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Quality infrastructure for innovation in Germany

This chapter assesses the quality infrastructure in Germany, and the extent to which it can support or constrain innovation. Norms and standards by quality-infrastructure institutions play a crucial role in the innovation system, setting the rules of the game and creating path dependencies in global value chains. Germany has traditionally played an important role in the international quality-infrastructure architecture, but the shift towards digital and other new advanced technologies creates a systemic challenge to the country's leadership position and requires policy attention to modernising the quality infrastructure.

Introduction

Norms and standards – ranging from the size of paper to interfaces for human-machine interactions in Industry 4.0 – are key to companies’ ability to innovate and market new products and services. By providing common rules, standard-setting institutions give the legal and financial clarity necessary to invest in innovation. Norms and standards also help secure the legitimacy of the “rules of the game” for public and private economic actors. They can support social welfare by improving product safety and quality, building trust among market participants and reducing transaction costs, especially in cross-border trade. Moreover, well-devised standards spur innovation by codifying accumulated knowledge and forming a baseline from which new technologies emerge, whereas outdated standards increase resistance to change by codifying inefficient or obsolete technology (Allen and Sriram, 2000^[1]; Blind, 2022^[2]).

In Germany, norms and standards are developed and overseen by a network of highly specialised institutions that make up the quality infrastructure, which refers to the public and private institutional framework needed to support and enhance not just standard setting but the general quality, safety and environmental soundness of goods, services and processes. Organisations in the quality infrastructure system are responsible for the implementation of standardisation, accreditation and conformity assessment services such as inspection, testing, laboratory and product certification. Key bodies include the German Institute for Standardisation (DIN), the National Metrology Institute of Germany and the German Accreditation Body. Emerging digital technologies such as artificial intelligence (AI), robotics, batteries and quantum computing pose new challenges and entail novel processes and expertise, requiring an upgrading of the infrastructure.

In practice, the prominence of German industry in the international economy means that German standards and norms are often global. Innovation in the German economy therefore has the ability to shape the regulatory environment and standards beyond its borders, which is a key strategic strength of German industry. The practical – and, as these standards become codified in different legal environments – internationalisation of Germany’s quality infrastructure is particularly important for some of its most successful industries, such as machinery and automotive manufacturing. Being a “rule-maker” as opposed to a “rule taker” can underpin Germany’s ambition for global innovation leadership, but the digital and sustainable transitions, where Germany is not as successful as in other technology fields, could challenge its position.

This chapter is organised into five parts. The first section begins with an overview of recommendations related to Germany’s quality infrastructure. Section 8.1 reviews the key stakeholders in Germany’s science, technology and innovation (STI) quality infrastructure. Section 8.2 deals with German quality infrastructure in an international and EU context while section 8.3 addresses the role of quality infrastructure in the context of the digital and green transitions. Section 8.4 concludes with a discussion of the use of quality infrastructure as a strategic instrument for competitiveness.

Recommendation 9: Digitalise, modernise and strategically use quality infrastructure

Overview and detailed recommendations

Quality infrastructure – the standards and norms that shape and inform manufacturing and services – Germany's competitiveness in the manufacturing of certain goods implicitly granted it global leadership in standard-setting. In a world where output has a higher digital intensity, and a greater degree of interconnectedness exists across products, services and sectors, standard-setting is more complicated. The much faster speed of change in the current period of transitions also requires new approaches and more strategic uses of the standards and quality infrastructure.

R9.1 Enhance digitalisation and develop state-of-the-art capabilities in both the standard-setting process and quality infrastructure. The institutions in charge of standards and quality infrastructure have not completed their digitalisation, despite urgent needs in capacity and infrastructure investment. The digital connectivity across institutions at the federal and state levels also requires attention. Germany's advanced metrology institutions must be strengthened and modernised to deal with the complexity and interconnectedness of the new technologies they must measure, such as autonomous driving or the application of AI in the medical and pharmaceutical sectors. Developing the quality and standards infrastructure also critically depends on supporting investments in human capital, including by promoting the attractiveness of working in this field.

R9.2 Use the quality infrastructure as a strategic instrument for innovation and competitiveness. Germany's leadership in many areas of manufacturing and industry, combined with the high quality of the current metrology system, have conferred on its economy an implicit leadership position in standardisation. This leadership confers competitive and innovative advantages, as it orients global manufacturers towards norms set by German firms. The government should thus adopt a systemic approach to standardisation and the quality infrastructure as integral components of international innovation and competitiveness, explicitly determining their contribution to achieving the "Germany 2030 and 2050" vision.

Relevant global experience

Although Germany's quality infrastructure is generally highly advanced, international best practices can provide helpful guidance. Leading global institutions, such as the American National Standards Institute (ANSI) and the Korean Agency for Technology and Standards (KATS), explicitly address the strategic importance of standards for trade and innovation in their strategies. Two aspects are particularly important. First, as mentioned in the strategic report of ANSI, standards and their application should be continuously monitored and updated to ensure they do not become trade barriers to products and services. Second, international outreach programmes beyond national borders are crucial facilitators of better trade relations and the success of a country's own standards (ANSI, 2021^[31]).

As discussed in Recommendation 9.1, improving institutional operations and engagement with producers and users of new innovations, as well as the wider public, is important for quality infrastructure institutions. This includes capacity and skill development in some key technologies, particularly AI and data-driven digital applications, that affect several important sectors of the German economy and raise new questions on privacy and security. To deal with those developments, ANSI has established "standardisation collaboratives" – forums where stakeholders and experts can advise the Federal Government on how to proceed with standardisation in emerging technology fields that both require technical expertise and affect society (ANSI, 2022^[41]). KATS publishes annual reports on its ongoing activities, providing quantitative data on the benefits and challenges of standardisation that support evidence-based policy making. Both KATS and KSA are active in public schools and universities, by offering certificates and training on the basics of

standardisation and quality assessment, or organising regular educational events (KSA, 2022^[5]). In its 2020 strategy, ANSI also addresses the importance of promoting a standards-literate workforce by building awareness of standards and overall competence (ANSI, 2021^[3]).

8.1. Overview of Germany's quality infrastructure

This section describes the formal institutions that comprise Germany's quality infrastructure for standard-setting, metrology, research and testing, conformity assessment and accreditation, and market surveillance. In addition to these institutions, several informal forums and consortia draft sectoral and industry-wide standards that often become standards in practice.

Since the introduction of the Standards Agreement in 1975, two institutions have acted as the main national standard-setting bodies on behalf of the German Federal Government: DIN and the German Commission for Electrical, Electronic & Information Technologies (DKE).

DIN is a public-private partnership whose primary task is to develop consensus-based standards that meet market requirements. At DIN, work is co-ordinated by the standardisation department, focusing on five key areas: construction; research and transfer; living and environment (relates to health, life sciences and sustainability); industry and information technology (IT); and water, air, technology and resources. In addition, DIN set up several thematic commissions that co-ordinate its activities within a specific area of standardisation, currently health care and small businesses. The main standard-setting work, however, is carried out by its working committees, which bring together technical experts from industry and research to develop standards in specific fields. These committees are either permanent (for example, the construction or information and communication technology [ICT] committees) or appointed for a limited period. to work, and are partly not located within DIN, but rather within industry associations.

DKE, a division of the Association for Electrical, Electronics & Information Technologies (VDE), is responsible for the development of standards and safety specifications in the areas of electrical engineering, electronics and IT. Both are non-profit organisations that finance themselves in large part through the sale of standards (representing 63% of funding for DIN and 95% of funding for DKE in 2019) (BMWK, 2021^[6]).

With regard to the process described in Figure 8.1, anyone can submit a proposal, and all those interested in a specific topic related to standard can participate in the standard-setting process and contribute their expertise. Firms that introduce new products and services are most likely to participate in standard-setting, hence the importance of this process for innovative firms and the competitive advantage of being a first mover (Blind, Lorenz and Rauber, 2021^[7]). Before a standard is officially adopted, the standard-setting institution publishes a draft and solicits public comments, allowing experts to reach an agreement on the standard's content. Moreover, standards are regularly reviewed by experts at least every five years to ensure they reflect current best practice (Hallscheidt et al., 2016^[8]).

Figure 8.1. The standard-setting process in Germany

Other than norms, standards do not require a full consensus of all stakeholders involved in the process



Source: BMWK (2021^[6]), United in Quality and Safety: An introduction to quality infrastructure in Germany and the European Union for policymakers and trade partners. <https://www.bmwk.de/Redaktion/EN/Publikationen/united-in-quality-and-safety.pdf>

8.1.1. Metrology and conformity assessment

Metrology – the science of measurement and the development of measurement units – is a key component of the quality infrastructure. It is vital to the innovation system, as it provides the basis for product development, quality assurance and regulation, and fair and reliable market transactions. The crucial role of metrology is confirmed by studies that find large benefits for productivity and economic growth, especially in IT (Link, 2021^[9]; Robertson and Swanepoel, 2015^[10]).

Economic incentives for market actors to develop measurement units are limited and under-investment is likely, owing to the public-good character and high positive externalities of measurement units, making private provision unviable. Measurement development has high fixed costs, while marginal costs (and benefits) are relatively low so that the government usually becomes the effective provider of metrology services (Robertson and Swanepoel, 2015^[10]). Public policy must therefore play an active role in supporting metrology.

In Germany, two main institutions perform metrology, as well as related research and testing. The National Metrology Institute of Germany (Physikalisch-Technische Bundesanstalt [PTB]) is responsible for developing and disseminating measurement units in the service of science, society and the economy. It derives its legal mandate and activities through 23 laws and ordinances, particularly the German Units and Time Act of 1978, which regulates the legal time in Germany and entrusts PTB with disseminating legal time to the public. PTB is the highest federal authority under the Federal Ministry for Economic Affairs and Climate Action (BMWK).

While PTB is in charge of metrology, the Federal Institute for Materials Research and Testing (Bundesanstalt für Materialforschung und -prüfung [BAM]) conducts research and testing to guarantee the technical safety of products and processes in order to protect people, the environment and material goods. Its working areas include materials science, materials engineering and chemistry. BAM is a senior scientific and technical federal institute overseen by the Federal Ministry for Economic Affairs and Climate Action (BMWK).

8.1.2. Accreditation

The main function of accreditation is to assess the competence of organisations conducting conformity assessment, supporting trust in the quality infrastructure. Accreditation contributes to the effective operation of markets, so that buyers and sellers can trust in the reliability and competence of their (trading) partners, and in the properties of the goods and services on offer (Frenz and Lambert, 2014^[11]). For instance, as accreditation increases the credibility of test reports and certificates, producers can gain greater commercial benefits from the products and services offered. This is particularly true for innovative products and services, creating incentives for further innovation-related investment.

The German Accreditation Body (Deutsche Akkreditierungsstelle [DAkkS]) is the sole provider of accreditations in Germany, and operates in the public interest on the basis of both EU and Germany regulations. DAkkS was established as a limited liability company operating on a non-profit basis. It is owned equally (one-third each) by the Federal Government, the federal states and the Federation of German Industries (Bund der Deutschen Industrie [BDI]).

8.1.3. Market surveillance

Identifying market actors and products that do not comply with German and EU regulations is the main function of market surveillance institutions. Thus, market surveillance not only protects consumers from potentially dangerous products but also promotes fair competition among businesses, based on the same rules for all. In Germany, two main institutions are in charge of market surveillance at the federal level.

The Central Authority of the Federal States for Safety Engineering (Zentralstelle der Länder für Sicherheitstechnik [ZLS]) is in charge of monitoring product markets and co-ordinates the market surveillance activities at the level of the German states. In case of a suspected problem, it delegates authority to respective conformity assessment bodies, which carry out product inspections. ZLS received its mandate through from an agreement of the 16 *Länder* in 1993, but is in fact a higher state authority that operates within the Bavarian State Ministry responsible for technical labour and consumer protection.

In the markets and infrastructures linked to energy, telecommunications, post and railways, market surveillance is delegated to the Federal Network Agency for Electricity, Gas, Telecommunications, Post and Railway (Bundesnetzagentur [BNetzA]). BNetzA is an independent higher federal authority overseen by BMWK and the Federal Ministry for Digital and Transport. It seeks to promote well-functioning markets through deregulation and liberalisation, while ensuring compliance with the German Telecommunications Act, the Postal Act and the Energy Act.

8.2. Germany's quality infrastructure in European and international standard-setting

This section discusses Germany's position in European and global standardisation, which plays an important role in trade, competitiveness and innovation performance. It also discusses current initiatives to strengthen standardisation at the EU and international levels. It highlights areas for improvement, notably missing empirical evidence and the lack of awareness among businesses and policy makers on the impact of standardisation on German businesses and the economy as a whole.

As a major trading country, Germany has a central position in European and international standard-setting. Today, roughly 85% of all national standards projects were originally European or international, which generates significant benefits for the German economy (DIN, 2022^[12]). Economic research shows that standards that are shared by more than one country drastically decrease transaction costs, thereby reducing barriers to the international trade on which Germany depends. By contrast, relying solely on national standards in certain product areas, which foreign market actors may struggle to comply with, may

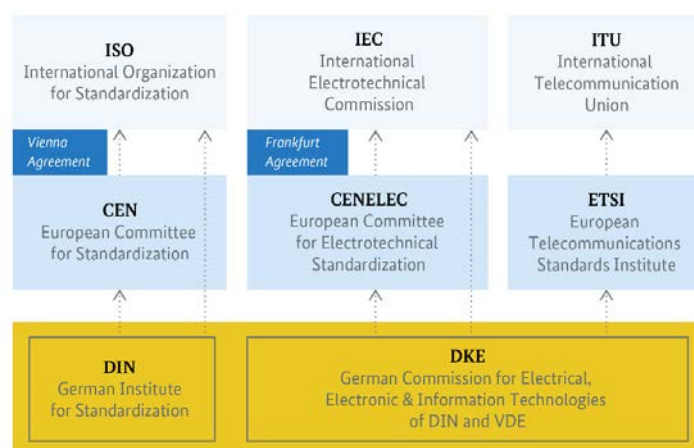
hamper cross-border trade. In particular, the combination of national and international standards is known to facilitate international co-operation and generate higher gains from trade, especially in Europe (Blind et al., 2017^[13]).

However, as at the national level (discussed above), the international standardisation process faces new challenges from the diversification of business models, the increasing role of ICT and the growing importance of services in global value chains. In addition, as the need for communication between market participants grows, owing to the increasing number of production stages in global value chains, standards gain in importance as means of reducing information asymmetries (Blind et al., 2017^[13]). It is therefore crucial for both German companies and policy makers to secure and expand Germany's influence on standardisation beyond the national level. Germany should continue to act as an initiator for international standardisation projects and the regional harmonisation of standards, especially in Europe. This implies the active participation of German companies, especially small and medium-sized enterprises (SMEs), in filling seats on European or international standardisation bodies. Businesses and policy makers in general should see standardisation as a strategic tool for improving Germany's competitiveness. This requires raising awareness of international standardisation, as well as further empirical investigations on the benefits of standardisation for both individual companies and the overall economy in order to guide effective policy.

Germany's main bodies in charge of standard-setting, DIN and DKE, are embedded in a larger network of European and international standardisation organisations. Generally, international standards are set by the European institutes CEN, the European Committee for Standardization (for non-electrotechnical standardisation), CENELEC, the European Committee for Electrotechnical Standardization (for electrotechnical standardisation) and the European Telecommunications Standards Institute (ETSI), as well as by three international organisations: International Organization for Standardization (ISO), International Electrotechnical Commission (IEC) (for electrotechnical standardisation) and International Telecommunication Union (ITU) (for standards in telecommunication). By agreement with the Federal Government, DIN is acknowledged as the national body representing German interests in European and international standards organisations, with DKE closely supporting DIN in line with the German Standardisation Strategy (DIN, 2017^[14]). In addition, DIN can transfer standards established by the consortia into national, European or international standards, and works on harmonising national and international standards to reduce trade barriers.

Figure 8.2. Standard-setting across German, European and international levels

German standard-setting institutions are embedded in a network of European and international actors



Source: BMWi (2021^[6]), *United in Quality and Safety: An introduction to quality infrastructure in Germany and the European Union for policymakers and trade partners*. <https://www.bmwk.de/Redaktion/EN/Publikationen/united-in-quality-and-safety.pdf>

At the European level, the importance of standards has been explicitly recognised by the European Commission's Joint initiative on Standardisation, which was established through the 2015 Digital Single Market strategy. The joint initiative aims to advance the EU standardisation system in co-operation with industry, standardisation organisations and the wider standardisation community (European Commission, 2016^[15]). It prioritises (1) improving awareness, education and understanding about the European Standardisation System; (2) promoting co-ordination, co-operation, transparency and inclusiveness in standard-setting; and (3) supporting competitiveness in international trade. In line with the Digital Single Market strategy, EU-level efforts have focused specifically on ICT technologies and reviewing the European interoperability framework. However, there remains significant untapped potential in the development and use of voluntary European service standards, which currently account for only a small fraction of EU standards.

In early 2022, the Commission presented an updated Standardisation Strategy that shifts the focus explicitly on standards as a strategic tool for competitiveness and for supporting member states and the European Single Market as a whole (European Commission, 2022^[16]). In five key areas for action, the strategy recognises the EU's need to be assertive and strategic at international level and seeks to address standardisation issues arising from the green and digital transformation of the EU's industrial ecosystem. A central goal is to prioritise standardisation in strategic areas, especially in medicine production, critical raw materials recycling, clean hydrogen value chains, low-carbon cement, chips certification and data standards ("1. Anticipate, prioritise and address standardisation needs in strategic areas."). This includes setting up a high-level forum to anticipate and inform future standardisation priorities, a new Chief Standardisation Officer function to ensure high-level guidance across the Commission on standardisation activities as well as an EU excellence hub on standards.

The strategy also outlines several actions for improving the governance and integrity of the European standardisation system ("2. Improve the governance and integrity of the European standardisation system."). To avoid undue influence of outside actors on the development of standards for key areas, like cybersecurity or hydrogen standards, standardisation mandates at the request of the Commission should in the future be handled by national standardisation bodies. Further, the Commission will launch a peer review process to support the modernization of national standard organisations, particularly with regards to the inclusiveness for civil society, users as well as SMEs-friendly conditions for standardisation.

On a global level, the Commission aims to strengthen the EU's leadership position by establishing a new mechanism with member states and national standardisation bodies to share information, coordinate and strengthen European approach to international standardisation ("3. Enhance European leadership in global standards."). Moreover, standardisation will be linked closer to EU-funded research programmes, for instance by supporting researchers under Horizon 2020 in testing the relevance of their results for standardisation as well as through a new Code of Practice for standardization in a research context ("4. Support innovation."). Lastly, the new strategy outlines the Commission's goal of promoting standardisation expertise and awareness of standards among academic researchers ("5. Enable the next generation of standardisation experts.").

At the international level, ISO – which numbers more than 160 member countries – is the most important forum for German influence on standardisation. German interests at ISO are represented by DIN, which sends expert delegations to ISO working bodies, who then vote on standardisation decisions. In addition, DIN holds a large number of secretariats of ISO committees and working groups. Participation in these committees and working groups offers companies and research institutions the opportunity to place their research results at the international level and promote their own technical specifications as international standards. As of 2022, Germany is one of the most important members of ISO and participates in 700 ISO technical committees (Blind and von Laer, 2021^[17]), positioning Germany at the third place worldwide behind France and China. DIN, as a permanent member of ISO steering committees and the ISO Council, as well as through its regular participation in the annual ISO General Assembly, can also actively shape the strategic direction of international standardisation. As technological development

accelerates and moves away from the traditionally strong sectors of the German economy, DIN should step up its efforts to represent German interests.

Beyond formal co-operation across the European and international levels, German institutions regularly engage in international partnerships to develop a more coherent and uniform body of standards and specifications, and promote trade and product safety. An important platform for collaboration is the Global Project Quality Infrastructure (GPQI), which was established in 2017 by BMWi (now BMWK), jointly with important trading partners including Brazil, China, India, Indonesia, Mexico, Canada, the Eurasian Economic Union and the United States. The goal of GPQI is to support the international harmonisation of quality infrastructures among participating countries. It is set up as a multi-stakeholder platform that brings together governments and experts from the public and private sectors. Similarly to national standard-setting, GPQI initiates and implements political and technical dialogues where each stakeholder can propose topics. These topics often concern co-operation on specific sectors (e.g. chemistry or transport) or the harmonisation of activities and procedures (e.g. in metrology).

8.3. Digitalisation and the green transition create new demands on Germany's quality infrastructure

Accelerated technological developments pose new challenges to Germany's quality infrastructure, notably by requiring institutions to improve their speed of work. Quality infrastructures were traditionally developed to deal with linear innovation processes, but today's technological developments tend to be much more dynamic, creating a greater degree of interconnectedness across products, services and sectors. Standard-setting bodies need to find new ways of processing and keeping up with these fast-paced technological developments, particularly in areas like autonomous driving, or the use of AI in critical fields such as medicine and pharmacy.

Developed in 2016 by representatives from all the institutions involved in standard-setting, the German Standardisation Strategy was an important first step towards future-proofing Germany's standard-setting capacities and role as a global rule-maker (DIN, 2017^[14]). The strategy sets out six specific goals for the future development of DIN and DKE.

- Goal 1 emphasises the role of standardisation for international – and especially European – trade. It pledges to promote the adoption of international standard agreements in Germany while ensuring high transparency of standard-setting in the country.
- Goal 2 stipulates that standardisation should also be employed as an instrument for deregulation allowing participating actors to achieve independent and consensus-based agreements that do not require detailed legislative action.
- Goal 3 recommends new processes and open platforms for co-ordination in standard-setting. This is particularly relevant to future-oriented topics, such as “smart cities”, Industry 4.0 and the energy transition, which require much broader stakeholder involvement. The digitalisation of standard-setting, and utilisation of open-source methods and technologies in standardisation, will support this goal.
- Goal 4 recommends reducing standard-setting costs, and promoting the active involvement of industry and SME associations, as well as actors from society as a whole.
- Goal 5 recognises standard-setting as a strategic instrument allowing companies to promote their own (or favourable) standards in global competition. However, this means that standardisation should be transparent and easily accessible, and that corporate management considers participation in standardisation committees as both beneficial and effective.

- Finally, Goal 6 recommends improving public recognition of standardisation thanks to transparent and efficient standard-setting procedures, and by promoting the role of standard-setting in ensuring quality, safety and innovation.

Table 8.1. Impacts of standardisation on innovation

The positive impacts of standards on innovation outnumber the negative impacts

General functions of standards	Positive impacts on innovation	Negative impacts on innovation
<i>Information</i>	• Provide codified knowledge relevant to innovation • Co-ordinate collaborative innovation activities	• Generate cost for standard screening • Allow unintended knowledge spillovers to competitors by implementing standards
<i>Variety reduction</i>	• Allow exploiting economies of scale through standards • Support critical mass through standards in emerging technologies and industries • Create incentives for incremental innovation based on standards	• Reduce choice • Support market concentration • Push premature selection of technologies • Limit incentives for radical innovation
<i>Minimum quality</i>	• Create trust in innovative technologies and products on the demand side	• Promote market concentration
<i>Compatibility</i>	• Increase the variety of system products • Promote positive network externalities • Avoid lock-in into old technologies	• Push monopoly power • Promote lock-in into old technologies in case of strong network externalities
<i>Insurance</i>	• Serve as insurance against failure of radical innovation	• Create incentives for incremental rather than radical innovation

Source: Blind (2022^[2]), *Standard and innovation – What does research say?*, <https://www.iso.org/files/live/sites/isoorg/files/store/en/PUB100466.pdf>.

Further steps towards modernising standard-setting in Germany are being developed by QI Digital, a consortium established in 2021 by BAM, DAkkS, DIN, DKE and PTB, and supported by BMWK. The goal of QI Digital is to develop ways for quality infrastructure institutions to exploit new developments in digital technologies and internationalise the standardisation process. To identify and illustrate practical implications of emerging technologies for Germany's quality infrastructure, the consortium has compiled use cases for a number of fields. This includes new products and production technologies, where additive manufacturing such as 3D printing drastically reduces requirements for production chains and allows manufacturing very small batch sizes of new products (e.g. in aerospace, energy and medical technology). In such cases, conventional conformity assessment methods are often inadequate, requiring new procedures for process-integrated quality assurance, non-destructive testing, and digital evaluation of process and measurement data. This is also the case for digitally connected networks of hydrogen filling stations, for example, where more complex hardware and software interfaces, and interactions between producers, suppliers and customers (e.g. through distributed ledger systems on a blockchain) require new approaches to digital systems and data security in quality infrastructures.

AI is another key technology where quality infrastructure institutions must assess whether existing standards and specifications are still suitable, and find new ways to evaluate autonomous and self-learning systems (Wahlster and Winterhalter, 2020^[18]). The rapid development and wide applicability of AI poses a particular challenge to the quality infrastructure, notably with regard to ethical considerations, quality, conformity assessment and certification, and IT security. To improve Germany's capacities in this field, specifically in standard-setting, DIN and DKE jointly developed the *German Standardization Roadmap on Artificial Intelligence*, which was published in 2020 (Wahlster and Winterhalter, 2020^[18]). The roadmap

aims to provide a framework that guides standardisation efforts in AI to support German industry in international competition, as well as promote an innovation-friendly environment for AI research and development (particularly at the European and international levels). The roadmap's six recommendations focus on the implementation of data reference models that ensure the interoperability of AI systems, the creation of security standards, and the initiation and promotion of standards for reliable and “trusted” applications of AI.

In addition to investments in digital capacities, developing Germany's quality infrastructure depends critically on investments in human capital. This includes promoting the attractiveness of working in the various quality infrastructure institutions, and creating university chairs and programmes that both produce scientific knowledge and educate future experts in advanced technologies and their regulation.

8.4. Using Germany's quality infrastructure as a strategic instrument to promote innovation and international competitiveness

8.4.1. Standard-setting for global leadership

Standard-setting should be an international effort if it is to reduce transaction costs in cross-border trade and promote the compatibility of new inventions with existing ones in world markets. In Germany, these efforts have been largely driven by export-oriented companies, which actively promoted their product standards among global manufacturers and took a leadership position in standard-setting for many areas of manufacturing and industry. In the context of the digital and sustainable development transitions, many new standards will need to be set for fundamentally different projects where setting the standards can yield a competitive advantage. However, such strategic uses of Germany's quality infrastructure rely critically on business innovation being at the frontier, since (as has always been the case) leadership in innovation supports building international standards.

Policy makers should recognise and support standardisation as an integral part of international innovation and competitiveness. The German Standardisation Strategy (Goal 5) has already highlighted the need to support businesses in using standardisation as a strategic tool (DIN, 2017^[14]). Government support for standardisation, both in the form of resource allocation and indirect promotion of standards (e.g. through public procurement), can crucially support the innovation system. This includes active involvement in international standard-setting bodies, where Germany had a strong position in the past, but which increasingly require engagement, expertise and funding to keep up with accelerated technological developments beyond Germany's traditional core industries (e.g. software and AI). The central contribution of standard-setting – and the quality infrastructure more broadly – to realising the vision for Germany 2030 and 2050 should also be discussed by participants of the forum (see R1.1).

8.4.2. Engaging firms in quality standards

Companies benefit from actively participating in standards projects. By interacting with specialists in other areas, they can gain a knowledge lead, introduce their own technologies and help shape the content of standards. Furthermore, innovations that have been guided by standardisation processes from the initial idea to the market launch have a better chance of penetrating the market. Clearly, standardisation is an important strategic instrument in a company's technology and innovation management portfolio. Participating in the development of standards is a valuable alternative to – or can supplement – the patenting process, which can be cost-intensive and often only touches on a limited topical aspect (DIN, 2017^[14]).

At the same time, technical experts are aware of the benefits of standardisation for their companies. Their technical know-how and experience are indispensable to the success of standard-setting work. However,

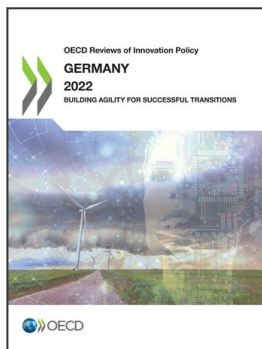
companies can only unlock this potential when they integrate standardisation in their overall strategy. It is essential that management recognise and value employees' commitment to their work in standards committees, for example by securing the financing allowing them to attend committee meetings. Companies' participation in standard-setting should be further promoted by easing and digitising access to the standard-setting process and committee meetings, particularly for corporate management and technical experts.

In addition to efforts by DIN, DKE and other quality infrastructure institutions, BMWK promotes firms' participation in standard-setting with EUR 26 million (euros) annually through the "WIPANO – Knowledge and Technology Transfer through Patents and Standards" programme. Since 2016, WIPANO has supported firms in identifying, protecting and exploiting economically promising research results through expert advice on patenting and standard-setting procedures.

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