Code of practice on standardisation for researchers

based on the Scoping study for supporting the development of a Code of practice for researchers on standardisation[1]

1st draft of 19 May 2022

1. Introduction

Standards help researchers and innovators bring their innovation to the market and spread technological advances by making their results transparent. In spreading the diffusion of new technologies, standards provide economic opportunities, facilitate realisation of sustainable development goals and give confidence to consumers that an innovative technology is safe. They codify the technology requirements and inform both manufacturers and consumers on what to expect. They allow technologies and materials to be interoperable: since a standard provides details on the use and content of a technology or a material, it is much easier to know when and how it can be used in combination with other technologies.

In other words, by codifying information on the state of the art of a particular technology, standards enable dissemination of knowledge both within and outside the relevant industry community. Moreover, standards bridge the gap between research and products or services allowing the diffusion of the technology in the market and increasing the probabilities of its take-up. Standardisation facilitates the deployment of new technologies, interoperability between new products and services. Innovations can more easily gain market acceptance and consumer trust if they comply with existing standards for safety, quality, performance and sustainability.

Evidence has proven the role of standardisation in creating marketable products and solutions throughout R&I projects. Similarly to research data management, included in the programme guidelines, effective valorisation through standards requires strategic thinking on standardisation, including sufficient resources to address the specific needs during the lifetime of R&I projects. Awareness of the benefits of standardisation is an equally important prerequisite for the successful involvement of research generators in standardisation activities. It proves to be important to plan standardisation activities upfront in the initial project work plan and to identify the standardisation needs at the beginning of the project when the project is far from delivering exploitable results.

Results of the scoping study indicate the existence of a stable and recurring set of elements of good practice of research projects dealing with standardisation. It has been concluded that the more exploratory research activities and the more formal standardisation processes are different in nature and difficult to synchronise. Standardisation activities within a research project largely lead to a need to engage in wider stakeholder management. There need to be close ties between projects and the technical committees that develop standards. Researchers' awareness of and know-how about

[1] Scoping study for supporting the development of a code of practice for researchers on standardisation - Publications Office of the EU (europa.eu)

standardisation processes are frequently low, and the development of recognised performance indicators to track the success of technology transfer and valorisation activities is in its infancy.

Innovation success depends on the interplay of various instruments, including – besides availability of finance – the context-specific management of intellectual property (IP) rights, the conscious opening up of innovation processes, and engagement in partnerships with various organisations and market players, in addition to, for example, regulatory measures or innovation procurement. Another important element of efficient innovation ecosystems is standardisation that allows new technologies to enter into a more mature phase, favouring their applicability on a larger scale, promoting their market uptake and contributing to the mastering of environmental, safety or health challenges. Without incentives and a good framework for pre-normative research to engage in standardisation, Europe faces the risk of falling behind its global competitors in standard setting, especially at a time when these economies are investing heavily in the creation of standards.

Against this backdrop and in order to strengthen the link between standardisation and R&I, the Commission is stepping up efforts to implement Horizon Europe, the framework programme for research and innovation for the period of 2021-2027[2], in such a way that it aims at valorising R&I results to the highest possible extent by developing incentives and guidance to use standardisation as a valorisation channel. Valorising R&I results means turning results into sustainable solutions with economic benefit and societal impact.

Beyond the research framework programme, in line with the Communication on 'A new ERA for Research and Innovation'[3] draft guiding principles for knowledge valorisation have been developed to shape a broad approach to knowledge valorisation and provide directionality. The draft guiding principles constitute a political commitment co-designed with and endorsed by Member States. The aim is to achieve a common line on measures and policy instruments for improving knowledge sharing and valorisation in Europe. They will also help to address gaps across Member States and help more and more countries to better benefit from R&I results.

In order to implement the draft Guiding Principles, the Commission proposes a Code of Practice on standardisation for researchers to support research actors further exploring the use of standards as a knowledge valorisation channel.

The Code of Practice on standardisation for researchers reflects a consistent approach to facilitate standardisation activities and raise strategic awareness among researchers and innovators. The need for a Code of Practice was identified in the Council Conclusions[4] of 26 November 2021 on the governance of ERA and on the Pact for Research and Innovation in Europe. The Standardisation Strategy[5] of 2 February 2022 also envisages the action on the development of the Code of Practice to strengthen the link between standardisation and pre-normative research.

The Code of Practice is primarily based on the findings of the scoping study for the development of a code of practice on standardisation for researchers. The study identified elements of good practice for when researchers had to deal with standards and/or the process of standardisation in the course of

[2] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52018PC0435
[3] https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52020DC0628&from=EN
[4] https://data.consilium.europa.eu/doc/document/ST-14308-2021-INIT/en/pdf
[5] https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/13099-Standardisation-strategy_en

research projects that were funded by Horizon 2020, the research and innovation framework programme of the EU for 2013–2020.

To this end, a methodology was developed to single out 40 projects as case studies that deal with standards and standardisation in good ways, and hence exhibit different elements of good practice. The basis for the selection was a survey carried out by the European Commission to identify projects that deal with standards and standardisation and to enquire about the ways in which standards and standardisation have been catered for. The survey, while extensive, was mainly used in this study to narrow down and select the cases that were then the subject of case study analyses.

The code provides a set of recommendations for beneficiaries of EU, national and local R&I programmes on how they can best valorise projects results through standardisation. They also target universities, public research organisations to help build their capacities to support the valorisation of R&I by standardisation. Finally, some recommendations are formulated at policy level with a focus on the European Commission, European national and local authorities and standard development organisations (SDOs). The recommendations are based on the lessons learnt and success factors from examples of H2020 projects, and on identifying areas for improvement that serve as a basis for concrete actions for future beneficiaries. They shall help these entities to identify opportunities and techniques to use standardisation for valorising results from their project.

RECOMMENDATIONS

AT THE LEVEL OF UNIVERSITIES AND PUBLIC RESEARCH ORGANISATIONS	
A1	Develop a standardisation policy, alongside or as part of an IP or R&I results valorisation policy
A2	Consider standardisation activities and diverse outputs appropriately in the career development plans and research assessment exercises of researchers
A3	Provide for training and teaching on standardisation
A4	Make technology transfer offices fit for standardisation
A5	Establish links with relevant initiatives such as Putting Science into Standards
A6	Develop an indicator and evaluation system
AT PROJECT LEVEL	
B1	Assess carefully whether and where standards and/or standardisation are really needed in the research project
B2	In case of collaborative project, create a common understanding, as well as a common strategic position in the consortium, on standardisation and standardisation issues
B3	Make standards a tangible component in the proposal and project
B4	In case of collaborative project, involve partners with standardisation experience in the team, with good access to the standardisation community
B5	Invest in and cater for stakeholder management throughout the project
B6	Be realistic about outputs, outcomes and impacts – consider appropriate key performance indicators
B7	Strive for combined qualitative and quantitative performance reporting for evaluations and monitoring
B8	Take standardisation issues into account in IP management and strategy (and vice versa)
B9	Ensure sustainability beyond the running time of the project
B10	Address standardisation within sector platforms, project clusters or other joint fora
AT POLICY AND STAKEHOLDERS LEVEL	
C1	The European Commission shall promote standardisation as means of knowledge valorisation through the collaboration with SDOs, university associations as well as associations of technology transfer offices
C2	SDOs should further develop their service portfolios for R&I actors and examine new ways to align their activities with R&I
C3	The European Commission should examine the needs of startups and small and medium-sized enterprises in EU funded R&I projects in relation to standards and standardisation
C4	The European Commission and SDOs should raise awareness across Member States and national support structures in relation to the role of standardisation in R&I valorisation

2. Recommendations

The recommendations are structured into three major groups: recommendations at institutional level (including technology transfer offices); recommendations for researchers / research groups (at individual researcher or project level); and recommendations at policy level and wider stakeholder level.

RECOMMENDATIONS AT THE LEVEL OF UNIVERSITIES AND PUBLIC RESEARCH ORGANISATIONS

Recommendation A1: **Develop a standardisation policy, alongside or as part of an IP or R&I results valorisation policy**

Universities and public research organisations (PROs) must answer questions about which research fields would be exposed to standardisation, and in what ways, and how standardisation can help valorise research results. This means that at institutional level there should be a **needs assessment** regarding standards and standardisation.

The code proposes a **two-pronged approach**. Firstly, within a university/PRO, an enquiry could be made to all internal research units about their level of possible and actual engagement with standards and standardisation activities (and their level of knowledge of the activities). Secondly, universities and PROs should liaise with SDOs, which could inform and champion standardisation as a task in research projects. At universities, the offices most relevant to SDOs are often those of the vice deans responsible for R&I.

Recommendation A2: **Consider standardisation activities and diverse outputs appropriately in the career development plans and research assessment exercises of researchers**

One of the major issues to be addressed in a university policy regarding standards and standardisation for research valorisation is to **incentivise the standardisation activities** of its researchers and make these activities count towards career development. Standardisation follows a similar path to that of IP-based research commercialisation, where activities with respect to patenting or spin-off creation have had to be considered in career development plans that were typically only based on publication track records.

Considering the current European stakeholder-driven initiative for reforming research assessment, part of the ERA Policy Agenda for 2022-2024, and the Paris Call on Research Assessment, the diversity of research and innovation outputs, (including publications, datasets, software, codes, methodologies, protocols and patents), and diversity of research and innovation activities, should be recognised. Therefore, in this process, standardisation activities should be considered as valuable contributions with potential impacts and effects of a scientific, technological, economic and/or societal nature.

Recommendation A3: **Provide for training and teaching on standardisation**

There is a need to **address the skills gap** in training and lecturing.

- **Targeted training** should be delivered first to key executive staff at universities, such as vice deans for research, ensuring their support for further development of a standardisation policy in

their institutions. Following this, training should then be offered to those researchers and professors who are most likely to be affected by and exposed to the topics of standardisation.

- As part of institutions' standardisation strategies, **standardisation** should be also considered as a topic for teaching **in appropriate business, technology and science programmes**. Cases in point could be, for example, innovation management lectures, which currently hardly tackle standardisation issues.

Recommendation A4: **Make technology transfer offices fit for standardisation**

In Europe, technology transfer organisations (TTOs) have over the years established themselves in many universities as service stops not only for handling and filing IP, or supporting start-up creation, but also for providing general support when dealing with contract research and helping to administer collaborative research projects. **TTOs are** hence another **institutional anchor point indicated for supporting standardisation**, and their involvement is a logical continuation of their tasks.

TTOs should be enabled – e.g. through training and institutional empowerment – to **provide a set of services in relation to standardisation**, such as:

- provision of basic know-how regarding standardisation needs;
- ability to link to SDOs and their training/service offerings;
- guidance on how to link with National standardisation bodies (NSBs) and on how to join Technical Committees in SDOs
- basic support when creating research proposals including in relation to standards and standardisation;
- basic support in the standardisation process when it comes to filling out forms etc. (and/or referral to SDOs for that purpose);
- support when dealing with IP matters in standardisation processes;
- monitoring and reporting of standardisation-related outputs of R&I projects;
- organisation of training.

Recommendation A5: **Establish links with initiatives such as Putting Science into Standards (PSIS)**

Putting science into standards is acknowledged by the EU Standardisation Strategy as a foresight exercise that explores standardisation needs linked to emerging technologies. The PSIS initiative is coordinated by the Joint Research Centre in collaboration with CEN and CENELEC, bringing relevant communities (researcher and academia, SMEs and industry, standardisers and policy makers) together to promote the market uptake of research and innovation in various fields of science.

PSIS Workshops are landmark events aiming at mapping existing and missing standardisation efforts to assess and recommend actions needed to start the process of drafting new or complementing existing standards. The recommended actions may lead to the proposal of a standardisation roadmap validated by the stakeholder audience of the PSIS Workshop.

Researchers and Universities and PROs are encouraged to actively take part in these events as an effective way of conveying R&I towards standardisation.

Recommendation A6: **Develop an indicator and evaluation system**

The development of indicators to track the valorisation of research results with standards and standardisation is in its infancy, and the relevant body of evidence is only just starting to develop. Basic consideration for defining KPIs are as follows:

- Universities and TTOs should start addressing the **need for a monitoring system with indicators**. This is recommended in close collaboration with other universities and TTOs to create common and comparable methods of data collection and interpretation. In a mixed (qualitative and quantitative) approach, there would be not only data for quantitative indicators defined and collected, but also a clearly spelt out need to have researchers and/or TTOs write self-assessment reports or developing other qualitative methods detailing the context of the standardisation activities. This would help in making good interpretations of the quantitative indicators and providing a basis for evidence-based improvements of monitoring and indicator systems. Leveraging on existing networks of TTOs, as implementers of a monitoring system, would be advisable.

- An important issue is how to track individual researchers' contributions to standards and standard development. In contrast to patents and scientific publications, it seems that the concept of authorship is not widely implemented, making it more difficult to track impact using citation measurement techniques. Engagement with scientific data repositories, notably through the European Open Science Cloud, should be also pursued enabling specific metadata to link standardisation actions with supporting data and publications.

Taken together, this points to the following needs: firstly, to **build up an evidence base regarding the pros and cons of certain standardisation-related indicators**; secondly, and most likely, as in the area of IP, to draw on a **set of indicators rather than single indicators**.

RECOMMENDATIONS AT PROJECT LEVEL

Recommendation B1: **Assess carefully whether and where standards and/or standardisation are really needed in the research project**

At the beginning of the process of drafting a research proposal, there is always a need to assess whether activities in standardisation are really needed. Standardisation has been shown to be a powerful tool for valorising research results. However, standardisation should hence be understood as a tool and not a goal in and of itself. There are several indications of whether standards and standardisation could be a topic to cater for in a research proposal, such as these:

- the call for proposals mentions standardisation and standards explicitly in the call text and / or the evaluation criteria;

- the research/technology field requires interoperability of different technological parts;

- there are safety, environmental or health issues to be defined and catered for;

- there is a need to develop a common terminology to be used by different stakeholders;

- there is a need to have clearly defined ways of measuring problems;

- the technology field is evolving and (new/amended) standards are needed.

- existing standards can be used for benchmarking new methodologies and for proposing updated of those standards being benchmarked

A standardisation gap analysis should be considered as one of the first tasks during project execution. It could be ideally carried out by an organisation familiar with the standards landscape, such as an SDO.

Recommendation B2: **In case of collaborative project, create a common understanding, as well as a common strategic position in the consortium, on standardisation and standardisation issues**

- Researchers must properly understand what standardisation is. It is important that **researchers have and/or obtain a basic knowledge of formal standardisation processes**, including the need to achieve, as regards a formal standard, consensus among many stakeholders; to understand the possibilities and limitations of standardisation-related deliverables such as reference and specification documents (CEN workshop agreements (CWAs), DIN Specs, etc.); and to understand the processes leading up to these deliverables, including their requirements and strict timing.

- Consortia should also **define a common strategic position regarding the planned standards** and standardisation activities. Once consortium members act on behalf of the project in the different WGs and standardisation fora, they should have the backing of the various consortium partners and avoid situations where different consortia partners contradict each other. This entails finding common denominators regarding technical features to be developed further in the standardisation activities.

Recommendation B3: **Make standards a tangible component in the proposal and project**

Standardisation has to be a tangible component of a research proposal and situations of '**standards-washing[6]' has to be avoided**.

Making standardisation tangible should happen through the translation of relevant activities into work packages or tasks. Underpinning these activities with budgets, time resources and responsibilities is more likely to ensure that the planned activities are carried out.

Recommendation B4: **In case of collaborative project, involve partners with standardisation experience in the team, with good access to the standardisation community**

There is a **strong need to have partners** in the consortium **with standardisation experience** who also have good access to the standardisation community. Ideally, such partners should already be on board from the start. Most importantly, there need to be good links to Technical Committees (TCs) of the SDOs, which in the end take the decisions on ongoing standardisation activities. Ideally, researchers in the consortium should hence also be members of the relevant TCs.

If this cannot be achieved from the start, alternatives might be to involve TC members (or active standardisation specialists) as sounding boards for the project. Yet another option would be to involve SDOs as project partners or subcontractors in the consortium.

Another important activity is the provision of training and awareness raising for all consortium members who are not highly familiar with standards and standardisation. Awareness raising and training could also be offered by SDOs specifically to researchers as part of project activities.

SDOs have an important role of facilitator. It is important to have good links established to the TCs and WGs, and, if this can be already guaranteed through the relevant backgrounds of researchers involved, having additional facilitation and guidance through an SDO might not be necessary.

Recommendation B5: **Invest in and cater for stakeholder management throughout the project**

Large proportion of standardisation activities translate in practice into stakeholder management. Four areas of action can be identified.

- **Ensuring industry involvement:** Regardless of the kind of contributions to standardisation (whether this is a full-grown standard to be amended or developed further, or an intermediate step such as a CWA), there is a need to have as much industry backing as possible – not only for the standardisation activities to succeed, but also generally to ensure uptake and wider-reaching commercialisation of the innovations developed. Industry involvement can be from the start in the form of having relevant industry payers in the project consortium, or by ensuring uptake by substantiating the proposal in terms of standardisation activities with letters of intent.

[6] Following the analogy of green washing, 'standard washing' is meant as form of marketing spin in which standardisation is deceptively used to persuade proposal evaluators that the proposal aims at creating standards or involving in standardisation.

- **Implementing a good marketing and communications policy:** It is advised to develop a dedicated marketing and communications plan in relation to standardisation activities. In this regard, some case study projects have reverted to measures such as dedicated websites, mailing lists or series of webinars specifically designed for that purpose.

- **Training for negotiation skills and policy work:** For many researchers who are not familiar with standards and standardisation, stakeholder management may be a new area of activity. Therefore, training in this area (e.g. negotiation skills, policy work) may need to be considered. Researchers may find relevant information on support via the HSBooster.eu portal.

- **Resourcing:** Stakeholder management is a time-consuming activity, the extent of which can be surprising to researchers inexperienced in this matter. Hence, sufficient time and resources need to be allocated for these activities.

Recommendation B6: **Be realistic about outputs, outcomes and impacts – consider appropriate key performance indicators**

For many projects the involvement in creating a new standard may not be the best or even a feasible option. At the same time there is a great potential in pre-normative activities of R&I funding programmes, where researchers gain important knowledge that could contribute to standard development.

The following options are suggested for consideration:

- **Portfolios/strings of projects:** While it is hardly possible to support the definition of a standard substantially within the time frame of an R&I project, there are success stories where this has been achieved with a string of research projects (i.e. projects that have predecessor projects) and/or using synergies with other funded research projects that run in parallel. To the extent that the realisation of project strings/portfolios is realistic and feasible, this approach could be strategically shaped for developing new standards with the support of R&I funding.

- **Contributions to standardisation using intermediate contributions (reference documents and specifications):** If developing a new standard as whole is out of reach, because it is too difficult to reach consensus in the communities within the available time, projects can be more closely involved in the work of Technical Committees to develop standardisation documents that do not need full consensus, for example reference documents and specifications such as CWAs and DIN Specs. Projects should make themselves familiar with the advantages and disadvantages of these tools (and, again, make themselves aware that the overall aim is to gather as much industry support behind these specifications as possible, not the specifications per se).

It is also important to consider the development of KPIs that take the aspect of realistic outputs, outcomes and impacts into account. This also mirrors at project level recommendation A5 above.

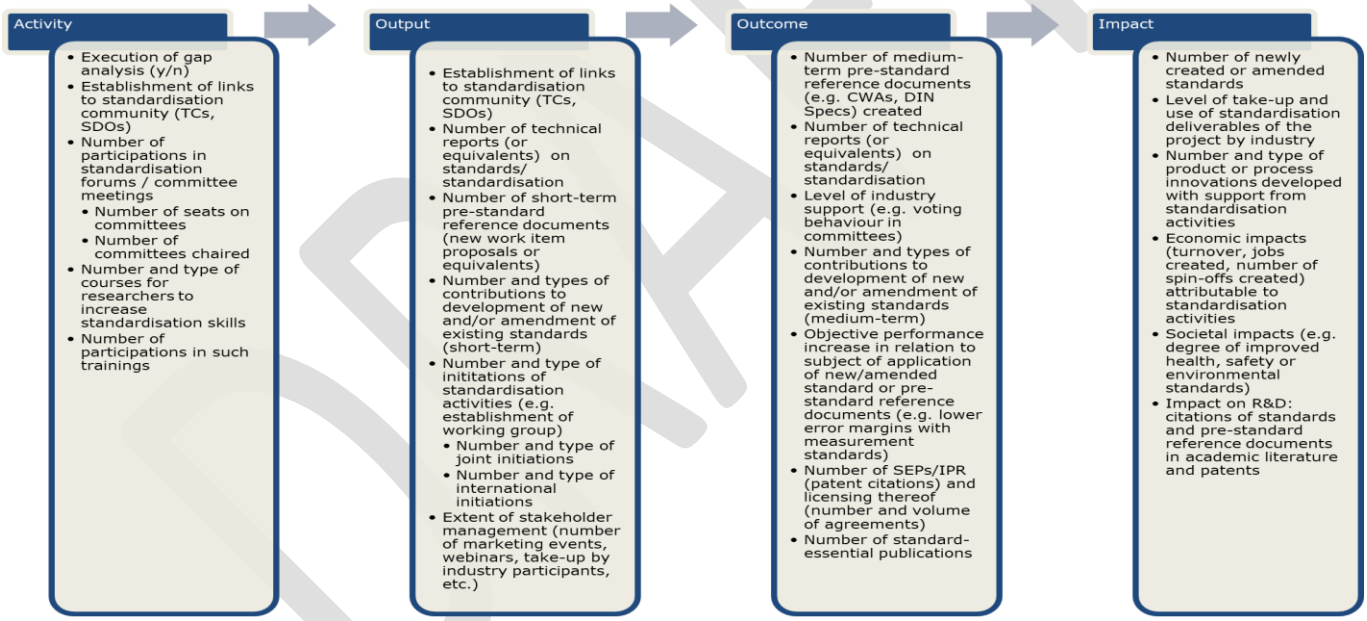
Recommendation B7: **Strive for combined qualitative and quantitative performance reporting for evaluations and monitoring**

Combined qualitative and quantitative reporting on indicators for assessing valorisation performance might be warranted: indicators should hence be defined, and the corresponding data collected, but

instead of simply relying on indicator values, **emphasis should be placed on qualitative reporting and interpretation of the indicators, such as in the form of (self-)assessment reports**.

The number of pre-standard reference documents and specifications such as CWAs (as well as other outputs, such the more short-term new work item proposals) look as if they are sensible output and outcome indicators. However, like patents, they are not a direct measure of actual valorisation and commercialisation, as CWAs may have limited impact. Even the adoption of a standard – a straightforward-looking indicator, but not realistic for a single R&I project because of the time it takes to develop – may not be sufficient for successful commercialisation, as they may end up not being used either.

The figure below indicates a list of potential indicators and a suggestion of which level of the impact pathway / logic framework to use to measure the indicator, as a basis for further discussion. The outcome level is chosen such that the outcome can be achieved within the running time of a project. The indicators will, in all likelihood, need to be specified further in the context of specific research projects.



Source: Scoping study for the development of a code of practice for researchers on standardisation

Recommendation B8: **Take standardisation issues into account in IP management and strategy (and vice versa)**

Defining standardisation outputs and impacts can usually not be done in isolation from other activities to commercialise research results. Because many such commercialisation activities – including different licensing models (including open-source licences) and the creation of start-ups – involve strategic

considerations regarding the use of IP, IP issues must thus be considered in conjunction with standardisation when defining a proper commercialisation strategy.

IP management must ensure that the **different assets are managed in the context of standardisation** obligations. These considerations at project level should be also informed and guided by the university's or PRO's institution-wide general IP and standardisation policy (see recommendation A1).

Recommendation B9: **Ensure sustainability beyond the running time of the project**

To create impact, particularly in relation to standardisation activities that extend beyond the time frame of a research project, it is necessary that research results be sustained beyond the running time of the project (and even if project participants leave for new jobs). The following options are suggested.

- Having official specification and reference documents such as CWAs can increase the chances that the standardisation-specific research results are sustained in the future. This is due, on one hand, to the official character of such documents, which makes them easily retrievable in standardisation communities. On the other hand, SDOs also have a sort of repository function so that the documents also stay accessible over prolonged periods.

- Beyond the maintenance of project websites and using document repositories for things such as technical reports, an informal way to secure sustainability is to ensure a sufficiently high level of industry interest. The logic is that, if industry is really interested in the standardisation work undertaken, it will itself take the initiative and keep the project activities alive. This is again a rationale for intensive stakeholder engagement during the running time of a project.

- Follow-up projects may be another way to ensure sustainability in the standards development process.

Recommendation B10**: Address standardisation within sector platforms, project clusters or other joint fora**

Recognising that a project alone is often too limited in scope, duration, and resources, a project may seek to consolidate its findings and inputs with other similar projects. Many thematic platforms and clusters already exist in different sectors and seek to improve the performance and maximise progress of their specific sectors. Projects should therefore promote and seek to valorise standardisation as a powerful tool within these fora. Joining forces will bring a broader and more sustainable (than project) space for gathering evidence at sector level.

RECOMMENDATIONS AT POLICY AND STAKEHOLDERS LEVEL

Recommendation C1: **The European Commission shall promote standardisation as means of knowledge valorisation through the collaboration with SDOs, university associations as well as associations of technology transfer offices**

To have researchers and research organisations pick up on the recommendations, it is imperative that action also be taken at policy levels with different stakeholder groups. In this context, there is a foremost a need for the European Commission to liaise with SDOs, associations of universities and

research organisations, and associations of technology transfer offices and professionals (notably the Association of European Science and Technology Transfer Professionals (ASTP)).

Specific activities that could be tackled through this collaboration are:

- Establishing WGs for the harmonised development of indicators to track knowledge valorisation with standards;
- Collection and reporting of the data;
- Elaborating principles by which IP management and policies can be aligned with standardisation activities;
- Offering training and awareness-raising activities (for researchers, but also for TTOs); developing specific support services to be provided by TTOs to researchers (also including referrals to SDOs for specific types of services);
- Elaborating on ways in which research performance assessment can take standardisation activities into account; and evaluating the feasibility of establishing a standardisation helpdesk similar to the already existing European IPR Helpdesk. From April 2022 the Standardisation Booster is operational to help beneficiaries, whose Horizon 2020 and Horizon Europe research results are likely to lead to the revision or creation of a standard.

Recommendation C2: **SDOs should further develop their service portfolios for R&I actors and examine new ways to align their activities with R&I**

It is recommended that SDOs extend their outreach and service activities to other units and stakeholders within universities and PROs. This refers particularly to the offices of vice deans responsible for research at the universities, to TTOs and to the equivalent units in PROs.

Furthermore, SDOs should evaluate whether there are ways, particularly in early phases of standardisation, to make the standardisation processes more flexible and hence easier to synchronise with from the research side. It is imperative to assess possibilities by which authorship and contributions to standards creation by researchers can be better tracked (which is important for measuring research performance in a setting where citations are a major KPI). Finally, training and awareness raising should continue to be offered to researchers and explained in greater detail, such as what are the advantages and disadvantages of 'standards-light'-like/pre-standard outputs (CWAs etc.).

Recommendation C3: **The European Commission should examine the needs of startups and small and medium-sized enterprises in EU funded R&I projects in relation to standards and standardisation**

It is recommended to examine the role of startups and SMEs in R&I projects, specifically regarding their use and exposure to standards and standardisation topics. This is because of, on the one hand, the significant role of innovators, entrepreneurs and SMEs play in innovation but, on the other hand, notable issues such as a lack of awareness and resources (time and money) as well as their having potentially less leverage in TCs than large firms. In this context it is suggested for the European Commission (and SDOs) to seek collaborations with leading SME associations and startup incubators. Overall, this could also lead to specific actions, such as an SME-tailored/SME-specific standardisation booster.

Recommendation C4: **The European Commission and SDOs should raise awareness across Member States and national support structures in relation to the role of standardisation in R&I valorisation**

Outreach activities for the code of practice would not be complete if there were no activities (by the European Commission and/or SDOs) targeting the Member States. Two types of institutions stand out here as target institutions. Firstly, the national ministries in charge of education and research could champion the topic of standardisation and standards, such as when negotiating performance contracts with universities. Secondly, national support structures aim to help researchers in their efforts to participate successfully in R&I projects. Overall, the establishment of a national contact point for standards and standardisation could be considered, too, akin to the already existing national contact points for the thematic areas of Horizon Europe.

3. Conclusions

EU R&I projects using standardisation for valorising their results show consensual patterns of good practices, such as including individuals with standardisation experience in the project team, ensuring good links to the broader stakeholder community and securing industry support.

Major take-aways include the fact that standardisation has to be considered, following a needs and gap analysis, as an important channel for the valorisation and commercialisation of research results (with the observation that this understanding is rather new in the realm of R&I commercialisation and valorisation); the need to cater for standardisation issues, particularly in the planning and proposal phase, especially in relation to avoiding 'standards-washing' and catering for clearly defined tasks and WPs; the need to have close links to TCs; the observation that standardisation activities translate in practice into compelling needs for stakeholder management and engagement activities (covering activities such as lengthy negotiations, policymaking and agenda setting, and outreach and marketing); the need to carefully consider the interplay of IP and standardisation issues; and the important role of know-how with regard to standardisation processes.

European R&I programmes at community, national and regional level have a fundamental role to play by helping identify and transfer research results into marketable solutions by standardisation. This Code of practice shall be instrumental for research actors to raise awareness and to replicate good practices of effective strategies in bringing results close to market.