Generic guidelines

for IST research projects interfacing with ICT standards organizations

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1   Introduction

As Europe is gradually progressing from a predominantly industrial society to an Information Society, technology becomes more challenging every day, and an increased recognition of the need to work together in order to exploit this development to its fullest potential for industry and society. In this context, both ICT[1] standardization and IST[2] research are playing a key role, and cooperation between these two domains is strongly encouraged by the European Commission.

Despite this encouragement, and the fact that projects are often required to interface with standards organizations, many IST research project results that could establish valuable contributions as standards still do not find their way through standardization processes. This happens for many reasons such as projects were not able to find the right organization to interface with, or projects were not able to synchronize with standardization processes, or projects did not allocate sufficient resources to their activities with standards bodies.

Apart from standardization being an effective route for IST research results to reach industry and society, it also represents a good – but often overlooked – opportunity for projects seeking to disseminate and exploit their research results. Not only does standardization work provide the opportunity to create exposure among a huge community of external experts, it may also lead to technologies developed by a project and its partners being embedded in future standards.

This guideline document was developed by COPRAS: The Cooperation Platform for Research and Standards, an IST project under the 6th Framework Programme, initiated by the three European standards bodies CEN, CENELEC and ETSI, together with the World Wide Web Consortium and The Open Group, and with the backing of the ICT Standards Board.[3] COPRAS aims to assist researchers in planning their interfacing with standardization in order to implement, disseminate and exploit their research through standards, and to achieve maximum benefit from their work.

CEN	www.cenorm.be	Member
CENELEC	www.cenelec.org	Member
ETSI	www.etsi.org	Member
The Open Group	www.opengroup.org	Member
W3C	www.w3.org	Member
ATM-Forum	www.atmforum.com	Member
DVB	www.dvb.org	Member
EBU	www.ebu.ch	Member
ECBS	www.ecbs.org	Member
ECMA International	www.ecma-international.org	Member
EICTA	www.eicta.org	Member
ERTICO	www.ertico.com	Member
ISOC-ECC	www.isoc-ecc.org	Member
Liberty Alliance	www.projectliberty.org	Member
OASIS	www.oasis-open.org	Member
OMG	www.omg.org	Member
Radicchio	www.radicchio.org	Member
RosettaNet	www.rosettanet.org	Member
TeleManagement Forum	www.tmforum.org	Member
European Commission	europa.eu.int	Observer
EFTA secretariat	www.efta.int	Observer
ANEC	www.anec.org	Observer
NORMAPME	www.normapme.com	Observer

Table 1: ICTSB members & observers

These guidelines will elaborate what the benefits from interfacing with standardization can be, both for your project and for your individual project partners. Furthermore, they will help you in determining whether or not your project should actually plan to interface with standardization, how to

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[1] Information and Communication Technologies

[2] Information Society Technologies

[3] The ICT Standards Board aims to coordinate specification activities in the field of Information and Communication Technologies in Europe

reflect this within your project work plan, and how best to allocate work packages and resources to standardization.

These guidelines will also provide you with an overview of the most common processes and procedures in standardization and their relationship with specific standardization deliverables, and they list a set of transparent and comprehensive criteria that will assist you in selecting the standards organization that best match the working methods, background and objectives of your project. All together, they provide you with the basic information you will need to determine whether you should choose to exploit certain research results through the development of standards, and if so, how this should be structured.

2   Benefits of standards and standardization

Standardization is a consensus-driven activity, carried out by – and for – the interested parties themselves. It is based on openness and transparency within independent organizations, and aims to establish the voluntary adoption of, and compliance with standards. Despite its voluntary and independent character, standardization however many times has an effect on a number of areas of public concern, such as the competitiveness of industry or the functioning of a single market environment. Therefore standardization can also play a role in regulatory policy.

Standards and standardization processes serve a number of different purposes and their importance to industry and society can be seen from several different perspectives. Some of the more important objectives of standardization are the establishment of compatibility and interoperability, the removal of trade barriers through harmonisation, and the safety and health of citizens. As a consequence, the three groups of stakeholders primarily benefiting from standardization processes are industry, consumers and governments.

Standardization is also quite beneficial to research projects. For example, it strongly supports the dissemination and upgrading of project results, it widens the exploitation potential of project output, and it provides projects with access to a large pool of external expertise. Moreover, developing new standards can help to build a competitive advantage and it can create the ability to test according to internationally agreed principles. In addition, participating in standardization processes may bring projects higher international recognition and new opportunities for collaboration.

Standards bodies and industry consortia welcome contributions from IST research projects, as they provide them with information on the latest developments in ICT technology, and help them to coordinate their resources in a more effective way, avoiding overlap between organizations.

Despite these benefits, not all research results are appropriate to be passed through standardization and not all types of partners in a project consortium may benefit in exactly the same way from standardization. The different backgrounds that academia and research institutes, Small and Medium-size Enterprises (SMEs), industry and services providers or governmental bodies come from, also trigger their different interests in and benefits from standardization processes.

As one of the first steps in the process of defining whether and how to interface with standardization, your project as well as its consortium partners should evaluate which particular results can be obtained from cooperation with standards bodies. The benefits may prove to be well worth the effort and resources involved.

2.1 ICT standards, industry & society – what standards are and why standards are important

Just as there are many participants to the standardization process, there are also several definitions for standards and standardization. However, within the context of these guidelines, standardization can best be understood as the process aiming to define common and mutually agreed (technical) solutions between relevant stakeholders, for the benefit of all involved.

The primary aim of standardization in the current social and economic context is to help encouraging the free movement of goods. Standardization will help to remove technical barriers, open up new markets, and enable new economic models. It helps to create economies of scale while at the

same time increasing opportunities for product differentiation and competition and services. Consequently, standardization may help establish compatibility and interoperability, it may enable market self-regulation, and guard the safety and health of citizens.

These general descriptions can be applied to most everyday standards that define, for example, the design of road signs or the way to apply bar coding. However, when looking at their purpose, four major categories of standards can be identified:

- **Fundamental standards** - concerning terminology, conventions, signs and symbols, etc;

- **Test methods and analysis standards** - measuring characteristics such as temperature or chemical composition;

- **Specification standards** - defining the characteristics of a product or service and their performance thresholds, e.g. inter-changeability, health and safety, or environmental protection;

- **Organization standards** - describing the functions and relationships of a company, as well as elements such as quality assurance, maintenance, or production management, etc.

2.2 Disseminating your project's results through standardization

The objective of a project's dissemination and exploitation activities is to define a complete and tailored set of instruments, tools and mechanisms for effective promotion of a project, its objectives and its results, in conjunction with an effective and coherent strategy. Promotional efforts aim to create maximum awareness of a project's objectives, goals and benefits among its main target groups: IST research projects, standardization working groups and relevant industrial organisations.

Dissemination of project's results through standards bodies in general brings projects higher international recognition, collaboration opportunities, and the ability to cooperate with a variety of specialists, thus benefiting from their collective expertise. This may be specifically relevant when standardization work proves to be expensive and time consuming, and cooperation with outside experts may provide projects the leverage needed when budgets are constrained.

2.3 What does my project get out of interfacing with standards bodies

Not every single project result can be standardized and not every single project partner is necessarily aware of the strategic benefits of standards. These may be best understood by those partners involved in standards work, and by their technical experts participating in standards development on a regular basis. Projects should therefore benefit from their partners' participation in their consortium when defining which parts of their output and results could be standardized.

Input into standardization processes, as discussed and agreed within your consortium and validated by your technical experts, will benefit from an additional validation process by a wider expert audience that may be closer to the market. These experts well understand standards' key role in encouraging innovation, improving markets and creating competitive opportunities. Also, outside expertise may provide your project's deliverables with additional value, e.g. by upgrading the reliability, safety, accessibility or quality of the solutions proposed (technologies, services, guidelines, etc.), and thus increasing future product efficiency and safety of consumers.

Although interfacing with standardization provides a range of benefits, some of these may be more relevant than others. Project consortia many times include different types of participants such as industry & service providers, SME companies, research institutes & academia or public authorities. In general, each project partner will benefit from interfacing with standards bodies, although certain benefits can be specific to a particular type of partner.

2.3.1   Industry & service providers and SME companies

Industry & service providers as well as SME companies accrue two kinds of benefits by participating in the development of standards: immediate and deferred.

The immediate benefits come about through access to technical resources, communication and interacting with peers in industry, the ability to influence the development of the standard, and recognition for participation. Examples of immediate benefits include:

- Early access to specifications, prototypes and legislation;

- Better understanding of standards (and their underlying design), trade-off and compromising during the development process, and the operating conditions and environments they are intended to serve;

- Leverage the expertise of standards organizations in building consensus within your area of technology;

- Development of relationships and contacts that may become additional technical resources;

- Reducing commercial risks through lowering development costs (due to knowledge and experience sharing among a larger group of participants);

- Improved ability to identify future trends (due to research developing during the design of the standard);

- Increase technical staff experience by giving them the opportunity to work with leaders in the field and to witness standards development processes;

- Enhancement of the corporate image as an industry leader and of the status of the company technical expertise;

- The ability to participate in promotion of the standard, such as through press releases or participation in (sponsored) events or materials such as conferences, workshops, journals, etc.;

- The ability to participate in exclusive (i.e. member-only) technical events, such as workshops, development meetings, conferences, etc.

The deferred benefits come about when the standard is released and accepted by its user community. Although some of the benefits will apply to all users of the new standard, companies that participated in the development process generally have a lead in the market and typically gain from the following benefits:

- Increased market access and product or service acceptance;

- Improved sales efficiency due to decreased trading costs, simplification of contractual agreements, and lowering of trade barriers;

- Value Intellectual Property Rights (IPR) by selecting the best policy matching the wider targets;

- Risk reduction through prototyping, testing, certification, improved product safety and broad industry acceptance;

- Better economies of scale; deploying standards in components improves the reusability of modules, hence increasing sales and production of these components; this will make them cheaper to build and will increase the competitiveness of products using them;

- Investments are better protected since the market generally provides replacement for standards based products in case technologies have to retire;

- Products that use standards are less likely to require replacement in order to integrate with other, newer products and standards organizations many times provide migration paths to newer versions of standards supporting next generations of product.

- Finding staff, trained and experienced in standardized technologies is many times easier – and hence cheaper – than finding the same staff trained to work with proprietary technology.

2.3.2   Academia, research institutes and professional bodies

Academics are already engaged in professional qualification, and are in the best position to assess the role standards (and conformity assessment & accreditation) play in social-economic development. However, academics usually adhere to the basic principles and ethics of science and do not serve particular interests or interest groups.

Universities, research institutes and professional bodies that are actively involved in standardization processes, typically gain from the following benefits:

- The possibility to benefit from IPR developed through academic research.[4]

- Access to more and wider in-depth information exchanged in standardization processes will provide an edge over non-participating institutes, as early access to information is valuable.

- Possibility to introduce standards and their effect on technology and trade into university curricula in business, engineering, and public administration;

- Promotion of awareness of the significance of standards and standardization activities as such with regard to their socio-economic impact on modern societies, regional integration and globalization.

- New opportunities for international and interregional research co-operation with various partners (academics, industry, standards bodies);

- The possibility to raise the profile and reputation of scholars as well as of the university or institute among peers, through participating in international standardization processes.

2.3.3 Governments and public authorities

Governments and public authorities recognize the importance and impact of standards on their economies. Pre-competitive standardization work has significant positive effects on economy and society, such as increased product availability and lower prices, as standardized products are interoperable, and take into account aspects such as consumer safety. Countries that are leaders in developing standards provide their economy with a competitive advantage, and a higher international trade potential.

In addition to recognizing the economic benefits of standard-setting activities, governments and public authorities also have an interest in standard setting in their capacity as purchasers of large quantities of goods and services, hence they share with other consumers the desire for a wide variety of interoperable high quality solutions.

However, while the benefits of standards are widely recognized, standards setting activities that are improperly conducted can discourage or even eliminate competition, giving rise to antitrust concerns. Participating in standardization processes therefore provides governments with an opportunity to monitor activities and to safeguard standards setting processes against abuse, thus taking an active role in mapping the ongoing processes with the developing regulatory and legislative environment (e.g. antitrust regulation).

2.3.4 Consumers and society

Standardization generates a considerable number of benefits for consumers. It does not only provide them the ability to use, purchase and choose from a large variety of different but interoperable products, but it also gives them a level of assurance on compatibility with existing or future products or services.

In addition, several aspects of the standardization process, such as conformance testing, will help to ensure the safety and health of consumers purchasing tested, and subsequently certified products. Moreover, cooperation between standards bodies and consumer organizations provides better guarantees for the accessibility of products and services to all citizens.

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[4] Traditionally, universities' mission of advancing knowledge and promoting social and economic progress is served by publishing research results in the public domain, e.g. via publications and presentations and conferences; however, recently, universities started considering applying for patent protection on research output of potential commercial utility, and the rise in university patents over the last decades reflects a general strengthening of patent rights, a relaxation of patentability standards, and rapid progress in fields where scientific and technical advance is closely related

3   Your project and interfacing with standards bodies

The challenge for an IST project in addressing standardization is in the diverse set of tasks that are required to be successful. Standardization involves an unusual combination of interdependent project activities. Some are research and development related such as defining specifications, interfaces or methodologies that result from research and development, while others are more aligned with dissemination, such as creating awareness and getting industry to agree your project results should be a standard.

An IST project that intends to impact or contribute to standards needs to address this diverse set of tasks in its project plans, and consider which partners are most appropriate to lead each task. If properly planned and structured, standardisation activities can be a very effective dissemination path for achieving broad awareness and take-up of project results. The following sections identify the key questions that should be asked when preparing a project proposal or negotiating a new project contract, and indicate some common approaches to standardisation that have proven effective for IST projects.

3.1   Determining whether your project should plan to interface with standards bodies

Sometimes a project from the early proposal stages has a clear objective that research results will be proposed as new standards for industry. But, not all IST projects that eventually include standardisation activities start with a specific objective of creating a new industry standard. Some see standardisation as less important because they are developing innovations above the technology layer where standards exist, while others see their role as only assembling and integrating standards-based technologies to create new platforms or frameworks.

Even without a specific goal of contributing to standards, a project may still find that broad dissemination and take-up of research results requires interfacing with standards bodies. Given the tasks and the resources involved to interface with standards bodies, it can be a major challenge for the project partners to accommodate standardisation activities within an existing project programme or budget, if not planned for in advance.

In determining whether your project should include plans to interface with standards bodies, there are no simple rules or formulas. However, there are some common characteristics that can help identify if an IST project is likely to need activities related to standardisation. Consider if your project has one or more of the following characteristics:

- Adding domain-specific elements to an existing standard – projects often overlook the need to establish consensus within the specific domain concerning the new elements.

- Using an existing standard for an application not originally envisioned – the original specification often needs to be extended or modified in some way when used for applications not originally envisioned when the standard was created.

- Integrating different standards into a platform, framework or architecture – usually more complicated than most researchers realise and often requiring modifications to one or more of the standards to avoid clumsy workarounds.

- Dissemination channel to end users has several vendors each with small market shares – if there are many customers and many suppliers, standardisation becomes the critical path to ensure project results are widely disseminated.

- Research results are intended as basis for a new generation of products or services – industrial organisations considering developing new products will often require standardisation processes be underway in order to reduce investment risk.

If any of the above characteristics apply , it is likely that your project will eventually need to interface with standards bodies. Including some provisions in the original planning for the project will avoid problems later on when the project is well underway and resources difficult to reallocate.

3.2 Identifying possibilities for cooperation with standards bodies

Determining if your project should cooperate with standards bodies can be especially challenging when consortium partners are not already active in standardisation activities. Partners in project consortia comprised of smaller or regional organisations may not have resources to regularly participate in standards activities. Identifying areas for possible cooperation with standards bodies should be done early, best at the proposal stage of the project, but certainly not later than during negotiations of the project contract with the European Commission. The approach that is recommended is to use a structured analysis of the project outputs.

The structured analysis is organised according to the set of work packages within the project. The work packages represent a logical grouping of tasks and each work package normally will have one or more deliverables. Some deliverables will be for formal submission to the European Commission for approval, while others are outputs from the work package used by the project partners, or as inputs to other work packages. The first step is to identify for each work package what are all of the outputs. Then, for each output, ask the following questions:

1. Does the output rely on an existing standard?

2. Will the output be exploited by organisations already using standards for their products or services?

3. If an industry standard changed, would the output need to be modified?

4. Is the output a basis for commercial companies to develop new products or services

5. Does the output need to be used consistently by industry for the project to deliver expected benefits?

6. Is the output intended to encourage many other organisations to create compatible technologies?

7. Will products from multiple suppliers utilise the output?

8. Is the output essential for the correct operations of higher level features and capabilities?

9. Will the output fill a gap or address an area only partially covered by an existing standard?

If one or more answers to the above are affirmative for one of the outputs, then it is likely that some interactions with standards bodies should be planned within the project. The level of interaction will vary according to which of the questions were answered in the affirmative.

If the questions that were affirmative were in the bottom half of the list, then it is likely that contributions to standards will be an important element of the project if it is to achieve good results. Proactive participation and significant interactions with standards bodies will likely be required. If the questions that were affirmative were in the top half, then it is likely that the project will mainly need to monitor activities of relevant standards bodies.

3.3 When should my project think about standardization?

A project that intends for project results to contribute to standards needs to view standardisation as a process that begins at the concept stage of a proposal, and continues throughout the entire life of the project, and often beyond. The mindset should be one of a programme that involves a sequence of actions to achieve a specific result, much like a research programme that passes through different phases starting with an initial concept and ultimately leads to development and dissemination of new technologies. There are several important project milestones within a project lifespan where standardisation should be considered:

> **Milestone 1: Proposal preparation stage -** It is important to identify and plan for contributions to standards when preparing the project proposal. Projects that start off at the proposal stage with a specific intention to create a new standard or modify an existing standard normally allocate a minimum of 6 person month's effort to the specific procedural tasks of standardisation. However, the average for these types of projects is 12 person month's effort, usually spread over 18 to 36 months of a project. This does not

include the research work related to defining the standard, only managing the process of standardisation within appropriate standards bodies. Therefore, it is important to allocate sufficient resources during the proposal stage and to maintain those resources during contract negotiations with the European Commission.

Milestone 2: Start of the project contract - At the start of the contract it's important that the responsibilities for standardisation be discussed amongst the partners. At least one partner should be identified to participate in the standards bodies where the project expects to eventually make a contribution. The reason for this early participation is that it will later be important that at least one partner is familiar with the procedures within the target standards bodies, has contacts with the member organisations, and is able to identify who are the members that are influential or set the pace for the decisions within the standards bodies.

Milestone 3: Requirements defined - Research projects generally start with the specification of requirements and designs of the technologies that will be developed. These requirements can be the basis for a first check of whether the research results are aligned with the work within the standards body. On more than one occasion, projects have learned by presenting their requirements and expected results that some standards already exist that address part of the technologies being developed. Sharing requirements and expected results within the standards body is also an important step in building awareness and support for the contributions to standards that will eventually be developed by the project. It can also be beneficial to the project for obtaining additional requirements as the representatives within the standards bodies might come from a broader set of industries of types of organisations than the project partners.

Milestone 4: Results available for submission to standards bodies - The milestone where the project partners feel comfortable submitting a specific proposal to a standards bodies varies depending on the technologies and their maturity. Sometimes it is earlier in the project while research and development is underway, other times it is later in the project after the project has completed some validation with pilots or demonstrators. The misconception that many projects have is that submissions to standards bodies need to be very complete or exhaustive. What is actually essential is that the core components of the submission are stable, clear and fully defendable in meeting specific needs, even if some surrounding elements are not yet finalised. The process of consensus will likely result in changes and additions from other members of the standards bodies, which can strengthen the submission and also benefit the project.

Milestone 5: Project contract termination - This is an important milestone because often the timing of the standardisation process extends beyond the duration of the project. Therefore, as the European Commission project contract is approaching closure, it's important to identify how the standardisation process will continue. With some planning and foresight, the time and effort invested during the project towards standardisation will lead to the project work becoming an industry standard, and in so doing, deliver expected benefits and broader opportunities for exploitation by the project partners.

An underlying principle for the project is that when planning and actions for standardisation occur earlier within a project, the results lead to more effective use of project resources and greater likelihood of meeting project objectives for standardisation.

3.4 Planning your project's interfacing with standards bodies

Once you have decided your project should interface with standards bodies, it becomes important to include activities for these interactions as part of the project work plan. There are different aspects to be considered such as timing of interactions, the formal mechanisms that enable interactions, and the tasks that are needed to effectively contribute to standards.

3.4.1   What stage to start thinking about interfacing with standardization

Progressing your project's deliverables through the standardization process can be a time-consuming process. Although there may be – depending on the nature of the input you intend to deliver, as well as on the type of standard you decide to pursue – ways to achieve your goals within 6-12 months, mostly standardisation processes will take longer and require between 1 and 3 years.

Your project will however have a limited lifespan and will most likely not be able to allocate resources to standards work beyond that lifespan. In order to safeguard ongoing standardization work from falling apart after the completion of your project contract, you will either have to:

- Ensure all your project's standardization activities can be completed before your project finalizes its activities;

- Ensure one or several of your consortium partners are in a position to continue and complete the standardization work initiated by your project at their own cost;

- Build a constituency among relevant stakeholders that are willing to continue and complete the standardization work initiated by your project at their own cost.

For these reasons it is recommended to plan interfacing with standards organizations at the beginning of your project's activities. Even though your deliverables will not be available yet, it will help you synchronize with relevant ongoing standardization processes, and start the process of building the consensus required in order to achieve the goals you are pursuing.

Postponing this interfacing until your standardization deliverables are completed – usually towards the end of your project – will delay the standardization process and increase the 'standardization gap' between the end of your project and the availability of standards resulting from it.

3.4.2   Participate in standardization processes as a project or as a project partner

To influence the standards making process, one must be able to make submissions and encourage progress towards reaching consensus. Generally, this is done through being a member of the targeted standards organization. This means that either the partners or the project itself must become a member or participant. Sometimes, you will find that one of your project partners is already a member, which will make interfacing relatively easy.

There are different aspects to consider when creating a formal membership link between the standards body and the project, but in the end, the decision must be driven by which is the best way to influence the standardisation process towards consensus that project results should be an industry standard. Some aspects that are common to both approaches to membership are:

- **Fees** – regardless of whether you participate as project partners or as a project, nearly all standards bodies have fees for membership, and some provision for membership fees need to be included in the project budgeting. The fees are sometimes linked to the size or turnover of the organisation that becomes a member. Standards organisations may not be willing to provide membership to the project at the same fee level as a single partner when the project consortium includes for example, a large multi-national commercial organisation. In some cases it may be cheaper to have one or two partners become members.

- **Approvals** – some partners will have internal procedures that make it difficult for them to become a member of a standards body. These can range from policies that strongly discourage joining any groupings to avoid implied endorsements, to having a centralised budget department for managing membership in industry groupings. These internal budgets or departments might be fully appropriated to existing groups making approvals for new groups time consuming even when fees are partially funded by the project.

- **Legalities** – some standards bodies require that membership agreements be between the standards body and a legal entity. This might be because there are provisions related to copyrights, confidentiality, etc. that can be sometimes difficult to interpret when dealing with an individual or project.

All of the aspects can usually be addressed and since most standards organizations are open towards contributions from research projects, contacts should be established with them to discuss the various options, and how to best proceed. Some upfront discussions amongst the partners concern-

ing how the project will participate in standards bodies and what restrictions might exist for some partners is however needed to avoid surprises later on, such as having to reallocate resources because a partner is prevented from becoming a member and undertaking planned standardisation tasks.

There are also pros and cons to each type of membership with regard to achieving consensus for research results becoming standards.

Membership as a project	
Pros	• Easier to share standards information amongst partners
	• Opinions or positions may carry greater weight as a project position
	• Participation in standards body meetings more cost effective for travelling, etc.
Cons	• Extra process needed for the partners to establish common positions in advance of voting in the standards body
	• May not always be a consensus amongst partners for standards body decisions
	• A single project vote will have less ability to influence formal decision-making

Table 2: Pros and cons of standards body membership as a project

Membership as individual partners	
Pros	• Partners can express their own views rather than only the consensus of the project
	• Multiple votes will have more ability to influence decision making
	• A mix of support from different types of organizations can be seen as a stronger endorsement of project proposals
Cons	• There may be restrictions for sharing detailed standards body information amongst project partners who are not members
	• Individual partner opinions or positions may carry less weight than a project position
	• Participation in standards body meetings more expensive due to more partner participants

Table 3: Pros and cons of standards body membership as an individual project partner

Regardless of whether the project or the partners join the standards body, it is important to have a lead individual who will coordinate the activities towards the standards body and ensure that any issues concerning project proposals are addressed.

3.5 Planning resources and work packages for standardization activity

The amount of resources that need to be included in the work plan depends on the degree to which the project has standardisation of project results as an objective. If one of the main results is intended to become an industry standard then a specific work package for addressing standardisation is recommended. The type of tasks that might be included in a standardisation work package are the following:

- **Formal submission preparation** – understanding the required format for submissions utilised by the target standards body and preparing the research results as a formal submission to the standards body. The actual content of the submission would be developed in one of the other technical work packages.

- **Constituency building** – identifying the various constituencies that will have an opinion or position with regard to the proposals from the project and to meet with them to understand their interests and positions.

- **Consensus building** – organising meetings and briefings with those individuals or organisations that are important for the decision making within the standards body. This is an essential part of achieving acceptance of the project submission from as an industry standard.

- **Conflict resolution** – there will likely be questions, challenges, and alternative approaches from the members of the standards bodies concerning the proposals made by the project. These will often require technical resources to investigate and respond in order for the standardisation process to move forward, but may also require further business or market data, or collection of additional and user needs and requirements.

- **Accelerating standards take-up** – there are actions that can be taken that can accelerate the take-up of new standards. Some of these include creation of a trust-mark or brand that gives assurance that products conform to standards, others might involve certification using test technologies or working with a certification organisation to put in place a conformance programme.

- **Dissemination and awareness** – creating awareness amongst important constituencies of those that might exploit and those that might benefit from related technologies can build momentum within the standardisation process. This task can be part of a broader dissemination programme within the project.

Carefully consider which of the tasks outlined above should be part of your project and how much resources are appropriate for each task, given the specific technologies from your project and the standards bodies you intend to target.

3.6 Continuing standardization processes beyond the scope of your project's lifespan

The fact that European Commission funded projects are addressing advanced research often leads to the creation of a standards gap. The work within the project must be pre-competitive basic research that will benefit European society as a whole. This means projects are usually completed long before commercial products are available and before the standardisation process has reached a consensus that project results should be become industry standards.

While this is a challenging structural issue for European Commission programmes, there are some techniques that a project can take to reduce the likelihood that the standardisation process will stop prematurely when the formal project contract is completed:

- When identifying the partners responsible for standardisation tasks, select not only those most technically knowledgeable, but also those that will substantially benefit from exploitation of the project results. These organisations are more likely to be able to justify continued participation in standards bodies as completing the standardisation process will increase exploitation opportunities.

- If the project consortium includes user partners, get them involved in the standardisation activities. They represent the view of the customer for those interested in commercial exploitation, and may motivate partners to continue the process after the project is completed.

- Consider the membership fee structure and if there are different fees for different types of member organisations. Often academic membership is cheaper than that of commercial organisations, so it may make sense to have an academic partner carry forward the standardisation process after the project is completed as the costs will be lower.

- Consider combining the interests and resources of partners in order to continue the standardisation process beyond the end of the project. It may be that sharing the costs between two or three partners will provide sufficient resources to complete consensus process.

All of these techniques become more viable the earlier the process of standardisation starts within the project, so that substantial progress is made towards consensus before the project contract is completed. Waiting until late in the project to commence the standardisation process will make the standards gap much larger and less likely that it can be bridged by any of the above actions.
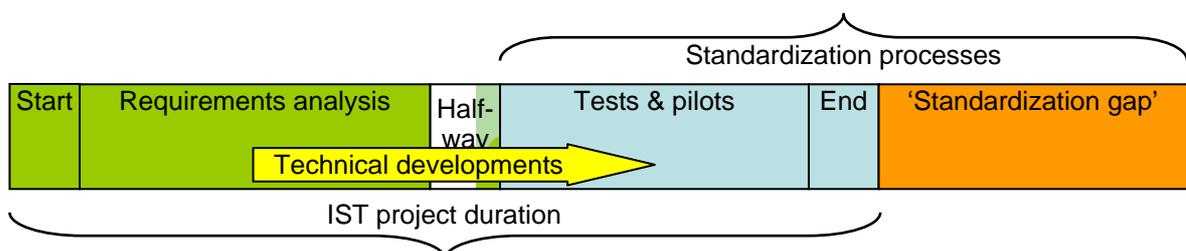

Figure 1: the standardization gap at the end of a project's lifespan

4. Standardization Processes

ICT standardization processes are carried out in many different organizations on a national, regional (e.g. European) or global level, by many different types of organizations. In most of these organizations, standardization is conducted following a number of identical process steps. In order to interface with standards bodies in the most efficient way, your project should take these steps into account when determining work packages, when allocating resources, and when planning the timing of your deliverables.

Despite these general process characteristics there are also differences between organizations, for example in the approach they take, or with respect to the results they seek to achieve. Standards bodies do not always have the same objectives and therefore do not always produce the same type of output. Some organizations may for example pursue results more fit for legislative purposes, e.g. through emphasizing the thoroughness of their formal and public approval processes, while others just seek to produce guidelines addressing immanent market needs, e.g. through consensus among their participants.

When planning to submit your project's output to standards bodies, you should determine which standardization results you will be pursuing, as this will influence the type of process as well as the type of deliverable you produce, and in certain cases, the type of organization you should interface with.

Once you have determined the standardization results and subsequently the types of processes, and the results and organizations with which you seek to interface, you are able to start the planning of your standardization work, define concrete activities and work packages, and allocate resources.

4.1 General process characteristics

Although not all standardization processes follow exactly the same steps, in exactly the same order, a number of commonalities can be identified that characterise a 'typical' standardization process:

1. First, a market need for a new standard or standardization activity has to be identified and recognized among a sufficient number of members of a standards organization;

2. Subsequently, a set of requirements has to be drafted, underlying the actual technical specification work (usually referred to as 'commercial', 'user' or 'functional' requirements);

3. Based on consensus reached among the organization's members on these requirements, a specification is drafted by a group of technical experts;

4. Once the draft specification is finalized, a formal approval process is conducted; this may be limited to the organization and its members, but may also invite a wider audience, e.g. to broaden the support for, or impact of the future standard;

5. After its approval, arrangements are made for testing or (self-) certification by the industry, in order to guarantee interoperability between different implementations; this may also encompass developing reference implementations or implementation guidelines;

6. Finally, a maintenance or periodic review process will be embedded in the organizations procedures to ensure the standard will remain in sync with market requirements.

When planning its standardization activities and goals, your project should determine which of the process steps it seeks to address, and in how many sequential steps it aims to participate.

For example, when setting out at the commercial requirements stage, it may take considerable time and resources, before the standards body you're interfacing with can start its work on reference implementations, even though your project may in fact be producing these reference implementations within a much shorter timeframe itself. If the latter aspect is your prime focus, you should synchronize this with your project planning as well as with the organizations you aim to interface with.
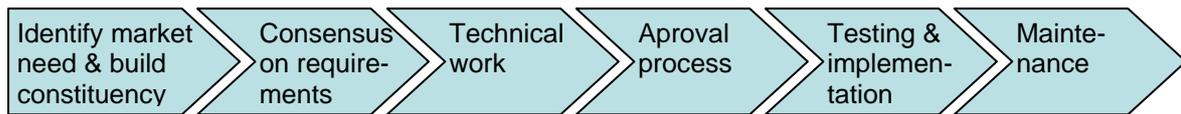
Figure 2: Most common steps in a standardization process

4.2 Different organizations, different approaches & different results

Many standardization processes in principle follow the same sequential steps, but they do not necessarily generate the same results. This may be due to differences between the nature of organizations, or due to a specific approach (e.g. formal or non-formal) towards standardization processes. Also, it can be a result of an organization's members aiming at specific standardization deliverables (e.g. guidelines documents or test-specifications).

When mapping your project's standardization goals with standards bodies and processes, you should consider the differences between types of standards bodies, as well as differences between the standardization processes they support and between standardization deliverables they produce.

4.2.1 Different types of standards bodies

On a European level, there are three formal standards organizations: CEN, CENELEC and ETSI. These are recognized by the EU and meet the WTO[5] criteria for standards setting. All three have cooperation arrangements in place with their global counterparts: ISO[6], IEC[7] and ITU[8]. In addition, there are several formal standards bodies working on a national level, which also have wider impact (e.g. DIN[9], ANSI[10] or BSI[11]).

In case your project or project partners are aiming to set standards that ultimately should have a more legal (or mandatory) character, choosing a formal standards body could be the best route. This however implies that consequences associated with formal standardization processes (e.g. the relatively long periods required for formal approval processes) have to be taken into account.

Many aspects of ICT standardization are however covered by other forums (e.g. W3C for the Web and the IETF[12] for the Internet), industry consortia and trade organizations rather than by formal standards bodies. Industry consortia do not primarily aim at producing formal standards, and many times set out to address or resolve only a limited number of specific issues. Usually they have a lifespan between 5 and 15 years, as their activities tend to terminate once their original standardization goals have been accomplished. Despite the less formal character of the industry standards they produce, their focus on specific market segments often proves to be an efficient way for generating critical mass among stakeholders, necessary for successfully completing standardization processes.

Standards bodies' and industry consortia's activities sometimes seem to overlap. Although this is occasionally unavoidable due to the dynamics of ICT developments, industry consortia may also address only specific elements within standardization processes; for example: while one organization may concentrate on the development and maintenance of the actual specification, others may be involved in developing implementation guidelines, reference implementations or test and certification procedures.

4.2.2 Formal and non-formal standardization processes

Formal standards bodies are often associated with formal – and time consuming – processes. Industry consortia on the other hand are often regarded as providing quicker routes to standardization, and may not always be seen as an obvious choice when pursuing formal standards.

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[5] World Trade Organization
[6] International Organization for Standardization
[7] International Electrotechnical Commission
[8] International Telecommunication Union
[9] Deutsches Institut für Normung
[10] American National Standards Institute
[11] British Standards Institution
[12] Internet Engineering Task Force

In this respect it should be taken into account that there is little difference between formal standards bodies and industry consortia as far as the timing and effort involved in the actual technical work is concerned. The approval process resulting in a specification becoming a formal standard however, can take a considerable period due to the legal and regulatory implications involved.

Formal standards bodies or industry consortia should however not be automatically associated with formal or non-formal standardization processes. Formal standards bodies often have "short path" processes (e.g. Workshop Agreements) in place, which lead to voluntary industry specifications. Industry consortia often pass their specifications through formal standards bodies, giving their output a more formal status as well.

When translating standardization goals for your project into cooperation objectives, you should not automatically associate formal process and standards with formal standards bodies, or vice versa. Both formal standards bodies and industry consortia may be able to provide the processes that best fit your project objectives, regardless of the actual standardization deliverable you're pursuing.

4.2.3 Different types of standardization deliverables & results

The ICT standardization environment is characterized by a large number of standards bodies, generating an even larger number of standardization activities. Even with these differences however, the deliverables resulting from these activities can be grouped as follows:

- **Formal standards**, sometimes also referred to as 'de jure' standards, are normative documents from formal standards bodies and have passed through a full and open consensus process. They are implemented on a national level and there is strong pressure to apply them; formal standards have a legal basis and can be made mandatory but considerable time (up to 4 years) is needed for completing the full approval process.

- **Technical or industry specifications** are based on consensus among members of standards bodies, consortia or trade organizations and do not have a formal character or legal basis; they are recommendations and require less time to produce (1-3 years) but when widely accepted and used in practice by relevant market players they can become 'de facto' standards.

- **Workshop Agreements** are industry recommendations developed by interested stakeholders through a short-track process (6-12 months) facilitated by several formal standards bodies; workshop agreements serve as industrial consensus documents between participating individuals and organizations, and can be revised relatively easily.

- **Conformance, test applications, reference implementations and guidelines** aim to support interoperability between and easy roll-out by market players of equipment and services based on formal standards or industry specifications. They have an informative character and are usually produced in a relatively short timeframe (6-12 months).

- **Technical reports** are informative documents supporting further standardization work, e.g. by identifying the need for additional technical clarifications in – or between – existing specifications, standards, or guideline documents.

Both formal standards and industry specifications that are developed in an open process and are publicly available under so called Fair, Reasonable and Non-Discriminatory (FRaND) terms, can be regarded as 'open standards'. Nevertheless, there can be a trade-off between the formal impact of a standard, and the amount of time (and in some cases also resources) it takes to produce.

While in some cases the establishment of an industry specification (or even a formal standard) may indeed be your project's goal, many times shorter processes may serve your needs better (for example if your aiming to define technologies for a relatively small constituency). When planning your activities in detail, you should determine what the nature or type of deliverables that you will – or could – contribute to standardization, as it will help you to save time and resources.

4.3 When & how to contact targeted standardization working groups?

In order to plan your project's interfacing with standardization, you will need feedback from standards bodies' working groups, technical committees or ad-hoc groups you've selected, because

some of the specifics of their processes may not match the overall planning of your project. Feedback from those groupings your project is targeting should best be obtained early, preferably before the launch, or during the early days of your project. Contacts can best be established with those responsible for conducting the core activities of a technical body or working group. Depending on the standards body your project plans to interface with, this could be the chairperson, the secretary, the convenor, the technical officer, or the moderator of a group.

Information on how to contact these formal representatives of standardization working groups can be obtained from standards bodies' secretariats, project offices, or directly through the web portals of the organizations.

5 Selecting the standards bodies that best fit your project's needs

Process characteristics and the nature of deliverables play an important role in selecting the organization that best fits the standardization requirements of your project. However, the specific characteristics of individual standards bodies often play a more decisive role: when selecting standards organizations to interface with, your project should consider the following aspects:

- The standardization goals pursued by your project should match the thematic scope of the targeted organization(s);

- The lifespan of your project and the timing of its deliverables should match the agenda of the targeted standards organization(s);

- The methods, processes and principles applied by the targeted organization should match your project's objectives, as well as the standardization results it is pursuing;

- What is the geographic scope of the impact your project is pursuing with, or through its planned standardization deliverables;

- IPR rules and confidentiality policies of targeted standards bodies should match your project's as well as you project consortium partners' requirements;

- Standards bodies' membership rules and procedures should provide possibilities for your project's input being taken into account;

- What are the options if your project's input cannot yet be considered for standardization by the organization of your choice.

5.1 Thematic focus area

Finding the standards body best covering the thematic scope of your project's activities may seem a relatively easy part of the selection process. Nevertheless, it can be quite complicated to point out a single organization, because you may find that several standards bodies are in fact addressing the specific standardization area your project is targeting. Consequently, it may be necessary to define in much more detail the specifics of the envisaged results, which may not always be possible in the early stages of your project. On the other hand, your project's output may indeed be relevant to several standards bodies, but you may not have anticipated the resources required to interface with all of them.

Narrowing down, and focusing your envisaged standardization output, while simultaneously matching it with the thematic scope of targeted standards bodies, should therefore be done at the earliest possible point in time, e.g. when preparing the initial project proposal. This will provide greater assurance that your project will be able to pursue all its standardization goals, and generate feedback from an outside expert community in the most efficient way.

5.2 Timing

Standardization processes are market driven and usually start when market players have identified the need to initiate a process of capturing user, commercial or functional requirements for what is

to become a new, or improved specification or standard. Timing is often an essential aspect in these processes as standards bodies consequently have to focus on the momentum in the market.

When putting forward output for standardization, your project should ensure that the issue or area addressed is actually on the agenda of the targeted standards body, and that there is sufficient critical mass among the target standards body's members to work on the issue.

If this is not the case, additional constituency or consensus building may be required first, but if there is little perspective that this situation can and will be changed within a reasonable amount of time, it may be preferable to look for alternative organizations for which the agenda provides a better match with your project's standardization objectives.

5.3   Open standardization processes

Standards organizations do not all have the same background. Moreover, their structure, working methods and principles have developed over the years and mostly reflect a balanced result of the positions and considerations of their founding members.

There are a number of commonalities between processes adopted by most organizations that have proven to be essential to conducting voluntary, open, and market driven standardization processes. When choosing standards bodies to cooperate with, research projects should verify that:

- Standardization activities are carried out through what are essentially public processes; although work is normally done by expert committees, other interested parties should have the opportunity to become involved;

- Specifications or standards are essentially the result of consensus between parties involved, and participation of all relevant stakeholders should be sufficiently ensured, e.g. by validating draft specifications through a public review process;

- Approved drafts of standards and specifications are formally ratified by the members of the standards organization, and subsequently published;

- Standards produced by an organization are available to all interested parties either free of charge, or licensable on FRaND terms.

- Interoperability between various implementations is verified, either as part of the standardization process or through a process of self-certification, installed by the parties involved, and maintenance is embedded in the processes of the organization that developed the standard.

5.4   Geographic focus areas

Generally speaking, projects pursuing standardization of their results should take a global focus. This will maximize exposure of research results to the industry and consequently widen dissemination opportunities. In addition it will help to prevent competing regional standards from emerging, which may cause barriers to trade.

However, there may be specific reasons to pursue standardization at a regional level:

- Projects may have consortium partners that are particularly well embedded in national or regional standardization organizations or processes;

- Projects may want to take specific national or regional legislative or cultural environments into account;

- Resources required for national or regional standardization processes can be considerably lower and projects may desire lowering the threshold, e.g. for SME companies participating in standardization processes;

- Projects may focus on a specific regional market environment and may specifically want to take requirements from this environment into consideration when passing their output through standardization processes.

Regional and global standardization systems can be complementary and several standards bodies have arrangements in place for addressing this. Nevertheless cooperation and exchange between

globally and regionally oriented standards organizations is mostly organized on an ad-hoc basis. Consequently projects should determine whether the organization they intend to interface with actually matches the scope they have defined, prior to starting their standardization activities.

5.5 Confidentiality & Intellectual Property

Standards organizations do not always have the same rules with respect to confidentiality and intellectual property rights (IPR). While there are organizations that require its members and/or participants to submit their contributions and technologies or specifications for free (i.e. without obligations for users of this technology to pay license fees), other organizations may work under an IPR regime offering their contributors opportunities for exploiting standardized technology through licensing.

Regardless of the IPR regime a standards body is working under, most standardization processes are open, i.e. documents discussed are accessible to all the organization's members and in principle considered being in the public domain. Nevertheless, in specific situations, mechanisms usually exist for keeping contributions confidential, or to discuss issues in a confidential environment.

Before deciding which standards body to interface with, you should ensure that the IPR regime of the organization chosen, as well as its confidentiality policy match your project's and – when applicable – also your project consortium partner's requirements.

5.6 Membership of standards bodies

With the exception of two of the three European formal standards bodies (CEN and CENELEC), who's membership is through national standards organizations, most standards bodies offer their membership to a variety of organizations, encompassing individual companies, non-profit organizations, institutions, governmental bodies, etc. Although research projects are usually not excluded from membership, there can be several reasons (e.g. the financial consequences, or the limitations of a project's lifespan) for not applying.

There are also some organizations where membership is not strictly necessary for participating in at least part of the technical development process. Taking part in the decision making process on the other hand usually does require membership.

In those situations where a project's membership is not an option, the following alternatives may be considered:

- Participate in standardization processes and get access to documentation through the membership of one of the project's consortium partners;

- Rely on public events (e.g. seminars, conferences, etc.) that are sometimes organized by standards organizations, for making their contributions;

- Apply for an observer status or temporary membership that is offered by some standards bodies or industry consortia;

- Submit results through other standards organizations that are able to participate in the activities of the specific standards body a project intends to target.

- Some European standards bodies are willing to be partners in projects in cases where the envisaged research is closely aligned with work or interests of that particular organization.

In case none of these options provides sufficient means for your project to participate in standardization processes of particular organizations, you may want to consider solely focusing on those standards bodies that have membership requirement better matching your project's specific background.

5.7 What if I can't find an organization to address my project's output

Despite the large number of ICT standards bodies and what sometimes seems like an infinite number of technical committees and working groups, there is no guarantee that your project will actually be able to have its output passed through standardization.

This may for example be the case when the subject or technology you're addressing is so advanced that it is not yet possible to build a constituency of market players around it. For these situations, some standards bodies have installed incubator facilities, allowing projects or other contributors of advanced – but not yet 'standardizable' – technology or concepts to continue their work towards standardization and constituency building until the level of maturity is sufficient to initiate more formal processes.

The nature of your project or its standardization deliverables may require you to specifically focus on those organizations that offer incubator-like facilities.

6   Summary

Standards and standardization processes generate a lot of benefits for stakeholders in industry and society, and although mutual cooperation may occasionally require some effort on the side of standards bodies as well as on the side of research projects, in most cases it will turn out to be beneficial for both.

Moreover, although standards bodies follow their specific procedures and will generally stay within the boundaries of the areas of work their members have defined, there is great interest among them to work with IST research projects and to address findings that could improve the European and global framework of standards.

Projects are therefore strongly encouraged to evaluate the possibilities of passing their output through standardization and use the guidelines provided in this document to define and establish their interfacing and cooperation processes with standards bodies at an early point in time during their lifespan. This will not only upgrade their output and provide them with additional means to disseminate their results, but it will also support the overall goals of the eEurope programme and bring research and standardization closer together.

Although this document provides your project and your consortium partners with a number of helpful guidelines on how to determine, initiate and structure your cooperation with standards bodies, many questions may still rise, that have not yet been addressed. Therefore – and because standardization is a dynamic and evolving environment – additional information and tools will be made available on www.copras.org.

The COPRAS consortium partners are:

European Committee for Standardization (CEN)
36, rue de Stassart
1050, Brussels, Belgium
www.cenorm.org

European Committee for Electrotechnical Standardization (CENELEC)
35, rue de Stassart
1050, Brussels, Belgium
www.cenelec.org

European Telecommunications Standards Institute (ETSI)
650, route des Lucioles,
06921, Sophia Antipolis, France
www.etsi.org

The Open Group
Thames Tower, 37-45 Station Road
Reading, Berkshire, RG1 1LX, United Kingdom
www.opengroup.org

World Wide Web Consortium (W3C)
2004, route des Lucioles
06902, Sophia Antipolis, France
www.w3.org