

STRONGEST – Document

Deliverable D5.1

“Plans for coordination, dissemination and standardization activities”

Version and Status:	Version 2.0, Final	
Date of issue:	30/06/2010	
Distribution:	Public	
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Abstract

Proper planning of coordination, dissemination and standardization is essential in a large project like STRONGEST, that is based on a collaborative work where the multiplicity of contributors and the complexity of objectives, if too loosely run, could lead to poor consistency, inefficient use of resources and partially or totally missed objectives.

The present document describes the organization tools and the specific actions that have been devised, agreed and planned by the consortium to ensure a satisfactory coordination, both for the technical activities, and for the communication ones – namely dissemination, training and contributions to standardization.

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Executive summary

Plans for coordination, dissemination and standardization are essential in large projects like STRONGEST, that is based on a collaborative effort where the multiplicity of contributors and the complexity of objectives, if too loosely run, could lead to poor consistency, inefficient use of resources and partially or totally missed objectives.

The present document includes the STRONGEST plans for coordination, dissemination and standardization activities and describes the organization tools and the specific actions that have been devised, agreed and planned by the consortium to ensure a satisfactory coordination, both for the technical activities, and for the communication ones – namely dissemination, training and standardization.

The preparation of the plans and their implementation are under the responsibility of Workpackage 5 “Technical coordination, dissemination and standardization”.

In details, these plans address all the areas that are considered coordination-critical by the STRONGEST management team:

- **Internal coordination:** this section includes the guidelines to ensure satisfactory harmonization among workpackages that are responsible for technical activities, i.e.: WP2 (“Network efficiency and optimization”), WP3 (“End-to-end solution for efficient networks”) and WP4 (“Network prototypes implementation and demonstration”), to ensure results consistency, with particular attention devoted to the choice of network architectures. The “Project Intranet”, a restricted area on the website that was created to enforce the collaboration among Partners, is also described.
- **External coordination:** this section includes the guidelines to ensure good coordination with other projects, either belonging to FP7 (e.g.: GEYSERS, MAINS, ETICS) or not (e.g.: GENI from US and AKARI from Japan).
- **Dissemination and training:** this sections includes a plan for dissemination activities (e.g.: flyer, newsletter, website, participation to conferences and workshops, publication of papers on technical magazines,...) and training events, aimed to ensure a consistent and effective representation of STRONGEST results among the scientific and technical communities.
- **Standardization:** this sections includes a plan for feeding standardization discussions, preparing contributions for standardization bodies and fora (e.g.: ITU-T, ETSI, IETF, OIF...) that shall highlight the value of STRONGEST technical solutions, and whenever possible promoting liaisons with these bodies.

1 Introduction

The management of a large project like STRONGEST, with plenty of partners (see Appendix I) and several challenging objectives, calls for a strict coordination of activities, in order to achieve the desired results in a short (three years) time frame. Many of the partners in the consortium have a long experience of participation in large European projects, and know very well the risks underlying a collaborative work where the multiplicity of contributors and the complexity of objectives, if too loosely run, could lead to poor coordination, inefficient use of resources and partially or totally missed objectives.

To avoid these risks, the STRONGEST project has chosen a simple and clear organization based on three technical workpackages, and has planned a number of activities, to be carried out under the control of a specific workpackage, WP5, that is in charge of technical coordination and, as a logical consequence, also guides dissemination and contributions to standardization. These last two activities, indeed, produce results that are directly intended for use by the external techno-scientific community, and, as such, require a high degree of harmonization to offer under any circumstances a clear, consistent and valuable communication of the Project outcomes.

The present document describes the organization tools and the specific actions that have been devised, agreed and planned by the consortium to ensure such coordination, both for the technical activities and for the communication ones.

For the internal coordination process the basic steps are described, i.e.: identification of hot-topics needing coordination, definition of responsibilities, elaboration of a coordination plan, and finally identification and mitigation of coordination-related risks. A set of electronic tools has also been created to enforce the collaboration among Partners (i.e. a restricted area, or "Intranet", on the Project website and a set of mailing distribution list). Coordination actions are devised as well for external activities, particularly for collaborations with other projects, both inside European FP7 and outside.

Finally, the document describes the way communication activities shall be run inside STRONGEST. For dissemination, a few permanent vehicles are defined (flyer, newsletter, website), whose contents and distribution criteria are defined. Also, guidelines for properly selecting dissemination and training events are presented together with rules for establishing contents. For contributions to standards, the key international bodies are identified and the scope and criteria for submission are defined.

This planning document can be considered as an integration, for the specific aspect of coordination, of the Project Management Plan that has been issued as D1.2 [D12].

2 Plans for WPs coordination and architecture

2.1 Internal coordination

Since the preliminary phase of proposal preparation the STRONGEST Consortium agreed on a simple organizational structure. In fact, despite the dimension of the Project (more than 1000 person-months human resources), STRONGEST scientific and technical activities have been organized into only 3 Workpackages:

- WP2 – Network efficiency and optimization
- WP3 – End-to-end solution for efficient networks
- WP4 – Network prototypes implementation and demonstration

Deliverable D1.1 “Project Presentation” [D1.1] described in details objectives, activities and organization in tasks of each workpackage.

Two additional WPs have been introduced to guarantee internal coordination of all organizational (WP1 – Project Management) and technical activities in the project including dissemination and standardization (WP5 – Technical coordination, dissemination and standardization).

While the plan for all the management activities (under WP1 responsibility) are reported in D1.2 “Project Management Plan” [D1.2], the plan for internal technical coordination (under WP5 responsibility) is described in this section.

The logical steps identified to achieve an efficient technical coordination and illustrated in the following section are:

- Identification of hot-topics needing coordination
- Definition of responsibilities
- Elaboration of a coordination plan (main actions and expected results)
- Identification, evaluation of risks about coordination and relevant contingency plan.

2.1.1 Identification of hot-topics needing coordination

One of the main STRONGEST objectives is the definition of innovative network architectures, in order to overcome most of the bottlenecks of current network paradigms in term of scalability, flexibility, power consumption and cost effectiveness. Different working groups (tasks, workpackages, task forces), aiming at a common goal need coordination, in order to avoid misunderstandings, duplication of work, pieces of achievement that result in

contradictory conclusions or researches that do not start from the same initial assumptions. To obtain a general harmonization of activities and results the Project calls for:

- technical coordination of WP work ensuring the harmonization and consistency of the different activities with the objectives of the Project. In particular, the STRONGEST evolutionary approach summarized in Figure 1 [AnnexI] requires deep technical coordination among the different WPs. The WP roles are defined as follow:
 - WP1 assures the management of the Project
 - WP2 will focus on medium and long term data plane design and performance analysis by simulation. Furthermore WP2 will analyze the STRONGEST integrated data and control plane solutions under a techno-economic point of view (e.g. incremental costs/savings from the previous architecture).
 - WP3 will focus on medium and long term control plane design and performance analysis by simulation
 - WP4 will experimentally validate the most promising mid and long term solutions designed in WP2 and WP3
 - WP5 will coordinate all dissemination and standardization activities as well as the network design activities done in STRONGEST in order to assure the optimum integration between data and control plane designs.

- coordination of dissemination and training activities (e.g. participation in conferences, organization of Workshops and Events, etc.) coordination of activities relevant to standardization carried out by the Project

- coordination with other Projects (within and possibly outside FP7);

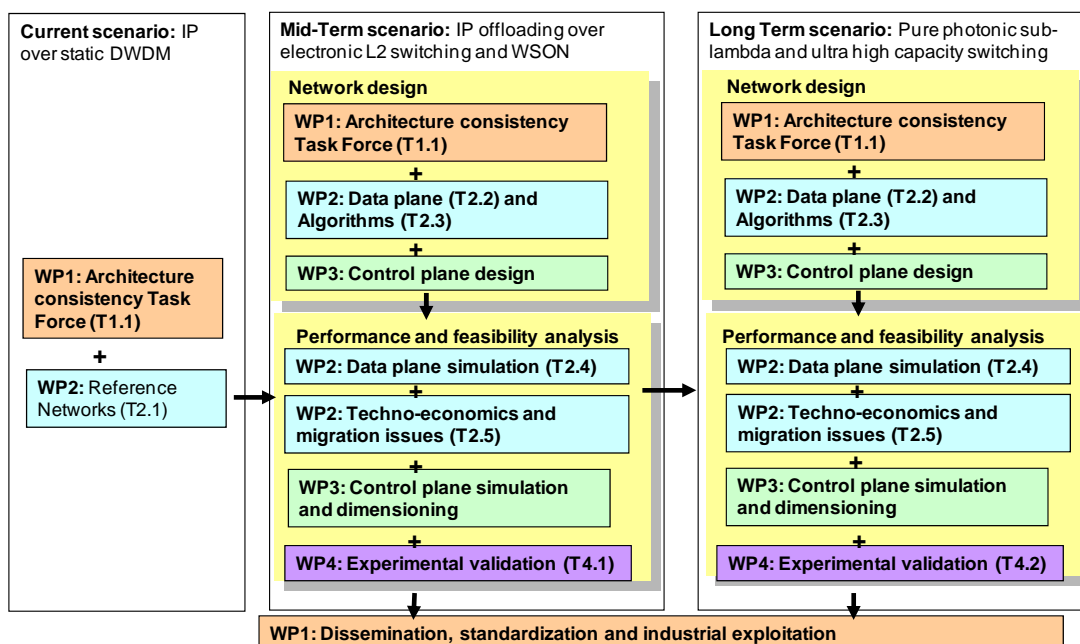


Figure 1 – STRONGEST evolutionary approach

2.1.2 Definition of responsibilities

To coordinate the architecture definition and to agree (inside the Project) contributions to standardization bodies and dissemination material WP5 needs tight relationships with technical WPs; in particular, WP5 receives information from WP2 and WP3 about architectural researches, coordinates technical activities, and gives feedbacks to the same WP2 and WP3 to avoid overlapping and to harmonize the whole STRONGEST research. Also, WP5 ensures that the experimental activity carried out in WP4 is consistent with WP2 and WP3 views and results.

Furthermore, WP5 uses results from the other WPs for dissemination, training activities and contributions to standardization bodies and fora.

To achieve these goals, since the beginning of the Project, the organization of WP5 is based on specific task forces. As reported in Annex I of the Contract [AnnexI] and in D1.1 [D1.1] WP5's task forces are:

- **WP coordination and architecture consistency** task force (leader: rotation among WP leaders). Most important duties of this task force are:
 - to guarantee a proper work flow within the project, organizing a regular exchange of information among WP Leaders;
 - to contribute to the definition of a Medium and Long Term end-to-end architecture, ensuring the proper alignment with operator requirements and vendor views;
 - to coordinate the consistent development of the activities related to the design, implementation and demonstration of different parts of the end-to-end architecture;
 - to coordinate the exchange of information with other FP7 projects, and to monitor the progresses of other research projects on transport networks in the USA and in Asia (the relevant plan is reported in section 2.2 of this deliverable).
- **Exploitation of results** task force (leader: Telefónica I+D) Most important duties of this task force are:
 - SWOT (Strength, Weakness, Opportunities and Threats) analysis of the STRONGEST medium and long term architectures
 - Identification of new business opportunities and services derived from STRONGEST concepts
 - Migration guidelines towards STRONGEST based commercial solutions. Description of the steps to be taken to evolve from the STRONGEST prototypes to Carrier Class commercial systems
 - Definition of specific exploitation plans per industrial partner
- **Dissemination and training** task force (leader: UPC). This Task is focused on the organization of dissemination and training activities. The dissemination of STRONGEST results will be realized in different ways, i.e.: the publication of a regular bulletin with online summary of key technical issues, the publication of positioning/white papers, the preparation of a Project flyer, the presentation of

contributions to workshops, conferences and magazines. The training efforts will be focused on the realization of training events on specific aspects of the evolution of optical networks, , the presentation of web tutorials on relevant topics, and the dissemination of (non-confidential) STRONGEST project results to the external research community, in particular in new and associated EU countries.

- **Standard contribution** task force (leader: Nokia Siemens Networks Germany) This Task coordinates the standardization activities carried out inside STRONGEST. The work will start with an analysis of the ongoing activities in the standardization bodies (e.g. ITU-T, IETF, OIF, ETSI) with the objective of identifying relevant topics to which the project could contribute (e.g. MPLS-TP). The Task will then organize specific task forces for the definition of a common view and the coordination of consistent input for the involved standardization bodies by leveraging the involvement of many STRONGEST Partners to the main Standard bodies and fora.

In addition to these task forces and since the beginning of the Project STRONGEST designated some key-role people, that are responsible for coordination in well defined areas. As reported in Annex I of the Contract [AnnexI] these roles are:

- **architecture chief**; in charge of coordinating the definition of STRONGEST target architecture taking into account the basic requirements, the need for harmonization among different tasks, and the results of experimental activities.
- **dissemination manager**; in charge of identifying the key Project results deserving diffusion and organizing dissemination events (i.e. workshops) in order to promote the STRONGEST' achievements outside the project (also by uploading selected material onto the STRONGEST website).
- **standardization manager**; to coordinate STRONGEST's contributions to the Standard bodies through individual Partners' participation. A specific task of this figure will be to keep the Project continuously updated about the relevant activities carried out in the Standard bodies (packet transport, optical technologies, control plane,...). He will also stimulate and coordinate Partners to contribute to these Standard bodies with significant inputs taken from STRONGEST's key results.

Furthermore a **Quality Manager** is identified to guarantee a standardized high-level for the outputs of the Project.

2.1.3 Internal coordination plan

The activity of WP5 task forces (and as a consequence of key-role people) has the same duration as the Project lifetime (Month 1 – Month 36). The main coordination milestones are already identified:

- By Month 8: WP5 will provide a report about the identification of functionalities for implementations and demonstrations

- By Month 12: WP5 will provide a report about the identification of scenarios for experiments and demonstrations
- Starting from Month 9: WP5, together with technical WPs, will provide quarterly reports representing consistency check points about:
 - WP2 network architecture and WP3 control plane and OAM
 - WP2 resource allocation schemes and WP3 traffic admittance solutions
- Starting from Month 18: WP5, together with technical WPs, will provide a six months periodic report representing consistency check points about feedback from experiments and demonstrations
- At the end of each project year: STRONGEST WP5 will provide a deliverable illustrating the results of the coordination, dissemination and standardization activities in the year.

2.1.4 Identification and evaluation of risks

The main risk identified by STRONGEST about activity harmonization and consistency is that uncontrolled parallel or duplicate development of similar exercises in different areas of the Project will cause confusion and waste of time. To avoid or at least mitigate this risk WP5 will periodically monitor the work carried out in technical workpackages.

In the particular case of network architectures the consistency of results about the development of the target network architecture is under the specific responsibility of the Architecture Chief.

2.2 External coordination

2.2.1 Collaboration with other FP7 Projects

STRONGEST initiated since the beginning of the Project some collaborations with other FP7 projects, that was facilitated by the involvement of some partners both in STRONGEST and in the other projects, and by a common approach to technical problems.

Among FP7 Projects, STRONGEST selected for its external collaborations projects operating in similar research areas and with some points of complementarity; potential partners have been identified in:

- GEYSERS — Generalized architEcture for dYnamic infraStructurE services [GEYSER]
- MAINS — Metro Architectures enabllNg Sub-wavelengths [MAINS]
- ETICS — Economics and Technologies for Inter-Carrier Services [ETICS]

The respective Project Coordinators did an overview of their projects, highlighting main objectives and scope. The following steps have been jointly identified to carry out the collaboration:

- **Beginning of collaborations:** put links to the other projects in the respective websites.
- **After 1 month:** identification of common threads, in order to have at least 1 thread per project.
- **First year:** internal updates and discussions to keep the projects synchronized .
- **First half of second year:** common meeting dedicated to test-beds
- **Second year:** identification of dissemination events where common participation can be envisaged (internals and externals)
- **Second year:** identification of possible joint results
- **Third year:** verification about feasibility of a common demonstration event

The above mentioned projects confirmed their interest on evaluating possible collaboration efforts, and a formal agreement was reached on two types of collaboration: on technical topics and about dissemination activities.

2.2.1.1 Collaborations in technical areas

Technical collaborations were agreed on:

- Definition of a common strategic collaboration agenda – as the main challenge. If feasible, and as a major achievement, the projects target a common testbed demonstration by the end of their activity.
- Identification of a basic set of project interests in order to better internally clarify possible collaborations.
- Exchange of public deliverables, still in a (mature) draft phase, between projects; if urgent requests from another project arrives, it will be possible to exchange mature draft versions.
- Synchronization among projects about ongoing research activities.

2.2.1.2 Collaborations in dissemination areas

Collaborations in dissemination activities were agreed on:

- Common dissemination actions (e.g. put cross-links on projects' websites, common panel discussions at conferences, joint presentations)

- Definition of an agenda for possible collaboration on future dissemination events.
- Elaboration of common messages highlighting that collaborations are ongoing, avoiding overlaps.
- Submission of collaborative papers (long term achievement).

2.2.2 Collaboration with NON FP7 Projects

STRONGEST initiated since the beginning of the Project some collaborations with other projects, outside the FP7 umbrella.

Among the projects having similar research interests, STRONGEST selected, since the beginning, a couple of projects which began reciprocal communication.

- **JAPAN AKARI:** The *AKARI Architecture Design Project* aims to implement a new generation network by 2015, developing a network architecture and creating a network design based on that. AKARI's philosophy is to pursue an ideal solution by researching new network structures from a clean slate without being impeded by existing constraints. Once these new networks are designed, the issue of migration from today's conditions can be considered using these design principles. STRONGEST and AKARI have several points of contact, like the design of innovative architectures and the commitment to assure end-to-end QoS. Some contacts with the Project Leader of AKARI (Dr. Hiroaki Harai) led to the possibility of exchanging information that might be beneficial to both projects.
- **U.S. GENI (Global Environment for Network Innovations):** GENI is an experimental suite of infrastructure designed to support Network Science and Engineering experiments ranging from new research in network and distributed system design to the theoretical underpinnings of network science, network policy and economics, societal values, and the dynamic interactions of the physical and social spheres with communications networks. Such research holds great promise for new knowledge about the structure, behavior, and dynamics of our most complex systems (e.g. networks of networks) with potentially huge social and economic impact. STRONGEST's Consortium and ideas were presented to GENI that agreed on collaborating with STRONGEST about the design of innovative network architectures. The project leader of GENI (Dr. Elliot), on behalf of the GENI research project, sent a letter of support to STRONGEST during the preparation phase, assuring collaboration in case of approval.

Beside the above-mentioned interactions, any possible information exchange with related national and regional initiatives, as well as other projects involved in studies about the evolution of telecommunications networks, will be pursued by the Project coordinator.

2.2.3 Identification and evaluation of risks

The main risk identified in potential collaborations with projects outside the FP7 perimeter is the increased difficulty of synchronization, due to a likely different objective

scheduling that does not fall within the STRONGEST control. The avoidance or mitigation of this risk is under the responsibility of WP5, that has to evaluate pros and cons of potential collaborations with other projects and to present a proposal to the General Assembly. It is worth noting that from this point of view both WP5 and General Assembly activities are ruled by the Project Management Plan, in order to assure quick and effective decisions and to avoid waste of time.

2.3 Electronic tools for internal collaboration (Intranet and mailing lists)

The STRONGEST website team has provided a set of electronic tools to enforce the collaboration between partners. These electronic tools mainly consist of:

- The restricted area (or “Intranet”) on the STRONGEST web page (for the Public area on the web page see section 3.3).
- A set of mailing distribution lists.

The STRONGEST website has been developed using plain HTML and its performance has been tested on the most used web browsers (i.e. Internet Explorer 8, Firefox and Chrome). In order to have a corporate-like image of the project the STRONGEST website team has acquired the domain [ict-strongest.eu](http://www.ict-strongest.eu). This domain is used for the Intranet as a part of the public web: <http://www.ict-strongest.eu/intranet> (for the public web see section 3.3). Besides, the Intranet introduces a set of tools to allow an easy collaboration among the participants in the Project, so that they can share information either in web pages or documents. Finally, the mailing lists aim to facilitate the communication between members.

2.3.1 The Intranet

The Intranet is aimed to provide a collaborative environment where the participants of the STRONGEST project can work together to obtain and share the results of the project. To reach this objective, we have decided to use a “wiki” based tool. The flexibility provided by the wiki allows users to create pages / documents easily or upload their files as if a repository was considered.

The Intranet is accessible from the public web page or directly, using the URL: <http://www.ict-strongest.eu/intranet>. Only authenticated users have access to the content of the wiki. In order to give more security to the web access, we have created different roles of users. The administrator is the most privileged user having all the rights to modify all the web or configure the characteristics of the tool.

The manager is a normal user who has the responsibility for validating self-registered users and giving them write access to the sections they are involved in. There is one manager for each institution of the project and this manager is responsible for validating the users belonging to his institution.

Finally, normal users have read access to the entire web and write access to the WP sections where they are involved in. Write access allows modifying pages inside the WP sections, generating new pages and uploading documents.

To modify the web pages, an edition tool has been provided. This edition tool, similar to the bar of an ordinary word processing editor, avoids users the need to know the syntax used in wiki editors. To avoid errors or malicious modifications, the wiki has a history of changes of the web page indicating who has modified the page and which changes have been introduced.

From the wiki home page, users can access the “workpackages sections”. There is one page for each of the WPs. These pages are divided basically in three sub-sections:

- “Tasks”, where the users of the WP have a working area and a place to upload the documents generated during the meetings;
- a “Milestones” section
- a “Deliverables” section.

Other sections of the home page are:

- “Deliverables and Milestones” where the final version of these documents will be uploaded.
- “Project Management Documents”.
- “Communication Activities”, where papers, patents, trainings information, etc. can be found in this section.
- “Plenary Meetings”: a repository for information about plenary meetings and documents presented or generated during these meetings.
- “Guidelines and Templates” where people will find guides to generate standard documents for the project.
- “Audits”, where a page for each audit has been created.
- “People”, where every member has a personal web page organized by institutions that can be found in this section.
- “Mail archive” a repository of all the mails of the mailing lists.

2.3.2 The mail distribution lists

Eight mailing lists have been created to facilitate communications between members. There is one mailing list for each of the workpackages of the project. These lists are only available for members of the lists. Messages sent by non participants of the list are moderated to be accepted or discarded.

A general mailing list has been also created and it is used to inform about general topics all the members of the project. The General Assembly mailing list, which is constituted for one representative of each institution involved in the project and the WP leaders mailing list constituted for the leaders of WP. These lists are moderated in the same way as WP mailing lists.

Summarizing, the available internal mailing distribution lists are:

- Strongest-wp1@ac.upc.edu
- Strongest-wp2@ac.upc.edu
- Strongest-wp3@ac.upc.edu
- Strongest-wp4@ac.upc.edu
- Strongest-wp5@ac.upc.edu
- Strongest@ac.upc.edu
- Strongest-gral-assembly@ac.upc.edu
- Strongest-wpleaders@ac.upc.edu

3 Plans for dissemination and training

3.1 Project Flyer

The Project flyer is a *depliant* to be prepared and used for the dissemination of the STRONGEST project at a very simple and basic level. It shall describe in a concise way the Project composition, its objectives and expected impact, and will supply a few synthetic information about the technical approach.

The flyer will be available for all beneficiaries, and will be distributed whenever a quick and effective communication is required, for instance during exhibitions, workshops and conferences where the STRONGEST Project will be in some way involved. Updated versions of the flyer will be possibly produced, when required by the Project evolution and outcomes.

3.2 Project Newsletter

The Project newsletter is a quarterly communication to be prepared and used in order to keep the techno-scientific community informed about the Project progress. It shall include several sections, most of them describing in some details the evolution of the Project technical activity and its main outcomes, the Project views on networks evolution, and periodic outlines of emerging transport technologies. It will also include sections describing ongoing collaborations with other projects, participation and contributions to technical and scientific events, and information on Project meetings.

The Newsletter (current issue and archive) will also be visible on the Project website (see next sub-section).

The Newsletter shall be circulated by e-mail to a mailing list created from the inputs of all beneficiaries and including technicians, scientists and managers being potentially interested in the Project outcomes. The project coordinator is the only allowed to send mails to be distributed, while everybody is allowed to join this mailing list by means by subscribing in the newsletter section of the public web page.

This mailing list, that has been produced by the website team and adds to the set of eight internal mailing lists already described in section 2.3.2, is:

- Strongest-newsletter@ac.upc.edu

3.3 Project website

To facilitate the dissemination of the results generated within the project the STRONGEST website team has provided a specific electronic tool, i.e. the public page of the Project website.

The STRONGEST website has been developed using plain HTML and its performance has been tested on the most used web browsers (i.e. Internet Explorer 8, Firefox and Chrome). In order to have a corporate-like image of the project the STRONGEST website team has acquired the domain [ict-strongest.eu](http://www.ict-strongest.eu). This domain is used in the public web page as: <http://www.ict-strongest.eu> (in the Intranet it is used as a part of the public web, as described in section [2.3](#)).

3.3.1 The website public area

The main goal of the public web page is to give a solid image of the project to the external visitors explaining them the main objectives of the STRONGEST project and its achievements.

As mentioned, the Public Page is available on the Internet at the address <http://www.ict-strongest.eu/>. It reports general information about Project composition, objectives, technical approach and organization. It also includes the Project newsletter (current issue and archive), information about dissemination activity and contributions to standards, the full-version public deliverables, and information about collaborations with other projects. It is structured as a set of static HTML-based web pages each one representing a section of the site. Thus, the home page contains the general description of the project; the “At a Glance” section shows the main figures of the project as well as the partners' list. The rest of the sections are focused on more specific information related to the project, namely, the workpackage division, news and dissemination and main objectives. The Newsletter and Public Deliverables sections are aimed to permit downloading these documents from the website.

This page is intended to give a timely and effective view of the Project progress along with time, and therefore shall be kept continuously updated throughout the life of the Project. To allow interactions with anybody being interested in STRONGEST activity the home page includes a “contact-us” link, as well.

3.4 Dissemination events

STRONGEST will devote particular attention to dissemination activities and events, both internally, among partners involved in the Project, and externally, within the scientific and industrial communities.

Regarding internal dissemination activities, non-confidential results will be spread among Project partners by periodically updating the information published on the website and through the newsletter. In addition, WP5 will encourage and coordinate presentations during the plenary meetings of the STRONGEST project from the different WPs to share information on the achieved results. To proactively combine the two actions above, a list of the papers published with STRONGEST funding, sorted by number of citations (as shown by widely used tools such as “Publish or Perish”), will be maintained and posted on the project website, and the most cited papers will be invited for presentations at the plenary meetings.

A particular focus will be given to dissemination activities external to the Project. First, to give visibility to STRONGEST within the scientific and industrial communities, publications and presentations of non-confidential results will be available and downloadable from the public section of the Project website. Second, WP5 will identify the most relevant conferences and journals on optical networks and on photonic technologies and communications, and will coordinate the presence of STRONGEST partners in these conferences and journals, by encouraging paper submissions to them. To foster collaboration among partners, WP5 will coordinate and check joint publications, i.e. publications involving researchers from different partner institutions, and also publications with contributions from different WPs, including position papers on key issues, to present a complete and organic view of the main results achieved by STRONGEST. Finally, a target of WP5 is to organize at least one special issue on one of the major journals in optical networks and photonic communications to present the main project results.

At least two workshops will be organized by STRONGEST. First, a technical workshop on the project topics will be organized within one of the international conferences that were identified as major venues for dissemination actions (see above). Second, towards the end of the project, WP5 will organize a stand-alone (i.e., not within other conferences) workshop, to which presentations from selected and relevant other European and non-European projects focused on research topics related to STRONGEST activities will be invited.

3.5 Training events

The training efforts will be focused on the organization of training events on specific aspects of the evolution of optical networks, the publication of web tutorials on relevant topics and the circulation of non-confidential information about the Project results, at a basic and tutorial level, to the external research community, in particular in new and associated EU countries.

Also, on the teaching side, the following internal and external training activities are planned within the WP5:

- WP5 will be involved in the preparation of lectures and teaching materials, starting from existing Master and Ph. D. courses within the STRONGEST academic partner institutions. An effort will be done to i) share contents and teaching material across different partners, ii) involve industrial partners into academic teaching (e.g., by offering short seminars within regular courses), iii) offering courses based on the previous two actions to industrial partners as part of their internal training activities (including continuing education programs).
- WP5 will participate in Summer/Winter Schools organized by NoEs like BONE or others in the optical networking field to present relevant aspect of the project.

All the teaching materials will be generated under a creative commons license, which accepts updating and improvements from external authors.

4 Plans for cooperation with Standardization Bodies

The cooperation with standards bodies can have a variety of benefits for STRONGEST: for ongoing work, it assures the alignment with activities at those bodies and is a source of technical feedback from a large pool of interested experts. For completed work, the inclusion in standards is a very concrete form of dissemination, placing it in a position where it will form the basis for actual implementations later.

In order to communicate with standards bodies, different approaches are at our disposal:

- **Observation**
Getting input to STRONGEST from an SDO through observation of mailing list activities or reports from members who are active in this body. This is the fastest way to gain an insight into whether activities of an SDO are relevant to STRONGEST, but requires a certain degree of familiarity with this particular SDO and (usually) SDO membership by at least one STRONGEST member organisation
- **Liaison**
Official communication between STRONGEST and an SDO, with the goal of exchanging information and asking questions. Tends to be very formal and slow.
- **Contribution**
Bringing STRONGEST results into an SDO for discussion, feedback and/or inclusion into a standard. This method tends to be much more immediate and responsive than liaisons, and is indeed the most important way to bring results into standards. Contributions cannot be brought by a research project such as STRONGEST, only by member companies represented in that SDO.

Observation and liaisons can be done pretty much ad hoc, but contributions need to be well prepared, and an active presence of a willing STRONGEST member has to be insured well ahead of time. For this reason, the identification of areas for potential contribution to standards takes greatest priority.

The diagram depicted in Figure 2 summarizes planned standardization activities, as understood at the time of writing. Most of those activities take place within WP3.

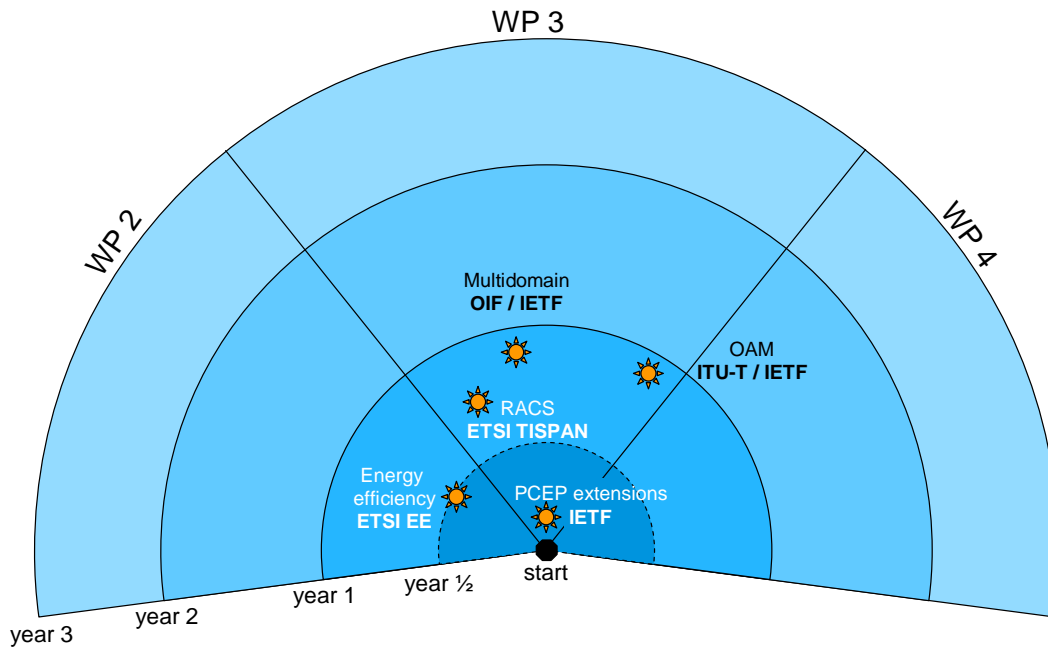


Figure 2 – STRONGEST planned standardization activities

The following sections address the different bodies and planned standardization topics in more detail.

4.1 ETSI

ETSI (European Telecommunications Standards Institute, <http://www.etsi.org/>, <http://portal.etsi.org/> [ETSI]) is a European standards organization which is now operating globally, with many non-European member companies. The actual standardization is mostly carried out in technical committees dedicated to particular topics.

4.1.1 ETSI technical committees

The following groups within ETSI work on themes relevant to STRONGEST and are candidates for liaison, contribution or observation:

- **EE** (Environmental Engineering)
 This group defines environmental and infrastructure aspects of telecommunication equipment, including environmental tests and observation of European legislation. Part of this activity is the energy efficiency of telecommunications equipment and networks, which is of relevance to STRONGEST.
- **TISPAN** (Telecoms & Internet converged Services & Protocols for Advanced Networks)
 The main topic is Next Generation Networks (NGN), containing the evolution of fixed telecommunication networks and their services. The focus is placed on control

and service layer architecture and protocols; the transport layer is only addressed via its interfaces.

4.1.2 Standardisation topics for STRONGEST

Energy efficiency and power consumption

Started activity: The reduction of the energy consumption of telecommunication networks through efficient combination of optical and electrical components is one of the key topics of STRONGEST in WP2. This overlaps with work of the EESP subgroup of ETSI EE, which focuses on Eco-environmental issues, power management and energy reduction and is writing a deliverable on “Power management in transport networks and routers / switches”. A liaison exchange has been started in order to gain access to latest ETSI work and to inform EE about positions and developments at STRONGEST.

Resource and admission control

Potential activity: In order to coordinate end-to-end quality of service while crossing domain boundaries, it was proposed to use RACS (Resource and Admissions Control Subsystem) from TISPAN as a control layer functional element. This would require an extension of scope of RACS to take account of PCE and MPLS control elements. Currently, RACS is mostly geared towards control of an access network.

4.2 IETF

The IETF (Internet Engineering Task Force, [IETF] <http://www.ietf.org/>) is the major body for standardizing anything related to the internet. Membership is individual rather than by company, meaning that it is important to have a well-established representative in order to bring contributions effectively. The work is structured into areas and further into working groups (WGs) and progressed mostly via mailing lists.

4.2.1 IETF working groups

The following WGs within the routing area have activity on topics related to STRONGEST and are candidates for contribution or observation:

- **PCE** (Path Computation Element)
The main group working on PCEs and the PCEP protocol.
- **MPLS** (Multiprotocol Label Switching)
The main group dealing with everything related to MPLS. In particular MPLS-TP related work is coordinated with the CCAMP, L2VPN and PWE3 groups.
- **CCAMP** (Common Control and Measurement Plane)
This group has a rather large scope coordinating work on common control and measurement planes for physical path and core tunneling technologies. Most relevant to STRONGEST is the work on OAM extensions for MPLS-TP.

- **L2VPN and L3VPN** (Layer 2/3 Virtual Private Networks)
These groups define a number of layer 2 and layer 3 VPN services, including MPLS-TP services which are relevant to STRONGEST.
- **PWE3** (Pseudowire Emulation Edge-to-edge)
This group deals with the emulation of classical communication services on packet switched networks, using pseudowire links. This includes extensions necessary for MPLS-TP.

4.2.2 Standardisation topics for STRONGEST

Path Computation Elements (PCE) for GMPLS

Ongoing activity: A task group has been formed within WP3 to study PCE architecture and PCEP protocols for their applicability to GMPLS networks. In particular issues for multi-layer and multi-domain path computation are being targeted. Specific extensions of the PCEP protocol are being contributed to the PCE WG. A first proposal, named *draft-margaria-pce-gmpls-pcep-extensions-00*, was submitted to the IETF PCE WG and presented in the 77th IETF Meeting in Anaheim. A new version of the proposal, merged with other industry proposal is being prepared and is going to be presented in the 78th IETF Meeting in Maastricht. Future plans include rising the draft to the status of PCE Working Group draft and finally, adopt it as a standard.

The other topic of importance is the Hierarchical PCE for multidomain GMPLS networks. Currently, comments have been sent to the PCE mailing list. Future plans include submitting new contributions with the STRONGEST approach.

Multi-domain / Multilayer architectures

Potential activity: It has been proposed to integrate the PCE plus GMPLS architecture from the IETF with the E-NNI hierarchical model from the OIF, taking the best from both worlds.

OAM for photonic switching and sub-lambda switching

Potential activity: It has been proposed to study OAM for photonic switching and later also for sub-lambda switching. As this would impact MPLS-TP standards at ITU-T and IETF, contributions in both bodies would be required.

4.3 ITU-T

ITU-T is the standardization branch of the International Telecommunication Union [ITU], making this the most important body for truly global telecommunication standards. Work is categorized in study groups (SG) and organized in “questions” addressing particular topic areas.

4.3.1 Working groups and questions

The following study groups (SG) and questions (Q) within the ITU-T work on themes relevant to STRONGEST and are candidates for liaison, contribution or observation:

- **SG 5:** Environment and Climate Change
While the focus of this SG lies on environmental and safety issues for telecommunications equipment, it also has an interest in the energy efficiency of networks.
- **SG 15:** Optical Transport Networks and Access Network Infrastructures
This SG works on all aspects of optical transport networks (long-haul, metro and access). Questions relevant to STRONGEST include
 - **Q3:** General characteristics of transport networks
 - **Q6:** Characteristics of optical systems for terrestrial transport networks
Focus on the external characteristics of entities and their interfaces, taking a “black box” approach
 - **Q7:** Characteristics of optical components and subsystems
 - **Q9:** Transport equipment and network protection/restoration
 - **Q10:** OAM for transport networks
 - **Q11:** Signal structures, interfaces and interworking for transport networks
Main focus on OTN (Optical Transport Networks) architecture
 - **Q12:** Transport network architectures
Includes metro network architecture and MPLS-TP, and a growing interest in the modeling of all-optical networks
 - **Q14:** Management and control of transport systems and equipment

4.3.2 Standardisation topics for STRONGEST

OAM for photonic switching and sub-lambda switching

Potential activity: It has been proposed to study OAM for photonic switching and later also for sub-lambda switching. As this would impact MPLS-TP standards at ITU-T and IETF, contributions in both bodies would be required.

4.4 OIF

The OIF (Optical Internetworking Forum, <http://www.oiforum.com/> [OIF]) main work is to define interoperability agreements for hardware interfaces, for optical interfaces and on software level (UNI, NNI, security, ...).

4.4.1 OIF projects

The OIF work is divided into two main groups:

- **Physical and Link Layer (PLL)**
This includes various 100G DWDM projects including forward error correction, common electrical interfaces and tunable laser assembly. While none of those projects corresponds directly to STRONGEST work, there is a general interest in “green technology” and multilayer approaches.
- **Networking**
Current projects are centered on E-NNI (External Network-Network interface, inter-carrier) and on control plane security. A joint project on multilayer management together with the TMF (TeleManagement Forum) is just being started. All these topics hold relevance for STRONGEST.

4.4.2 Standardisation topics for STRONGEST

In general, it is proposed to open communication with both areas of the OIF, presenting STRONGEST and establishing a liaison channel.

Multi-domain / Multilayer architectures

Potential activity: It has been proposed to integrate the PCE plus GMPLS architecture from the IETF with the E-NNI hierarchical model from the OIF, taking the best from both worlds.

5 List of acronyms

CCAMP	Common Control and Measurement Plane
E-NNI	External Network-Network Interface
EE	Environmental Engineering
ETICS	Economics and Technologies for Inter-Carrier Services
ETSI	European Telecommunications Standards Institute
EU	European Union
FP7	Seventh Framework Programme for research and technological development
GEYSERS	Generalized architEcture for dYnamic infrastructure service
IETF	Internet Engineering Task Force
ITU-T	International Telecommunication Union - Telecommunication Standardization Bureau
L2VPN	Layer 2 Virtual Private Networks
L3VPN	Layer 3 Virtual Private Networks
MAINS	Architectures enabling Sub-wavelengths
MPLS	Multiprotocol Label Switching
MPLS-TP	Multiprotocol Label Switching – Transport Profile
NGN	Next Generation Networks
OAM	Operation Administration and Maintenance
OIF	Optical Internetworking Forum
PCE	Path Computation Element
PLL	Physical and Link LayerPhysical and Link Layer
PWE3	Pseudowire Emulation Edge-to-edge
RACS	Resource and Admissions Control Subsystem
SDO	Standard Development Organization
SG	Study Group
STRONGEST	Scalable, Tunable and Resilient Optical Networks Guaranteeing Extremely-high Speed Transport
SWOT	Strength, Weakness, Opportunities and Threats
TISPAN	Telecoms & Internet converged Services & Protocols for Advanced Networks
TMF	TeleManagement Forum
UNI	User-Network Interface
US	United States
WG	Working Group
WP	Workpackage

6 References

- [AnnexI] Annex I to the STRONGEST Contract
- [D12] STRONGEST deliverable D1.2 "Project Management Plan", 31 March 2010
- [ETICS] <http://www.ict-etics.eu/home.html>
- [ETSI] <http://portal.etsi.org/>
- [GEYSERS] <http://www.geysers.eu/>
- [IETF] <http://www.ietf.org/>
- [ITUT] <http://www.itu.int/ITU-T/>
- [MAINS] <http://www.ist-mains.eu/>
- [OIF] <http://www.oiforum.com/>
- [WEB] <http://www.ict-strongest.eu/>

7 Document History

Version	Date	Authors	Comment
0.01	09/04/2010	Carlo Cavazzoni, Andrea Di Giglio, Emilio Vezzoni	Proposed ToC of the document and Chapters' editors
0.02	17/05/2010	Carlo Cavazzoni, Andrea Di Giglio, Emilio Vezzoni	Updated ToC for Munich Plenary meeting
0.03	23/05/2010	Deliverables authors	Agreed ToC
0.04	23/05/2010	Carlo Cavazzoni, Andrea Di Giglio	Telecom Italia contribution (Ch. 1 & 2)
0.05	03/06/2010	Emilio Vezzoni	VECOMM contribution (Intro & parts of Ch. 3)
0.06`	09/06/2010	Andrea Di Giglio, Emilio Vezzoni	Review of Ch. 1 and 2
0.07	11/06/2010	Andrea Di Giglio	Abstract and Executive summary
0.08	15/06/2010	Andrea Di Giglio, Emilio Vezzoni	Integration and review
0.09	17/06/2010	Josep Sole Pareta	Inclusion of Ch. 3
0.10	21/06/2010	Emilio Vezzoni	Review
0.11	22/06/2010	Klaus Pulverer	Inclusion of Ch. 4
1.0	24/06/2010	Andrea Di Giglio, Emilio Vezzoni	Version to be approved by the General Assembly
1.1	25/06/2010	J. Fernandez, O. Gonzales	Additions
2.0	30/06/2010	General Assembly	Approved final version

8 Appendix I – List of STRONGEST beneficiaries

Beneficiary name	Short name	Country
Telecom Italia S.p.A.	TI	Italy
Alcatel-Lucent Deutschland AG	ALUD	Germany
British Telecommunications PLC	BT	UK
Centre Tecnologic de Telecomunicacions de Catalunya	CTTC	Spain
Consorzio Nazionale Interuniversitario per le Telecomunicazioni	CNIT	Italy
Deutsche Telekom AG	DT	Germany
Ericsson Telecomunicazioni S.p.A.	TEI	Italy
Interdisciplinair Instituut Voor Breedbandtechnologie VZW	IBBT	Belgium
Nokia Siemens Networks GMBH & Co. KG	NSN-G	Germany
Telefonica Investigacion y Desarrollo SA	TID	Spain
Universitaet Stuttgart	UST	Germany
Universitat Politècnica de Catalunya	UPC	Spain
University of Essex	UEssex	UK
University of Peloponnese	UoP	Greece
VECOMM di Vezioni Emilio	VEC	Italy
PrimeTel PLC	PRI	Cyprus
Nokia Siemens Networks Technologies Israel 1990 Ltd	NSN-I	Israel