



ANNUAL REPORT 2021

ICT STANDARDS CONSULTATIVE
COMMITTEE (NSAI TC 02)

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1 Chairperson's Statement

Covid-19 and Beyond

2021 was in many respects a repeat of 2020; a year when the Covid pandemic continued to dominate our world, and the digital transformation and hybrid-working reset became more deeply embedded.

In 2021

- We saw the rapidly **changing global business environment** in terms of new organizational types, new regulations, and new standards set against a rapidly evolving Technosphere or 'metaverse'
- We learned how reliant we are on **interconnected ICT systems**, and how fragile they can be when it comes to cyberattack, and on the need to become cyber-resilient
- We witnessed the normalization of **blended or hybrid work**, and the move to cashless society
- We saw **5G starting to make an impact**, while work on 6G is starting - reference the new EU Hexa-X initiative
- There was a **relentless rise of Cyber and Ransomware attacks** - with only modest success at tipping the balance away from the cyber attacker ¹
- A post **COP-26** brought a renewed and new focus on the important role of ICT to support SDGs, with a particular focus on data centers in Ireland - as a resource but also the pressure they present on our power grid, and embodied CO2
- **A renewed focus on compliance and certification** emerged as European nations issued a record €1.1 billion in GDPR fines ², and with ENISA's work on EU Cybersecurity certification
- **Transhumanism** — How we live and interact between the digital and physical world is changing because of IOT, Implants and Brain Computer Interface (BCI) technologies
- **A rising tech geo-politics and cyber-diplomacy** - focus emerged with the potential for a cyber cold war - against a backdrop of intensifying competition between autocracies and democracies, increasingly contested governance, restricted access to new technology, more on-shoring and agreeing the relative power of big tech and governments in defining the 'new rules of the road'

2 Key Developments in 2021

2.1 Summary

Despite the continuing challenges presented by Covid-19 the work of our ICT Standards Consultative Committee (ICTSCC) continued almost without interruption. Working virtually, we managed not only to maintain but also expand our portfolio of activities through our participation in European and International committees at CEN/CLC and ISO/IEC.

The presence of NSAI experts in key standardization areas was again to the fore through their leadership roles in committees and working groups, as project editors and in key liaison roles including between ISO/IEC JTC 1 and the European Commission. At home we also expanded our engagement with stakeholders and with new experts joining our work while continuing to

¹ [ENISA-Threat-Landscape-2021](#)

² [European nations issue record €1.1 billion in GDPR fines | CSO Online](#)

liaise with key stakeholders to ensure that public policy acknowledges and appropriately references European and International ICT standards.

2.2 Artificial Intelligence

Through our membership of CEN-CLC /JTC 21 (Artificial Intelligence) and ISO/IEC JTC 1 /SC 42 (Artificial Intelligence), Irish delegations participated in plenary meetings at both European and International level during 2021. NSAI experts also participated at working group and project level throughout the year.

Irish leadership continues in this key area of standardization where our national committee Chair, Dr. David Filip is Convenor of JTC 1/SC42 Working Group 3 (Trustworthiness of AI) and where NSAI hosts the secretariat of that working group. 2021 also saw Ms. Marta Janczarski join our national committee furthering our presence and leadership internationally through her role on SC 42/WG 1 as project editor for the emerging management system standard for AI.

2021 saw a significant increase in the number of international projects, with new projects launched in the areas of a data life cycle framework and data quality for analytics and machine learning (ML). The year also saw key projects on concepts and terminology, a management framework for big data analytics, and governance implications of the use of artificial intelligence by organizations all progress through draft and final stages of approval on their way to expected publication in 2022.

Publications by JTC 1/SC 42 during 2021 include

- *ISO/IEC TR 24372:2021 - Information technology — Artificial intelligence (AI) — Overview of computational approaches for AI systems*
- *ISO/IEC TR 24030:2021 - Information technology — Artificial intelligence (AI) — Use cases*
- *ISO/IEC TR 24029-1:2021 - Artificial Intelligence (AI) — Assessment of the robustness of neural networks — Part 1: Overview*
- *ISO/IEC TR 24027:2021 - Information technology — Artificial intelligence (AI) — Bias in AI systems and AI aided decision making*

2.3 Blockchain

NSAI experts continued to make a significant contribution in European and International meetings in 2021 through their participation in CEN/CLC JTC 19 (Blockchain and Distributed Ledger Technologies) and ISO TC 307 (Blockchain and Distributed Ledger Technologies). In her role as a project leader/editor, NSAI expert Ms. Fiona Delaney leads International projects on use cases and for data flow model for blockchain and DLT use cases, while Dr. Robin Renwick is project leader for Re-identification & privacy vulnerabilities & mitigation methods in blockchain & DLT.

2021 brought renewed activity to our national committee with new experts joining and with engagement by our members in a DPER project on Blockchain and DLT use cases in the public sector.

Key developments during 2021 include the publication of

- *ISO/TS 23258, Blockchain and distributed ledger technologies — Taxonomy and Ontology,*

while the following documents have passed their final stages of approval and are expected for publication in early 2022

- *ISO/TS 23635 Blockchain and distributed ledger technologies — Guidelines for governance*
- *ISO/DIS 23257 Blockchain and distributed ledger technologies — Reference architecture*

2.4 Cloud Computing

NSAI membership of ISO/IEC JTC 1/SC 38 (Cloud Computing and Distributed Platforms) saw national delegations participate in plenary meetings and also NSAI experts further engage in the work of several SC 38 advisory groups during the year. At national level Ms. Ruth Lennon was appointed as Chair of our NSAI committee.

2021 saw SC 38 initiate new projects in the areas of taxonomy for digital platforms and concepts for multi-cloud and other interoperation of multiple cloud services. Meanwhile projects on audit of cloud services and data flow, data categories and data use have progressed to final draft stage for ballot in 2022. The year also brought finalization of committee work on ISO/IEC 23751 - *Cloud computing and distributed platforms – Data sharing agreement (DSA) framework*, with publication expected during early 2022.

A new topic which is already seeing considerable interest is trustworthiness of cloud services. While consideration of this topic is at an early stage it is already one to watch for in 2022. Meanwhile the impact of AI, ML and similar technologies as well as a stronger focus on green technology are also currently the subject of much discussion with more expected in 2022.

2.5 Cybersecurity

2021 again saw our national committee engage at European and International level through our participation in CEN/CLC JTC 13 (Cybersecurity and Data Protection) and ISO/IEC JTC 1/SC 27 (Information security, cybersecurity and privacy protection). Our main involvement in these committees is in SC 27 Working Groups 1 (Information security management systems) and 5 (Identity management and privacy technologies) and in CEN-CLC JTC 13 Working groups 1 (Chairman Advisory Group) and 5 (Data Protection, Privacy and Identity Management).

Meanwhile, ENISA is taking a key role in establishing European Certification schemes that support the new EU cybersecurity strategy. With already more than 15 of the ISO/IEC 27000 (Information security management systems) series of standards having been ratified as European Norms (EN) we should see accelerated adoption of these International standards across the EU.

Some key publications during the year include 10 standards and technical specification as part of the 27000 series. Highlighted as part of this package are

- *ISO/IEC TS 27110:2021 - Information Technology - Cybersecurity and Privacy Protection – Cybersecurity Framework Development Guidelines*
- *ISO/IEC TS 27570:2021 - Privacy protection – Privacy guidelines for smart cities*

Also of note during the year was progress of an amendment to ISO/IEC 27001 (Information security management systems - Requirements) which is due to go for consultation in January 2022. This standard remains one of the most widely adopted International management system standards and together with ISO/IEC 27002 (Information technology – Security techniques – Code of practice for information security controls) forms part of the critical standards infrastructure utilized by organizations in managing the security of their IT systems.

2.6 Electronic Invoicing

2021 proved to be another very active year for our national committee as NSAI experts continue to make an impact at European level. As Chair of our national committee Mr. Edmund Gray participated at plenary meetings of CEN TC 434 (Electronic Invoicing) and is also as part of that committee's management team where he is Convener of Working Group 7 (Registry Services) and Co-convener of Working Group 3 (Syntax Bindings).

2021 also saw our national committee consider common business requirements used by public bodies for eInvoicing in Ireland together with a European Parliamentary research study which

among other things proposed to accelerate adoption of a mandatory electronic invoice for both public and private entities.

A further key item for consideration during the year was a proposed amendment to the European eInvoicing standard EN 16931-1- *Electronic invoicing - Part 1: Semantic data model of the core elements of an electronic invoice*. Having passed through an extensive enquiry stage the amendment to this core eInvoicing standard is expected for publication later in 2022 or early 2023. As a mandatory standard for all EU public bodies, EN 16931 is also mandated by some countries for private business and is therefore expected to become the predominant method of eInvoicing across the European Union.

A project of note having progressed through its public consultation phase during 2021 is *prEN 16931-8 - Electronic invoicing - Part 8: Semantic data model of the elements of an e-receipt or a simplified electronic invoice*.

2.7 Internet of Things & Digital Twin

2021 brought the re-establishment of our IoT and Digital Twin committee with a core group led by national Chair Mr. Ray Walshe. Through our membership of ISO/IEC JTC 1 SC 41 (Internet of Things and Digital Twin) NSAI experts participated at plenary meetings of this international committee during the year. While monitoring activities across most of the SC 41 working groups (below) our current interest lies mainly in the area of Digital Twin.

- IoT Architecture
- IoT Interoperability
- IoT Applications
- Digital Twin
- Maritime, underwater IoT and Digital Twin applications

JTC 1/SC 41 published eight standards documents during the year with trustworthiness in IoT systems a subject being addressed by several work items, with a featured publication in 2021 *ISO/IEC 30147 - Internet of Things (IoT) - Integration of IoT trustworthiness activities in ISO/IEC/IEEE 15288 system engineering processes*.

National outreach activities are planned for 2022 to consolidate our current committee's membership and to support extended engagement in the work of JTC 1 SC 41.

2.8 IT and Data Governance

2021 brought the re-establishment of the NSAI national committee under Chair Mr. Brian McAuliffe.

As members of ISO/IEC JTC 1/SC 40 (IT Service Management and IT Governance) NSAI actively participates in International standardization activities in this area, with our experts also contributing to key leadership roles. As project editor, 2021 saw Mr. Terry Landers bring to publication the International technical specification *ISO/IEC TS 38505-3 Information technology — Governance of data — Part 3: Guidelines for data classification*. The year also saw Mr. Ray Walshe appointed as Convenor of JTC1/SC 40 /WG 1 – Governance of Information Technology. This is a key leadership role in the development of International standards for IT Governance. This appointment should support further national stakeholder engagement and complement national research initiatives including at the new SFI funded Empower centre.

2021 also brought progress in the development of a committee draft for a 3rd edition of *ISO/IEC 38500 Information technology — Governance of IT for the organization* while additional work is also underway to address the governance implications of the use of artificial intelligence by organizations, with ISO/IEC 38507 due for publication later in 2022.

2.9 IT Professionalism and Digital Competences

2021 was a very active year for our national committee and Chair Ms. Mary Cleary, who also Chairs the European committee CEN TC 428 (Digital Competences and ICT Professionalism). Under her leadership the year saw the publication of key standards on a common European framework for ICT professionals, the completion of a renewed business plan for TC 428 and the establishment of a new working group structure.

Other projects progressed by CEN TC 428 during the year include those on a framework for professional ethics, foundational body of knowledge for the ICT profession, guidelines for developing ICT curricula together with competence performance indicators and common metrics.

2021 also brought further collaboration between CEN TC 428 and IT Professionalism Europe to further the concept of IT professionalism and to promote the professionalism standards developed by CENTC 428.

Key publications by CEN TC 428 during 2021 include

- *EN 16234 -2 A Common European Framework for ICT Professionals Development, Part 2, User Guide*
- *EN 16234 -3 A Common European Framework for ICT Professionals Development, Part 3, Methodology*
- *EN 16234 -4 A Common European Framework for ICT Professionals Development, Part 4, Case Studies*

2.10 Standards for Future and Emerging ICT

The ICT sector continues to be characterized by waves of innovation both for discrete technologies and novel combinations of existing technologies, as we've seen in IOT.

The ISO/IEC JTC 1 *Emerging technology and Innovation* (JETI) group conducts an annual strategic review which identifies and prioritizes potential areas for future standardisation (see Figure 1) and conducts a deeper dive on more immediate technology areas of interest which are explored via Technology Trend Reports.

2021 saw JETI progressing work on *Unmanned Aircraft Systems* (UAS) in cooperation with ISO TC 20/SC 16, on a new Technology Trend Report on *Intelligent Computing* and on a white paper on *Digital Manufacturing*. The year also highlighted continued NSAI engagement in this strategic group.

No	Top Technology	DEF	ARC	USC	TAX	PER	USB	IOB	SEC	REG	Total
1	Data privacy	8	6	10	4	3	7	6	20	17	81
2	Edge Cloud	12	12	11	3	4	1	4	9	1	57
3	Empowering AI on the Edge	10	13	11	5	3	3	5	9	1	60
4	Digital Health	10	11	15	5	1	7	11	13	9	82
5	Remote Workforce Technologies	6	4	8	1	5	4	5	8	0	41
6	Green Tech	11	9	9	3	5	4	2	1	6	50
7	Self-driving cars	9	10	6	4	7	3	6	13	13	71
8	Remote audio and video communication	5	6	9	2	8	5	5	10	4	54
9	Remote Education/Learning	7	5	9	2	8	8	7	9	3	58
10	Data-Intensive Computation	6	10	6	6	8	4	4	8	2	54
11	Intelligent computing	13	11	12	7	6	1	5	6	1	62
12	XR (eXtended Reality)	8	6	12	5	4	7	3	6	4	55
13	Distributed Cloud	8	11	8	5	6	2	5	9	0	54
14	MaaS (Mobility-as-a-Service)	13	8	9	3	4	6	5	9	4	61

DEF (Terms and Definition)
 ARC (Reference Architecture)
 USC (Use Cases)
 TAX (Taxonomy & Ontology)
 PER (Performance)

USB (Usability)
 IOB (Interoperability)
 SEC (Security and Privacy)
 REG (Regulation and Policy)

Figure 1 - Areas of standardization for top priority technologies

3 ICT Standards Consultative Committee – Operational Overview

ICTSCC engages in a broad range of standardization activities through its participation in those European and International standards committees listed in Table 1.

Committee Name	Committee Title
ISO/IEC JTC 1	Information Technology
ISO TC 307	Blockchain and distributed ledger technology
CEN TC 225	AIDC Technologies
CEN TC 428	Digital Competence and ICT Professionalism
CEN TC 434	Electronic Invoicing
CEN TC 440	Electronic Public Procurement
CEN/CLC JTC 13	Cybersecurity and Data Protection
CEN/CLC JTC 19	Blockchain and distributed ledger technologies
CEN/CLC JTC 21	Artificial Intelligence

Table 1 - European and International Committees mirrored by NSAI ICTSCC

Internationally, ISO/IEC JTC 1 is a joint technical committee of the International Organization for Standardization (ISO) and the International Electrotechnical Commission (IEC) with its purpose to develop, maintain and promote standards in the fields of information technology (IT) and Information and Communications Technology (ICT). JTC 1 is a global standards development environment where experts come together to develop worldwide ICT standards for business and consumer applications. JTC 1 also supports the standards process for integrating diverse and complex ICT technologies. These standards rely upon the core infrastructure technologies developed by JTC 1 centers of expertise complemented by specifications developed in other organizations.

Since its formation in 1987, 3174 ISO/IEC standards have been developed and published by committees in JTC 1, which are comprised of some 4500 registered technical experts from around the world. Currently there are 22 active Sub committees of JTC 1, covering the topics set out in Figure 2.

Membership of an ISO/IEC committee is qualified as being an observer or a participating member. Figure 2 identifies those JTC 1 subcommittees where NSAI experts are actively engaged as participating members and also those subcommittees where our experts have observer roles.

European standardization work represents a very important activity as many standards projects engaged in have been supported by or are directly mandated by the European Commission to facilitate the implementation of policy and legislative instruments. Examples of this include the European framework for ICT professionalism and the eInvoicing directive. Emerging policy and legislative areas covering Cybersecurity, Data Governance and Artificial Intelligence are also similarly being considered for standardization activity through the establishment of CEN/CLC JTC 13 and the CEN/CLC JTC 21.

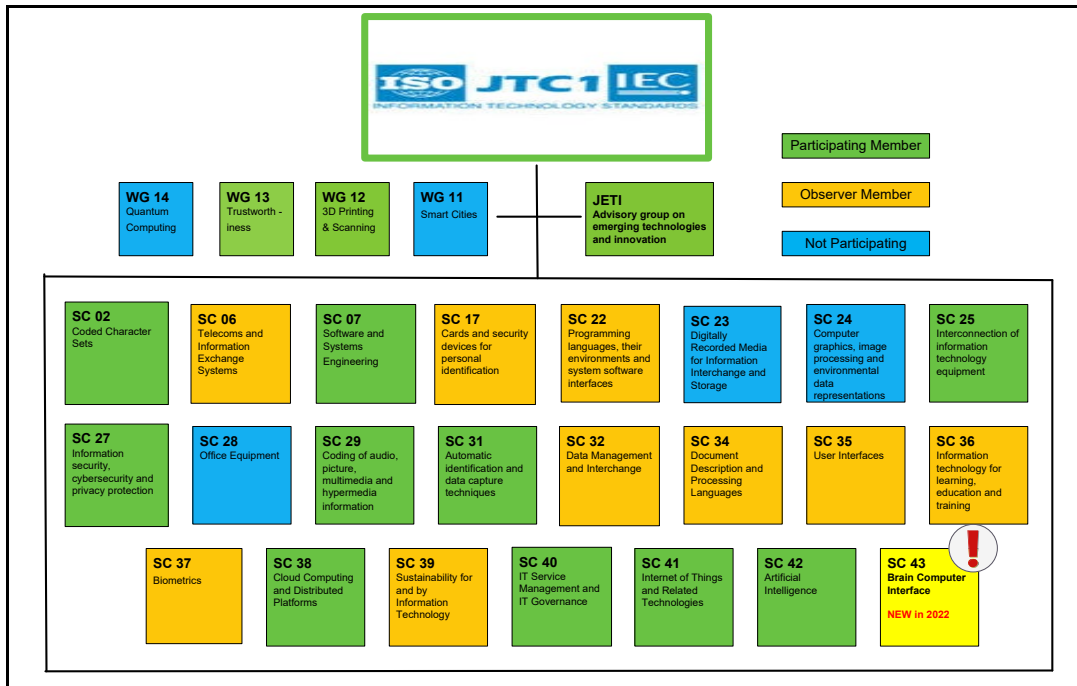


Fig 2 ISO/IEC JTC 1 Working Groups & Subcommittees (including NSAI participation)

4 Structure and Membership

The structure of ICTSCC comprises a plenary group (TC 02) and 16 subcommittees which mirror the engagement of NSAI registered experts in European and International standards. Table 2 details the current structure and organization of NSAI/TC 02.

Technical Committee/ Subcommittee	Committee Name	Mirroring	Chairperson	Membership
TC 02	ICT Standards Consultative Committee	ISO/IEC JTC 1	Mr. Terry Landers / Microsoft (rtd)	19
TC 02/SC 02	Software Engineering	JTC 1 SC 07	Dr. Paul Clarke / DCU	6
TC 02/SC 03	Telecommunications, media encoding and green IT	JTC 1 SC 06	Mr. Peter Lonergan / Enterprise Ireland(rtd)	3
TC 02/SC 04	Codes, character sets, and internationalization	JTC 1 SC 2	Dr. Michael Everson / Evertime	2
TC 02/SC 06	Generic cabling systems	JTC 1 SC 25	Mr. Matias Peluffo / Commscope	2
TC 02/SC 08	Biometrics	JTC 1 SC 17 & 37 / CEN TC 224	Dr. Michael Pierce / Daon	1
TC 02/ SC 09	Automatic Identification and Datacapture Techniques	JTC 1 SC 31 / CEN TC 225	Vacant	3
TC 02/SC 10	Information security, cybersecurity, privacy and data	JTC 1 SC 27 / CEN-CLC JTC 13	Mr. Terry Landers / Microsoft (rtd)	21
TC 02/SC 11	Cloud Computing and Distributed Platforms	JTC 1 SC 38	Ms. Ruth Lennon / Letterkenny Institute of Technology	9
TC 02/SC 12	eProcurement	CEN TC's 434 & 440	Mr. Edmund Gray/ Tubbercurry Software	15

Technical Committee/ Subcommittee	Committee Name	Mirroring	Chairperson	Membership
TC 02/ SC 13	e Competences and ICT Professionalism	CEN TC 428 / JTC 1 SC 36	Ms. Mary Cleary / Irish Computer Society	16
TC 02/SC 14	Document description and processing languages	JTC 1 SC 34	Mr. Eamonn Neylon / Signalarc	2
TC 02/SC 15	IT Service Management and IT Governance	JTC 1 SC 40	Mr. Brian McAuliffe / HP Inc.	7
TC 02/ SC 16	Blockchain and electronic distributed ledger technologies	ISO TC 307	Mr. Vikas Sahn / National College of Ireland	29
TC 02 / SC 17	Internet of Things and Digital Twin	JTC 1 SC 41	Mr. Ray Walsh / DCU	24
TC 02 / SC 18	Artificial Intelligence	JTC 1 SC 42	Dr. David Filip / Huawei	29
TC 02 / SC 19	Coding of audio, picture, multimedia and hypermedia	JTC 1 SC 29	Dr. Flaithrí Neff /TUS	15

Table 2 - ICTSCC Structure and Organization

5 ICTSCC Summary of Activities - 2021

5.1 Meetings

Meetings of the ICTSCC plenary group (TC 02) generally mirror the plenary meeting schedule of ISO/IEC JTC 1 which hold spring and autumn sessions. In 2021 NSAI TC 02 held three meetings on May 5th, November 2nd and December 13th.

ICTSCC subcommittees actively participating in European and International technical committees generally meet at least twice a year. As with the plenary group these national subcommittee meetings mirror the meeting schedules of the European and International committees that they participate in.

5.2 Ballots on European and International Standards

An important obligation on the membership of standards committees is engagement in the balloting process. While our national experts are active in this process, NSAI also utilizes a default voting policy to ensure all ballots are appropriately addressed. Figure 3 identifies the ballot activity in 2021 for those NSAI committees which maintain a participating membership of a related CEN/CLC and JTC 1 committee.

Number of national committee ballots 2021

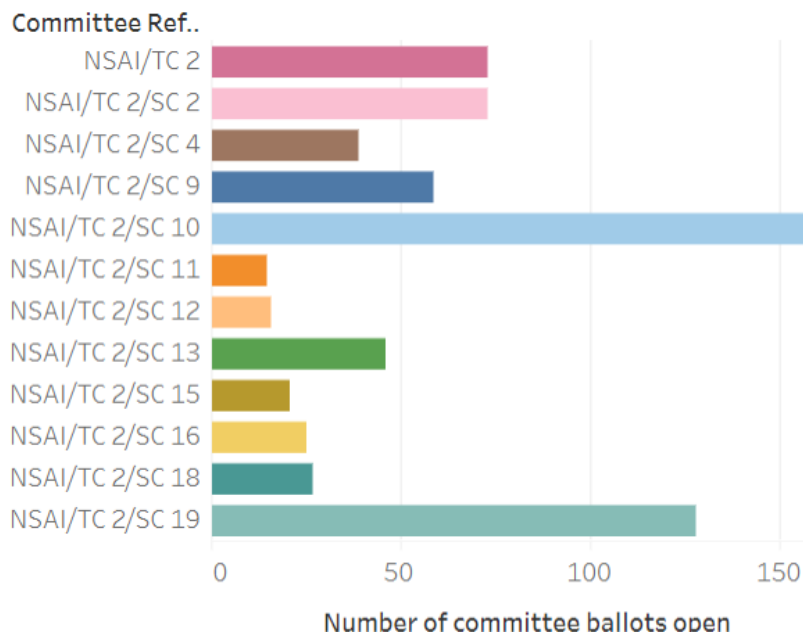


Figure 3 – European and International Ballots presented to NSAI national mirror committees.

6 Work programme for 2022 onwards

As well as maintaining our current ICT standards coverage, we plan to extend activities into the following domains

- **Sustainability** - Especially the role of ICT as an enabler, its role in the circular economy, and the importance of energy-efficient data centers
- **Brain Computer Interface** - Assess interest in establishing a national committee to engage with the new JTC 1 subcommittee (JTC1/ SC 43) on Brain Computer Interface
- **Cyber** – Engage with the new National Cyber Security Centre (NCSC) leadership in our standards work, and with Cyber Ireland with a view to hosting the JTC1/SC 27 plenary in Ireland in autumn 2023
- **Data Governance** - Building on the leadership of SC 40 / WG 1, engage with OGCIO and the Government’s data governance committee in the adoption of the ISO/IEC 38500 series of standards

7 Stakeholder engagement

We continue to broaden and deepen our stakeholder network, promoting the use of standards in national policy, regulation and procurement and new expert participation in our technical committees. Our key stakeholders include

- Government departments, agencies and authorities, including the NCSC, Data Protection Commission, Institute of Public Administration
- Industry, including IBEC, IRDG, Blockchain Ireland, Cyber Ireland
- Research and Academic Institution, including SFI
- Professional bodies, including the Irish Computer Society
- Sister agencies, including the IDA and EI