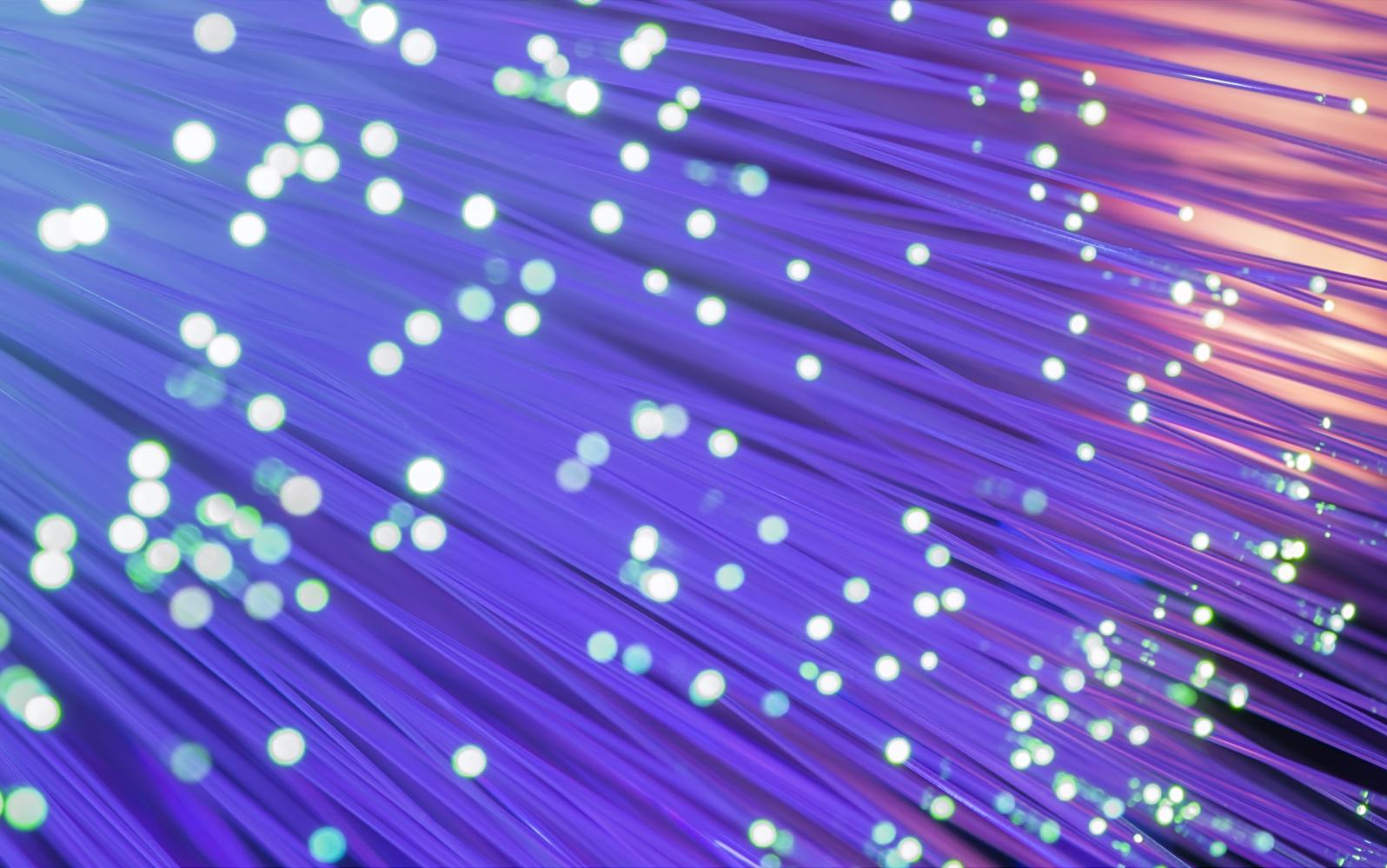




UNITED NATIONS
INDUSTRIAL DEVELOPMENT ORGANIZATION

STANDARDS & DIGITAL TRANSFORMATION

Good Governance in a Digital Age

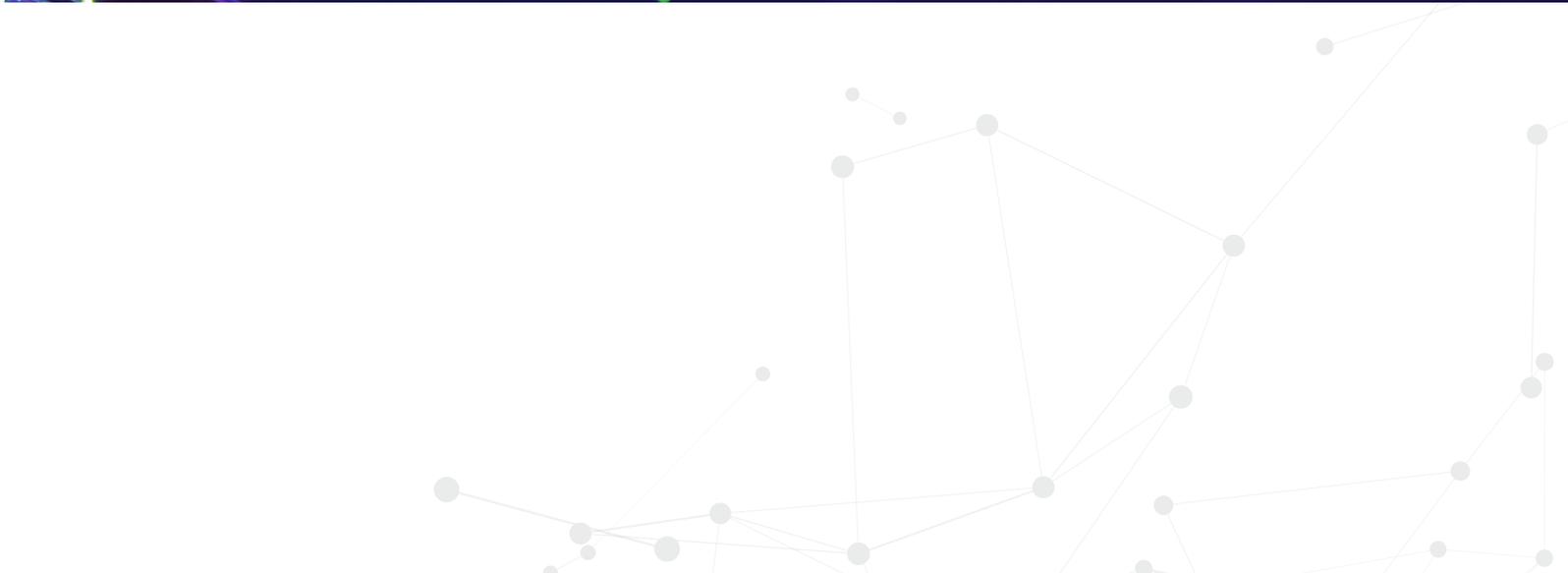




The world is in the midst of the Fourth Industrial Revolution (4IR) powered by digital technologies that are transforming society, economies and the environment. Increasingly connecting objects, machines, people and the environment, the disruptive nature of these technological innovations makes it difficult to plan for and anticipate the future. What is clear is that the seismic shift that digital transformation brings has major implications for sustainable development.

Timely and harmonized standards can play a pivotal role in shaping the digital transformation process, complementing regulations and contributing to digital transformation governance. Standards can facilitate the ongoing digitalization of industry by enhancing productivity and efficiency, promoting compatibility and interoperability between products and processes through common language, while guaranteeing minimum levels of quality and safety. Furthermore, standards can serve as accelerators of change as they promote innovation and the uptake of new digital technologies and spread knowledge through codification.

This brochure, introduces a broader publication developed by the United Nations Industrial Development Organization (UNIDO), which describes digital transformation, its key drivers and the implications for three of the Sustainable Development Goal (SDG) pillars—people, prosperity and planet. It also highlights the role of standards in digital transformation governance. A review of the international standards landscape was undertaken for seven of the most-trending digital technologies of the 4IR. While standardization reflects the different features and scope of impacts of 4IR technologies, this publication identifies the essential criteria to understand how to develop appropriate and effective standards for digital transformation worldwide. Based on the review, further consideration is given to what good governance principles are necessary for guiding the development of standards in the digital technology landscape to ensure that the technologies remain human-centered and aligned to the goals of sustainability.





CHANGING WORLD – THE FOURTH INDUSTRIAL REVOLUTION

Revolutions and change have marked human development. What distinguishes the 4IR from previous industrial revolutions is the parallel technological breakthroughs within and across the digital, biological and physical spheres. The complexity and rapid pace of change of the 4IR also make the revolution unique compared to previous industrial revolutions. Moreover, the COVID-19 pandemic has acted as an unanticipated accelerator to the pace of change and structural shift towards the 4IR and the adoption of new technologies.

The 4IR is still being shaped. The digital technologies that sit at the heart of the 4IR will irrevocably transform systems and, consequently, how people live, work and play; therefore, societies need to understand its risks and rewards. It is essential to ensure the new technologies in the digital, biological and physical worlds remain human-centered and serve society and the planet as a whole.



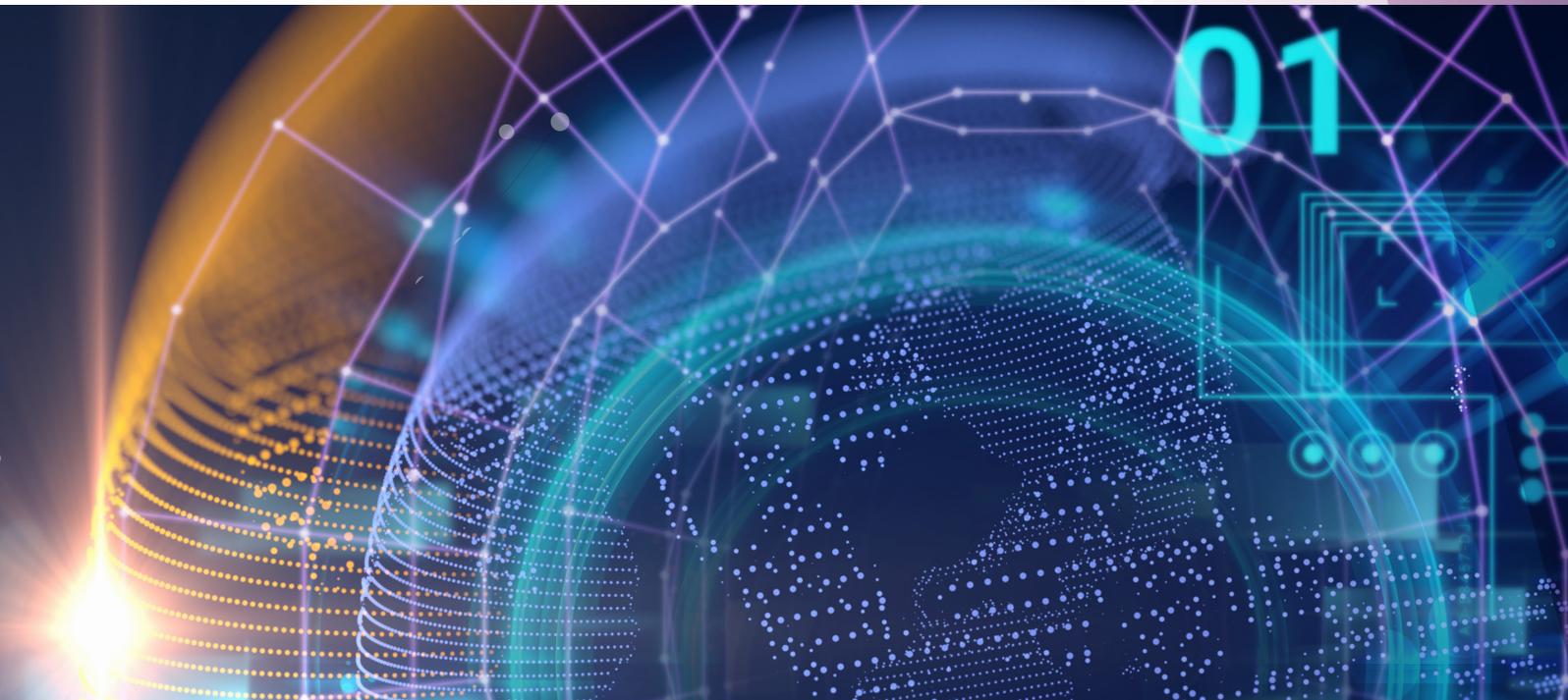
IMPLICATIONS FOR SUSTAINABLE DEVELOPMENT

The 4IR is in full steam. It already has global implications for sustainable development. Enormous consequences arise from the new and transformational technologies as they enable new modes of production, new businesses and societal models and new behaviours that can disrupt established and fundamental paradigms.

The pace and the complexity of the 4IR can blur international borders and entangle boundaries between public and private, presenting national regulators with unique governance challenges. Regulation can struggle to keep up with advances of the 4IR, hindering innovation and leaving society with outdated laws and regulations. Regulators need to adopt a more agile, flexible approach to regulation to seize the potential of the 4IR to deliver benefits to society and manage its risks.

To grasp the opportunities and mitigate the risks from 4IR technology, the 'regulate and forget' approach needs to give way to an 'adapt and learn' approach.

The SDGs sit at the center of the 2030 Agenda for Sustainable Development and guide global, regional and national development endeavours until 2030. Subsequently, as the 4IR continues to reshape the world, alignment with the SDGs is fundamental to ensure that benefits accrue for people, delivering them prosperity, and that the planet is protected.





DIGITALIZATION AND THE DIGITAL TRANSFORMATION

The 4IR is characterized by the widespread and ever-increasing phenomena of *digitization*, i.e. the conversion of analogue information into the digital form. At the same time, the ever-greater *digitalization*—the development and application of digital and digitalized technologies that augment and dovetail with all other technologies and methods—is serving to reinforce and expand the *digital economy*.

In a larger context, digital transformation is a broader term than digitalization. It is the integration of digital technology into all organizational areas, fundamentally changing how the organization operates and delivers value to customers or stakeholders. It is also about prioritizing organizational culture change, which requires organizations to continually challenge the status quo, experiment, and learn from failure. Digital transformation is a widely used term that, in practice, will look very different in each organization. In essence, it refers to the customer-driven strategic business transformation requiring organizational change and the implementation of digital technologies.

The three factors that are driving the digital transformation include: necessity, the technology itself, and the heightened set of expectations that have been raised by digitalization.





DIGITAL TRANSFORMATION IMPACTS ON PEOPLE, PROSPERITY AND PLANET

The accelerated pace of change brought about by digital transformation to production, the economy, the environment and society will significantly impact the achievement of the 2030 Agenda for Sustainable Development and SDGs. As a development driven by humans, despite still being in its infancy with little mention made to it in the SDGs, digital transformation has the potential to be shaped to promote sustainability for the benefit of all parts of society.

- » *Implications for People* - Digitalization is unevenly distributed but offers the potential for overcoming spatial and social barriers to benefit **people**.
- » *Implications for Prosperity* - Digital transformation is fundamentally changing the commercial world, impacting competition whilst disrupting markets and affecting **prosperity**. Digital technologies are transforming production by enabling new production methods and business models.
- » *Implications for Planet* - Unchecked digital transformation unaligned with the environmental constraints of the earth will negatively impact the **planet**, increasing resource and energy consumption, exacerbating damage to terrestrial and water ecosystems and accelerating climate change. Digital technologies offer the potential to contribute to the protection of the planet.





THE ROLE OF STANDARDS

The role of standards in economic governance derives from the wide range of functions that they fulfil. Amongst others, standards have the potential to reinforce opportunities, enhance productivity, and promote technology adoption, while minimizing risk, improving safety, and supporting policy and legislation. These functions, in turn, affect the economy in a variety of ways, including through the improvement of competition and efficiency, the exploitation of network effects, the diffusion of innovation and the reduction of production costs.

There is also a circular relationship between standards, regulations and policies, which feed into an overall concept/public good of good governance. Standards are a voluntary complement to regulation, which have the effect of enhancing efficiency and productivity. These standards inform effective regulations, which can create an enabling environment for innovation and minimize risk for disruptors and investors. Standards developed by international organizations can provide an effective response to market barriers.

In the context of digital transformation, the timely and harmonized adoption of standards is likely to play a key role to this end, both as a means of promoting interoperability, productivity and innovation, and also of ensuring the successful scale-up of solutions to be implemented globally. Standardization can offer a number of benefits and opportunities for digital technologies. These outcomes may be especially beneficial in restoring international manufacturing and trade to their previous vitality, as both sectors slumped significantly due to the COVID-19 pandemic, the associated lockdowns and value chain breakdowns in many regions.

Digital technologies and the new business models of digital transformation do not fit easily into the traditional regulatory framework regulators use to intervene in markets. It is clear that previous modes of governance, which are largely reactive in nature, cannot hope to be effective in the era of advanced digital transformation. Governance rules and regulatory approaches for new technology and processes of innovation need to be more agile, flexible and resilient through the development of experimental regulation such as regulatory sandboxes, anticipatory approaches, multi-stakeholder use of guidelines and standards, and the promotion of international initiatives.

Even though the world has witnessed a rise of standards-setting activities related to digital technologies in recent years, it still falls short to meet the need of producers, consumers and regulators and remains fragmentally concentrated at the national level, leaving plenty of work for international exploitation and harmonization.





SEVEN BIG TECHNOLOGIES

The digital transformation is powered by digital technologies of the 4IR. The rapid adoption of these disruptive technologies is accelerating and has been further boosted by the COVID-19 pandemic. Global spending on digital transformation technologies and services grew by 10.4% in 2020 and is projected to grow by more than 10% in 2021.

Technological adoption is not a geographically even process; a greater quantity and rapidity of technology adoption is happening in developed countries. Least developed countries are hampered by, among other things, lack of information and communications technology (ICT) and access to proper architecture and basic assets such as computers and smart devices but most importantly, the capacity to ensure people have the right set of basic skills. Illustrating this unevenness: in 2019, 92% of Swiss households compared to 38% of Bangladeshi, 36% of Peruvian and 34% of Pakistani households had access to ICT.

Detailed descriptions are included in the full publication of the following seven digital technologies important to the digital transformation: artificial intelligence, big data, blockchain/distributed ledger technology, Internet of Things, robotics, 3D printing and autonomous vehicles. The scope and impact of these technologies vary and standardization has a role to play in each one to help deliver trust, privacy, protection, interoperability and sustainability.

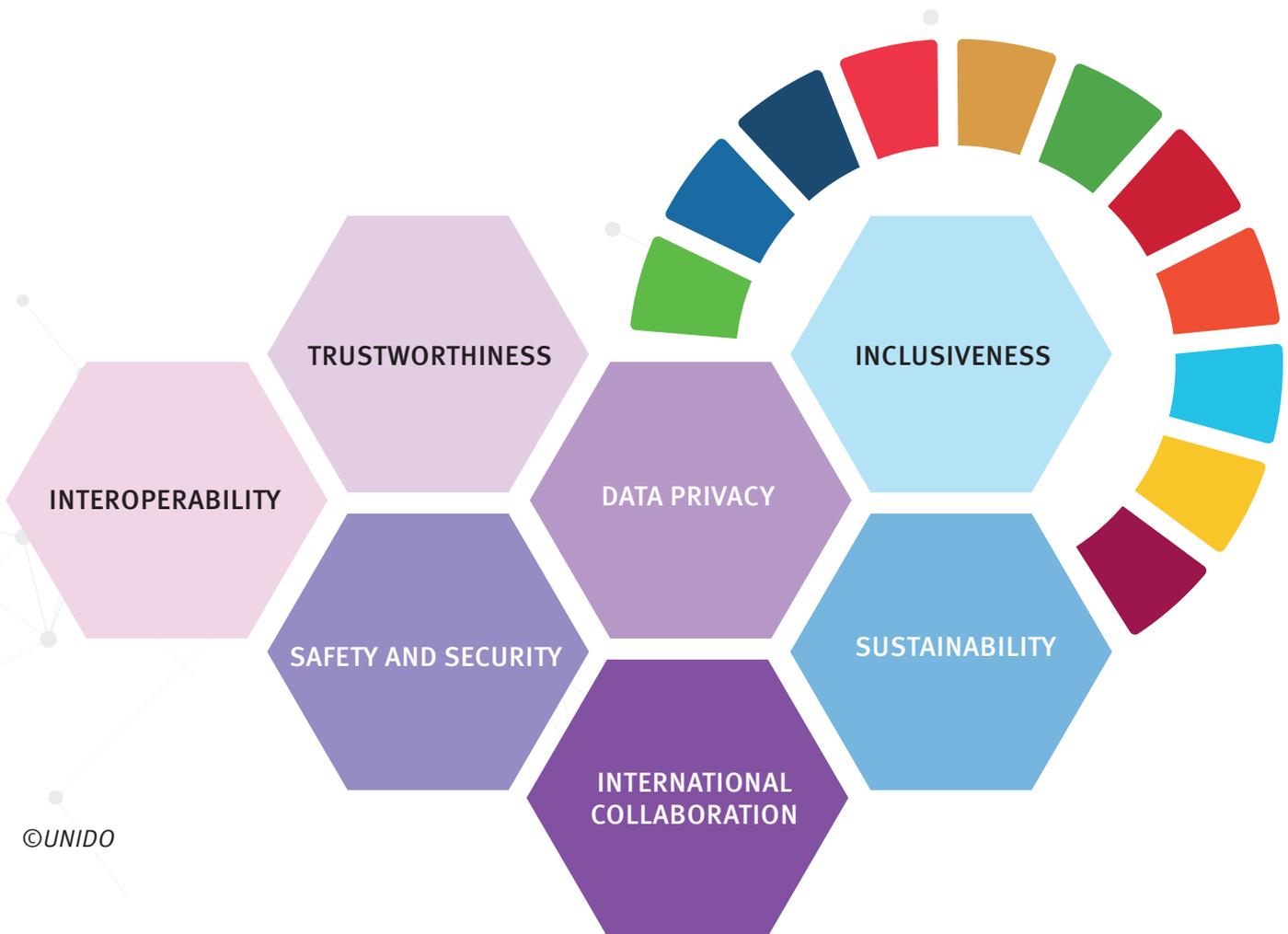


PRINCIPLES FOR GOOD GOVERNANCE IN A DIGITAL AGE

The rapid and extensive adoption of digital technologies and their far-reaching pervasive impact on people, their prosperity and the planet suggest a core set of distinct principles is needed to guide standards developed for digital transformation governance.

The review of current developed digital-related standards and the activities of standards developing bodies' committees in the digital space, and for the seven big digital technologies in particular, evidenced that the following seven principles should be placed at the center of standards making:

- » Trustworthiness
- » Inclusiveness
- » Sustainability
- » Interoperability
- » Safety and security
- » Data privacy
- » International collaboration



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The seven principles relate to the impacts of new technologies in the digital era and are based on the nature and internal mechanism of standardization in the context of digital transformation governance. They cover notable concerns about the complex impacts of new technologies on people and the planet, in terms of well-being and ethics, as well as the key factors emerging from the evolving discussions about what should be considered in standards making in the context of digital transformation governance.



LOOKING INTO THE FUTURE

Progress in the innovation and development of digital technologies and digital transformation is creating a fast-moving environment and is unstoppable. The evolving regulatory and policy frameworks develop appropriate governance rules for technology, however, this evolving framework has limitations such as being primarily nation bound and time-consuming. Standards have an important role in this framework, being transnational, multi-stakeholder driven, speedy to develop and responsive to user needs.

Standards have the potential to contribute to digital transformation governance. In order to unlock this potential, the following aspects should be considered:

- » The scope of impacts of the digital technologies shaping the 4IR vary. A robust strategy is required to understand the implications of current and future technologies and to shape the digital transformation towards people, their needs and the planet.
- » Standards developers worldwide need to work as a community to provide objectivity, credibility, and transparency in their standards work and to ensure their output is understandable and usable.
- » There is a need for collaboration and technical cooperation between standards developers of all types to ensure the most comprehensive, high-quality, and up-to-date selection of standards for digital technologies and a high level of convergence is produced. This includes creating an inclusive environment and allowing equal and appropriate representation of all relevant stakeholders, which is paramount in standardization.
- » Sustainability is an area where the link must be made more evident in standards developed for digital technology. In doing so, the impacts of digital technologies can be taken into account and their transformative capabilities can be better leveraged to strengthen all SDG pillars—people, planet, prosperity, partnership and peace.
- » Standardization, guided by the seven principles of trustworthiness, interoperability, safety and security, data privacy, inclusiveness, sustainability and international collaboration, can support people, prosperity and the well-being of the planet. Building on strong partnerships, the standards community can ultimately contribute to good governance and peace and sustainable development worldwide.



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