



Standards Outlook 2017

Delivering Digital

How standards are enabling the adoption
of digital technologies

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Welcome

Our theme for this year's Standards Outlook is digital. The digitization of industry provides huge opportunities to find new innovations, new products and services and new solutions to the challenges of productivity, ageing societies and security.

Pioneering developments in healthcare, construction, the Internet of Things and fintech are strengthened by a structured approach to knowledge sharing based on a consensus of interested stakeholders.

In BSI's role as the UK's National Standards Body we are working with industry, researchers, UK government, consumer groups and business organizations to capture best practice and share knowledge to grow the digital economy.

The international dimension

There is a constant need for international solutions to solve universal challenges, and to provide opportunities to deploy new technologies globally. Over the past year our work on Smart Cities has been adopted in China and the BSI standards for BIM have gained international acceptance. BSI is continuing to invest in participation in ISO and IEC, and in the European standards system. I stepped down as Vice President Policy for CEN in March 2017 following my appointment as Vice-President (policy) for ISO, the first British Vice-President of ISO for almost 30 years.

Scott Steedman CBE
Director of Standards

David Bell, BSI's Director of Standards Policy, will join the ISO Council. My ambition at ISO is to make real progress with the delivery of the ISO strategy to see ISO standards used everywhere, as a basis for global trade, innovation and growth.

The challenge of digital

The breadth of the impact of the digital economy poses challenges for standards organizations to coordinate across their traditional scopes and to ensure that digital innovations are integrated with mechanical, electrical and telecommunication technologies. We have led European efforts to

develop coordination across CEN and CENELEC that improves the effectiveness of their response to the digital economy. We've joined ETSI to promote the views of our stakeholders on their standards. Also BSI is working to improve coordination of UK stakeholders in the standardization work of ITU-T.

In this edition of Standards Outlook we look at some of the ground breaking ways our standards development communities are building solutions that will help to realize the opportunities of the digital economy.

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Standards and Brexit

The result of the referendum on the UK's membership of the European Union has triggered a welcome discussion on the role that standards play in helping companies gain market access, build consumer trust in products and services, and facilitate international trade.

Voluntary business standards share knowledge and embed best practice, helping businesses to innovate, save money, improve their performance and manage supply chains.

Since the referendum BSI has been in dialogue with industry, UK government, consumer groups and all other stakeholders to shape a clear strategy whereby UK experts can continue to influence the development of the European and international standards on which UK industry and consumers rely.

The European standards system, and in particular CEN and CENELEC, of which BSI is a member, is not part of the European Union. Although around a quarter of European standards (ENs) support compliance with EU regulations, the majority of ENs are used by industry to facilitate business activity.

The system provides for a 'single standard model', meaning new ENs are implemented identically in all countries that are members of the system and any conflicting national standards are withdrawn. This approach enables reciprocal market access and simplifies cross-border trade. The single standard model has led to some 160,000 national standards being replaced by around 20,000 ENs.

"BSI's ambition is to stay within the European standards system to avoid conflicting standards being used in the UK and the rest of Europe."

BSI's ambition is to stay within the European standards system to avoid conflicting standards being used in the UK and the rest of Europe.

As the UK looks to establish new trade deals with the rest of the world, BSI will work with UK government to ensure that they are underpinned by the appropriate use of voluntary standards.

 bsigroup.com/nsb

 bsigroup.com/brexit



Did you know?

A Copenhagen Business School study found that the UK has the potential to benefit more from manufacturing digitization than any other developed economy. While Germany and Japan will likely only grow productivity by 8 per cent, the UK's could grow by 22 per cent.

Enabling the advance of digital manufacturing

Applying digital technologies and capabilities to manufacturing can drive up productivity and boost export opportunities. BSI is collaborating to establish how the development and adoption of standards will help make sure that the benefits are realized.

Digital manufacturing is the collaborative transformation of manufacturing by exploiting advances in ICT. It means new supply chains and operational capabilities can emerge. Proponents see significant opportunities in flexible manufacturing, mass customization and value chain optimization, as well as for traditional product manufacturers offering novel services. It can reduce costs and lead times, offer more personalization and choice, and improve productivity and availability.

Digital manufacturing could lead to significant growth for UK industry. Examples include:

- **Electric car batteries** This requires digitally linking the emerging battery supply chain with technology users and the necessary public infrastructure. If the UK can get its next generation batteries into the international marketplace first and in the right way, it will give the UK economy a significant boost.

- **Personalized medicines** Medicines that are tailored to the individual patient's needs are in increasing demand but need feedback mechanisms enabling the patient's DNA to be digitally connected to smaller, local production units. Redistributed smart manufacturing technologies will enable the rapid and flexible production of small amounts of high purity medicine.

“BSI worked with the Institute for Manufacturing to establish how best to support UK industry in driving up productivity and exports.”

The vision for standards

In 2016, BSI worked with the Institute for Manufacturing to establish the best way to help UK industry drive up productivity and exports. The prioritized areas where BSI could help UK manufacturers innovate:

- interoperability of data and machines
- using data in a manufacturing context
- governance in a digital environment
- performance assurance of 'digital twins' (assuring physical systems using virtual modelling)
- collaboration (digital is driving behaviours away from transactional and towards collaboration so all parties need to know what that involves)

In 2017 BSI will collaborate further with the High Value Manufacturing Catapult and other industry partners to turn this vision into a practical standards programme.



Developing a framework for MMC

Modern Methods of Construction (MMC) improves quality and performance in a complex and competitive construction sector. BSI is set to play a part in developing MMC standards that will help deliver the benefits.

Modern Methods of Construction (MMC) is the manufacture and pre-assembly of construction components, elements or modules in a factory, before they're installed in the final location. It is one of the key developments in digitizing the construction industry and likely to be the future of building.

We know the industry is engaged. National House Building Council (NHBC) research from June 2016 found that 98 per cent of construction firms had used or considered using an MMC approach on at least one of their developments in the last three years.

This level of interest has the potential to improve capacity and productivity greatly and help drive innovation across the industry. The perceived benefits include:

- quicker delivery
- better cost control
- increased efficiency and productivity
- easier compliance and innovation
- more consistent quality from a manufacturing process
- improved health and safety through less on site activity
- sustainability from waste reduction and energy management
- a positive impact on the export market

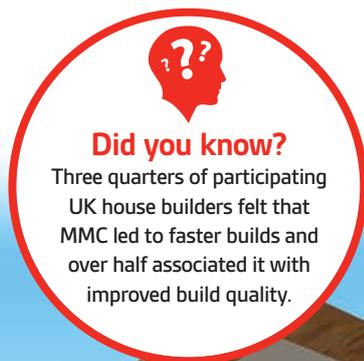
Meanwhile the development of new products and processes, including the growth in complex products such as panellised systems, sub-assemblies and volumetric and pod construction, is driving a need for MMC standards.

“BSI has drawn key industry stakeholders together to review national activity, prioritize key areas, identify challenges and consider standards solutions.”

Rationalization

At time of writing, a proposal is in the works to rationalize the existing international standards in MMC and merge the relevant information into a new core document. This is being led by the Chinese who have also highlighted the need to review the technical content of the current ISO MMC standards to incorporate modern modular construction techniques.

In response BSI has drawn key industry stakeholders together to review national activity, prioritize key areas, identify challenges and consider standards solutions. We expect that a new BSI Task Group will be formed in 2017 to develop a standards strategy and formulate a UK consensus position ahead of full participation in the future ISO development process.



Did you know?

Three quarters of participating UK house builders felt that MMC led to faster builds and over half associated it with improved build quality.





Accelerating the adoption of BIM

The UK construction industry was set a stretching target in 2011 when the Government asked for collaborative 3D BIM on all its projects by 2016. BSI standards made the transition possible and will continue to help the UK industry stay world-leading.

Building Information Modelling (BIM) is a collaborative way of working in construction. It lets different parties collect and share information about the same building in a common digital format. Designing, constructing and operating buildings becomes much more efficient throughout the building's life. The UK Government believes that BIM dramatically reduces operating costs and can reduce construction costs by up to 25 per cent.

To speed up BIM's adoption, in 2011 the UK Government Construction Strategy made the use of BIM Level 2 a condition of contract on all public sector projects by 2016. To help make that possible, BSI was brought in to write standards that would inform the industry and spread knowledge about BIM and its use.

So far this has resulted in seven BIM standards that are playing a pivotal role in making BIM happen and in supporting the UK Government's innovation agenda. The success of the UK approach has been recognized worldwide and has made the UK a global leader in transforming the construction industry.

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Creating a digital economy

Going forward, a new BIM standard focussing on health and safety (PAS 1192-6) will be published in 2017. BSI is also coordinating the UK's input into ISO 19650 (based on the BIM Level 2 standards), and the CEN standardization work on data dictionaries.

Building on the success of BIM Level 2, we are also helping shape standards development activities that support BIM Level 3. The end-game is to create a digital economy for the built environment that delivers high performing assets and increases client and societal value, potentially by connecting BIM with technology/data initiatives such as the Internet of Things (IoT), digital manufacturing and smart cities.



BIM-level2.org



Did you know?

The global construction market is forecast to grow by more than 70 per cent by 2025, from \$8.7 trillion in 2012 to \$15 trillion by 2025.



Did you know?

By 2050, it's expected that two-thirds of the world's population will live in cities.

Making smart cities a reality

Cities have more and more citizens to look after even as they have to conserve environmental resources and build sustainable local economies. Becoming 'smart' will help meet these challenges, and standards can play a big part in the smart city transformation.

Smart cities use information generated by the urban environment to help make better decisions on things like service provision and resource targeting. They also create opportunities for new information-based businesses to develop innovative services.

As smart city technologies develop BSI has produced a number of smart city standards. For example we've worked with the Government's Future Cities Catapult to create the Cities Standards Institute (CSI). This collaboration has produced two standards for publication in early 2017 tackling two of the main challenges cities face in developing smart solutions:

- **PAS 183** will provide guidance on decision-making around data sharing because smart cities need to break down information silos and publish open data that businesses and citizens can use.
- **PAS 184** will provide guidance on how to develop project proposals with a robust business case that can demonstrate good value at the same time as being innovative and transformative.

This is important to project officers and city services commissioners.

We're also contributing to ISO's smart and sustainable city standards work which has recently published the first management system for sustainable development of cities, BS ISO 37101.

Global reputation

These new standards will join a growing body of BSI smart city PASs that provide guidance for city leaders on strategic smart city issues at a global level. Our work has developed a worldwide reputation, so BSI is now taking it forward internationally.

"Our work has developed a worldwide reputation, so BSI is now taking it forward internationally."

In China, we're collaborating with the Standards Authority of China, the China Electrotechnical Standards Institute and Chinese city stakeholders to develop smart city indicators and reference models.

In India, we're working with two cities to deliver leadership programmes based on the BSI suite of smart city standards.

We expect these collaborations to build a common understanding and shared approaches between cities and businesses in the UK and in major smart city markets worldwide. The future of smart cities looks exciting and BSI is set to be at its heart.



bsigroup.com/smart-cities

BSI standards in NUMBERS

7,951

Standards' projects in development

EMPLOYEE ID CARD

BSI employees
(Knowledge Solutions)

340

bsi.

F INTECH

Organizations our committee members come from

0000 0000 0000 2,695



Technical and sub-committees

1,206

19:01

50%



TOP 5



Committee representation

Trade associations

- ✓ BEAMA
- ✓ GAMBICA
- ✓ UK Steel
- ✓ British Cables Association
- ✓ British Plastics Federation

Professional institutions

- ✓ The Institution of Civil Engineers
- ✓ The Energy Institute
- ✓ The Institution of Engineering and Technology
- ✓ The Institution of Structural Engineers
- ✓ The Institution of Mechanical Engineers

19:01

100%

standardsdevelopment.bsigroup.com

Comments on draft standards in 2016

4,960

Users 603

BSI

19:01

100%

Origins of current standards

National (BS Only)

6,178

European (BS EN only)

19,858

International (BS ISO, BS IEC & EN ISO/IEC)

13,160

CUSTOMERS

 35,000

UK universities
represented on
committees

118

Top subject areas of projects in development

 Built Environment - Construction & Design	1,425
 Mechanical Machinery & Components	835
 Aerospace, Automotive, Transport	709
 Electrical Machinery and Components	704
 Materials	640
 Electronics	550
 Environment/CSR	550
 ICT	356
 Energy	327
 Food and Drink, Agriculture	264
 Health & Safety	234
 Consumer Goods	173
 Healthcare	156

Subscribing members

13,800



Live updates

New and updated standards published



2,585



International committee leadership roles provided by UK

UK ISO Chairpersons	79
UK ISO Convenors	284
UK CEN Chairpersons	58
UK CEN Convenors	277
Total number of chairs and convenors from UK	698



Published standards in
our current portfolio

39,196



Did you know?

The UK's digital healthcare market is expected to be worth £2.8 billion in 2018, employing around 28,000 people across 600 companies.

Supporting the deployment of digital healthcare

The UK's health and social care system faces major challenges, resource constraints, rising expectations and escalating demand. Digital solutions can help relieve the pressure, and standards can play an important role in extending digital healthcare's use.



Digital healthcare is growing rapidly. It includes the remote monitoring of long term conditions; wearables and apps; predictive interventions such as genomics and precision medicine; and the systems for digitised patient and hospital records.

For digital healthcare to flourish, healthcare systems and innovators need to work together to demonstrate how their innovations will change care pathways and improve patient outcomes. Solution providers will also need the freedom to be innovative and at the same time be held responsible for making sure their products are safe, effective and ethical.

Given BSI's background in medical device and healthcare informatics standardization, we are well-placed to bring these groups together to set robust standards that will support the deployment and scaling of emerging digital healthcare technologies.

Progress to date

In 2015, BSI published PAS 277: *Health and wellness apps – Quality criteria across the lifecycle*. A number of organizations are already incorporating this standard within their evaluation procedures and BSI has proposed that a similar European standard is developed, following interest from the European Commission in tools to drive up the quality of apps.

In 2016, PAS 212: *Automatic resource discovery for the Internet of Things* was published. It is now being considered by two NHS Testbeds that are providing novel devices and information to dementia and diabetes

“We are building our understanding of how big data can improve service delivery and the measurement of health outcomes.”

patients so they can better manage their conditions remotely.

BSI will work with the Testbed project teams during 2017 to evaluate the use of PAS 212, and also consider how standardization can support broader information governance issues. We are also building our understanding of how big data can improve service delivery and the measurement of health outcomes.

We will continue to focus on bringing together healthcare professionals, policy makers, industry and consumers to set standards that support the future deployment of digital health technologies.



bsigroup.com/digital-healthcare

A roadmap for the future of fintech

The financial technology sector – fintech – is estimated to be worth £20 billion, with the UK already a global centre in this emerging field. Now standards makers are getting involved in helping the UK industry provide global leadership.

Fintech blends finance and new technology to create innovative products and services that are accessed through the internet, smartphone apps and digital platforms. It disrupts financial services because it creates competition and challenges traditional business models.

Fintech's benefits include offering more choice and flexibility to customers as well as increased financial inclusion. It may also help deliver greater efficiencies for business customers. At the same time its development may be hindered by various barriers including the potential risks to both customers and the financial system.

Recognizing the challenges and opportunities, in 2016 BSI published *A Roadmap for Fintech Standards*. This new research, prepared by Finextra, consulted a broad range of industry stakeholders, including fintech companies, banks and trade associations, and found several areas where standards might help accelerate and strengthen the UK's fintech industry.

A number of priorities emerged, including how standards might help with market access for new entrants (e.g. addressing the procurement process between banks and fintech companies) and promoting consumer assurance and greater systems' interoperability.

Demonstrating control

The findings suggest that fintech start-ups could use both existing and new standards to demonstrate they have adequate controls, security processes and governance in place, all of which can provide customers with confidence.

One of the key recommendations was that a fintech community be established to spearhead any standards creation. There may also be opportunities for UK industry to provide leadership through international standards development. This will be vital to helping secure the UK's position as a leading global fintech centre.

To this end BSI plans to work with industry, government and consumer bodies to take forward the recommendations of this new research in 2017.



bsigroup.com/research-fintech-uk

“BSI plans to work with industry, government and consumer bodies to take forward the recommendations of this new research in 2017.”



Did you know?

The UK is establishing a number of 'fintech bridges' in cooperation with leading financial centres such as Singapore, China and Korea to help accelerate access to and expansion of the UK fintech industry and promote innovation in financial services.



Helping to realize the Internet of Things

Some think that the Internet of Things will be as revolutionary as the Internet. Meanwhile BSI is set to be at the heart of unlocking its global potential.

The Internet of Things (IoT) is an infrastructure of objects, people, systems and information resources that interconnect with intelligent services, allowing them to process information from the physical and virtual worlds and react. The IoT is possible because it's now economic for devices to have sensors, actuators and communication capabilities embedded within them. So 'things' from bridges to packages can generate and transmit information.

IoT has certainly produced a lot of international standards activity, including standards in development on vocabulary and definitions, and on IoT reference architecture. Sector specific work is also underway, for instance involving smart cities, connected homes and connected and autonomous vehicles. BSI is working to make sure we bring together existing work on IoT, sensor networks, smart cities and possible new areas like wearables.

Hypercat

For IoT to fully realize its potential, devices must be able to interoperate. To this end, the Hypercat project began life as an Innovate UK-funded idea. Eight diverse and separate IoT Ecosystem Demonstrators were set up to test emerging IoT technology and work together to tackle the challenge of interoperability. The result was a way for any IoT capable device to discover, and hence interoperate, with any other such device without the need for human intervention.

"Discoverability is now enabled by PAS 212: Automatic resource discovery for the Internet of Things."

BSI was then part of the winning Hypercat consortium for the second phase of development. Discoverability is now enabled by PAS 212: *Automatic resource discovery for the Internet of Things* – a freely available technical specification for developers. It puts BSI at the heart of a major global IoT initiative.

Hypercat is now an established name with around 1,000 organizations involved. The consortium is working to create an inclusive 'one stop shop' of best practice that will help IoT grow in the same way as the worldwide web.



hypercat.io



Did you know?

It's claimed that by 2020 there may be up to 50 billion connected devices adding \$10-19 trillion to global GDP.



Did you know?

According to a recent survey, 65 per cent of large firms detected a breach or attack in the previous year and on average each breach cost the firm over £36,000.

New approaches to cyber security

Cyber security matters because people need to trust technology to gain its benefits. As a result the UK Government has invested £1.9 billion in a Cyber Security Strategy, while BSI continues to maintain its longstanding leadership in cyber security standardization.

BSI has a long pedigree in cyber security standards: we published the world's first information security standard as long ago as 1995. It formed the basis of ISO/IEC 27001 which now has users in 100 countries, making it the world's most popular cyber security standard. BSI was in the vanguard of cyber security standardization then and has remained there ever since.

“BSI continues to recognize the importance of cyber in today's world and is committed to pioneering new ideas.”

In the interim, the cyber landscape has changed out of all recognition. In response there are now around 140 international standards that relate to cyber security. It remains a rapidly evolving discipline meaning that all these standards are continually reviewed and where necessary amended, both nationally and internationally. Indeed in 2016, 20 international information security standards were either published or revised.

2017 and beyond

Going forward BSI always ensures that the appropriate cyber security mindedness is incorporated in all national standards work, and we continue to champion international cyber security standards. In 2017 and beyond there's a particular focus on topics such as cyber insurance, crypto-mechanisms to implement protection in IoT worlds, sector specific privacy standards and new national work on risk management.

At home, BSI is extending its work on resilience with BS 31111 on cyber resilience due to publish in 2017. This standard will support good practice decision-making by top management by:

- **encouraging** effective information security through better assessment of the commercial and operational risks faced
- **highlighting** the priorities and critical actions needed to provide increased levels of assurance to top management, and internal and external stakeholders
- **encouraging** the building and maintaining of higher levels of organizational resilience

BSI continues to recognize the importance of cyber in today's world and is committed to pioneering new ideas and approaches to cyber security wherever they arise.



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What are standards?

A standard is simply an agreed way of doing or making something. Standards gain their authority from the fact that they're written through a process of wide consultation that leads to an expert consensus.

They cover every area of human activity and although their use is voluntary, they confer many benefits and are used worldwide to make everything run more smoothly. Standards play an invaluable role in underpinning the infrastructure of a modern economy.

What standards do



Improve productivity



Increase efficiency



Reduce costs



Fine tune performance



Accelerate innovation



Agree good practice



Build trust with consumers



Enable international trade



Embed sustainability



Create a common technical understanding



Ensure interoperability



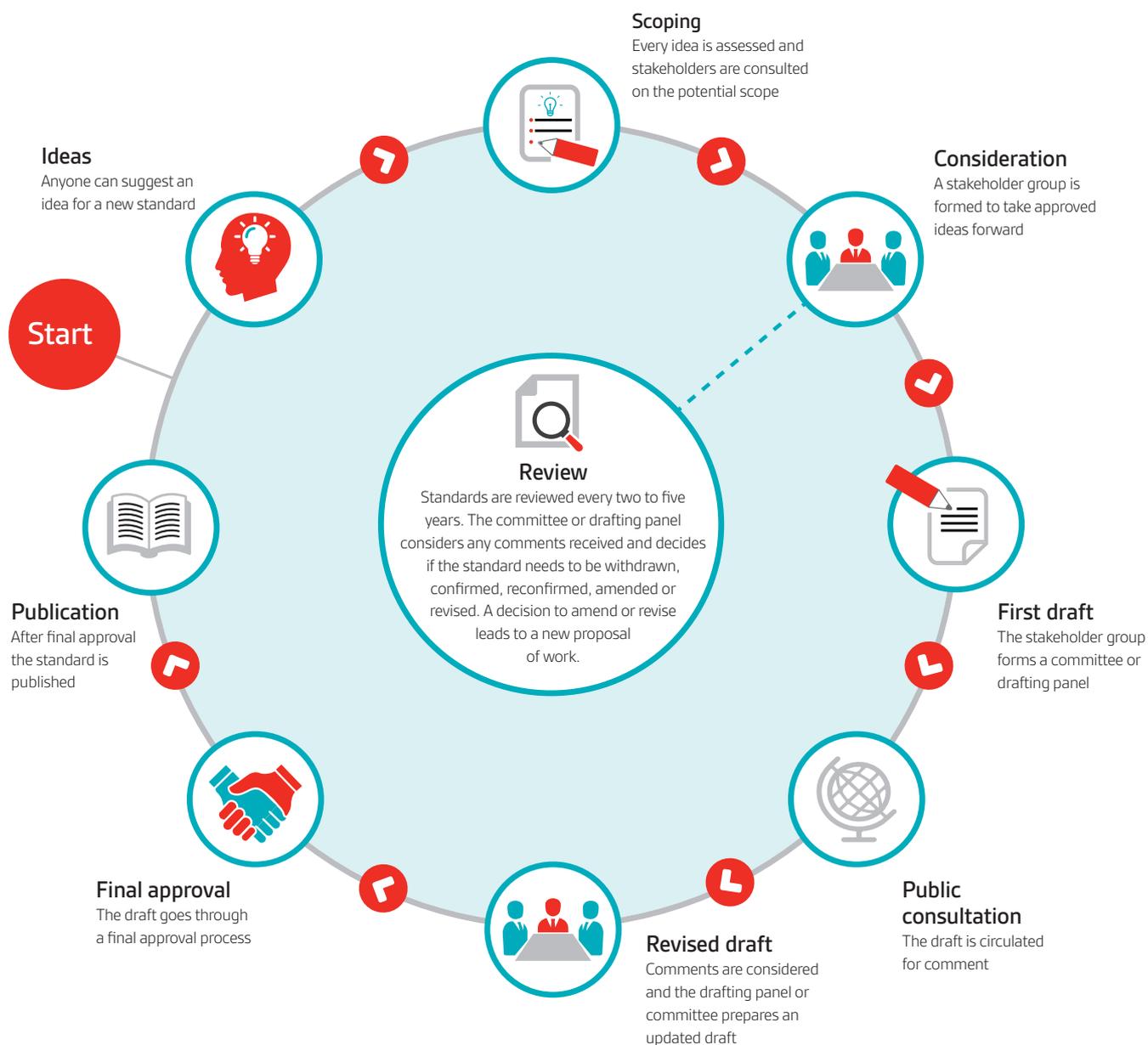
Manage risk and compliance

To learn more about what standards do visit:



bsigroup.com/standards

How standards are made



What is a PAS?

A PAS (Publicly Available Specification) is a document that standardizes elements of a product, service or process.

PASs are usually commissioned by industry leaders – be they individual companies, SMEs, trade associations or government departments. Commissioning a PAS puts an organization in the driving seat for setting the agenda in their sector. It helps them work with regulators, set an agreed level of good practice or quality, or establish trust in an innovative product or service.

To learn more about how a PAS is commissioned visit:

 bsigroup.com/pas

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