ITU News MAGAZINE

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2022

Standards for digital societies

Coming together for inclusive standardization

By Houlin Zhao, ITU Secretary-General

The World Telecommunication Standardization Assembly (WTSA-20) held from 1 to 9 March 2022, underlined the key role of International Telecommunication Union (ITU) standards in all of our economies and societies, as well as the fundamental importance of international cooperation.

We reviewed the strategic direction, structure and working methods of the ITU Telecommunication Standardization Sector (ITU-T). Importantly, we also welcomed new members of ITU-T leadership teams for the coming study period.

A conference like WTSA-20, much like ITU standards, stands as a testament to the enduring value of international collaboration, highlighting the contributions and efforts made by all engaged participants.

Through the various committees, working groups, and over 90 ad hoc groups that were formed over nine days of the conference, we had the privilege of hearing from dedicated, long-serving ITU members deeply invested in ITU standardization work for the world to be equipped with more technologies.

In particular, I would like to thank Bruce Gracie of Canada, Chairman of ITU's Telecommunication Standardization Advisory Group (TSAG) for the past two study periods and Chairman of WTSA-20, to whom I awarded an ITU gold medal for his outstanding contribution and leadership.

In recent years, we have seen new partners moving forward with ITU as part of our standardization work. This kind of collaboration to build future-ready technical and business ecosystems has become increasingly complex, yet it is more important than ever before. As we move forward, I call on the ITU family and its partners to keep working together to accelerate digital transformation for all.

This edition of the ITU News Magazine highlights key topics discussed at WTSA-20, as well as the Global Standards Symposium (GSS) that preceded the conference.

> *"We had the privilege of hearing from dedicated, long-serving experts who have helped us develop excellent standards for the world to be equipped with more technologies."*
>
> Houlin Zhao

"As we close one study period and open the next, I would like to take this opportunity to applaud all of the experts who give life to ITU standardization work."

Chaesub Lee

Director of the ITU Telecommunication Standardization Bureau

Houlin Zhao, ITU Secretary-General presents WTSA-20 Chairman, Bruce Gracie, with a gold medal and certificate in recognition of his contribution to WTSA-20 and Chairmanship of the ITU Telecommunication Standardization Advisory Group Group (TSAG) from 2013 to 2021.

Also in the picture, from left to right: Bilel Jamoussi, Chief, Study Groups Department, ITU Telecommunication Standardization Bureau; Chaesub Lee, Director of the ITU Telecommunication Standardization Bureau; Doreen Bogdan-Martin, Director of the ITU Telecommunication Development Bureau; and Mario Maniewicz, Director of the ITU Radiocommunication Bureau.

A global community

ITU is characterized by its inclusivity. We are given life by a unique public-private partnership of members hosting government, industry and academia.

193
Member States

700+
industry players

5000+
participants in standardization work

160+
academic and research institutes

4600+
e-meetings in 2021

87 000+
e-meeting participants in 2021

Standards for digital societies

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Setting the standard

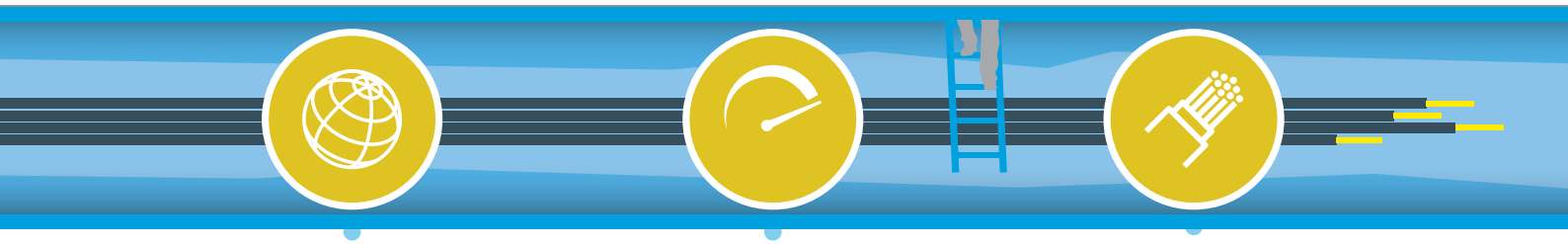
ITU's international standards provide common platforms for information and communication technology growth and innovation.

38
billion
Number of Internet of Things devices by 2025

150K GB
per second
More traffic in 2022 than entire history of the Internet

450
million
Number of wearables to be shipped in 2022

80%
video
Over 80% of Internet traffic is video, enabled by ITU standards



95%
Amount of international traffic carried over fibre networks built using ITU standards

500x
Broadband access speeds over **copper** increased by 500x over past 20 years with ITU standards

80x
Broadband access speeds over **fibre** increased by 80x over past 20 years with ITU standards

Widening our tent for post-COVID standardization

By Chaesub Lee, Director of the ITU Telecommunication Standardization Bureau

> *"Here at ITU, we aim to extend the opportunity to everyone to influence how fast-evolving ICT solutions shape our world and our lives."*
>
> Chaesub Lee

Innovative applications of information and communication technologies (ICTs) across a growing array of industries and sectors call for continually updated technical standards, purpose-built or adapted to meet the latest requirements.

The COVID-19 pandemic has accelerated this trend, linking global hopes for the future to successful, sustainable digital transformation.

Here at the International Telecommunication Union (ITU), we aim to extend the opportunity to everyone to influence how fast-evolving ICT solutions shape our world and our lives.

Tackling today's challenges

At our recent Global Standards Symposium (GSS), policymakers and industry leaders shared their ambitions for, and concerns about, a digitally transformed future. They also delved into how technical standards can support sustainable development, whether in the realm of climate and environmental action, energy efficiency, health, financial inclusion, road safety, or smart cities and communities – all topics accounting for a rising share of ITU standardization work.

The symposium emphasized the importance of international standards in the context of the 17 Sustainable Development Goals (SDGs) set out by the United Nations for 2030. Standardization for sustainable economies and societies is also our focus for World Standards Day on 14 October, a focus we will maintain in the years leading to 2030.

ITU members at the governing conference of ITU standardization arm (ITU-T), the World Telecommunication Standardization Assembly (WTSA), also came together behind some notable new directives, requesting ITU to: (a) consider establishing a "5G observatory" to share lessons from the rollout of 5G mobile networks around the world; and (b) help African countries adopt the ITU-recommended common emergency numbers 911 and/or 112.

The spirit of cooperation among ITU members at WTSA has helped set a constructive tone for other upcoming ITU governing conferences, including the World Telecommunication Development Conference (WTDC) in June, ITU's overarching Plenipotentiary Conference in September and October, and the World Radiocommunication Conference late next year.

Envisioning and shaping the future

ITU standards are fundamental to the vision of a sustainable 5G world – where a high-performing, versatile digital environment supports a vast and most importantly trustworthy Internet of Things (IoT). Building trust in these new technologies became a key priority for ITU in the run-up to 2020, when ITU standards for mobile telecom services marked the beginning of the global 5G era.

Continued global progress in this regard, moreover, remains high on the ITU standardization agenda today. Global experiences of the pandemic have only underscored the need to continue connecting the unconnected, keep boosting confidence and security in the use of ICTs, and invest wisely and ambitiously in our collective digital future.

ICTs must address people's needs meaningfully, as well as become more intuitive for everyday users. As the last two years have shown, security and access to reliable information are nothing less than matters of public safety.

People around the world, without necessarily knowing it, rely on ITU standards to connect, do business, express ideas, and share experiences every day. Already, 95 per cent of international data traffic runs over fibre-optic networks built to ITU standards. Video services – enabled by Primetime Emmy-winning video-compression algorithms developed jointly by the International Electrotechnical Commission (IEC), International Organization for Standardization (ISO), and ITU – now account for over 80 per cent of Internet traffic.

We have pushed beyond a new frontier in recent years, with ICTs forming a nexus among a growing range of business and regulatory jurisdictions, and ITU standardization thereby gaining a host of new stakeholders. ITU standards now enhance agriculture and transportation along with other key sectors, helping all of them capitalize on advances in artificial intelligence (AI) and machine learning.

"Global experiences of the pandemic have only underscored the need to continue connecting the unconnected, keep boosting confidence and security in the use of ICTs, and invest wisely and ambitiously in our collective digital future."

"Already, 95 per cent of international data traffic runs over fibre-optic networks built to ITU standards."

How we do it

International standards represent voluntary commitments and the widest possible participation. Inclusive dialogue helps to clarify how everyone can contribute, creating the conditions to develop impactful standards.

Open platforms, such as ITU-T focus groups, help determine the way forward, while membership-driven ITU-T study groups develop international standards that let us all move forward together. Collaborative frameworks like AI for Good, United for Smart Sustainable Cities, the Financial Inclusion Global Initiative, the Digital Currency Global Initiative, and the new AI for Road Safety initiative bring multiple perspectives to timely global industry and policy challenges.

With this inclusive approach, we can each identify where our specializations are most needed and thereby maximize the impact of our collective expertise.

I am proud to see the comprehensive support that ITU standards are providing to 5G, network 2030, IoT, and trust building. I have been honoured to head ITU's standardization arm when AI has captured imaginations worldwide – becoming a symbol of hopes and fears for our high-tech future – while ITU convened broad and growing partnerships to ensure that AI proves a force for good.

If you haven't already, we welcome you to join us.

Sustainable standards in demand

Ongoing ICT advances keep raising new possibilities going forward. ITU standards must meet the latest requirements on a global scale. The world's demand for standardization work, therefore, will continue to grow.

As we look ahead to 2030, we will need increasingly diverse expertise to understand the full implications of new ICT applications in different sectors.

I would like to express my deepest gratitude to ITU members for their dedication, and especially for their resolve over the past two years in tacking the challenges brought on by the pandemic. Our standardization work has continued online, we have welcomed new members and partners, and we have continued to build consensus.

We can only achieve this together, the ITU way, where all voices are heard and every step forward is decided inclusively.

ITU-T focus groups

The focus groups augment the ITU Standardization Sector (ITU-T) study group work programme by providing an alternative working environment for the quick development of specifications in their chosen areas.

- Testbeds Federations for IMT-2020 and beyond
- Artificial Intelligence (AI) and Internet of Things (IoT) for Digital Agriculture
- AI for Natural Disaster Management
- Autonomous Networks
- AI for autonomous and assisted driving
- Environmental Efficiency for AI and other Emerging Technologies
- Artificial Intelligence for Health
- Vehicular Multimedia

See all focus groups.

Faster, smarter networks

Metro transport network

The International Telecommunication Union (ITU)'s standards for 5G transport include a new technology optimizing metro networks – or large core communications networks – to support 5G with carrier-class Ethernet. The new technology targets the transport of communications traffic from either centralized or distributed radio access networks, providing the full range of operations, administration and management capabilities required by carriers.

Software-defined networking

Standardized architecture for software-defined networking (SDN) control of transport networks describes a hierarchy of SDN controllers, playing a key part in transport networks' support for 5G network slicing – the creation of network "slices" specialized to meet the requirements of specific applications.

Fibre to the home up to 50 Gbit/s

Millions of homes and businesses access global networks through cost-efficient passive optical network (PON) technologies standardized by ITU. The next generation, known as "Higher Speed PON", will provide for speeds of 50 Gigabits per second (Gbit/s) per wavelength, up from its predecessors' 10 Gbit/s.

MGfast up to 8 Gbit/s

The ITU standard MGfast represents the latest leap forward in broadband access over telephone wires and coaxial cable. The new access technology is capable of transmission at an aggregate bitrate of up to 8 Gbit/s in Full Duplex mode and up to 4 Gbit/s in Time Division Duplexing mode.

Premium cable networks

An ITU standard provides a framework for new premium cable network platforms assisted by cloud-based AI. Although originally designed for the transmission of TV and sound programmes, cable networks have long been capable of supporting interactive broadband.

Making the most of 5G

Machine learning for 5G and beyond

The International Telecommunication Union (ITU)'s standards provide a toolkit to integrate machine learning (ML) capabilities into 5G and future networks as both ML and network capabilities continue to evolve. The toolkit addresses architecture, intelligence level evaluation, data handling, quality of service, and ML marketplace integration. It also offers key support to competitors in ITU's AI/ML in 5G Challenge.

5G network orchestration

End-to-end flexibility is one of the defining features of 5G networks, supported by ITU standards on topics such as network softwarization and the associated ability to configure highly specialized network slices, including slicing with the support of artificial intelligence (AI).

Reinventing access

LiFi complements WiFi

The International Telecommunication Union (ITU)'s standard for indoor visible light communication, also known as "LiFi", is the world's first standard for high-speed wireless communications using light rather than radio signals. LiFi offers attractive features with respect to latency, security, and quality of service, and it will also lighten the load on the increasingly crowded radio-frequency spectrum.

Fibre for everyone

Lightweight optical cable made to ITU standards is deployable with minimal expense and environmental impact. This low-cost "do-it-yourself" solution can be deployed with everyday tools, giving developing countries the confidence to consider the rollout of optical networks in some of the world's most remote areas, including Mount Everest.

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Eight key priorities

Digital leaders recognize technical standards, built through patient, continuous collaboration, as key foundations to harnessing emerging technologies for the good of everyone on the planet.

The Global Standards Symposium (GSS-20), held on 28 February by the International Telecommunication Union (ITU), called for technical standards to support progress towards global socio-economic and environmental goals.

"Digital technologies provide opportunities but also risks, including risks to the international order – that is under stress and that we can guarantee only by working together," said Nele Leosk, GSS-20 Chairman and Estonia's Ambassador-at-Large for Digital Affairs.

GSS-20 – delayed two years by the COVID-19 pandemic – submitted its conclusions to the World Telecommunication Standardization Assembly (WTSA), held from 1 to 9 March in Geneva, Switzerland. The symposium was open to all, with possibilities for remote and physical participation. WTSA reviewed the strategic direction of ITU's work on standards to meet the emerging needs of society and industry.

> *"Digital technologies provide opportunities but also risks, including risks to the international order – that is under stress and that we can guarantee only by working together."*
>
> Nele Leosk
>
> GSS-20 Chairman, Estonia's Ambassador-at-Large for Digital Affairs

How tech can serve sustainable development

The one-day symposium underlined eight key priorities for the global standardization community:

1 Cooperate on standards for sustainable digital transformation
The world's leading developers of international standards – ITU, the International Organization for Standardization (ISO), and the International Electrotechnical Commission (IEC) – along with numerous other standards bodies, should keep collaborating to facilitate digital transformation and bridge standardization gaps between developed and developing countries.

2 Unlock the full potential of digital transformation for sustainable development
Countries and companies will need clear technological and digitalization guidance to engage in effective climate action, cutting their emissions in line with the Glasgow Climate Pact and the Paris Agreement, along with the Sustainable Development Goals (SDGs) set out by the United Nations (UN) for 2030.

As part of this, the symposium's conclusions called for ITU, ISO and IEC to contribute actively to the world's energy transition, provide a decarbonization pathway for the information and communication technology (ICT) sector, support initiatives for net-zero emissions by 2050, and develop clear standards to measure progress towards net-zero commitments.

3 Foster cross-sectoral innovation for people-oriented cities and communities
United for Smart Sustainable Cities (U4SSC), an ongoing initiative coordinated by ITU, the UN Economic Commission for Europe and UN Habitat, supported by another 14 UN partners, provides expert guidance for digital transformation at the city level and drives collaboration that has led more than 150 cities to adopt U4SSC Key Performance Indicators based on ITU standards (read the case study on Republic of Korea's Daegu smart city).

4 Make the world's ongoing digital transformation sustainable
Technical standardization that promotes sustainability, circularity and resilience will help accelerate the transition to a net-zero, energy-efficient and ultimately circular, waste-free economy.

ITU membership discussions at WTSA reviewed the strategic direction of ITU's work on standards to meet emerging industry and societal needs.

KPIs for smart sustainable cities

The U4SSC key performance indicators (KPIs) are a vital tool for cities wishing to achieve the UN Sustainable Development Goals. They support cities and communities worldwide in evaluating their level of smartness and sustainability.

Learn more.

5 Promote artificial intelligence (AI) for road safety
Connectivity plays a decisive and important role in enabling assisted and automated driving and ensuring road safety for all.

6 Leverage digital health technologies for equitable healthcare access
Digital health systems can fundamentally transform health-care services for the elderly, the poor and people in rural communities, empowering patients, enabling health-care providers to deliver better care, and improving treatments for everyone, especially during global health emergencies.

7 Boost financial inclusion for all
Technical standards can help lower ICT costs, enhance the resilience of digital infrastructure, and support high levels of security for financial transactions, in line with the outcomes of the Financial Inclusion Global Initiative by ITU, the World Bank and the Committee on Payments and Market Infrastructures (CPMI), with the support of the Bill & Melinda Gates Foundation.

8 Strengthen standards to overcome challenges, maximize opportunities, accelerate digital transformation and achieve the UN Sustainable Development Goals
Developing countries face challenges in implementing standards and frameworks to accelerate digital transformation – a constraint addressed by an ITU programme, Bridging the Standardization Gap.

Maintaining technical cooperation

Participants in the symposium exchanged views on the priorities for ITU's standardization arm, "ITU-T", during the coming 2022–2024 study period.

Previous GSS meetings took place in Johannesburg, South Africa, in 2008; in Dubai, United Arab Emirates, in 2012; and in Hammamet, Tunisia, in 2016 – each setting the stage for a WTSA and helping to guide ongoing ITU standardization work.

Ambassador Leosk, the first woman to hold the GSS chairmanship, stressed the need to always press on with technical standardization. "Let us keep forging a future that is more free, sustainable, inclusive and peaceful," she said.

Digital financial inclusion

A 2021 edition of the ITU News Magazine highlights the work of the Financial Inclusion Global Initiative (FIGI).

Download your copy.

The Global Standards Symposium (GSS)

The symposium comprised seven sessions dedicated to the theme of "International Standards to enable digital transformation and achieve the SDGs" and a U4SSC ceremony with cities.

More about GSS.
Download GSS conclusions.

Video interviews from the Global Standards Symposium

See all GSS-20 video interviews.

We interviewed several thought leaders from the private and public sectors on the sidelines of the latest Global Standards Symposium.
Here's what some of them had to say about international standards to enable digital transformation and achieve the UN Sustainable Development Goals.

"If we do not improve access to connectivity to all, we will not be able to extend services."

Khumbudzo Phophi Silence Ntshavheni
Minister of Communications and Digital Technologies, South Africa

"Digital transformation is a key opportunity for all developing countries."

Martín Olmos
Undersecretary of Information and Communication Technology, Argentina

"Network efficiency for an operator today is based on a strong commitment to be net zero."

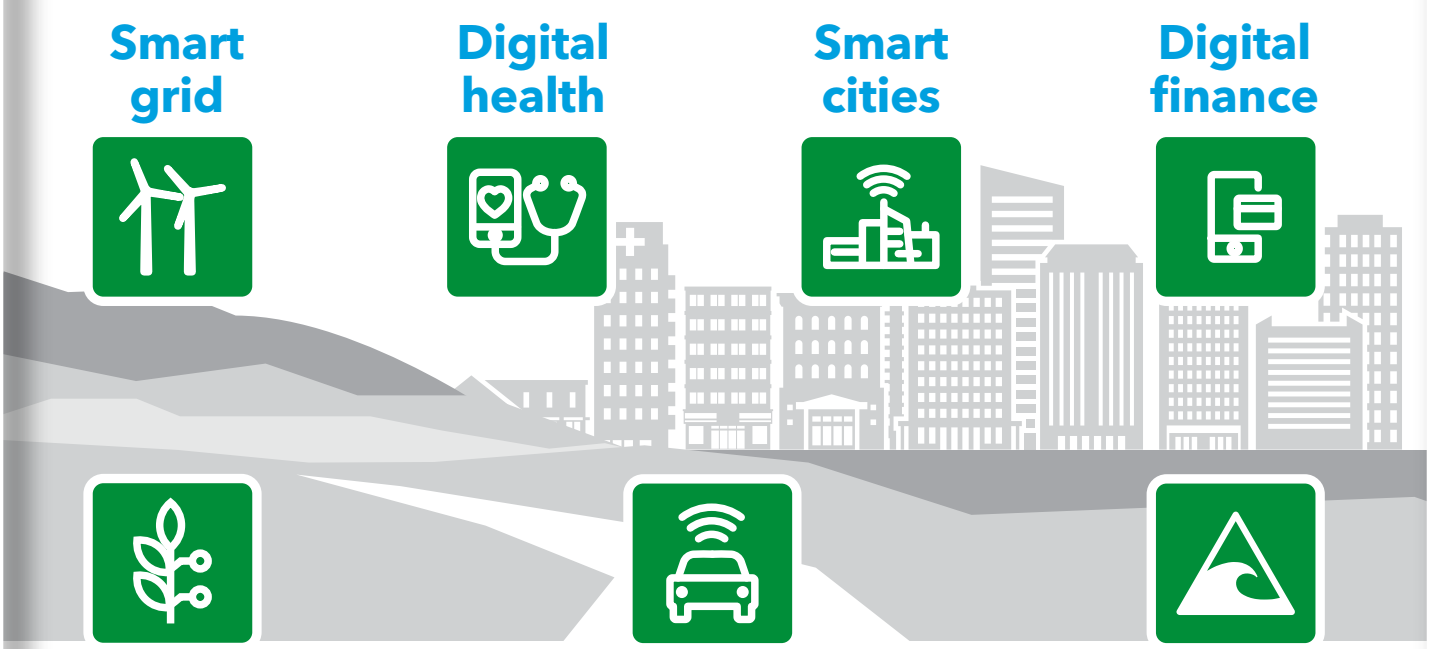
Philippe Tuzzolino
Senior Vice President, Orange

"With digitalization there is a lot more for us, the central banks, to do."

Barbara Kolm
Vice President, Austrian Central Bank

Enabling next-generation apps and services

ITU standards support digital transformation across a wide range of sectors.



Systemic resilience

Combatting counterfeiting and theft

Fake digital technologies can erode brand value for companies, cause governments to forfeit tax revenues, and even pose dangers to users' health and safety. The International Telecommunication Union (ITU)'s standards provide frameworks to combat information and communication technology (ICT) counterfeiting and the use of stolen mobile devices.

Testing labs connect

Labs dedicated to testing new technologies are maximizing their collective return on investments in specialized test equipment with the support of an ITU standard specifying open application programming interfaces for interoperable testbed federations. The standard defines a generic reference model for such federations and describes the foundational elements of this model.

Bracing for extreme weather

Network architectures must be able to contend with the sudden loss of network resources, as may happen in a severe storm or other extreme weather event. ITU standards specify architectures supporting such network resilience, means to reconnect surviving fibres of severed fibre-optic cables, and the make-up of emergency communications vehicles able to rush to the scene of network failures to shore up losses in capacity.

OTT economic and policy guidance

ITU standards on economic and policy issues outline a collaborative framework for over-the-top applications (OTTs), an enabling environment for voluntary commercial arrangements between telcos and OTT providers, and customer redress and consumer protection mechanisms for OTTs.

Pictures speak a thousand words

Primetime Emmy-winning video codecs

The latest standard in a joint IEC-ISO-ITU video-compression algorithm series, "Versatile Video Coding", expands the range of technical options available to support video, adding to those on offer by Primetime Emmy-winning "High Efficiency Video Coding" and "Advanced Video Coding".

IEC (International Electrotechnical Commission)
ISO (International Organization for Standardization)
ITU (International Telecommunication Union)

JPEG picks up long-due Emmy

People share over 10 billion JPEG images every day. The team of engineers responsible for the first edition of the JPEG (Joint Photographic Expert Group) standard was honoured with an Emmy Award, 27 years after the standard was first released, for their outstanding contribution to image coding.


Shutterstock

Breaking the bias: Why gender matters in standards

By Anjana Susarla, Omura-Saxena Professor of Responsible AI, Michigan State University

> *With algorithms influencing almost every part of our lives, we must turn our attention to the new algorithmic divide.*
>
> Anjana Susarla

Readers of this article may be familiar with the term digital divide: the gap between those who can access computers and the Internet, and those who cannot. Now, with algorithms influencing almost every part of our lives, we must turn our attention to the new algorithmic divide.

Artificial intelligence (AI), built on the back of increasingly sophisticated algorithms, has become a principal component of the world's accelerating digital transformation. AI can tackle problems in new ways. It enables a growing range of other new and emerging digital technologies.

At the same time, unfortunately, the in-built biases of today's AI are shaping the future world of work in a way that could exacerbate long-standing gender inequalities. The assumptions and biases underlying any predictive algorithms are based entirely on its initial data inputs.

Men and women may use technologies in different ways. However, we lack gender-disaggregated data on real-life tech use. The resulting "data desert" often, effectively, results in the exclusion of women's statistics, information and perspectives from the data sets that underpin algorithmic decision making.

> *Men and women may use technologies in different ways.*

Amid all the hype about the metaverse, Web 3.0, blockchains, digital currencies, and smart cities, these technologies remain informed by data deserts that fail to take women into account, with the risk of ignoring the context of women's participation in a wide range of economic activities.

Moreover, with AI increasingly automating the customer service roles typically filled by women, we could also see deeper gender wage gaps deepen in the age of AI.

Fostering equality

To foster equality in the world of work, decision-makers need to focus on key areas of science, technology, engineering, and mathematics (STEM) where men are over-represented and start consciously promoting women to roles that are not easily automated.

> *When it comes to ensuring fairness in predictive algorithms, the industry will need updated, gender-sensitive international technical standards to help foster inclusion.*

When it comes to ensuring fairness in predictive algorithms, the industry will need updated, gender-sensitive international technical standards to help foster inclusion.

According to a report on AI from the United Nations Educational, Scientific and Cultural Organization (UNESCO), fostering diverse teams is one way to build AI in a trustworthy manner. But standards-setting bodies also have work to do in terms of understanding "algorithmic harms." Only by knowing how AI reinforces biases can we mitigate individual and societal harms.

Mortgage lending algorithms, for example, have been found to award less than half of available credit limits to female applicants, compared to male applicants with equivalent incomes and residential addresses. Similarly, insurance or housing discrimination has negatively affected women's access to credit and borrowing opportunities, largely because AI training data did not correct for gender bias.

While firms may find AI efficient for mortgage processing, we need to ensure the algorithms they use don't place undue burdens on distinct groups of individuals, including women.

Inclusive AI

Builders of "gender-smart AI" also need to understand potential algorithmic harms and must correct for biases or discriminatory outcomes. This must include practices for development of gender-inclusive AI and auditing algorithms with a gender lens. Standards-making bodies must create standards for inclusion, which must then be applied by governments and companies to ensure sustainable economic development.

Looking at the big picture, gender equality would reinforce the full spectrum of UN Sustainable Development Goals (SDGs). If we do not meet SDG 5, which relates to women's equality, we certainly cannot achieve the others.

To break the bias hindering women's equality in standardization and more broadly in the age of AI, women and men must work together to build responsible AI. That means making sure AI is fundamentally human-centred, inclusive, and based on standards that address bias.

This is the message I brought to the Women in Standardization Expert Group (WISE) event on 8 March, International Women's Day, during the latest World Telecommunication Standardization Assembly organized by the International Telecommunication Union (ITU).

I was delighted to join International Gender Champion and ITU Secretary-General Houlin Zhao, as well as representatives from Australia, Cameroon, Tunisia and the United States, to discuss the development of global technical standards, and AI more broadly, through a gender lens.

Following those discussions, I am more confident we can build AI that uses inclusive data, complemented by human agency and oversight, together with standards for gender inclusion to ensure those algorithms are applied equitably.

See the full webcast of the Women in Standardization Expert Group event.

> *"To break the bias hindering women's equality in standardization and more broadly in the age of AI, women and men must work together to build responsible AI."*

The cost of side-lining women in standardization

According to a recent report from the World Wide Web Foundation, failure to ensure equal Internet access can have serious economic consequences, adding to the multiple socio-economic challenges already facing the least developed countries.

Read the full article.

Global perspectives

Exchanging operational updates

The International Telecommunication Union (ITU) assigns more than 20 types of international numbering resources (INRs), either directly or indirectly. The ITU Operational Bulletin provides an international medium for exchanging key information on changes in telecommunication networks and services, including codes and numbers, maritime services, and the introduction of new operators. The bulletin is issued every two weeks, free of charge, in ITU's six official languages.

One world, one global SIM

Demand for global connectivity for Internet of Things (IoT) and machine-to-machine (M2M) applications has motivated increasing applications for ITU-allocated "global IMSI ranges". International Mobile Subscriber Identity (IMSI) ranges – signified by the shared Mobile Country Code "901", a code without ties to a particular country – enable network-agnostic, cross-border connectivity at a unified price through "global SIMs", or mobile telecom subscriber identities valid around the world.


Pexels

Digital systems support equitable health care

For the elderly, for the poor, or for people in rural communities, access to health-care services has always presented challenges. Digital health systems promise to transform this, making medical diagnoses and advice easily available everywhere.

In the best circumstances, new health platforms have already helped to empower patients, facilitated relief for people who are vulnerable or in distress, and enabled health-care providers to deliver better care and treatments, especially during global health emergencies.

Digital health systems, however, rely on robust infrastructure – a basic requirement that can make equitable access elusive, according to South Africa's Minister of Communications and Digital Technologies, Khumbudzo Phophi Silence Ntshavheni.

"With many essential services now being pushed online, there is a real and present danger that those without broadband Internet access could be left even further behind," she said in her keynote at the Global Standards Symposium.

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> Khumbudzo Phophi Silence Ntshavheni
>
> Minister of Communications and Digital Technologies, South Africa

Barriers to digital health adoption

Even with infrastructure in place, challenges remain to make digital health services work for everyone.

"If we want people to use digital health services and we want people to feel confident in using them, whether young or old, we need to build the trust in the services," said Petra Wilson, Senior Advisor of Personal Connected Health Alliance. "We need to have people feel that their data is safe, that their privacy will be respected, that the services delivered digitally are as good as face to face services."

She identifies three inter-related barriers to digital health for older persons in particular:

1 **Trust:** The sense of familiarity and reliability, which must be earned, nurtured, and continually reinforced.

2 **Digital literacy:** Patients and health-care providers need to build digital literacy and digital health literacy with an understanding of what tools are available and how these can be used.

3 **Offering:** Recognition by providers that there is not a one size fits all and that some services may need to be tailored to older people or other kinds of patients.

Wilson stresses the importance of standards, along with the interoperability they support between different disciplines and use cases. For example, environmental data systems on pollution need to interoperate smoothly with health apps to inform patients with respiratory problems when specific activities may pose a risk.

Standards to safeguard social responsibility

Health-care technologies inherently cut across technical and social disciplines.

For Yong-Jick Lee, President of the Center for Accessible ICT (information and communication technology) in the Republic of Korea, this entails "a greater social responsibility than any other ICT application that has ever emerged."

> *"If we want people to use digital health services and we want people to feel confident in using them, whether young or old, we need to build the trust in the services."*
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> Petra Wilson
>
> Senior Advisor, Personal Connected Health Alliance

Lee encourages digital-health developers to pay due regard to bioethical issues, the multi-faceted digital divide, and the need to secure reliable online access for persons with disabilities and older persons, who may acquire age related disabilities. "Technical standards related to the social responsibility of digital health care are absolutely necessary," he says.

> *"Technical standards related to the social responsibility of digital health care are absolutely necessary."*
>
> Yong-Jick Lee
>
> President, Center for Accessible ICT, Republic of Korea

The need for flexible alternatives

As well as optimizing clinical care, digital-health technologies can enhance ongoing health research. They offer new opportunities to address long-standing challenges, such as low doctor-patient ratios or helping patients overcome the stigma of mental disorders or certain communicable diseases.

The COVID-19 pandemic and the accompanying restrictions on daily life have made the need even more apparent for viable, scalable and flexible alternatives to supplement traditional health treatments, said Leonidas Anthopoulos, Professor of E-business and Strategy at the University of Thessaly in Greece.

Remote monitoring and telemedicine facilities, combined with digital health records, have enabled the ongoing flow of information, limiting the need for direct contact during the pandemic of the past two years.

"However, the use of digital technologies for clinical care is not without challenges, including data quality, privacy, security as well as regulatory concerns related to digital health records", Anthopoulos adds.

> *"The use of digital technologies for clinical care is not without challenges, including data quality, privacy, security as well as regulatory concerns related to digital health records."*
>
> Leonidas Anthopoulos
>
> Professor of E-business and Strategy, University of Thessaly, Greece

Driving digital standardization

A global shortage of medical doctors, exacerbated by COVID-19, made the need for digital technologies increasingly urgent. However, widely recognized standards were not yet in place to scale up sustainable solutions. "The inter-operational capabilities and standards – they're absolutely critical," said Stefan Germann, chief executive at Fondation Botnar, a Swiss philanthropic foundation.

But getting stakeholders on board to drive digital health standardization has not been easy, either within or between different national jurisdictions, he added.

"What it requires is really strong collaboration between the relevant ministries. This cannot be solved by the ministry of health itself."

Germann called on governments to promote the necessary standards and accountability, especially among entrepreneurs in the tech sector. Key objectives for the industry can thereby contribute to socio-economic enhancements, in line with the Sustainable Development Goals (SDGs) adopted by the United Nations for 2030.

"Only in that way can we actually see that some of the adoption of the standards takes place, so that we have sustainable, scalable solutions in digital health," he said. "Through that, hopefully, we'll achieve the Sustainable Development Goals related to health, especially universal health coverage."

> *"What it requires is really strong collaboration between the relevant ministries."*
>
> Stefan Germann
>
> Chief Executive, Fondation Botnar

Metrics to build trust in AI for health

The UN's 2030 sustainability agenda, centred on the 17 SDGs, provides a framework to keep societal needs at the centre and ensure no one is left behind.

Two of the UN's specialized agencies – the World Health Organization (WHO) and the International Telecommunication Union (ITU) – see myriad opportunities to improve health services through artificial intelligence (AI).

Thomas Wiegand, Chairman of the ITU/WHO Focus Group on AI for Health and Executive Director of German research and development organization Fraunhofer HHI, noted the crucial role of technical standards developed through the broadest possible collaboration.

This occurs at the global level by way of ITU, the International Organization for Standardization (ISO), and the International Electrotechnical Commission (IEC), as well as regionally and nationally through other standards-developing organizations. The resulting standards ensure the quality, reliability and accessibility of digital health technologies and applications in diverse markets, while helping developing economies keep up with technological advances.

The ITU/WHO Focus Group on Artificial Intelligence for Health is developing a benchmarking framework for AI solutions, supporting global efforts to step up AI's contribution to health. An open-code proof of concept for the benchmarking platform showcases the type of metrics that could help developers and health regulators certify future AI solutions, in the same way as is done for medical equipment.

Wiegand, too, stressed the need to bring health and medicine specialists together with government representatives and regulation and ethics experts, as well as engineers, technicians and business people.

"You have to bring them all together," he said, citing the Focus Group on AI for Health as an example.

Participants from around the world are studying AI solutions in 24 topic areas, from neurology and radiology to dermatology and outbreak detection, looking at key aspects for clinical evaluation, data, ethics, regulations, and modelling for health-care services.

> *"You have to bring them all together."*
>
> Thomas Wiegand
>
> Chairman, ITU/WHO Focus Group on AI for Health and Executive Director, Fraunhofer HHI

Partnership tackles COVID-19 infodemic

ITU and WHO teamed up with the Pan American Health Organization (PAHO) to combat misinformation and strengthen vaccine acceptance in the Eastern Caribbean. Last October, the organizations, in partnership with regional media and advertising group Trend Media/Digicel, launched a public health education campaign to tackle the COVID-19 "infodemic" in Antigua and Barbuda, Grenada and Saint Lucia.

By sending key health messages, videos, and images via Short Message Service (SMS) and other electronic platforms, the eight-week campaign helped to spread reliable, evidence-based advice and guidance on COVID-19 vaccines to vulnerable people and communities. Topics included how vaccines are developed, how vaccines work, safety, side effects, and the benefits of vaccines.

About the Global Standards Symposium

Industry leaders and policymakers came together on 28 February to discuss how international standards supporting digital transformation can accelerate progress towards the SDGs. The symposium's conclusions were submitted to ITU's World Telecommunication Standardization Assembly (WTSA), which took place from 1 to 9 March 2022.

Focus Group on AI for Health

About the ITU/WHO Artificial Intelligence for Health Focus Group and how to get involved.

Learn more.
See video.

Accessible health technologies

Medical-grade health wearables

Connected blood pressure cuffs, glucose monitors, weight scales and a wide range of activity trackers help prevent and manage chronic conditions such as diabetes, hypertension, and heart disease. The trend towards "personal connected health" is supported by the International Telecommunication Union (ITU)'s standards for medical-grade digital health devices, standards first developed by the Personal Connected Health Alliance.

Safe listening to prevent hearing loss

"Sound-induced hearing loss" is the world's most common form of preventable hearing impairment, with over a billion young people worldwide at risk of being affected, according to the World Health Organization (WHO). An ITU standard developed in close collaboration with WHO provides guidelines for safe listening to music players in support of WHO's "Make Listening Safe" initiative.

Mainstreaming accessibility

Accessible telehealth services, also developed in close collaboration with WHO, is the latest ITU standard addressing the needs of persons with disabilities and other users facing specific challenges in the use of information and communication technology (ICT) solutions. ITU, aiming to ensure accessibility is considered in all its standards, supports standards developers with tools like the telecommunications accessibility checklist and standard accessibility terms and definitions.

Metaverse 2030: Experiencing the SDGs in virtual reality

Can you or your team create the best "SDG experience"?

The Global Standards Symposium (GSS) saw the launch of a new prize competition inviting young people to create virtual experiences to raise awareness about the United Nations (UN) Sustainable Development Goals (SDGs).

Marcus Shingles, co-founder and CEO of competition organizer Exponential Destiny, made the announcement during his GSS keynote in Geneva, Switzerland on 28 February.

Shingles was joined by the young people who designed his US-based organization's Metaverse for SDGs Global Prize and VR Competition. The participant or team who creates the best "SDG experience" using virtual reality (VR) technology will receive a USD 30 000 cash prize.

The SDGs in virtual reality

The Exponential Destiny team is training young people "to code the next generation of the Internet", with a broader aim of accelerating progress on the SDGs – the 17 key goals adopted by the UN for 2030.

Starting with VR technology training, the programme educates and upskills participants from a low-income background to help them escape cycles of poverty.

Immersive VR experiences can be designed with "no-code programming", using a visual interface that is more accessible for new learners, Shingles said.

Demand for digital skills is expected to grow rapidly as more businesses look to create applications for the metaverse – an entirely virtual network of 3D "worlds" focused on real-time social connection and interaction.

"The window of opportunity to capitalize on these skills is now," said Kevin Vega, a 20-year-old college student and VR education beneficiary who now mentors others at Exponential Destiny.

> *"The window of opportunity to capitalize on these skills is now."*
>
> Kevin Vega
>
> College student, VR education beneficiary and Exponential Destiny mentor

How to compete

Are you or students you know interested in learning more about the SDG metaverse competition?

Here's how to get involved:

- Who can participate?
  - → Students from two categories – aged 14 to 18, or post-secondary students aged 19 and older – may enter as part of a team of 2–6 individuals. Teams can be located anywhere in the world.
- How can teams enter?
  - → Student teams can use one of several free Metaverse Virtual Reality platforms to build and create immersive experiences around their chosen SDG. More information and entry instructions can be found on the competition website.

- When is the competition running?
  - → Teams will have until 1 August 2022 to bring one SDG "to life", specifically by creating an immersive and experiential learning environment in VR.
- How is the winner determined?
  - → 34 teams – representing the two age categories for each of the 17 SDGs – will go on to enter the grand finals in October 2022. There, the entry deemed "Overall best experience of show" will be awarded the grand cash prize and honours. More information on the evaluation process can be found on the competition website.

Metaverse experiences at WTSA Expo

Delegates attending the World Telecommunication Standardization Assembly (WTSA) in Geneva interacted with technology demos at an expo running in parallel to WTSA.

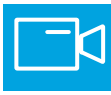
Live demonstrations gave delegates at this key gathering of the International Telecommunication Union (ITU) the chance to learn from students already embarked on the Exponential Destiny journey.

The students had designed creative worlds in the metaverse based on a variety of topics, from mental health to responsible consumption.

The expo alongside WTSA featured exhibitors from around the globe, highlighting innovations in areas including:

- Blockchain-based secure authentication
- Low-latency optical access solutions
- Quality of service and experience in mobile networks
- Datacentre liquid cooling
- Centralized marketplace systems.

The students had designed creative worlds in the metaverse based on a variety of topics, from mental health to responsible consumption.



Watch the ITU Facebook Live to see WTSA expo exhibitors and demos.

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Happy customers

Service quality from a regulator's perspective

Recent years have seen a marked increase in the participation of regulators in the International Telecommunication Union (ITU)'s work on key performance indicators (KPIs) for service quality. ITU standards now provide guidance in areas such as regulatory frameworks, regulatory supervision, measurement campaigns, and crowdsourcing.

Blockchain clarity

The recording of transactions through distributed ledger technologies like blockchain has opened vast potential for automated and transparent decision-making and process management, well beyond cryptocurrency-based financial services. For a clearer view of how blockchain solutions could best be applied, ITU standards provide the essential terms and definitions, a high-level reference architecture, and assessment criteria to understand the strengths and weaknesses of blockchain platforms in different use cases.

Riveting games and immersive media

ITU standards address user experience quality in virtual reality and 360-degree video and enable predictions of cloud gaming quality. They also outline factors influencing the gaming experience, including whether a game's tasks strike the right balance between challenge and achievability to keep gamers' attention and interest.

Video and voice quality

ITU standards calculate the quality of videos in 4K/UHD resolution and adaptive bitrate streaming sessions. Speech quality assessment is supported by ITU standards addressing relevant machine learning techniques and crowdsourcing approaches. They also offer tools to predict listening quality and provide for high-quality headsets and headphones.


standret via freepik

Towards a common understanding of digital currency

The fundamental need remains for regulators, technologists and decision-makers to collaborate on digital currency development.

Digital currency is a relatively new but buzzing field of finance. Recent months have seen countries from Sweden to Jamaica start exploring or piloting their own central bank digital currencies (CBDCs).

In fact, nearly 70 financial institutions around the world have stated that they are investigating CBDCs, one of them being the European Central Bank's announcement of the digital euro project launch.

The trend of innovation and openness towards digital currency, however, doesn't preclude divergent views on terminology. Digital currency comes in many forms – CBDC, e-money or cryptocurrency, for example – and there are many types of each.

Despite those many variations, the fundamental need remains for regulators, technologists and decision-makers to collaborate on digital currency development.

A working group formed through the Digital Currency Global Initiative (DGCI) has set out to establish a common classification framework for all kinds of digital currency. Members of the architecture-focused working group introduced a new tool designed to overcome terminology problems during a DC^3 conference hosted by the International Telecommunication Union (ITU).

A working group formed through DGCI has set out to establish a common classification framework for all kinds of digital currency.

Talking taxonomy

The missing ingredient amounts to an ontology – an explanatory framework of terms and characteristics – that can describe exactly what constitutes different kinds of digital currency.

"Our objective is to come up with a way to describe what 'digital currency system' means without the baggage of terminology," explained Jacques Francoeur of consultancy Security Inclusion Now!, who also leads the Architecture, Interoperability Requirements and Use Cases (AIRU) working group of the DGCI.

"Our objective is to come up with a way to describe what 'digital currency system' means without the baggage of terminology."

Jacques Francoeur
Security Inclusion Now!

Fellow working group member John Kiff, a former financial sector specialist at the International Monetary Fund (IMF), added: "Policymakers want to know what makes a retail CBDC different from a crypto asset."

The framework Kiff and Francoeur presented aims to answer those high-level questions, while also providing enough detail for technologists.

Specialists actually deploying digital currencies "need a more granular definition – that ontology provides," Kiff explained.

"Knowing that a CBDC runs on distributed ledger technology might be fine for a policymaker, but a technologist needs to go deeper." The goal, he continued, is to marry basic taxonomy concepts with deeper ontology concepts, or so-called "notions."

"Policymakers want to know what makes a retail CBDC different from a crypto asset."

John Kiff
Member of the DGCI Working Group

How it works

The ontology is based on a cascading matrix or interactive table that enables users to delve down into increasingly granular levels of detail – like a "choose-your-own-adventure" for digital currencies.

The overlying matrix assumes all digital currencies can be described using five main types of attribute – supply, value, ownership, agreement and recording.

Each of these affects the unit value of a digital currency, which changes as each parameter is adjusted. The five categories, or "ontology notions", were defined through an iterative process with digital finance policy and technology experts, explained Francoeur.

Every distinction in the matrix is material, in that it affects the architecture and technology of the digital currency type, he added. For any choice you make, the resulting digital currency type changes accordingly.

The ontology should help decision-makers as they weigh options for digital currency design and implementation.

A work in progress

The matrix is still a work in progress, Kiff and Francoeur said. The architecture group meets regularly to keep advancing the ontology and make sure of its real-world applicability.

The descriptions in the matrix must fit all use cases for digital currencies, whether centralized or decentralized.

Francoeur raised the "claim vs. token" debate to illustrate why the group's work is so important for digital currency development going forward. Claim-based digital currency users must prove their identity, or at least demonstrate their possession of money in a register or account.

A token or object-based digital currency works differently. Just like a dollar bill, each unit retains a stated fiscal value, regardless of the owner's identity, and requires no proof of ownership.

The way forward

The ontology should help decision-makers as they weigh options for digital currency design and implementation.

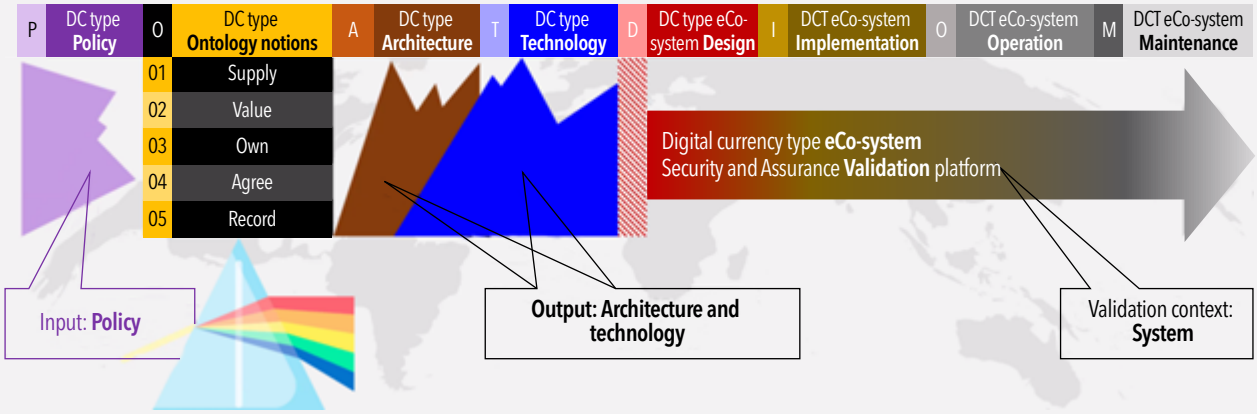
Whether one looks at digital currency from a tech, design, operational or maintenance point of view, the matrix can be thought of as a "prism", enabling the viewer to see the immediate implications of specific policy choices, Francoeur explained.

Interoperability across all digital currencies may be the 'holy grail' for standardization experts. In the quest to describe digital currencies and their behaviours, the key first step is to establish a common set of concepts and descriptions.

"A simpler vocabulary means we can all have discussions, realize we are talking about the same thing, and have a more productive conversation," Francoeur said.

> *"A simpler vocabulary means we can all have discussions, realize we are talking about the same thing, and have a more productive conversation."*
>
> Jacques Francoeur
> Security Inclusion Now!

Digital currency type – from **policy** through **ontology** to **architecture**, **technology** and **validation**



A flow chart explaining how the digital currency type changes in terms of architecture and technology as a function of five "ontology notions".
Image credit: ITU

Central bank digital currency rollout in Jamaica

Only a few years ago, the concept of a central bank digital currency (CBDC) was not something central bankers seriously considered, including those in Jamaica. Fast-forward to the present day, and that story has changed, said Bank of Jamaica Governor Richard Byles, speaking at a DC[3] conference held by ITU.

Read the full article.

e-krona: Sweden's journey to a central bank digital currency

More than 150 years after the world's first electronic fund transfer was issued by Western Union, digital tech innovation continues to revolutionize the world of payments.
While many countries have witnessed a downturn in cash use, Sweden's case in the last decade was more striking than most. The country's central bank, the Riksbank, upon observing the trend, started investigating how to issue a digital complement to cash. The result is the e-krona project.

Read the full article.

Safe and secure

Reliable wireless safety info

The International Telecommunication Union (ITU)'s standards include guidance on long-term measurements in the monitoring of electromagnetic fields (EMF), with the goal of providing the public with accessible data on EMF levels. These standards also underpin ITU's EMF-eestimator software, which calculates EMF levels in the vicinity of radiocommunication installations such as mobile base stations. The EMF Guide mobile app provides the latest wireless-related health and safety information from the World Health Organization (WHO) and ITU.

Trusted exchanges online

ITU-standardized digital certificates are a cornerstone of the public key infrastructure, or PKI, enabling authentication over public networks. These digital certificates enabled the rise of e-commerce, and new ITU standards specify how the certificates will continue to serve us in the coming quantum era.

Quantum leaps

Quantum information technologies will be capable of solving problems beyond the reach of classical computers, creating both new opportunities and significant risks. ITU standards aimed at addressing the network and security aspects of quantum information technology have focused initially on quantum key distribution to enable quantum-secure encryption and authentication.

Trusted digital finance

ITU standards for digital finance focus on security, infrastructure, and trust, helping keep everyone's money and digital identities safe through secure financial applications and services, as well as reliable digital infrastructure. Expert guidance is available via the ITU Security Lab for Digital Financial Services.

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AI for Good

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How could we improve mental health for 100 million people within 5 years

16:00–17:30 CET (Geneva)
10:00–11:30 EDT (New York)
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Start-ups decarbonizing agriculture and forestry sectors

14:00–15:30 CET (Geneva)
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SungHun Kim via Unsplash

Korean electronics hub adopts smart city KPIs

Daegu has adopted a people-oriented approach for urban planning and management.

Around the world, forward-looking cities are tracking their digital transformation progress in tandem with goals to reduce climate impact, improve health and maximize everyone's socio-economic opportunities.

The Republic of Korea's electronic manufacturing hub and third-largest urban centre, Daegu, is the latest to share its experience in adopting key performance indicators (KPIs) for smart sustainable cities in line with ensuring a better global future.

Officially known as Daegu Metropolitan City, the metropolis joins over 150 cities worldwide to implement the KPIs, linked closely with the United Nations (UN) Sustainable Development Goals (SDGs) set by the United Nations for 2030.

These KPIs have been developed under the umbrella of the United for Smart Sustainable Cities (U4SSC) initiative, supported by 17 UN agencies and programmes.

By adopting the initiative's recommended KPIs, Daegu has also become the first city in the Republic of Korea to actively chart out its path for a smart and sustainable future.

At the core of its smart city vision, Daegu has adopted a people-oriented approach for urban planning and management, to ensure quality of life for its inhabitants and to safeguard their interests.

As part of a national innovation project, Daegu enjoys an annual smart city budget of USD 17 million. The City's Smart City Plan (2021–2025) lays the foundation for boosting citizen's happiness and supporting local industries, with the aim of creating "Smart Daegu".

Tools for self-assessment

Based on International Telecommunication Union (ITU) standards, the U4SSC indicators can help cities set local priorities for driving sustainable digital transformation. They can, for example, help local businesses identify innovation opportunities or assist municipal leaders by informing new policies.

Based on ITU standards, the U4SSC indicators can help cities set local priorities for driving sustainable digital transformation.

The KPIs provide a common reporting framework that other cities around the world can readily replicate.

The U4SSC case study and KPI assessment of Daegu follows a similar structure to the already published case studies and assessments, ranging from global hubs like Dubai and Moscow, to smaller municipalities like Bizerte (Tunisia) and Pully (Switzerland).

All U4SSC KPI evaluations are independently verified, and the relevant reports produced confirm that each city's data follows the stipulated collection methodology and provides insights into a city's progress on becoming smarter and more sustainable, while highlighting the core initiatives and actions geared towards their overarching smart city plans.

Cultivating urban expertise

UN4SSC, together with national administrations, UN agencies and programmes, municipal leaders, and leading global experts, is building a comprehensive approach to smart city development, looking at both KPI evaluations and wider national contexts for smart city planning and action.

The initiative has set out to provide expert guidance on several topics, covered within different thematic groups. These include:

- Digital transformation for people-oriented cities;
- Lessons learned from building urban economic resilience at city level during and after COVID-19;
- Innovative financing for Smart Sustainable Cities projects;
- Guiding principles for artificial intelligence in cities;
- Procurement guidelines for Smart Sustainable Cities and
- City platforms

Smart city leaders at GSS

People-centred digital transformation requires urban stakeholders to prioritize the needs and concerns of citizens over the implementation of technologies across various business segments.

A keynote session and panel discussion at the Global Standards Symposium explored how digital innovations can be leveraged to meet the demands of inhabitants, build resilience within different sectors of smart cities and communities, and initiate digital transformation to tackle global challenges within the urban ecosystem.

The case study for the city of Daegu was released at the Global Standards Symposium, during the U4SSC Ceremony for Cities.

The U4SSC Daegu case study

Learn about Daegu's journey since 2014, when the city's Smart City Plan was unveiled to the public. The U4SSC key performance indicators for smart sustainable cities to assess the achievement of sustainable development goals were implemented to support the assessment of the city's existing smart city undertakings, benchmark performance and underscore effective best practices to improve their applicability on a global scale.

The findings will serve as a touchstone for other cities in the region that are commencing their smart and sustainable city journeys.

Download the case study.

Better city life

KPIs for smart cities

More than 150 cities around the world have started evaluating their progress towards smart city objectives and alignment with the United Nations (UN) Sustainable Development Goals (SDGs) using Key performance indicators for smart sustainable cities based on the International Telecommunication Union (ITU)'s standards. The cities are supported by United for Smart Sustainable Cities (U4SSC), an initiative backed by ITU and another 16 UN partners.

Smart city platforms

New digital services for city dwellers are more scalable, efficient, and attentive to people's needs. The ongoing digital transformation of public services is supported by an ITU standard for interoperable smart city platforms.

Smart city maturity

How far have you come in your smart city journey? An ITU standard offers a maturity model that can help city administrations assess their progress towards specified development goals, as well as expand collaboration with other cities around the world.

Lower-power connectivity

The transposition of the LoRaWAN specification – a low-power protocol for wide area networks – developed by the LoRa Alliance into an ITU standard will support the protocol's adoption globally, providing a key foundation for the growth of the Internet of Things.

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Tapping into data riches for road safety

Certain stretches of road are more accident prone than others.

Certain stretches of road are more accident prone than others. While traffic managers and police have long observed this phenomenon, they may struggle to zero in on the precise "crash hotspots" where roads or intersections require fixing.

The Kenyan capital, Nairobi, after a deep dive into data sources on its traffic patterns, found that more than half of its road crashes were happening on just one per cent of its road network.

The city combined data from multiple sources, including tweets, navigation and ride-hailing apps, weather information, and newly digitized police records of traffic incidents to create a real-time crash map.

The results had the effect of "translating a huge problem of fixing all of the infrastructure around Nairobi into the problem of fixing 45 kilometres (Kms) out of 4500 Kms of road network," highlights Arianna Legovini, Director for Development Impact Evaluation at the World Bank.

"A lot of countries appear to be data poor but, in fact, there is a lot of data," she adds. "The scarcity is really in translating and using research skills to extract data from existing sources."

Linking data sources for actionable insights

Satellite imagery offers a wealth of existing, readily available data for locations all over the globe. Often, it reveals a concentration of accidents on "about 10 per cent of the road network," according to James Bradford, Global Technical Director at the International Road Assessment Programme (iRAP). "Straightaway, you have identified that's where you have to focus first."

iRAP is working with artificial intelligence (AI) to speed up the analysis of satellite imagery, along with video and other data, to identify "what should we tackle first and foremost." Upgrading road safety infrastructure would cost a fraction of what crashes currently drain from economies. "If you invest in the safety infrastructure, the benefit-cost ratios are ten to one," says Bradford.

The World Health Organization (WHO) estimates that 1.3 million people die each year because of road crashes. But regional and country-level road safety data can be far from comprehensive.

"In some cases, countries don't have adequate data systems, and the data is not as reliable as others," says WHO's Head of Safety and Mobility, Nhan Tran.

In such cases, bringing in different data sources can make a world of difference. "We have seen in countries such as Tunisia and Mozambique, we have the [WHO] estimates dramatically improving by linking existing data sources," Tran explains.

> *"A lot of countries appear to be data poor but, in fact, there is a lot of data."*
>
> Arianna Legovini
>
> Director for Development Impact Evaluation, World Bank

> *"If you invest in the safety infrastructure, the benefit-cost ratios are ten to one."*
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> James Bradford
>
> Global Technical Director, International Road Assessment Programme

> *"In some cases, countries don't have adequate data systems, and the data is not as reliable as others."*
>
> Nhan Tran
>
> Head of Safety and Mobility, World Health Organization

Data systems and data collection are expected to improve over the long term, he says. For now, though, optimizing the use of existing data from sources like mobile apps offers significant opportunities. In the short term, "we can work with what's already there, and we can certainly use AI to facilitate that process."

Social media, emergency-response services, and navigation applications need to "all work together" to provide optimal benefits. "That's really going to be the game changer," Tran suggests. "I think we're almost there."

The power of mobile

Mobile phones, if properly harnessed, could deliver major road safety benefits, including "better data, predictability of crashes, prevention of congestion, speedy response, and more use of mobility," says Jean Todt, the United Nations Secretary-General's Special Envoy for Road Safety.

Todt, in partnership with the International Telecommunication Union (ITU) and the Office of the UN Secretary-General's Envoy on Technology, last year began a new AI for Road Safety initiative focused on the global goal to halve the world's annual road deaths by 2030.

Bryn Balcombe, Chair of the ITU Focus Group on AI for autonomous and assisted driving, agrees:

"The mobile phone is suddenly the intelligent device that the majority of the population has," enabling it to "penetrate markets quicker than vehicle technology."

Geo-located tweets from people's mobiles helped Nairobi identify its crash hotspots.

Mobiles also helped the city to improve its emergency response capabilities dramatically, says Caitlin Dolkart, Co-founder and Managing Director of Flare – a company starting out in Kenya that some have a called a "ride-hailing app for ambulances".

> *"The mobile phone is suddenly the intelligent device that the majority of the population has."*
>
> Bryn Balcombe
>
> Chair, ITU Focus Group, AI for Autonomous and Assisted Driving

Hailing an ambulance

By centralizing emergency services, and thereby improving the coordination emergency-response actions, Flare helped Nairobi reduce emergency response times from an average of 162 minutes several years ago to just 15 minutes today.

"Introducing that centralized system, we're able to reduce a lot of that response time," says Dolkart. "Unsurprisingly, the mortality figure has also gone down dramatically."

Flare matches people in need with emergency responders and health-care providers. "It isn't just about getting the ambulance," she says.

"It is also then ensuring that the person is taken to the right hospital. That requires a deep understanding of the healthcare system and where and how you best allocate those patients within the broader ecosystem."

The well-known universal 911 system in the United States took over 30 years to achieve, a consequence of the legacy telecoms environment of the time, Dolkart notes. But in Kenya, there was an opportunity to leapfrog.

"We built a mobile-first, cloud-based solution that allows cities or countries to establish that network in a matter of literally weeks, not decades," she says.

> *"We built a mobile-first, cloud-based solution that allows cities or countries to establish that network in a matter of literally weeks, not decades."*
>
> Caitlin Dolkart
>
> Co-founder and Managing Director, Flare

This article is based on a panel discussion at the ITU Global Standards Symposium.

Driving the future

Secure updates to connected cars

A modern road vehicle is said to run over 250 million lines of code. Such computers on wheels can be updated remotely, with many "recalls" even being achieved without any interruption to vehicle use. Confidence in this process is supported by an International Telecommunication Union (ITU) standard addressing secure over-the-air software updates to connected vehicles.

Vehicle emergency calls

The global regulation on Accident Emergency Call Systems references an ITU voice-quality performance standard. Such emergency calls depend on ITU-assigned international numbering ranges for machine-to-machine (M2M) communications.

Vehicle infotainment

The digital displays on vehicle windshields can convey vital road information and wake a driver up at any hint of drowsiness. Passengers can meanwhile take livestreams, videoconferences, or games started at home and continue in the car. Vehicle passengers will be able to share content to watch together across different screens or, just as easily, agree to disagree. ITU standards detail new use cases of vehicular multimedia and supporting architecture.

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Submarine telecom cables enhance climate monitoring and tsunami forecasts

The SMART cable will combine scientific sensing and telecoms into the same, shared submarine cable, never compromising reliable telecoms.

Over 1.3 million kilometres of submarine telecommunications cables now span the world's oceans. As the network grows and old cables are replaced, the next generation of cables could form a real-time ocean observation network able to provide accurate early warnings of tsunamis and a wealth of valuable data for climate science.

A standard SMART cable, meaning a telecom cable upgraded for "Scientific Monitoring And Reliable Telecommunications", will include climate and hazard-monitoring sensors designed to co-exist with telecom components and to last for the same 25-year lifespan as any commercial cable. Climate scientists hope for the resulting ocean-observation network to grow sustainably alongside commercial network deployments.

The SMART cable will combine scientific sensing and telecoms into the same, shared submarine cable, never compromising reliable telecoms.

Two new standards now under development at the International Telecommunication Union (ITU) will support this aim, providing for both SMART cables and cables dedicated exclusively to scientific sensing. This standards effort builds on minimum requirements established by the Joint Task Force on SMART Cable Systems, formed in 2012 with the support of ITU, the UNESCO-Intergovernmental Oceanographic Commission (UNESCO-IOC) and the World Meteorological Organization (WMO).

"We aim to reach a point where cable system suppliers are offering all their customers the option of standardized SMART capability," says task force chair Bruce M. Howe, a University of Hawaii research professor. At Station ALOHA 100 kilometres north of Oahu, Howe installed and now operates a cabled scientific observatory at a depth of 4728 metres, making it the world's deepest of its kind.

The Joint Task Force has helped develop the technical and financial feasibility of SMART cables. It now works closely with United Nations organizations, governments, and businesses intent on deploying SMART cables at scale.

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>
> Bruce M. Howe
>
> Chair of the Joint Task Force on Smart Cable Systems

A Portuguese first

Two years ago, Alcatel Submarine Networks became the first cable provider to commit to SMART, while Portugal's telecom regulator ANACOM pledged to build SMART into the new CAM [Continent-Azores-Madeira] ring cable connecting the mainland to islands a thousand kilometres out in the Atlantic Ocean.

"SMART cables have been on our agenda since 2018, when planning the replacement of the ageing existing cables," says João Cadete de Matos, Chair of ANACOM.

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The submarine cable division of NEC Japan has installed more than 6000 kilometres of submarine cables dedicated to scientific sensing, which are now operated by Japan's National Research Institute for Earth Science and Disaster Resilience. The first submarine cables for tsunami forecasts were deployed 12 years ago, and the network was expanded after the 2011 Great East Japan Earthquake – but without supporting commercial telecoms in parallel.

The Brazil-Portugal trans-Atlantic cable system, known as EllaLink, was the first to dedicate a fibre of a commercial telecoms cable to environmental sensing, between Madeira Island and the trunk cable. Portugal now plans to include full-fledged SMART capability in the new CAM cable ring, with sensors embedded in the 50 or so repeaters distributed at 70-kilometre intervals along the 3700-kilometre system.

"We understood the significance of the opportunity. Three tectonic plates meet in this region, making it prone to earthquakes, and much international data traffic will run through the region," says Matos.

This system could become the first step towards commercial telecom cables equipped with SMART capabilities.

"Portugal has been a huge voice of support. Some 15 to 20 per cent of international submarine cables will pass through Portuguese waters," says Howe. "Portugal's experience can catalyse the growth of a SMART cable community in Europe and globally."

Added SMART capability will form around 10 per cent (EUR 12 million, or about USD 13 million) of the total cost to deploy the new government-sponsored CAM cable. Expected to enter service in 2025, the cable will be constructed integrating sensors built by specialized companies.

Other SMART projects are in various stages of planning and development in Indonesia, the Vanuatu–New Caledonia island area, and even Antarctica.

The project between Vanuatu and New Caledonia – supported by the Joint Task Force with funding from the Gordon and Betty Moore Foundation – will establish cable linkage across a "young" subduction zone (just 50 million years of age), complete with a 6500-metre-deep trench where hundreds of earthquakes are known to happen each year, with associated tsunami risks.

"This project will be a major accomplishment for the Joint Task Force," says Howe, "and important in forming the foundations of an enduring regional science and early-warning ecosystem, bringing together scientific communities, providing training, and bringing more confidence to government and industry."

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Smarter sensors

SMART cables include tried-and-tested environmental and hazard-monitoring sensors in cable repeaters, which house devices amplifying the optical communication signals at intervals along a submarine cable.

Three sensors measure ocean-bottom temperature as an indicator for climate trends; pressure for sea-level rise, ocean currents, and tsunamis; and seismic acceleration for earthquake detection and tsunami alerts. Sensors should be operational at all times, and all detected data will be transmitted to cable landing stations at the speed of light.

"The three sensors will give us essential ocean variables, and they are compact and robust, and relatively easy to integrate in cable repeaters," says Howe.

And SMART monitoring will keep getting smarter, he adds. "In 10 years, we could consider more elaborate sensing capabilities, such as salinity, to add to what temperature and pressure tell us about circulation; water chemistry to understand risks like ocean acidification; and ocean sound measurements for monitoring marine mammals and biodiversity."

Undersea and under budget

For now, some 70 DART buoys – for Deep-ocean Assessment and Reporting of Tsunamis – are the principal existing means of tsunami detection. But 30 per cent of those are typically out of service at any time, says Howe. By contrast, probability studies suggest a failure rate of just 5 per cent for the new sensors over a cable's 25-year operational life.

A SMART cable spanning the Pacific region, where most of the US-operated DART buoy network is located, could therefore come at a more attractive price as well as offer more valuable and reliable real-time data with no maintenance.

The current DART buoy programme run by the US National Oceanic and Atmospheric Administration (NOAA) costs USD 27 million a year, while the international Argo programme, with 4000 expendable floats, costs around USD 32 million a year.

The US National Science Foundation's Ocean Observation Initiative, using buoys, gliders, autonomous vehicles, and a cable system, has annual operating costs of about USD 44 million, on top of some USD 400 million it took to set up.

In contrast, the Joint Task Force calculates annual expenditures of just USD 40 million to sustain 2000 SMART cable repeaters in 30 systems around the world, assuming a very conservative 10-year refresh cycle.

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Find more resources and contact the ITU/WMO/UNESCO-IOC Joint Task Force on SMART Cable Systems.

Draft ITU standards for SMART cables (working name G.smart) and cables dedicated to scientific sensing (working name G.dsssc) are under development in ITU-T Study Group 15, targeting completion by 2024.

Sustainable power and production

Smart energy solutions

The International Telecommunication Union (ITU)'s green information and communication technology (ICT) standards include sustainable power-feeding solutions for 5G networks, as well as smart energy solutions for telecom sites and data centres that prioritize the intake of power from renewable energy sources. They also cover the use of artificial intelligence (AI) and big data to optimize data centre energy efficiency and innovative techniques to reduce energy needs for data centre cooling.

Towards net-zero emissions

Compliance with the Paris Agreement maintained by the United Nations Framework Convention on Climate Change (UNFCCC) requires reducing the ICT industry's own greenhouse gas emissions by 45 per cent between 2020 and 2030. These recommended emission reductions, highlighted in an ITU standard, were the first ICT-specific targets to be approved by the Science Based Target Initiative (SBTi).

Building circular economies

ITU's green ICT standards enable assessments of environmental impact over a technology's entire lifecycle, providing the foundations for a circular approach to tech industry activities and consumption. The standards guide sustainable e-waste management and address extended producer responsibility – the concept of integrating environmental sustainability into core business activities.

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