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INTEREST

"Integrating Research and Standardisation– A 'Manual' for Researchers and Research Organisations –"

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Researchers, but also research organisations are mostly neither informed about nor in standardisation activities. Their priorities are in doing research and producing respective output, like publications or patents. However, researchers and their organisations can also benefit both from standardisation and standards. This manual addresses researchers and research organisations. Based on a conceptual model of the role of standards in the research and innovation process, it aims at first to point to the possible benefits they can derive from implementing standards, bit more important from standardisation processes. They provide several opportunities to disseminate and exploit research results efficiently in an additional way. After discussing possible barriers regarding participation in standardisation processes and eventually hurdles for the technology transfer process, we present adequate solutions. They range from new forms of mobility of personnel, new forms of collaboration to addressing standards and standardisation more prominently in research programmes, but also in evaluations of research projects, research organisations and finally of researchers.

Who should read this?

This guide has been designed to help researchers and research organisations to understand the relationship between research and standardisation, in order not only to successfully integrate their research results into standardisation, but also to learn about the options standardisation and standards provide for their research activities.

The guide will cover the following topics:

- How does an organisation or individual conducting research benefit from standardisation work?
- What are the incentives of researchers and research organisations to participate in standardisation?
- Which problems and barriers can be expected in such a process and how can they be dealt with?
- What transfer mechanisms can help to optimize the interface between research and standardisation?

Standardisation – An overview

”Standards are not only technical questions. They determine the technology that will implement the Information Society, and consequently the way in which industry, users, consumers and administrations will benefit from it.”

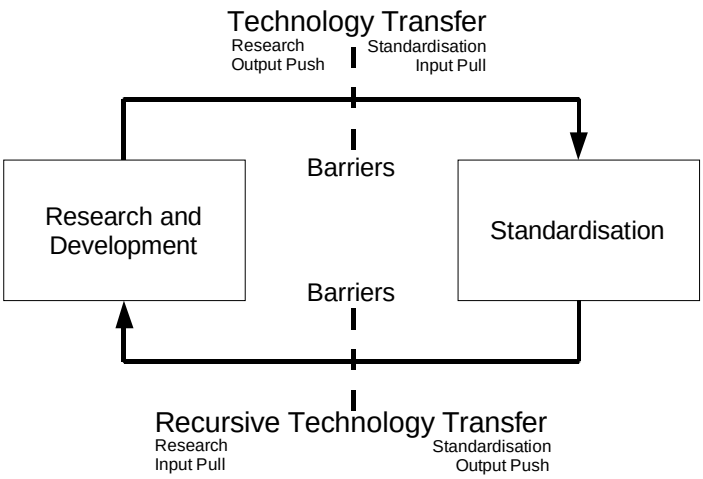
You can hardly put it more aptly than this quotation taken from a document published by the European Commission on ‘Standardization and the Global Information Society’. Information and Communication Technologies will have a profound impact as the major enabler of the move from an industrial society to the information society and then to the knowledge society. Yet this transition will only take place reasonably smoothly if adequate standards are in place, which take into account not only the technical aspects, but also the characteristics of the specific environment within which they will have to function. This aspect, the fit between the state-of-the-art of technology and the context of use, represents one side of the phenomenon "standard". The other side highlights the process of creation and continuous maintenance of the standard. This process involves the search for consensus between different parties. Such parties can consist of companies, user organisations, public authorities, but also public or private research institutes or universities can participate in this consensus process if they choose to do so.

The opportunities for individuals and their organisations to engage in this process of consensus are manifold. These days, a web of SDOs (Standards Developing Organisations), i.e., the likes of ISO and ITU at the global level, ETSI (European Telecommunications Standards Institute) and PASC (Pacific Area Standards Congress) at regional level, and ANSI (American National Standards Institute) and BSI (British Standards Institution) at the national level, issue what is commonly referred to as ‘de jure’ standards – although none of their standards have official regulatory power. Likewise, a plethora of industry forums and consortia (a recent survey found more than 250), such as the WWW consortium, the ATM forum, and the Open Group, to name but a few of the well known ones, produce so-called ‘de facto’ standards. As a result, an almost impenetrable maze of what is generally called ‘standards’ exists, ranging from company-specific rules, over regional and national standards and norms, up to globally accepted standards.

Still, this maze of standardisation organisations SSBs and SDOs and standards have one common denominator. Their output is shaped by the standardisation input, i.e. the research results that are fed into the process and additionally by the needs and interests of the involved parties. Research has not necessarily been conducted with the aim to transform its results into the specifications of a standard. Such research exists,

though, in the cases of pre- and co-normative research, respectively, which is carried out with the specific goal of integrating its findings into standards. But other research as well can be relevant to standardisation work, sometimes even without the researchers and their organisations being aware of it. The relation between research and standardisation can be described by the knowledge and information flows between the two realms, as shown in figure 1.

Figure 1: The relation between research and standardisation



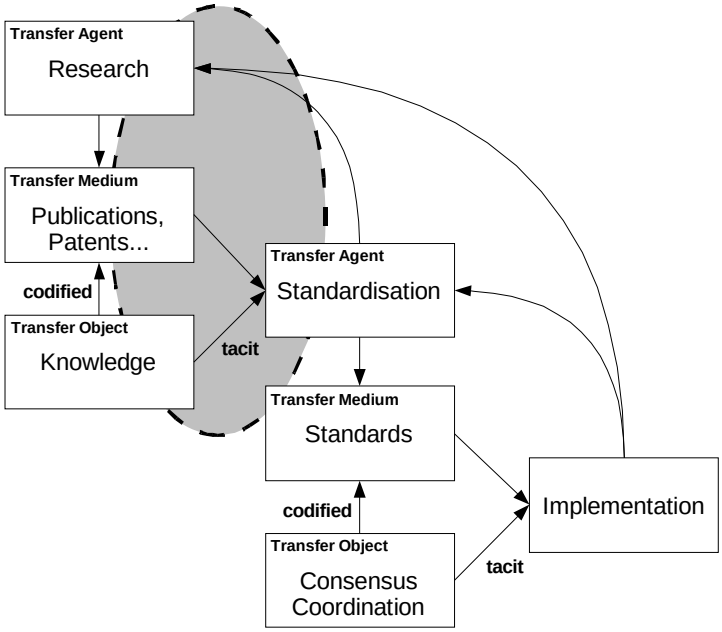
This interaction of research and standardisation can be described in terms of knowledge and technology transfer. In one direction, research outputs are the source of standards, in the other direction standards are a source of information for the research communities. In both directions specific barriers exist that influence this transfer of knowledge.

Codified vs. tacit knowledge

Codified knowledge refers to the knowledge that is embedded in patents, scientific papers or reports, products, prototypes and instruments developed in R&D. Tacit knowledge refers to knowledge that stems from the practice of research and experimental development but is hard to put into words. This "practitioner knowledge" plays an important role in the link between research and standardisation.

A more detailed model highlights the scope of a problem that relates to these knowledge flows and the differences between the flows of codified knowledge and tacit knowledge.

Figure 2: Research and standardisation in a simple technology transfer model



The benefits of standards and standardisation for R&D organisations

Research organisations mostly benefit from the effect of linking to other organisations through standardisation work and solving specific problems, like measurement and testing problems. Companies also benefit from the ability to shape the content of standards to raise the individual benefits that can be achieved through the economic and strategic impacts of standards.

One of the major benefits encountered by research organisations that participate in standardisation is the resulting higher number of links to other organisations of different types. Especially universities and private research institutes feature higher collaboration intensity with multinational and domestic companies as well as other universities compared to similar organisations not active in standards setting. Active standardisation work is especially valuable for getting in touch with industry partners interested in similar topics.

Companies mostly benefit from standards in terms of new market opportunities, long-term profits and coordination. In this respect formal standards have a positive impact:

- on the reduction of transaction cost
- on company cooperation, e. g. globalisation of R&D and production processes
- on internal communication
- on the diffusion of new products and services
- on product variety
- on export sales.

This positive impact can be maximised if companies integrate their research output into standardisation, thus shaping future standards. Moreover, and probably more importantly, standardisation work can provide companies with the opportunity to actively also shape new markets.

Standardisation work is not only beneficial for organisations. Individuals as well can gain from active standardisation work. Accordingly, R&D managers should also identify and highlight these benefits for individual employees during training, and provide incentives.

Incentives are key

Keys to successful standardisation work: raise the awareness of researchers and developers for the associated benefits and provide incentives for them to become actively involved in standards setting.

The link between research and standardisation – leveraging the results of research for research organisations and companies

In order to successfully feed research results into standardisation, an organisation has to be aware of the relevance of the different types of standards in different research contexts.

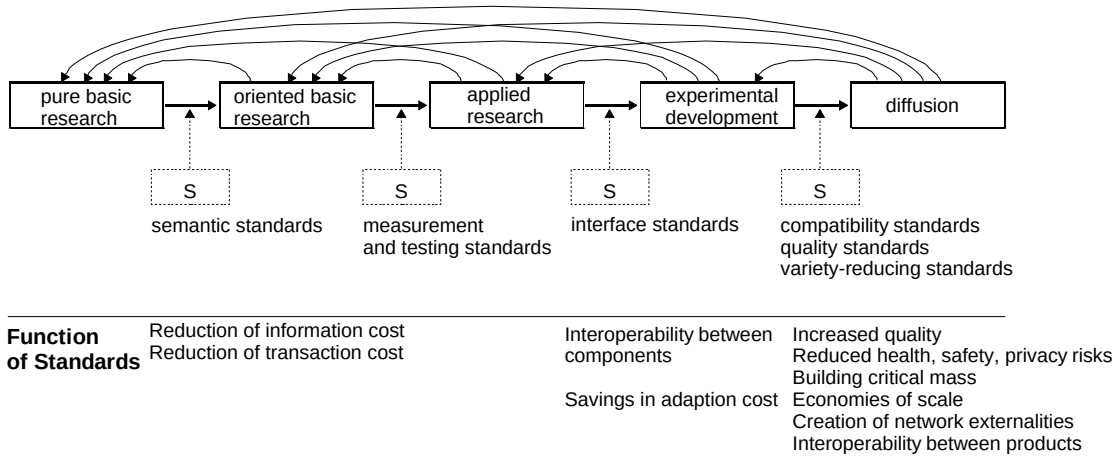
Standards become increasingly important the closer a research activity is to the market.

This is linked to researchers' levels of interest in standards setting. While basic researchers are less inclined to participate in standardisation, applied researchers are more frequently involved, and experimental developers top the list.

Frequently, standards from different ‘domains’ can be associated with the different categories of research. Typically, terminology and semantic standards are the first ones to be developed in a new area of technology, followed by standards for measurement & testing. Quality & safety as well as compatibility standards are the standards closest to the market.

One recent example for this succession of standards is nanotechnology. At the moment standardisation work is highly focused on terminology, and measurement & testing. Only few organisations already consider quality and safety and compatibility in nanotechnology as the next field of standardisation activities.

Figure 4: A linear model of research and standardisation activities



Basic research organisations like universities and some public research organisations are predestined to engage in standardisation processes that relate to terminology or measurement and testing. Terminology standards have a generic character and may fall into the dilemma of providing public goods in general, but an engagement may provide benefits in an indirect way. Research organisations which want to engage in standardisation work regarding terminology will have a good chance to network with organisations active in applied research or experimental development. Still, research organisations have to be aware of the specificity of their research field. In the field of ICT, compatibility standards are also highly relevant for the work of researchers and may provide additional opportunity for beneficial standardisation work.

Applied research is mostly done by public and private research organisations and companies. The focus of applied research is to transform the results of basic research into prototypes and products that can be introduced to the market at a later stage. Ap-

plied researchers are, therefore, optimally positioned for standardisation work. Applied research organisations, especially Research and Technology Organisation (RTO; for example, Fraunhofer, TNO, etc.), stand to benefit from standardisation work. According to the European Association of Research and Technology Organisations (EARTO), the typical task of RTOs regarding standards is certification with a special focus on metrology. Organisations highly involved in applied research can benefit from activities in standardisation work for measurement & testing, from work relating to interface standards, as well as from providing services for certification. Applied research organisations benefit from standardisation work by contacts to other types of organisations like universities and industry. This widens the opportunities to raise awareness for their research in industry and to pick up promising research trends in basic research.

Organisations active in **experimental development** also have to consider the role of standards in markets for new products and services. The strong focus on the market also highlights the importance of quality and safety standards as well as compatibility standards. Especially in network industries like ICT, standardisation work concerning the latter type of standard can provide a knowledge advantage to the organisation. Furthermore, influencing specifications towards the own preferences and capabilities creates a competitive advantage in comparison to those companies not actively involved in standardisation.

Opportunities for participation in standardisation work

For an organisation interested in standardisation work, it is interesting to know why other organisations participate and what the main drivers for participation are. The motivation to participate in standardisation work is mainly driven by the perceived opportunities for both the research organisations and the individuals.

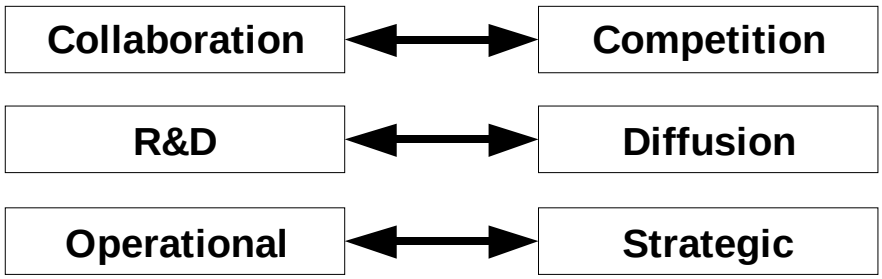
The most important opportunities to participate in standardisation are:

- Solution of specific technical problems
- Improved cooperation and strengthen links to other researchers and developers
- Improved dissemination of research results
- Improved chance of future funding

For a research organisation these opportunities provide complementary options to the more general benefits that have been discussed above. The opportunities for organisations to participate in research can be described by the motives that organisations suc-

cessfully apply in standardisation. Those motives can be described according to opposing drivers for participation as in figure 5. An organisation should shape their standardisation work or strategies according to the goals they want to achieve.

Figure 5: Types of opportunities for research organisations in standardisation



Collaboration vs. Competition

Standardisation work is usually an activity that integrates a number of stakeholders. This provides an opportunity to improve co-operation and to strengthen links to other researchers. Standardisation work can also provide competitive advantage; it increases technical know-how developed during the standardisation process. Also, observing the moves of the other R&D organisations working on the same standard can yield knowledge that can be used towards a competitive advantage.

R&D vs. Diffusion

Standardisation activities help to actively disseminate research results. Even though standardisation work does not produce new knowledge per se, it helps to organise or structure existing knowledge and disseminate it among other participating organisations. Organisations active in standardisation therefore can both expand or enrich their knowledge and disseminate their knowledge at the same time.

From prototype to product through standardisation

The opportunity to solve specific technical problems in standardisation can help research organisations to turn their "prototypes" into "products" and at the same time raise the chances to shape the markets for these products.

Regarding development activities, standardisation provides the opportunity to solve specific technical problems. Standardisation work provides the opportunity to test pro-

totypes, products or instruments required for research in an environment beyond the closed-off environment of an R&D laboratory or facility.

Standardisation work can also improve the chances of future funding. This holds true especially for organisations that want to apply for EU-funded projects where standardisation activities can be an integral part of a project.

Standards lower R&D risks and costs

Organisations can lower their R&D risks and costs through standards and standardisation. When a company can influence the content of standards to its advantage, the risk is lower in the following development processes. The cost of R&D, especially in sequential innovation processes, can be reduced when the participants in standards work make their results generally available and further research can build upon it.

Operational vs. strategic

Standardisation work can also be approached from an operational or strategic perspective. Operational aspects relate to internal matters of the organisation like transaction costs or the adaptation of production processes. Organisations active in standardisation have an advantage in being better prepared for upcoming standards and the changes in processes to allow conformity.

Reducing liability risk through standards

Because standards reflect the current state of technology, they can help organisations reduce their product liability risk. In questions of liability, legislators often fall back on a general clause which specifies that technical products are to be designed to recognised technical rules, such as standards.

Strategic aspects of standardisation relate to changes in the environment of the organisation or major changes in the position inside this framework, the shaping of future markets etc.

Operational	Strategic
• reduce transaction cost • reduce product liability • lower adaptation cost for standardised solutions	• influence regulatory framework • shape future technical fields • shape future markets • prevent proprietary solutions • increase reputation of the organisation and the involved individuals

R&D (input)	Diffusion (output)
• address specific technical problems • test prototypes in standard-compliant settings and improve them • frequently match own technology with that of other participants • increase chance of future funding • reduce cost and risk of R&D • use standards as source of information	• improve dissemination of research results • foster commercialisation of research results • improve trade opportunities by shaping standards

Competition	Collaboration
• monitor activities of researchers and experimental developers • increase lead-time advantage in new markets • Increase lead-time advantage and technical know-how respective to non-participants	• foster new links to other organisations • improve existing cooperation with other organisations • identify organisations with similar research mission • identify partners for collaborative research projects • use standards as instrument of transparency

Barriers and solutions to integrating research and standardisation

Standardisation work requires dedicated efforts (i.e., time, money and the will to engage in a process of negotiation with other stakeholders to finally settle on a consensus), and sometimes barriers need to be overcome. Some of these are hidden and relate to researchers' and developers' awareness of the issues surrounding standards and standardisation, and the problem of the integration of their tacit knowledge into the standards process. Also, the right standardisation body needs to be selected in order to meet a specific goal. Fortunately, there are strategies to overcome some of these barriers for organisations willing to invest in standardisation.

Barriers, mutual adjustments and process knowledge

Not all barriers can be overcome by research organisations and companies alone. These problems tend to be the most crucial ones for research organisations. Long standards processes and the lack of resources like personnel and money are the strongest barriers in standardisation. A sustainable solution to these problems requires the co-operation of standards bodies. Still, the time required for standardisation, and the associated costs can be reduced by e.g., choosing the most appropriate type of standardisation output. This, in turn, requires adequate knowledge of the world of standards setting.

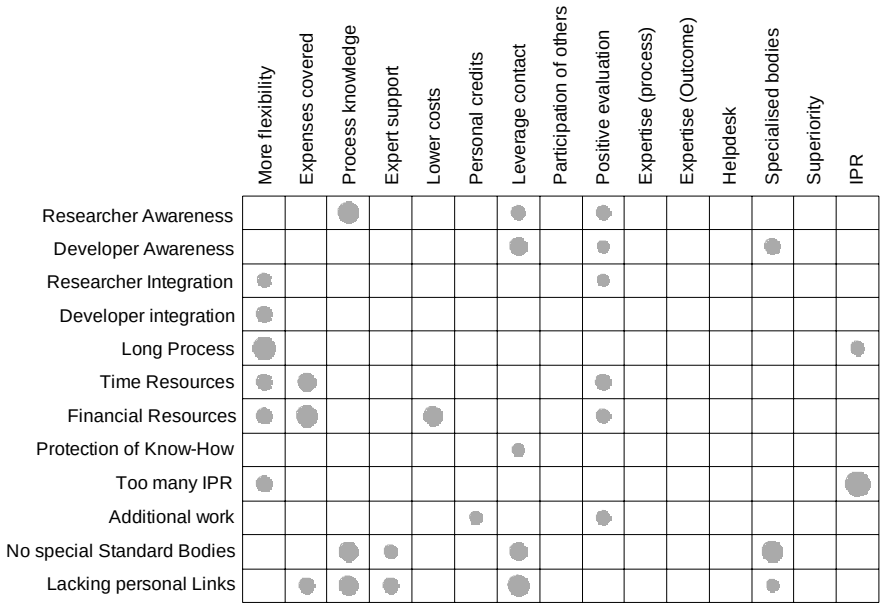
The barriers concerning resources might at first sight be outside the scope of R&D organisations, like the financial resources required and the length of the standardisation process requiring man-hours to be invested in standardisation work. Still, some formal bodies allow public research organisations or universities to participate "for free" as long as they can cover the expenses of personnel and travel. Moreover, research organisations also benefit indirectly by a higher chance to engage in projects and R&D collaborations with multi-national companies and thereby raise the chance of funding to cover additional expenses. Also there are different types of deliverables available in certain standardisation bodies. One example might be CEN workshop agreements which require less time to establish. Most standardisation bodies provide such types of deliverables (see annex).

Apart from problems relating to barriers that stem from the organisation of standardisation processes, some problems are genuinely rooted in the research realm. Most prominently, these include researchers' lack of awareness of the potential benefits of active participation in standards setting, and the lack of incentives for researchers to actually participate.

The problem of awareness can be solved by informing researchers and developers of the benefits discussed above. A more fundamental way to solve this problem is to educate them regarding standardisation and the benefits they may derive from this work. Some of these benefits are not necessarily related to immediate personal benefits of the researchers, but are more geared to the – rather more 'anonymous' – benefits for the employer, and perhaps for society at large. To explicitly recognise active contributions to standards setting would be a very good approach to overcome these barriers. In research organisations like universities, one means is to include standardisation work in the evaluation of researchers.

Regarding the problem of incentives, the INTEREST project has compiled a matrix of problems and solutions based on the responses of more than 500 researchers and developers to a survey conducted among participants in the 5th Framework Programme. Figure 6 represents the relationship between the problems perceived by researchers and the solutions that would raise their propensity to participate in standardisation work.

Figure 6: Relationships between problems and solutions



Obviously, a positive evaluation of standardisation work sharpens the awareness of researchers and developers who perceive a number of barriers, like the additional work and the time requiredThis incentive for participation is especially strong in the case of basic researchers and applied researchers.

Designing incentives for researchers

Incorporating standardisation work in evaluations of researcher would address a number of issues and lead to a higher propensity to participate in standardisation work. Educating researchers would raise their awareness of standards and standardisation work.

Honouring standardisation work should also make sense from the organisations' point of view when considering the benefits an organisation can harvest from standardisation activity, like the chance to raise funding, acquisition of projects with multinational companies or improvement of collaboration with other organisations.

Transfer mechanisms to bridge the gap between research and standardisation

Most research organisations and SMEs follow a project-based approach to standardisation, i.e., standardisation activities are closely linked to short-term project-based activities. However, those organisations that go beyond project-driven standardisation activity stand a better chance to benefit from the positive effects of standardisation work. Such organisations should consider how to establish their standardisation strategy, and slowly establish a "standardisation culture" in the organisation. The best way to establish such a culture is to raise the perceived value of standards as sources of information and at a later stage to provide the incentives discussed above to participate in standards setting. One sample element of such a culture would be a maintained list of implementers of specific standards.

A list of implementers of standards can help to raise the awareness and relevance of standards, and eventually trigger interest in standardisation work.

Such a list could provide a common ground for internal discussion on the standards and provide synergies between departments or research chairs and generally raise the importance and relevance of those standards. Moreover, such lists could help establish coherent implementations of standards across products or prototypes.

The tacit component of knowledge, i.e. the knowledge of practitioners, can be crucial for successful standardisation. This is especially true in the case of new and emerging technological fields, and in fields that are very dynamic. Many of the benefits of standardisation activities are closely linked to the tacit knowledge that is available in an organisation and ultimately at the level of individuals.

In the following, mechanisms will be described that can help R&D organisations to integrate their tacit knowledge into the process of standardisation, and to benefit from successful standards. Some of these mechanisms have not yet been put into practice, but should help devise ways of integrating the tacit knowledge of R&D organisations into standardisation. After all, these mechanisms have been successfully applied in other contexts of knowledge and technology transfer, and are therefore also worth considering in the transfer of knowledge from research to standardisation.

Mechanisms to transfer tacit knowledge from research to standardisation

The mechanisms discussed here have to be considered in the context of the research organisation or company. Some of the mechanisms might not be suitable for certain types of organisations or in certain technical and scientific fields. Therefore, examples are provided on how these abstract mechanisms might be directly put into practice. The focus of knowledge transfer will be on aspects of tacit knowledge that can proactively be used by research organisations to intensify the link between research and standardisation. These mechanisms include aspects of mobility of personnel and modes of cooperation with standardisation organisations. A more general overview is provided in a table also containing transfer mechanisms which also apply to standardisation organisations or require both standardisation organisations and R&D organisations to cooperate more intensively in applying them.

Mobility

Mechanisms of mobility to bridge the gap between research and standardisation refer to common knowledge and technology transfer mechanisms that have been put in practice to bridge the university industry gaps. Such mechanisms include:

- Spin-offs
- Exchange of personnel
- Dual positions

Spin-offs can be one means of intensifying the link between research and standardisation indirectly. Especially research organisations like universities that want to transfer their knowledge to standardisation can use spin-offs to channel their research results into standardisation. Such a mechanism requires that the spin-offs maintain a close connection to the research organisation in order to maintain the opportunities to collaborate with other organisations through standardisation. A spin-off can therefore also act as a monitoring agency in standardisation activities and also provide certification services.

Exchange of personnel between research organisations and standardisation organisations can also intensify the relationship between research and standardisation. In this case, the main benefit for the organisation is to acquire process knowledge of stan-

dardisation processes that can then be the basis to inform other researchers and developers interested in standardisation work.

Dual position is a mechanism that facilitates long-term relations between research and standardisation organisations. Dual positions allow an organisation to monitor ongoing standardisation activities and coordinate standardisation work from a perspective that includes both the ongoing research activities at the research organisation as well as ongoing standardisation activities at the standardisation body.

Cooperation

In contrast to mobility, which relates to changes in the affiliation of actors, cooperation mechanisms concern either the interaction of actors or organisational changes that do not directly affect the affiliation of the actors.

The most obvious integration of research and standardisation by means of interaction of research and standardisation is the dimension of cooperation. Cooperation activities can be categorised into three sub-categories:

- joint R&D
- sharing of facilities
- education/ training.

In the case of joint R&D, the integration of research output and standardisation input is generated by integration of standardisation into the research process as such, either as a topic in the light of research processes in terms of contract research conducted at the watershed between research and standardisation, as co-financing for research that helps to integrate specific technology-related knowledge into standards, or by consulting services and contract research that involves both researcher and standardisation organisations.

Another way to integrate research and standardisation is by sharing facilities of research and standardisation organisations. Research results being tested in specific standardisation facilities, e.g. test beds or certification centres that do not aim directly at certification of the products in question, but rather as a means of researching how new prototypes fit into existing standards.

The dimension of education and training in a cooperative way might also help to direct ?? mediate the flows of tacit knowledge in the future and also provide a solution to the incentives we categorised as support-focused. By integrating standardisation into the education system, and thereby also partly into the research system, knowledge about

the benefits of standardisation as well as the process of standardisation will be leveraged.

As we found that helpdesks seem to be a weak incentive, the natural integration of research and standardisation by education might yield more positive results which will lead to a better integration of both realms in the future. While the short-term perspectives are mostly aimed at interactions that do not intervene with the organisational setting of research organisations, the long-term perspective requires adaptations regarding research (and education) organisations.

Table: Mechanisms to transfer knowledge from research to standardisation

Mechanism	Active Actors	Examples
Informal Contacts		
Participation in conferences and exhibitions	Researchers Standardisers	Presentation of scientific and technological state of the art in Technical Committees Presentation of state of standardisation at scientific conferences
Networks of personal relations	Researchers Standardisers	
Mobility		
Spin-offs	Researchers	Spin-offs as monitoring agencies
Exchange of personnel	Researchers Standardisers	Exchange of personnel from research to SDOs and back
Dual positions	Researchers Standardisers	Position as professor and in leading position at SDO
Cooperation		
Sharing facilities	Researchers Standardisers	Co-location Research activities in test beds Standards implementations in laboratories Certification
Education and training (short term)	Standardisers	Summer schools Information events Student grants Guest lectures
Education and training (long term)	Researchers	Standardisation chairs at universities Standardisation in curricula
Joint R&D	Researchers	Contract research Co-financing Consulting
Participation	Researchers	Researchers as regular members Researchers as scientific advisors

Annex A: An overview of Standardisation Bodies and their Practices

This section will briefly discuss some examples of noteworthy attempts towards an improved integration of research output into standardisation.

The IEEE

The Institute of Electrical and Electronics Engineers (IEEE) is not really a standards setting body (SSB), rather, it is a not-for-profit professional association for the advancement of technology that happens also to be active in standardisation. The IEEE Standards Association (IEEE-SA) is one of the IEEE's five 'Technical Communities'. Their activities are limited to various engineering domains, with foci on 'Instrumentation & Measurement', 'Power & Energy', and, perhaps most prominently, on ICT (here, especially the 802 series of standards). IEEE-SA offer both individual and corporate membership. Currently, over 20,000 people are working on IEEE standards. Non-members may contribute to standards, but are barred from voting. Membership in the IEEE is not a pre-requisite for SA membership.

The IETF

Despite their highly-valued informality, the Internet Engineering Task Force (IETF) have – at the organisational level – established comparably formal links to the research community. The Internet Research Task Force (IRTF) "*investigates research topics related to the Internet protocols, applications, and technology*"[1]. The IRTF is composed of a number of focused, long-term, small research groups (RGs[2]). Rules are in place for the formation of RGs; the proposed work has to be relevant, and an RG charter is required (identifying the Chair(s), mailing list address, RG description, and membership policy). Membership of the IRTF is strictly on a per-individual basis.

It is interesting to note that the output of the individual RGs are supposed to be both publishable in academic journals and useful as input to the IETF's working groups

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1 The quotes are taken from Weinrib, A.; Postel, J.: IRTF Research Group Guidelines and Procedures, RFC 2014, October 1996, ftp://ftp.isi.edu/in-notes/rfc2014.txt.

2 At the time of writing (Sept. 2006), 13 RGs are active; http://www.irtf.org.

(WGs). That is, input to standardisation is not the sole purpose of an RG, and possibly not always the most important one. Rather, the IRTF assumes the role of a facilitator; they aim to foster "*cross-organizational collaboration, help to create a critical mass in important research areas, and add to the visibility and impact of the work*".

Yet, relevance of its research to the Internet community is the foremost criteria a proposed RG has to meet. However, input from the IRTF is handled in the same way as any other input to the IETF's standards setting process.

DIN

DIN, the German National Standards Organisation, promotes the concept of 'R&D phase standardisation'[3]. "Many new technical systems are developed with such rapidity that standardisation in its traditional form cannot adequately keep pace"[4]. To accommodate such technologies, DIN have introduced new deliverables (TRs, PASs) and underlying 'lightweight' processes. These processes are supposed to work in parallel with R&D efforts. They allow adopting a proactive approach to standardisation at a very early stage of the R&D process. Obviously, this requires a "much higher involvement on the part of R&D experts". Also, the approach aims at teaching the R&D stakeholders "to see standardisation in a new light: as an instrument that can be usefully applied to areas of rapid innovation and technological transfer". Areas in which work has been done include, among others, laser technology, integrated optics, microsystems, information technology, environmental technology, and services.

Another, very different approach was the foundation of a 'Research Network Standardisation'. This network aimed to support innovation and market acceptance of technologies through standardisation. A major difference here was that this network was supposed to do research *about* standardisation (as opposed to research *for* standardisation).

CEN

CEN are running two activities relating to the interface between research and standardisation. One is CEN/STAR (Standardisation & Research). Having recognised that standardisation and R&D are interdependent, STAR aims to identify R&D work necessary to support standardisation, through both co-normative and pre-normative research

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3 This is similar to co-normative research. The major difference being that 'R&D phase standardisation' is triggered by R&D proejcts, whereas CNR is typically initiated by an SDO.

4 All quotes are taken from http://www.ebn.din.de/index.php?lang=en&na_id=ebn.

(CNR and PNR, respectively)[5]. They collect and register from all CEN/TCs specific needs for research that would assist the standards setting process; these needs are subsequently prioritised. This prioritised list is communicated to the EC for potential future funding. The process of needs elicitation is supported through 'Trends Analysis Workshops', which aim to identify needs for new standards and for pre-normative or co-normative research[6]. The focus here is on projects that are co-sponsored by the European Commission. In addition, CEN/STAR is working towards a higher level of recognition of the importance of standards, and of the role research is plying in this context.

CEN workshops are a more generic tool to bring R&D closer to standards setting. For medium-length projects (about 2 – 3 years), they offer the opportunity of developing standards (in the form of CEN Workshop Agreements, CWAs) within the lifetime of the project (which may be very helpful, given the EU's current funding policies for R&D projects).

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5 CNR interacts directly with ongoing and/or planned standardisation activities. PNR relates to activities which are likely to generate new matters for standardisation.

6 The Copras project (http://www.w3.org/2004/copras/) represents a complementary attempt. It aims at helping IST projects to identify their potential for standardisation, and assists them in actually contributing to standards.

Recommended literature and information sources

To be completed in the final version and will consist of print and web resources. Potential candidates are:

COPRAS ICT Guide

MAXIQUEST Best Practice Guide

DTI IPR GUIDE

CEN/ISSS consortia survey

ETSI forawatch

Reports on Intellectual Property Rights and Standardisation

Reports on Impacts of Standards