons. The project Brochure is available through the website for anyone who is interested and is one of the basic means of dissemination of the project.

2.2 Description of the project brochure

This leaflet will be used as a means to provide project information in public correspondence, conferences and similar events.

LOCAL⁴ GLOBAL
SYSTEM-OF-SYSTEMS THAT ACT LOCALLY FOR OPTIMIZING GLOBALLY

Objective

To develop and extensively test and evaluate in real-life Technological System of System, a generic, integrated and fully-functional methodology/system for TSoS with the following attributes:

- Fully autonomous units that react depending only on their local environment in order to optimize the TSoS emerging performance at the global level.
- There will be no need for an elaborate and tedious effort to deploy the Local4Global system or to re-design/re-configure.
- plug-and-play control mechanism, learning, evolving and self-organizing capabilities.
- no need for an elaborate, "expensive" infrastructure

Solution

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. This system will be deployed and extensively tested and evaluated in 2 real-life TSoS Use Cases, a Traffic TSoS Use Case and an Efficient Building TSoS Use Case.

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For more information on the project, please use the contact form included in the project website: www.local4global-fp7.eu

Figure 10: First Page of project brochure

