Council Working Group for
Strategic and Financial Plans 2024-2027
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STUDY GROUPS SURVEY

Summary

This document presents the results of a Study Groups' Survey on the ITU Strategy sent to all ITU Study Groups Chairpersons to be considered in the process of the development of the Union's Strategic Plan for 2024-2027.

Action required

This document is transmitted to the CWG-SFP **for information**.

Reference

Results of the Study Groups' Survey on the ITU Strategy 2024-27

ITU COUNCIL WORKING GROUP ON STRATEGIC AND FINANCIAL PLANS 2024-27

Informal consultation of ITU Study Groups' Chairpersons

ALL Study Groups replied - **19** answers received

6 from ITU-R - **11** from ITU-T - **2** from ITU-D

Q. Please mention the key challenges the SG is facing in carrying out its mandate:

key challenges	%
Issues with **virtual meetings** (slowdown of standardization programmes, difficulty to resolve controversial issues, connectivity challenges, less productive hours)	47%
Attraction and **gathering of domain experts** (from various industry sectors and academy)	47%
Encourage **participation from developing countries and academia**	37%
Increasing **need to coordinate and collaborate cross-cutting topics** with other technical-oriented groups, including open-source community	26%
Overlaps and **stove-pipe approach** adopted by study groups	26%
Coverage of all **time zones** (especially important during the pandemic due to remote working)	21%
COVID-19 related issues (e.g. rare Regional Group meetings due to COVID-19 pandemic and work being deferred due to time and resource constraints)	21%
Maintain our long-term collaboration with a number of SDOs and key partners	21%
Maintaining relevancy and **global leadership role** as a useful organization	21%
Lack of **face-to-face meetings**	16%
Maintain good participation rates (e.g. in some cases delegates (and their employers) typically do not gain financial or academic benefits from the results of the SG; or some not able to remain due to other tasks assigned to them by their respective Administrations or due to changing their workplace)	16%
Lack of focus from contributions or not global scope of applicability	16%
Reaching consensus on policy and economic issues that are considered controversial topics (incl. need for time and resources to create dialogue and understanding between developed and developing countries)	16%
Impending **construction** at ITU complex when physical meetings resume	11%
Overcoming language barriers requires **translation** and **interpretation**	11%
Regulatory contexts & **Issues on data protection** relevant to local regulation/laws	11%
Security is everywhere to provide appropriate countermeasure to address emerging threats/risks for all areas/sectors that ITU is working on	11%

Q. Please identify the key trends that will influence the work of the SG in the near future (next 3-5 years)

key trends	%
Artificial intelligence, including machine learning	89%
High demand for frequency spectrum for many new applications of radio services	47%
Quantum related technologies	37%
Evolution of all transport, **access**, and **home networking technologies** to **higher transmission speeds**	32%
IoT in smart cities and communities (incl. concerns over trust, privacy, and identification)	26%
Satellite networks & **satellite broadband** communication systems	26%
Cloud technologies & **Data handling** (need for interoperability and optimization in data management)	26%
Inclusiveness, **cooperation** and **coordination of the work of SGs**	26%
Applications in **Smart cities and communities**	21%
Advanced definition video experiences (4K/8K/HDR etc.) and High realistic experiences (VR/AR etc.) including quality assessment & video technical standards	21%
Connectivity issues (secure, available, and reliable connectivity for all)	21%
Security and privacy by design applied to all services and applications	21%
Environmentally sustainable operations of ICTs & **environmental aspects**	21%
E-waste and implementation of a **circular economy** & Development of Data Center (Energy saving technologies such as liquid cooling)	16%
Crowdsourcing-based methodologies for the assessment of **QoS** and **QoE** for **5G and beyond**	16%
Accessible media	16%
Modernisation of **aeronautical systems** & Requirement for **greater navigational**	16%

Q. Is there a key suggestion for improvement in the ITU Strategic Plan 2024-2027?

ITU-R SG4: Purposes, composition, structure of the organization, rights and Obligations of Member States and Sector Members are described in the basic documents of the Union. **The Strategic Plan will be more understandable and successfully implemented when tasks that are missing in the Constitution and Convention are excluded from it**. For example, tasks **T.2** (this task is covered by T1), **T.5** (this is a private task, and the general one consists of ITU cooperation with regional and other organizations), intersectoral tasks **I.2, I.4, I.5** (these tasks are not spelled out in the basic documents).
ITU-R SG5: Encourage/facilitate greater participation and technical contributions by sector members. Encourage/facilitate exchange of information with external organizations. **Ensure Tight Focus on core ITU mission, objective and goals and avoid tangential offshoot areas, initiatives and, programs not directly aligned with attaining the 6 Key Goals of the plan, especially with tight budgets and resources in ITU** itself as well as in Administrations and Sector Members.
ITU-T SG12: **Mission**-To promote, facilitate and foster affordable and universal access to telecommunication/ICT networks, services and applications and their use for social, economic and environmentally sustainable growth and development. One of the aspects of the access to ICT that was highlighted by the pandemic is the type of access people have. One thing is to have access to ICT services and another completely different thing is to have an acceptable/high QoS access. Online activities such as school, work, entertainment require a minimum QoS level to actually benefit from. **The mission should highlight this fact. Affordable, high quality and universal access… and the goals adjusted accordingly.** Quality should also be maintained under values and goals. One of ITU-T objectives could be technical assistance for implementing recommendations on quality just as it is done for security. Alternatively, it could be as part of Intersectoral objectives yet with similar elevation as done with security of networks and services.
ITU-T SG17: **Mission**-To promote, facilitate and foster affordable, **secure** and universal access to telecommunication/ICT networks, services and applications and their use for social, economic and environmentally sustainable growth and development. **Suggested additional goal: Goal x - Confidence and security: Manage emerging treats and provide countermeasures to address threats in the use of telecommunications/ICT.**
ITU-T SG13: **Need to emphasize the importance of "innovation" and "partnership".** Goal 4 states "enable innovation". This is too weak. Innovation should be encouraged rather than enabled. Goal 5 states cooperation among the ITU membership and stakeholders. In the standard making in the field of future networks, any single organization cannot produce a good standard without cooperation with external organizations. The current text of goal 5 is not clear whether ITU encourages cooperation among all the industry bodies as well as any organizations working for other industries (vertical sectors). Clarification or enhancement is needed.
ITU-T SG16: **Broader and deeper collaboration, inside and outside ITU**, to attract expertise and development of relevant standards. Timely delivery of high-quality standards. **More balanced international participation.** **Stronger assertive presence of ITU-T in the international standardization stage.**
ITU-R SG6: **The current goals are still important but need more weight especially on Inclusiveness and Sustainability. Partnerships are also becoming vital** so the ITU may need to look closely at its collaboration rules and requirements. **Growing concern over the effects of climate change** would seem to point towards the need for a greater emphasis on sustainability.
ITU-R SG7: **Climate change is only mentioned in the sections on ITU-D. Climate change is a global problem** and the study of climate change cannot be accomplished unless the space-based climate monitoring and remote sensing systems are adequately protected from harmful interference and the data can be efficiently and reliably transmitted to the ground. I also note that there is no mention of the scientific use of the radio spectrum under ITU-R with the exception of the Earth exploration-satellite usage. This could be improved.
ITU-T SG5: **More focus on the reductions in GHG emissions needed** to meet the Paris Agreement. **To have clear instruction on how the target values are determined and how are they measured.**
ITU-T SG20: **More focus on the rights to data privacy and ownership related to smart cities and communities. The ITU strategic plan should include clear instructions or guidelines on how the target values are determined and how are they measured.**
ITU-D SGs: **Add a new strategic goal (Goal 6) focused on capacity building and empowerment.**

ITU-T SG9: It would be better if the **ITU Strategic Plan includes an element mentioning that ITU standardization** and other efforts should contribute **to reduction of inequality and disparities of wealth distribution worldwide** (wealth gap) in addition **to bridging the standardization gap**.

ITU-T SG11: **ITU-T objectives might need to be complemented with developing standards related to combating counterfeiting and stolen mobile devices.** In this regard, it is proposed to add the following change in T.1 (see p.16), highlighted in rev. marks: "… T.1 (Development of standards) Develop non-discriminatory international telecommunication/ICT standards (ITU-T recommendations), in a timely manner, and foster interoperability and improved performance of equipment, networks, services and applications and combat counterfeiting of ICT devices and mobile device theft. …" The relevant outcomes and outputs might need to be added respectively, as follows: "… T.1-d: Reduced spread of counterfeit ICT devices... T.1-e: Reduced the use of stolen mobile devices... T.1-9 Solutions for combating counterfeiting and stolen mobile devices.

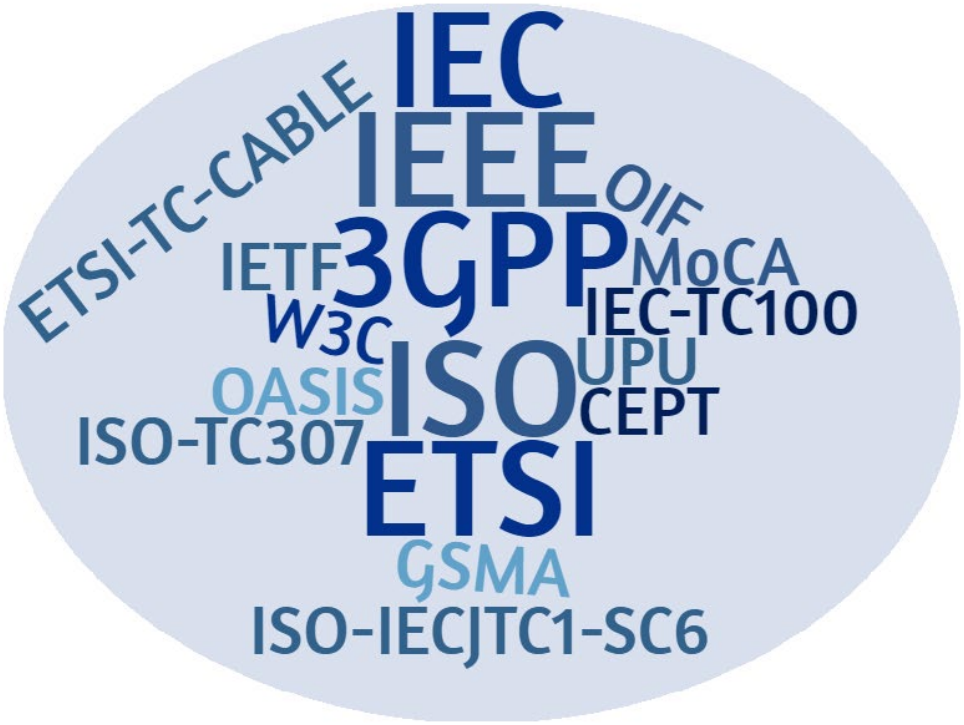
ITU-T SG15: **Outcome T.1-a** indicates "Increased utilization of ITU-T recommendations". Five of the top ten most downloaded Recommendations, and 41 of the top 100 most downloaded Recommendations are products of ITU-T SG15. This metric is best optimized by developing more Recommendations with high industry relevance and global applicability, and fewer Recommendations of questionable industry relevance and regionally narrow scope of applicability. It is not a useful strategy to look for those Recommendations that are rarely downloaded and try to convince people to use them. **Outcome T.5-d** indicates "Increased number of ITU-T A.4, A.5, and A.6 qualified organizations". Current A.4 and A.6 do not have relevance concerning the range of other organizations with which SG15 communicates and collaborates. Some of those organizations (e.g., ONF and the OpenROADM MSA) do not meet the qualification criteria, yet we communicate or collaborate with these organizations via liaison statements. Regarding A.5, it is not the actual number of qualified organizations that is important, but rather that we are able to qualify all organizations to which there is a need to make a normative reference or incorporate text from their documents in an ITU-T Recommendation. Carrying out such qualifications just to make the number bigger by adding organizations to the list where there is no need for referencing or incorporation does not make sense.

ITU-T SG2: Maximizing benefits and minimizing disadvantages of the evolution of NNAI resources; encouraging involvement of developing countries in the telecommunications sector.

Q. Please list the key organizations the SG collaborates with:

More than **100** organizations collaborate with ITU Study Groups

Q. Could you identify any organizations that could be considered as a competitor?



ANNEX

Council Working Group for Strategic & Financial Plans 2024-27 (CWG-SFP)
ITU Study Groups Survey

ITU Study Groups (SGs) Chairpersons were invited to answer the following questions. All answers received can be seen here:

1. Main themes the SG works on (please complete with **keywords**)**:**

ITU-R SG 1: **Spectrum management**
Spectrum engineering techniques; Spectrum management methodologies and economic strategies; Spectrum monitoring.

ITU-R SG 3: **Radiowave propagation**
Radiowave propagation prediction and data, for all services at all frequencies; Propagation measurements; Radiometeorology; Radio noise.

ITU-R SG 4: **Satellite services**
Systems and networks for the fixed-satellite service; mobile-satellite service; broadcasting-satellite service; radiodetermination-satellite service; orbit/spectrum efficiency; interference; coordination; related aspects for FSS and BSS; performance, availability, air interfaces and earth-station equipment of satellite systems in the FSS, BSS and MSS; efficient use of the orbit/spectrum resources by MSS and RDSS systems.

ITU-R SG 5: **Terrestrial services**
Terrestrial Services; Systems and networks for fixed, mobile, radiodetermination, amateur and amateur-satellite services; Amateur and amateur satellite; Land Mobile; Wireless Access; Aeronautical & maritime communications and radiodetermination; Fixed wireless systems; HF systems in the fixed and land mobile services; Terrestrial International Mobile Telecommunications (IMT).

ITU-R SG 6: **Broadcasting service**
Broadcasting of vision, sound, multimedia and data services principally intended for delivery to the general public.

ITU-R SG 7: **Science services**
space operation; space research; Earth exploration; meteorology; remote sensing; active sensors; passive sensors; meteorological aids; radio astronomy; radar astronomy; Very Long Baseline Interferometry (VLBI); standard-frequency and time signals.

ITU-T SG 2: **Operational aspects**
Numbering, naming, addressing and identification; Operational aspects of routing, interworking, number portability and carrier switching; Current and future service provision, definition and operational requirements; Telecommunications/ICT management; Advice to the TSB Director concerning principles for directly assigned NNAI resources, including revenue generation.

ITU-T SG 3: **Economic and policy issues**
Tariff and accounting principles; International telecommunication/ICT economic and policy issues; Regional and subregional telecommunication/ICT economic and policy issues; Regulatory models and frameworks; Economic and policy aspects of the Internet, convergence (services or

infrastructure) and OTTs in the context of international telecommunication/ICT services and networks; Economic and policy aspects of big data and digital identity in international telecommunications services and networks; Competition policy and relevant market definitions related to the economic aspects of international telecommunication services and networks; Economic and policy issues pertaining to international telecommunication/ICT services and networks that enable Mobile Financial Services (MFS).

ITU-T SG 5: **Environment and circular economy**
Energy Efficiency; Circular Economy; Environment; Climate Action; E-Waste; Electromagnetic Fields; Electromagnetic Compatibility; Lightning and Protection; Resistibility; Sustainable Digital Transformation; Circular Cities and Communities.

ITU-T SG 9: **Broadband cable and TV**
Accessibility; artificial intelligence (AI); audiovisual content delivery, contribution and distribution; augmented reality; cable network; cable transport; cloud computing; coaxial cable; customer premises equipment (CPE); gaming; hybrid fibre coaxial; hybrid networks; high-dynamic range; information and communication technology (ICT); integrated broadband services; integrated broadcast broadband; interactive; middleware; multiscreen; multiview; optical fibre; Television (TV) and Sound programs; terminals; time critical services; ultra-high definition; Video; video-on-demand; virtual reality; voice; 3D TV.

ITU-T SG 11: **Protocols and test specifications**
Signalling, protocols; security of protocols; testing; federated testbeds; benchmarking; counterfeiting; mobile devices theft.

ITU-T SG 12: **Performance, QoS and QoE**
Performance; Quality of service (QoS); Quality of experience (QoE); Operational aspects of performance, QoS and QoE; End-to-end quality aspects of interoperability; Multimedia quality assessment methodologies; Subjective and objective quality assessment methodologies; Driver distraction and voice aspects of car communications; Quality assessment of video communications and applications; Digital Financial Service quality and experience.

ITU-T SG 13: **Future networks (& cloud)**
Future Networks; Networks beyond IMT-2020; cloud computing; data handling; Quantum Key Distribution; trustworthy networking; Machine Learning.

ITU-T SG 15: **Transport, access and home**
Transport Networks (including optical transport network (OTN); metro transport network (MTN); Ethernet over Transport; network timing and synchronization); Access Networks (including passive-optical networking (PON) such as XGSPON, NGPON2), DSL-family (G.fast, MGfast)); Home network and power utility network infrastructures, systems, equipment, optical fibres and cables (including undersea cables for communications and scientific monitoring), including related installation, maintenance, management, test, instrumentation and measurement techniques; control-plane technologies to enable the evolution toward intelligent transport networks, including support of smart-grid applications.

ITU-T SG 16: **Multimedia**
Multimedia; audio and video coding; IPTV; digital signage; videoconferencing; video surveillance/intelligent visual systems and services; immersive environments; immersive live experience (ILE); distributed ledger technologies (DLT); civilian unmanned aerial vehicles; accessibility; human factors; digital health (e-health, tele-health); safe listening; intelligent

transportation systems (ITS); vehicular media; digital culture; artificial intelligence (AI) in multimedia; AI for health; digital culture.

ITU-T SG 17: **Security**
Main keywords include, not limited to, cybersecurity; identity management; telecommunication language; IMT2020 and beyond security; quantum key distribution security; distributed ledger technique security; ITS security; IoT security; cloud computing security; and data protection.

ITU-T SG 20: **IoT, smart cities & communities**
Smart cities & communities; Internet of Things; Artificial Intelligence; Intelligent Buildings; e-services; smart services; Ubiquitous Sensor networks; Big Data; interoperability; IoT and SC&C architectures; data analytics.

ITU-D SG 1: **Enabling environment for the development of telecommunications/ICTs**
Broadband; digital broadcasting; rural and remote areas; network and digital infrastructure; Emerging technologies; cloud; m-services; OTTs; economic policies; consumer protection; policy; regulation; persons with disabilities and specific needs; digital inclusion.

ITU-D SG 2: **ICT services and applications for the promotion of sustainable development**
Smart cities and communities; e-health; digital services and applications; Cybersecurity; Conformance & interoperability; counterfeit ICT; theft of mobile devices; EMF; network and digital infrastructure; Emergency telecommunications; e-waste; climate change; environment.

2. Please list the **key organizations the SG collaborates** with, also include collaboration with other ITU Sectors:

S*ee page 5.*

3. Could you identify any organizations that could be considered as a competitor? Please list the main ones below:

See page 6.

4. Please mention the **key challenges** the SG is facing in carrying out its mandate:

- Limitations due to COVID-19 pandemic (online meetings with limited hours)
- Limitations of the possibilities to hold large physical meetings (e.g., > 100 participants) due to the increasing number of ITU/ITU-R events having to share the limited number of rooms available in the ITU HQ with this capacity.
- Lack of sufficient contributions
- To increase the participation of experts in some fields within the scope of ITU-R SG1 (e.g., Economics aspects on spectrum management,…
- Time pressure to develop new prediction methods, particularly for WRC issues, with limited measurements. This is particularly true for higher frequency bands where equipment is not widely available, so there are few measurement campaigns and consequently, few data on which to base models.
- Virtual meeting format has made progress very difficult, due to limited hours, time zone differences, lack of informal collaboration time, and technical constraints on meetings.
- Unlike some other Study Groups, SG 3 delegates (and their employers) typically do not gain financial or academic benefits from the results of the SG, so it is challenging to

	maintain good participation rates. We rely on goodwill and a sense of community citizenship, but this is difficult to maintain, particularly with the virtual meeting issues mentioned above.
-	Development and testing of software to implement SG 3 Recommendations requires the involvement of participants with deep expertise in software.
-	The environments for which propagation predictions are required are becoming more diverse and complex.
-	Lack of face-to-face meetings after RA-19
-	Lack of a single center for research in WP. For example, in the part of preparation for WRC, WP is responsible to CPM for preparation of materials and is not considered in SG meetings. Regarding the current work, WP carries out its activities according to the mandate of SG.
-	Difficulties with planning of SG work according to A1.3.1.3 and planning of organization of meetings according to A1.3.1.9 of Resolution ITU-R 1-8
-	Attendance at WP meetings of representatives not involved in satellite matters (e.g. GSMA, etc.) whose purpose is to ensure that the criteria and methods for protecting space services do not impose restrictions on the development of terrestrial radio services. At times, the opportunity to study issues related to promising satellite radio technologies is also blocked.
-	The lack of interpretation reduces the effectiveness of the meetings SG work and reduces the list of potential meeting participants.
-	Lack of meeting time, particularly during e-meetings.
-	Difficulty in reaching consensus during e-meetings.
-	Volume of work
-	Definition of Consensus
-	Time available
-	Comprehension by other working parties of the implications of safety of life and the measures required to ensure that safety
-	Strong decrease on meeting time compared to physical meetings
-	Difficulty of mutual understanding during e-meetings, due to lack of off-line discussion possibility, with possible negative impact on time to reach consensus.
-	Difficulty to maintain centrality due to increased role of external organizations in specific fields, with specific targets, fast reaction and shorter workflow for provision of decisions.
-	Practical international e-meetings operate with only 40% as many productive hours compared to physical meetings
-	Difficulty in reaching consensus during e-meetings.
-	Work is being deferred due to time and resource constraints and as COVID continues the deferred work may never be recovered in time to be meaningful
-	Impending construction at ITU complex when physical meetings resume
-	Maintaining relevancy and global leadership role as a useful organization
-	Current pandemic restrictions are delaying ability to carry out testing and collaborative work to further the development of new technologies.
-	Production and distribution of audio-visual content for consumption on a wide variety of user terminals, delivered not only by traditional terrestrial and satellite broadcasting but also via the internet and mobile networks.
-	The existing spectrum allocated to the broadcasting service may not be sufficient to deliver beyond-UHDTV content that provides users with immersive, sensory experiences.
-	Growing concern over energy consumption may have potential impact on the development of new systems and applications.

- Certainly, the global pandemic has affected work in Study Group 7 and has been a key challenge to carrying out the necessary work within its Working Parties in a timely manner.
- A worldwide emphasis on furthering the interest of non-scientific uses of the radio spectrum to the detriment of the scienctific uses.
- A lack of understanding and acknowledgement of the societal benefits of scientific uses of the radio spectrum.
- Overlaps and stove-pipe approach adopted by study groups.
- Conversion of research/short term view into operational Recommendations.
- New use cases, business models & architectures that are challenging for current NNAI assignment policies.
- Regulatory contexts.
- Reaching consensus on policy and economic issues that are considered controversial topics.
- Negotiating process requires time and resources to create dialogue and understanding between developed and developing countries.
- Bridging the Standardization Gap (BSG): facilitating the efficient participation of developing countries in ITU's standards-making process.
- Overcoming language barriers requires translation of documents and interpretation of meetings.
- Increasing need to coordinate and collaborate cross-cutting topics with other technical-oriented groups.
- Limited time availability
- Time zone coordination (especially now during remote working)
- Limited subject matter expertise (membership limitations)
- Involvement of members from developing countries
- Scarce resources and scarce availability of experts to review the standards being proposed in SG9 for adoption as ITU-T Recommendation.
- Availability of other SDOs to collaborate and use SG9 as the international platform to validate international use of regional and national cable-related standards.
- Involvement of some cable industry, especially modern industry trends, e.g. OTT, in the work of SG9.
- Involving more participants from a wide variety of countries.
- Development of standards that will contribute to cable TV business growth under such a mature market situation.
- Maintaining sustainable relationships with relevant organizations particularly outside ITU, e.g., ETSI TC-Cable, CableLabs, CableEurope.

- Issues on starting new work items (e.g. Internet-related technologies/protocols). The fact of potential overlaps/related activities in other SDOs become a reason for rejecting the creation of new work items.
- Rare Regional Group meetings due to COVID-19 pandemic
- Few vendors participate in the work of SG11. In principle, the signalling and protocols related activities should attract more vendors.
- Representation of relevant stakeholders from all regions: a) Whereas Member States are represented from developing countries, there is rare representation of sector members, associates operating from developing countries b) In the case of industry representation, operators from some regions are missing.
- Interplay between machine learning and quality assessment. Impact of AI/ML on in-force standards
- Work in fully-virtual mode across different time zones: a) Participation in a SG12 meeting would typically include participants covering time zones from GMT-7 to GMT+9, which makes scheduling a challenge
- Efficient coordination and communication mechanisms with ITU internal and external entities
- Collaboration with open source community
- Encourage participation from developing countries
- Encourage participation of academia
- Encourage innovation utilizing latest technologies.
- Difficulty to resolve controversial issues with only virtual/e-meetings in the COVID situation
- Insufficient worldwide participation of network operators (ROAs)
- Too much time spent on work items with regionally narrow scope of applicability detracting from time available to advance global standards with worldwide deployment
- Increasing technical challenges as we approach physical limits (e.g., the Shannon limit) in transmission speeds
- Open and royalty-free video codecs like the ones developed by AoM present a challenge to the successful development of future video coding standards. How can SG16 and ISO/IEC JTC1 SC29 work together to cope with this challenge to deliver more powerful, higher cost-effective and industry-friendly video technical standards?
- Attraction and gathering of domain experts (from various industry sectors) to enable SG16 to develop more useful multimedia-related digital services Recommendations for those new verticals. E.g., health, transportation, blockchain.
- Maintain our long-term collaboration with a number of key partners like ISO/IEC JTC1 SC29 and SC35

- Mobilization and recruitment of more academic members to contribute original research to in our standards development
- COVID-19 impacts: slowdown of standardization programmes, lack of the spontaneous exchanges enabled by face-to-face meetings
- Coordination with other groups related security as competitors and collaborators
- Security should not be fragmented, resulting in one platform for security standardization
- Issues on data protection relevant to local regulation/laws
- Security is everywhere to provide appropriate countermeasure to address emerging threats/risks for all areas/sectors that ITU is working on.
- SG17 work, much like other SGs, is dominated by CJK delegates and few delegates from areas such as Europe.
- Limited time availability
- Time zone coordination (especially important during the pandemic due to remote working)
- Limited subject matter expertise (membership limitation)
- Lack of Involvement from members of developing countries
- Insufficient contributions received from developed countries
- The impact of COVID-19 on the work of the study groups with the connectivity challenges that arise
- Synergy between study groups, TDAG-WG-RDTP and RPMs in defining study questions
- Implementation of SGs' reports and guidelines by Member States
- Some office bearers for some study Questions are not able to remain due to other tasks assigned to them by their respective Administrations or due to changing their workplace.
- Some input contributions are not focused on the main topic of the respective questions.
- Some study questions have been kept for consecutive study periods, which prevents studying other topics of (more) importance.
- Some office bearers do not spend enough time to prepare good reports and lead the discussions.
- In some cases, there is too much emphasis on existing technologies and systems at the expense of neglecting future trends that may be more in line with achieving sustainability objectives.
- In general, there is minimal participation from the Academia, which needs to be fixed.
- One key and vital challenge traversing all study Questions and topics is how to produce useful and high-quality reports in a timely manner.

5. Please identify the **key trends** that will influence the work of the SG in the near future (next 3-5 years):

- High demand for frequency spectrum for many new applications of radio services
- Congestion in the use of existing allocations
- Adoption and integration of AI in developing and operating Spectrum Management and Monitoring tools, systems and applications
- Increasing use of ISM frequency bands for value-added services, and the use of other frequency bands by devices not subject to individual conditions on deployment or operation.
- Development of the satellite segment of broadband communication systems
- Consideration of new development trends and new radio monitoring technologies in the current edition of the Radio Monitoring Handbook, new and existing ITU recommendations and reports
- Protection of people from electromagnetic radiation from wireless communication system, environmental protection when using radio equipment
- Expanding new utilization of frequency spectrum for those other than radiocommunication services
- The move to ever higher frequency bands will require considerable new work.
- Software-based prediction methods will need to replace the current document-based Recommendations where all algorithms are written out in full. This will require higher involvement of Working Party participants to control SW content in order to avoid reducing the transparency of the work but on the other hand, it will increase accuracy and efficiency for users.
- External databases (terrain, buildings, meteorological, etc) will be increasingly important.
- Harmonization between terrestrial and satellite prediction models is becoming crucial.
- Implementation of the satellite component of 5G networks on a global basis, both in terms of mobile broadband access and in terms of satellite IoT.
- The need to create a mechanism for equitable access to the radio frequency spectrum and satellite orbits for all ITU Member States, both in terms of planned and coordinated radio frequency bands.
- The necessity to improve RR provisions regarding regulation of the use of radio-frequency spectrum and satellite orbits by NGSO multi-satellite systems.
- To improve international mechanism for detecting and eliminating radio interference from global multi-satellite systems at NGSO
- Development of methods and criteria used in coordination of multi-satellite NGSO systems.
- New emerging applications in the land mobile service (e.g., autonomous road vehicles; industrial/factory automation; new modes of wireless personal communications), with accompanying more stringent performance requirements.
- New emerging technologies such as artificial intelligence and machine learning.
- Introduction of unmanned vehicles (aeronautical & maritime) and space planes
- Modernisation of aeronautical systems
- Requirement for greater navigational accuracy
- Cybersecurity
- Increasing need for low latency, high data rate communication links
- New emerging applications in the FS service, such as use of higher frequencies with wide channel bands for delivery of very high capacity.
- Increase of use of several frequency bands by multiple services.
- Increase of use of new technological solutions, such as electronic antennas, and network complexity and intelligence

- Focus on energy efficiency and “green vision”, improve digital penetration, especially with low cost for developing countries.
- Bottom-up technology drivers/enablers: Evolving foundational communications capabilities (e.g., physical layer, coding layer, protocol layers, & architectures) applicable to IMT terrestrial wireless; spectrum shortages; spectrum sharing; interference mitigation
- Top-down stakeholder drivers: New applications and use cases as well vertical market drivers for IMT wireless communications in public, private, and hybrid deployments are increasingly coming to the forefront, shared operator network infrastructure
- Quantum computing, AI & machine learning, software defined “everything”, open architectures, distributed radio access networks,
- Economic drivers and global “connect everyone and everything” initiatives,
- The expanding “green” movement & other environmental aspects
- Multiple delivery options – growth in the number of delivery options together with an increasing variety of user terminals.
- Accessible media – new national and international regulations being enacted mandate increasing the creation and distribution of accessible media, aimed at making content on all platforms and devices accessible to all consumers.
- Personalized content – production and distribution of content in a way that allows users to choose a personalized experience that best meets their preferences.
- Converged media – confluence of technologies used to create content able to take advantage of the capabilities of each of multiple delivery platforms.
- Cloud technologies – increasing use of cloud-based technologies for content creation and also for distribution to end users.
- AI and ML – increasing use of AI/ML for a number of applications to improve productivity and reliability, and to enhance innovative creation.
- Environmentally sustainable operations – increasing requirements to create, deliver and consume content that reduces the environmental impact, aligning with the ITU Sustainable Development Goals.
- Saturated transmission efficiency – the transmission efficiency of radiocommunications has almost reached the Shannon limit.
- The global desire for more and more spectrum for mobile broadband communications.
- Technological advances in scientific instrument sensitivity.
- Understanding climate change will require more scientific measurements and will result in more data that needs to be transmitted from spacecraft to the ground.
- Evolutionary use of current regulated NNAI resources, e.g., M2M/IoT.
- Emergence of new technologies requiring regulation.
- Evolutional usage of AI in Telecommunications/ICT management.
- Advancement of technology: Policies and regulatory frameworks will have to be developed at an accelerated pace to keep up with the future’s technological evolution.
- Covid-19: The format (virtual/physical) of future meetings will impact the participation of developing countries as connectivity play a significant role.
- The effects of climate change, natural disasters, pandemics, and extreme weather events
- E-waste and implementation of a circular economy including the concept of digital sustainable product passport
- 5G, 6G related to EMF, EMC, Resistibility, E-waste and Energy Efficiency

- Sustainable Digital Transformation
- Increasing focus on Net Zero
- Development of Data Center (Energy saving technologies such as liquid cooling)
- Advancement of AI technologies
- Advanced definition video experiences (4K/8K/HDR etc.)
- High realistic experiences (VR/AR etc.)
- Integrated broadcast and broadband services
- Virtualization of service implementation
- Protocols and signalling requirements for networks with ultra-low latency and ultra big data, including protocols for autonomous networks, security of protocols for DFS and protocols for immersive technologies.
- QKDN-based protocols, AI-based protocols, blockchain-based protocols
- Testbed federations to be used for remote testing
- Requirements for AI-based testing tools and test specifications to be used for testing ultra-low latency networks and immersive technologies
- Methods for verification of unique identifier for combating counterfeiting and mobile devices theft
- Interplay between artificial intelligence, machine learning and quality assessment
- Quality assessment for video streaming, gaming, VR, AR, XR and other multimedia applications
- Crowdsourcing-based methodologies for the assessment of QoS and QoE
- Relationship between formal standards and open source
- Speech recognition and speech dialogue systems
- QoS and QoE assessment methodologies for 5G and beyond
- AI/ML
- Quantum related technologies
- Data handling
- Satellite networks
- Continued evolution of all transport, access, and home networking technologies to higher transmission speeds.
- Increasing automation of network operations, e.g., via increased use of SDN/NFV, more functions performed via software, and specification of enhanced control interfaces to facilitate the application of AI/ML to the automation of network operations

- Support of disaggregated network architectures
- Increasing diversity of user base – e.g., use of SG15 technologies by webscale data center operators, enterprise, and not exclusively network operators using SG15 standardized technologies
- Digitization of many industry sectors with increased use of ICTs
- Cross-fertilization and fusion of ICT technologies and culture
- Open development models of video technical standards (e.g., with open source)
- Increased use of ICTs and digital services and applications to combat health emergencies such as COVID, relying on the use of multimedia technologies
- Artificial intelligence-driven algorithms are becoming a seminal core capability to support the implementation of many forms of smart and innovative multimedia communications
- Trust infrastructure transition due to emerging commercially available Quantum computers
- Security by design applied to all services and applications
- Privacy enhancing techniques applied to all services and application
- From the viewpoint of network and service providers, as communication networks become complicated, providing effective security architectures and securing supply chains should be a high priority.
- Coordination and collaboration with other organizations working similar security areas is inevitable.
- SGs are contribution driven. Some trend is that each year sees a smaller set of countries submitting technical contributions.
- Increase in the deployment of IoT based sensors in smart cities and communities
- The need for interoperability and optimization in data management
- Increase in cyber security threats in smart sustainable cities
- Concerns over trust, privacy, and identification of IoTs in smart sustainable cities
- The need for interoperable digital architecture to support verticals in smart cities and communities
- Increase in the use of emerging technologies such as AI, digital twins, edge computing and quantum computing in cities
- Connectivity issues
- Emerging technologies and applications, regulation, including consumers protection issues in this era
- Inclusion of all stakeholders in SGs work, especially youth, women and person with disability

- Participation of members in the work of the SGs in the context of pandemic with more and more virtual meetings
- Cooperation/collaboration
- Application and use of new technologies, platforms, and trends pertaining to telecommunications/ICTs, such as 5G, AI, data analytics, etc.
- Provisioning of secure, available, and reliable connectivity for all.
- Studying the impact of utilizing new frequency spectrum (e.g., mmWave) on a massive scale on human health.
- How to engage the whole of government in an efficient and effective manner to ensure sustainability for utilizing telecommunications/ICTs in other sectors. This includes policy and regulatory issues.
- How to ensure sustainability in ICT-centric applications and services in a fast-changing world in spite of uncertainties, disasters, pandemics, etc. This requires a fresh new approach to policy, regulation, education, and operation.

6. Is there a **key suggestion for improvement** in the ITU Strategic Plan 2024-2027? (max. 100 words). The current Strategic Plan (2020-2023) is accessible here.

See pages 3-4.