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TIC Council Webinar
Quality Infrastructure and Industry 4.0: What's Next?
26 October 2021

Quality Infrastructure and Industry 4.0: What's Next?

Speakers

Dr. Bernardo Calzadilla-Sarmiento

Managing Director, Directorate of Digitalization, Technology and Agri-Business

UNIDO

Marcos Heleno Guerson de Oliveira Junior

President

INMETRO

Angus Low

Manager, Product Standards & Regulations

Rockwell Automation

Kenneth Boyce

Senior Director, Principal Engineering, Industrial

UL LLC

Moderator

Hanane Taidi

Director General

TIC Council

Dr. Bernardo Calzadilla-Sarmiento

Managing Director, Directorate of Digitalization, Technology and Agri-Business

UNIDO

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QUALITY INFRASTRUCTURE & INDUSTRY 4.0

Bernardo Calzadilla-Sarmiento, PhD
Managing Director, Technology, Innovation & Agri-business, UNIDO

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SUSTAINABLE DEVELOPMENT GOALS

Outline

DITIGAL TRANSFORMATION & INDUSTRY 4.0

QUALITY INFRASTUCTURE & DIGITAL TRANSFORMATION

LOOKING INTO THE FUTURE

DIGITAL TRANSFORMATION & INDUSTRY 4.0

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Crisis amidst an ongoing Paradigm Change

Profound and long-lasting impacts on how we work, innovate, live, and interact

Unique opportunity to future-proof productive sectors and foster long-term resilience

The repercussions of the pandemic in all aspects of our lives have accelerated the Fourth Industrial Revolution (4IR), with COVID-19 becoming a **driver for digital transformation!**

There is no way back!

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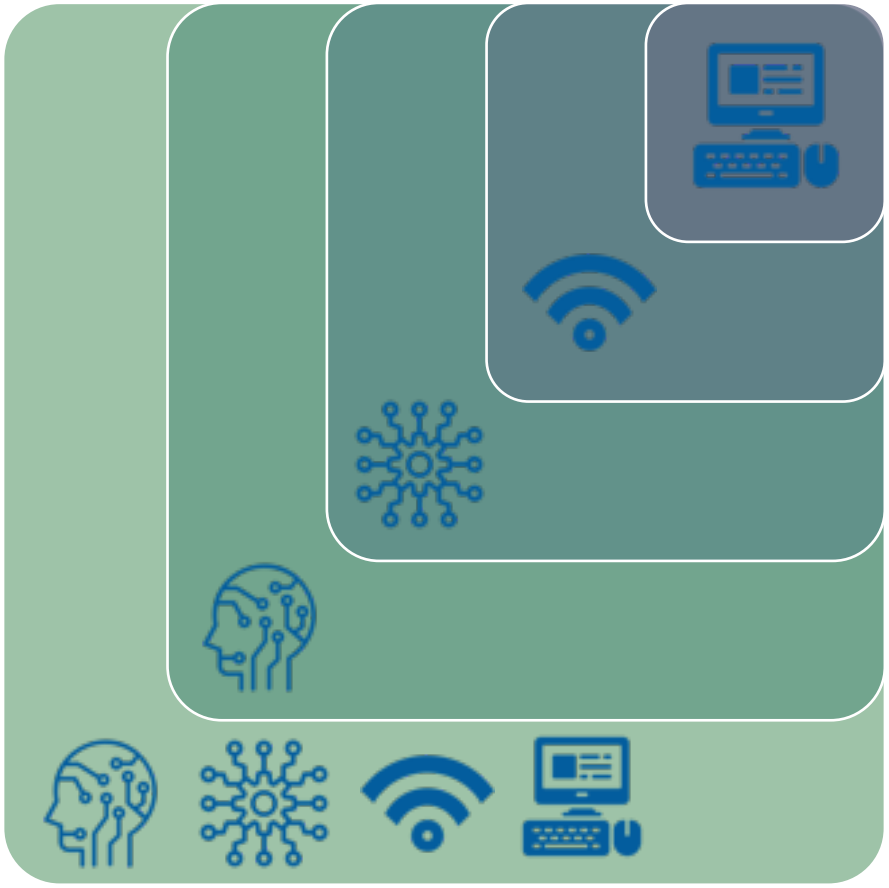
The 4th Industrial Revolution



ELECTRIFICATION

3rd Industrial Revolution

AUTOMATION
Computers

4th Industrial Revolution

DIGITALIZATION
Cyber-physical systems

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QI & the SDGs

BUILDING PROSPERITY

MEETING THE NEEDS OF PEOPLE

PROTECTING THE PLANET

QUALITY INFRASTRUCTURE & DIGITAL TRANSFORMATION

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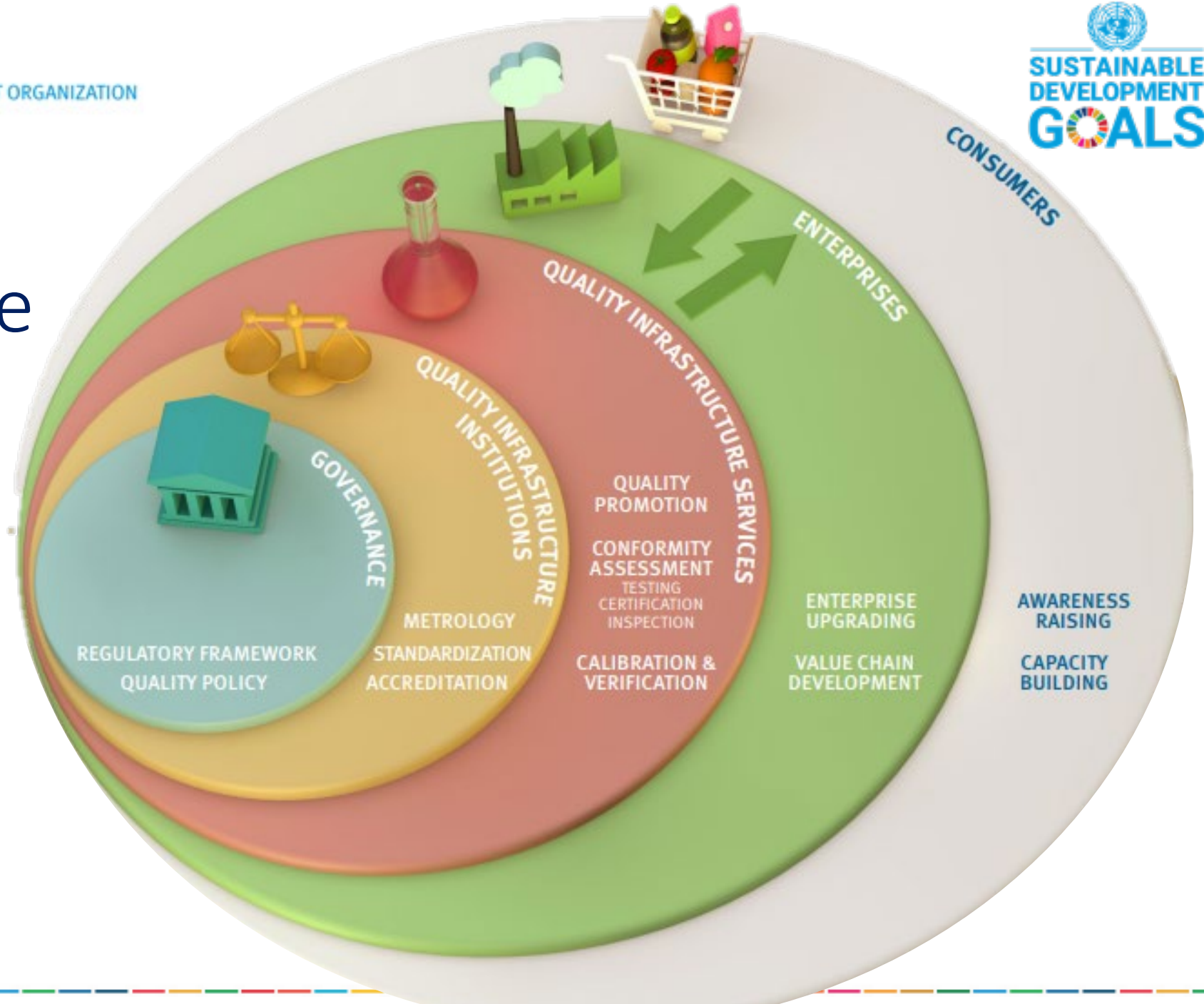
Quality Infrastructure



UNIDO'S APPROACH:

SYSTEMIC &

BASED ON MARKET NEEDS

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POLICY

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Quality Policy, Standards & Digital Transformation

Good Governance in a Digital Age

In the context of digital transformation, the timely and harmonized adoption of standards is likely to play a key role in achieving policy objectives.

Quality Policy lies the foundation for a fit-for-purpose quality infrastructure system.

Market Surveillance

- Rapid development of digital technology and its unique form
- Digital products introduced to the market are frequently updated with new features and components added
- The pace of market surveillance has to keep up to ensure safety & security
- QI relevance depends on the speed of action to ensure relevance

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QI INSTITUTIONS

Standardization 4.0 & Digital Transformation of NSBs

CONTENT CREATION

CONTENT MANAGEMENT

CONTENT DELIVERY

CONTENT USAGE

Digital document: digital representation

Machine-readable document: structured document format

Machine-readable content: earmarked information

Machine-interpretable content: Information models describing and explaining the content and the relationships between items of information, self-learning analysis

Machine-controllable content: The content of a standard is be amended automatically and adopted by automated decision-making processes.

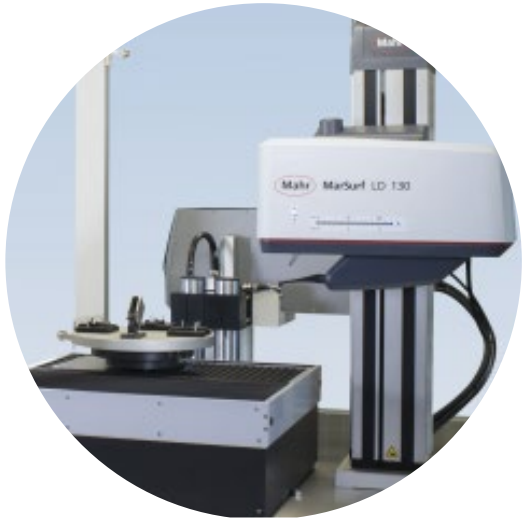
Source: DIN

Metrology 4.0

The metrology of the future will be intelligent and networked, and take on an important role in the control of production in the smart factory of the future.

Metrology 4.0 is used to describe existing innovations in non-contact metrology, such as applying smart measuring sensors, 3D scanning, and mobile-tools for real-time calibration and measurement.

- Smart: measures automatically and quickly
- Connected: communicates measuring data (between hardware and software)
- Controlled: cloud monitoring through sensors
- Autonomous: adjustment of measures, e.g. variant tolerances



Metrology for Industry 4.0: robot-assisted measuring station with workpiece recognition and labeling

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Accreditation 4.0: Remote Assessment

Opportunities, Challenges & Implications for Developing Countries

- the evolution of Remote Assessments and the associated requirements/guidance available from 2000 to the present
- typical remote assessment methodologies that are in use today
- overall challenges, implications and opportunities for the use of remote assessments
- different conformity assessment scenarios, including management system, product and personnel certification, certification to Voluntary Sustainability Standards / Organic certification, inspection and testing, accreditation and peer assessments, among others
- lessons learned and good practices that can be shared, potentially within different conformity assessment disciplines and contexts
- the future use of remote assessments in the post-COVID 19 era

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CONFORMITY ASSESSMENT

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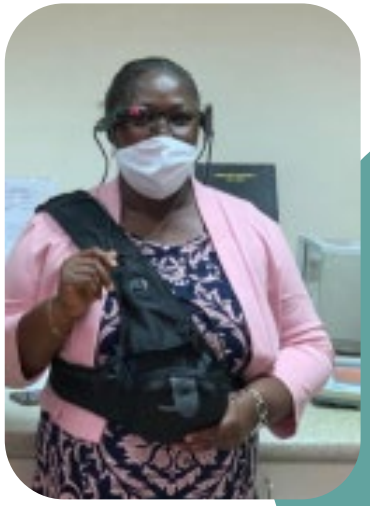
Smart Laboratories

Conformity Assessment in a Digital Age

Where automation and informatics can come together to drive change. Examples of the kinds of technologies in Smart Laboratories include:

- **AI and machine learning**, such as using digital images in a semi-automated process to reduce mistakes and take away the uncertainty of conformity assessments in industrial testing.
- **Big Data**, to help the management and analysis of the increasing qualities and types of data available for testing and inspecting products.
- **Cloud computing**, to share data instantly, report issuing and automate certification. This has already been developed in some CABs, resulting in greater insight for customers and their supply chains.



Ghana

The smart glasses solution enabled an international expert on laboratory analysis, based in Rome, to provide technical support and to assess the laboratory during a live visit to the laboratory in Accra.

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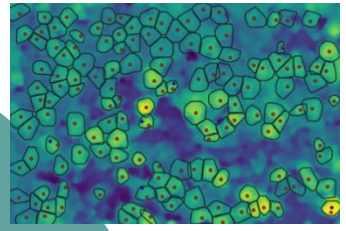
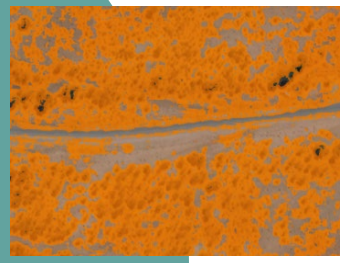
Drones & Sensors for Inspection

Conformity Assessment in a Digital Age

- Drones offer new ways of conducting **remote inspections** and aerial mapping. They can be equipped with multispectral sensors for precise measurements in agriculture, or thermal cameras for measuring heat distribution.
- Sensors will also play an increasingly important role in **process control and automated production lines**. This can bring greater opportunities for connectivity, data sharing and integration with logistics, providing valuable data and feedback from markets.

Namibia
use of satellites & drone-based imagery for sustainable bush processing





New technologies allow industrial-scale identification and targeted/ responsible harvesting of invasive species to ensure sustainable bush elimination and processing.

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VALUE CHAIN & ENTERPRISES

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Quality & Standards 4.0 along the Value Chain

Raw materials	Parts	Components	Modules	Final assembly	
▪ Additive manuf. ▪ Digital sensors	▪ Additive manuf. ▪ Digital sensors ▪ Digital twinning ▪ Cloud computing	▪ Additive manuf. ▪ Digital sensors ▪ Digital twinning ▪ IoT, blockchain	▪ Additive manuf. ▪ IoT, blockchain	▪ Eclectic vehicles ▪ Autonomous vehicles	*Most relevant technologies*
▪ Training & counselling	▪ Establishing digital platforms & networks ▪ Linking with research centres ▪ Widening supply portfolio	▪ Application of standards ▪ Develop new business models ▪ Adoption of 4IR technologies	▪ Development of QI and ICT ▪ Establish digital supply chain network ▪ Support local sourcing of suppliers	▪ Digital supply chain networks ▪ Increase resource efficiency and market access	*UNIDO intervention*

Quality & Standards → **Quality Management & Industrial Safety** → **(Digital) Lean Management & Kaizen** → **Industry 4.0 Readiness Analysis (shop floor)** → **Application of new Technologies**

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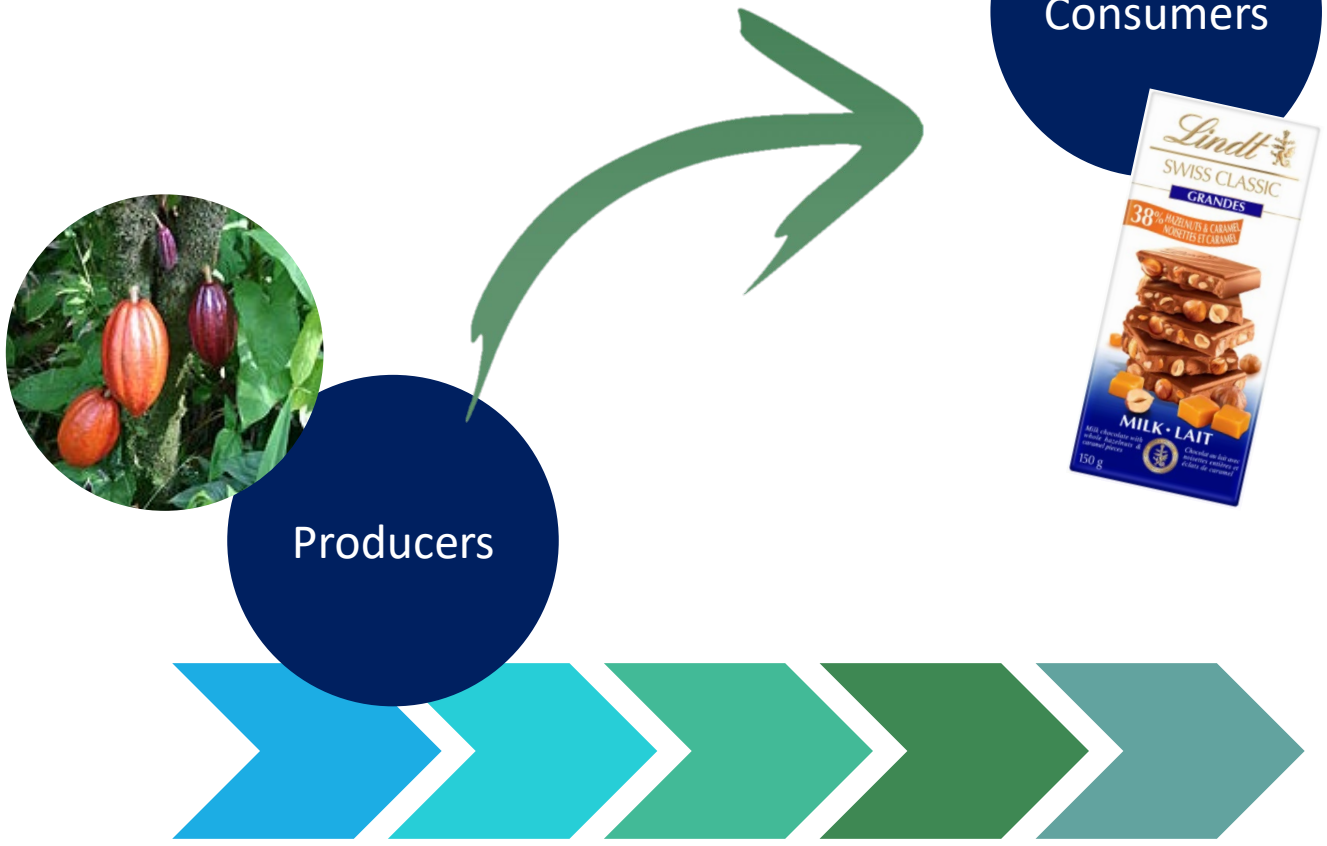
Blockchain for Traceability in Ghana

Linking producers and consumers

Block chain technology:

- Improve **traceability**, transparency & trade potential
- Transparent, secure & decentralized way of verifying **certificates**
- Increase **efficiency** & reduce costs



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CONSUMERS

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Consumers 4.0

- Need to provide safe products that meet quality requirements
- Increased consumer awareness on multiple aspects of sustainability: people, planet, prosperity
- New technologies need to be trusted
- Customization of products and increased use of online services (e-commerce, platforms, AI, etc.)

LOOKING INTO THE FUTURE

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The Path Forward

QI institutions need to **catch up with the 4IR** pace of development to support the sustainable development for people, planet & prosperity.

PROSPERITY

Promote adoption of new technologies, ensure interoperability, safety & security

PLANET

Ensure environmental Protection & improve ecological performance

PEOPLE

Social responsibility

THANK YOU

Marcos Heleno Guerson de Oliveira Junior

President

INMETRO

INMETRO

INMETRO

TIC Council Virtual panel:

Quality Infrastructure And Industry 4.0: what's next?

Marcos Heleno Guerson de Oliveira Junior
President of Inmetro

26h October - 2021


Instituto Nacional de
Metrologia, Qualidade e Tecnologia
Building Inmetro 4.0
INMETRO

INMETRO

√ Challenges of digitalization and industry 4.0 in Brazil;

√ How Inmetro is planning to strengthen its regulatory and quality infrastructure framework to overcome these challenges;

√ How Inmetro is engaging internationally and promoting public-private partnerships.


2005
2013

INMETRO

How Inmetro is planning to strengthen its regulatory and quality infrastructure framework to overcome these challenges

Strategic Plan

Inmetro 2021 - 2023

Modelo Regulatório DO INMETRO

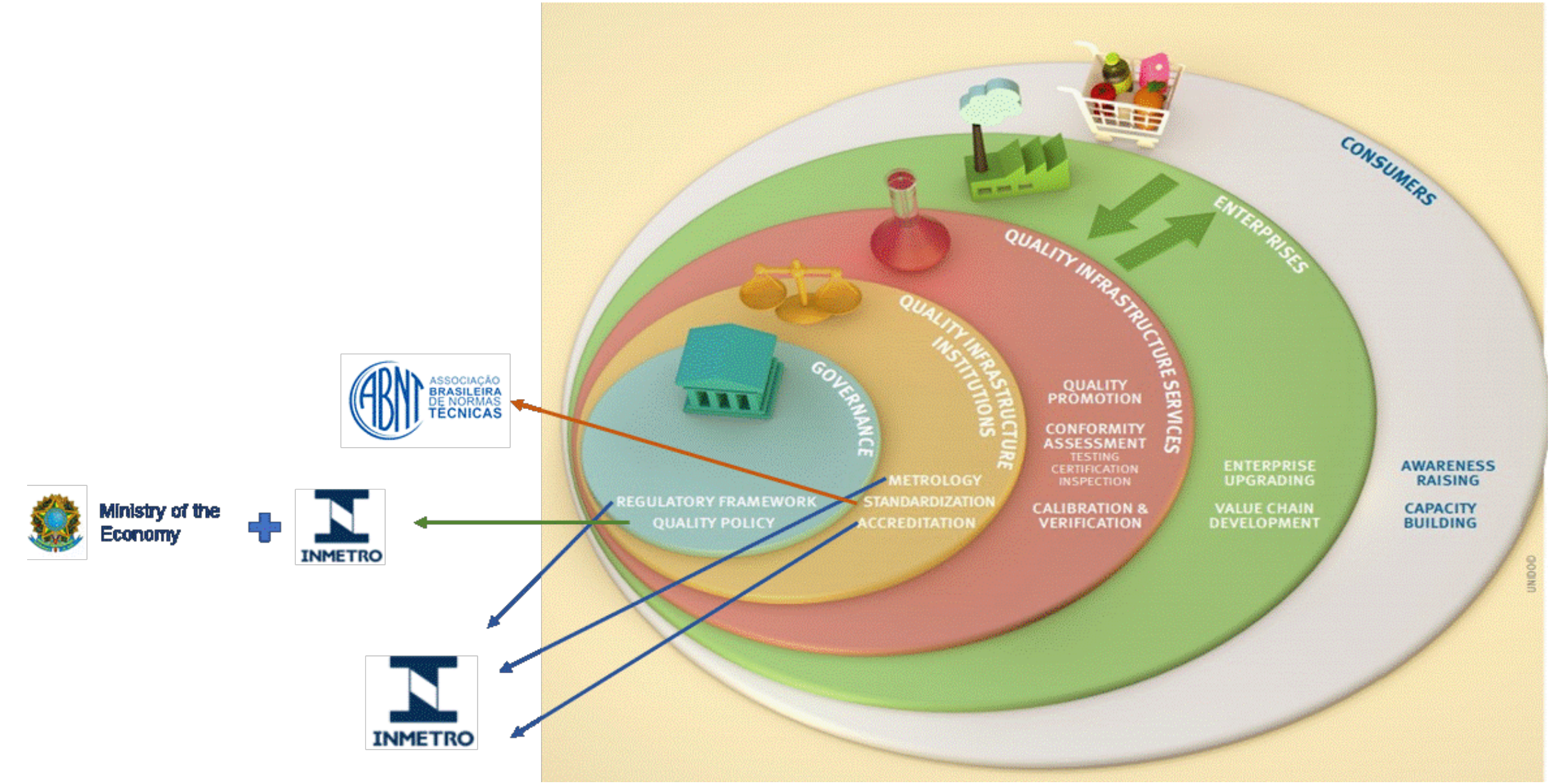
Inmetro’s Regulatory Model - Principles and Guidelines

National Quality Infrastructure Policy

INMETRO

Our MISSION

Enable quality infrastructure solutions that add confidence, quality and competitiveness to the products and services provided by Brazilian organizations, in favor of economic prosperity and well-being in our society.


ABNT
ASSOCIAÇÃO BRASILEIRA DE NORMAS TÉCNICAS
Ministry of the Economy
INMETRO
INMETRO
CONSUMERS
ENTERPRISES
QUALITY INFRASTRUCTURE SERVICES
QUALITY INFRASTRUCTURE INSTITUTIONS
GOVERNANCE
REGULATORY FRAMEWORK
QUALITY POLICY
METROLOGY
STANDARDIZATION
ACCREDITATION
QUALITY PROMOTION
CONFORMITY ASSESSMENT
TESTING
CERTIFICATION
INSPECTION
CALIBRATION & VERIFICATION
ENTERPRISE UPGRADING
VALUE CHAIN DEVELOPMENT
AWARENESS RAISING
CAPACITY BUILDING
UNIDO

The proposal for Inmetro's Regulatory Model modernization consists of the following elements:

- Vision
- Objectives
- Principles
- Guidelines

Macro-steps for the construction of the National Quality Infrastructure Policy

Study and alignment with international best practices

Step 1

What is there of Quality Infrastructure in Brazil?

Step 2

Draft of Objectives, Principles and Guidelines for the Quality Infrastructure of Brazil

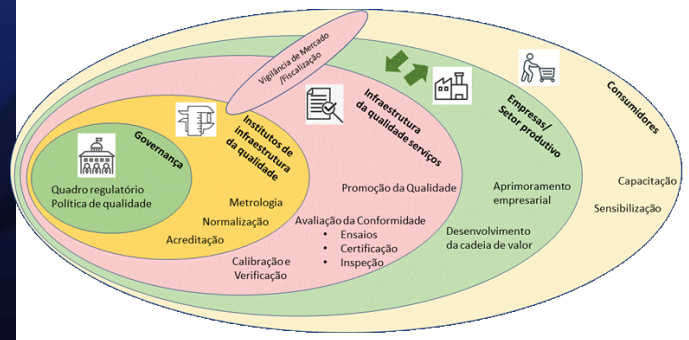
Step 3

Appreciation from key stakeholders

Step 4

Step 5

National Quality Infrastructure Policy



Adaptado: QUALITY INFRASTRUCTURE UNIDO's UNIQUE APPROACH, 2018

- **Inmetro's Public Private Partnership Project**
- Memorandum of Understanding between Inmetro, Labelo/PUC/RS and PCN.

- Implementation of an Electric Car Battery Private Laboratory at the Inmetro Campus in Xerem - Rio de Janeiro.

Goals

Establish a mechanism to encourage the exchange of knowledge and the development of national quality infrastructure for electric vehicles, electric vehicle charging stations and related items.

INMETRO

NOSSA MISSÃO

Viabilizar soluções de infraestrutura da qualidade que adicionem confiança, qualidade e competitividade aos produtos e serviços disponibilizados pelas organizações brasileiras, em prol da prosperidade econômica e bem-estar da nossa sociedade

INMETRO MINISTÉRIO DA ECONOMIA PÁTRIA AMADA BRASIL GOVERNO FEDERAL

Ouvidoria: 0800 285 1818

inmetro.gov.br

linkedin.com/company/inmetro

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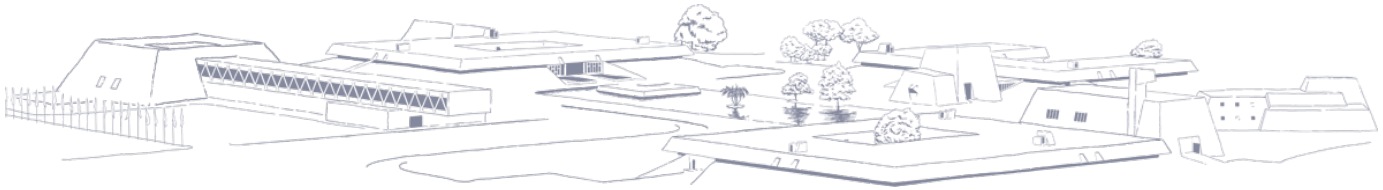
Thank you very much



Angus Low

Manager, Product Standards & Regulations

Rockwell Automation

Rockwell Automation

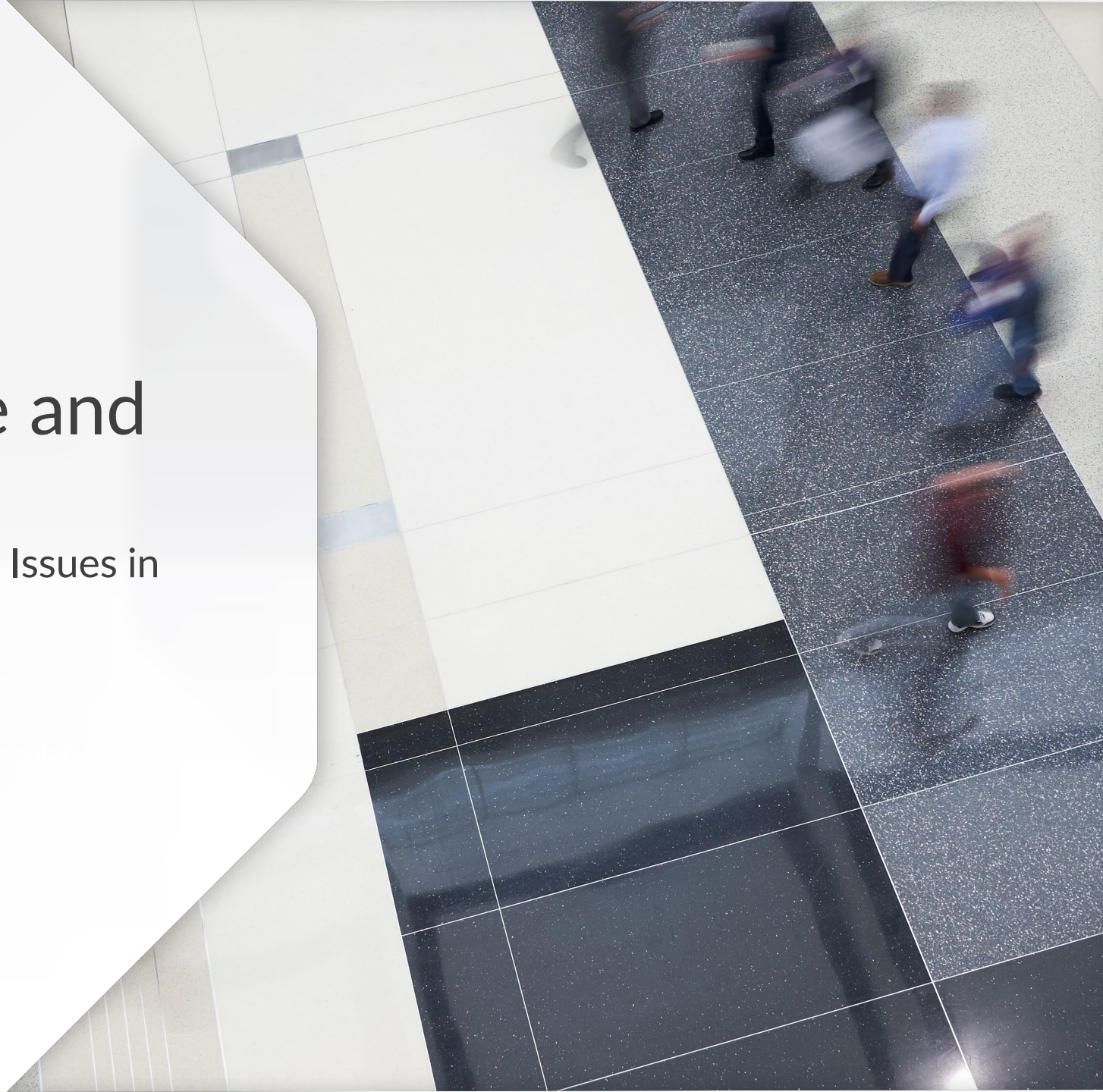
Quality Infrastructure and Industry 4.0:

Overview of Regulatory & Compliance Issues in the Manufacturing Domain

Angus Low • Manager, Global Product Standards & Regulations

10•25•21

expanding **human possibility**®



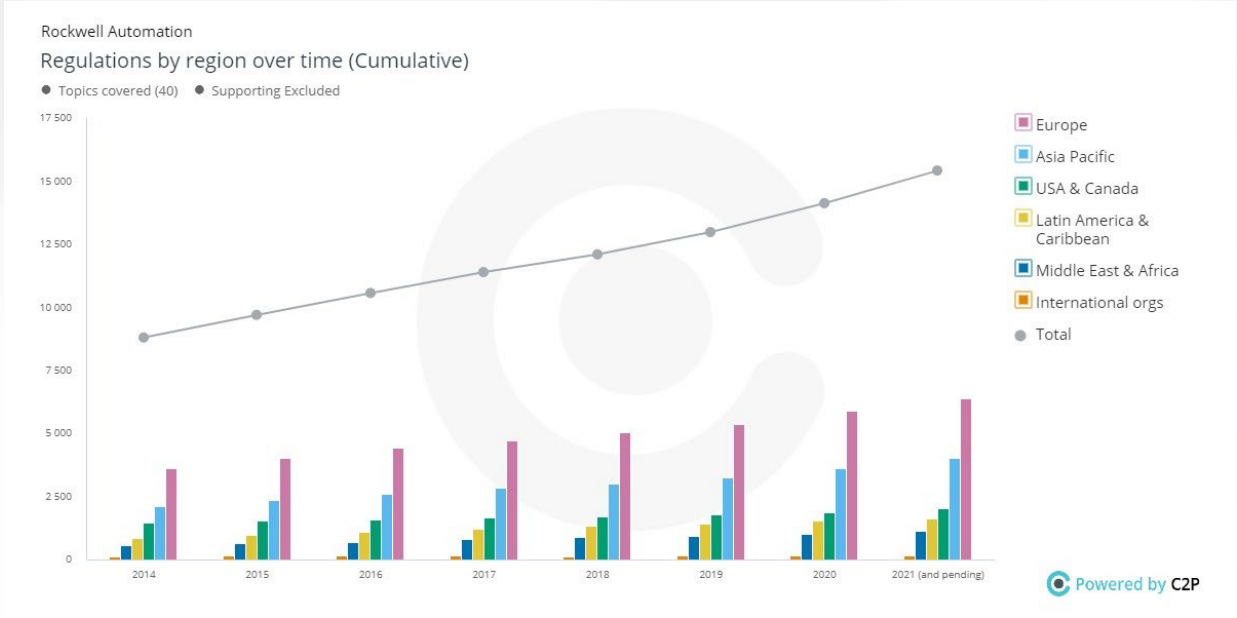
The Impacts of Regulations on Manufacturing

Smart Manufacturing - Smarter end points, data analytics, scalable computing, mobility and visualization are reshaping the future of industrial automation.

Greater connectivity and integration also increases risk.

Standards and Regulations help to mitigate risk but come at a cost:

- **Duplication of effort**
- **Overly burdensome compliance requirements**
- **Excessive costs**
- **Barriers to trade**
- **Fines for non-compliance**
- **Ever increasing regulations**
- **Compliance dates too tight**



Manufacturers are not able to focus on competitiveness and growth opportunities.

The Risks of the Current Trend

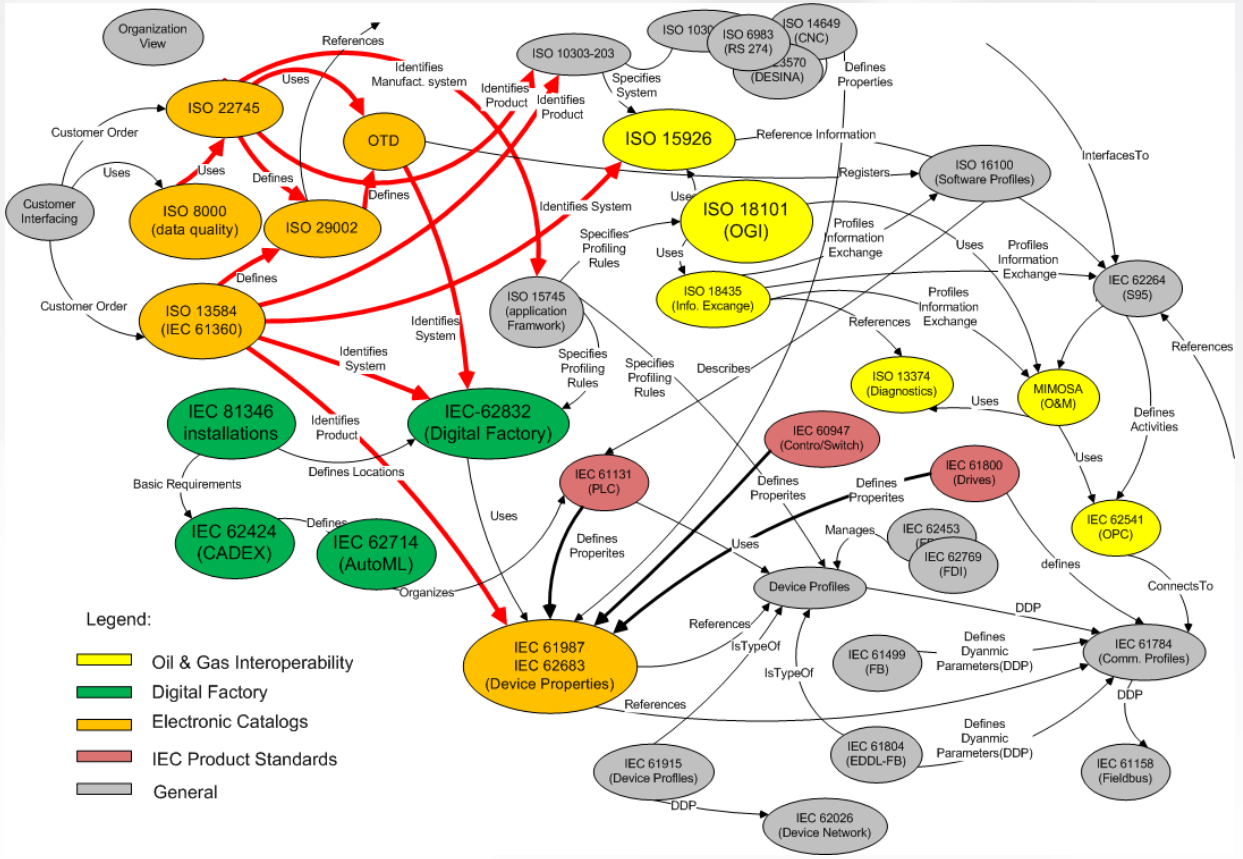
Digitization and Smart Manufacturing require effective standards and regulations strategically designed and executed to support, not hinder, manufacturing.

Standards and Regulations should:

- Create a safe and secure work environment.
- Be flexible to change as disruptive technologies emerge.
- Consider the long-term ramifications

Standards and Regulations should NOT be:

- **Overly complicated wrt compliance requirements**
- **Too prolific**
- **Ahead of the technologies**



Avoid setting requirements that may be too restrictive when the technologies they impact are still in their infancy.

Partnerships are the Future

Manufacturers, suppliers, national bodies, and customers are all part of an integrated and impacted group that can benefit each other through cooperation.

Standards and regulations can benefit manufacturing by listening to the requests of the customers, the voice of the manufacturers, and the evolving integration of the digital world.

Rockwell Automation

expanding **human possibility**®

Allen-Bradley by ROCKWELL AUTOMATION

LIFECYCLE IQ™ Services by ROCKWELL AUTOMATION

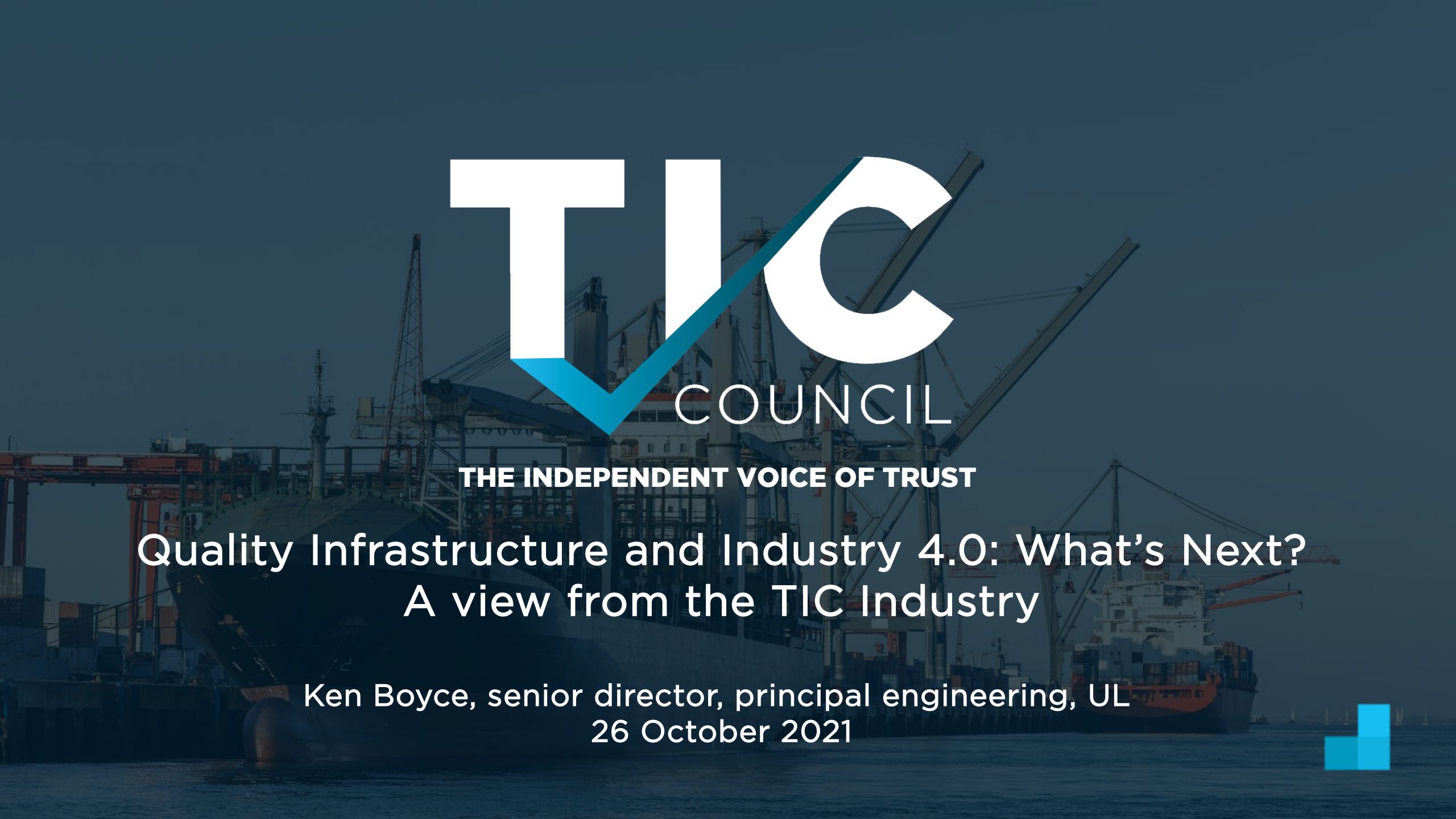
FactoryTalk by ROCKWELL AUTOMATION

Thank You!

Kenneth Boyce

Senior Director, Principal Engineering, Industrial

UL LLC



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Quality Infrastructure and Industry 4.0: What's Next? A view from the TIC Industry

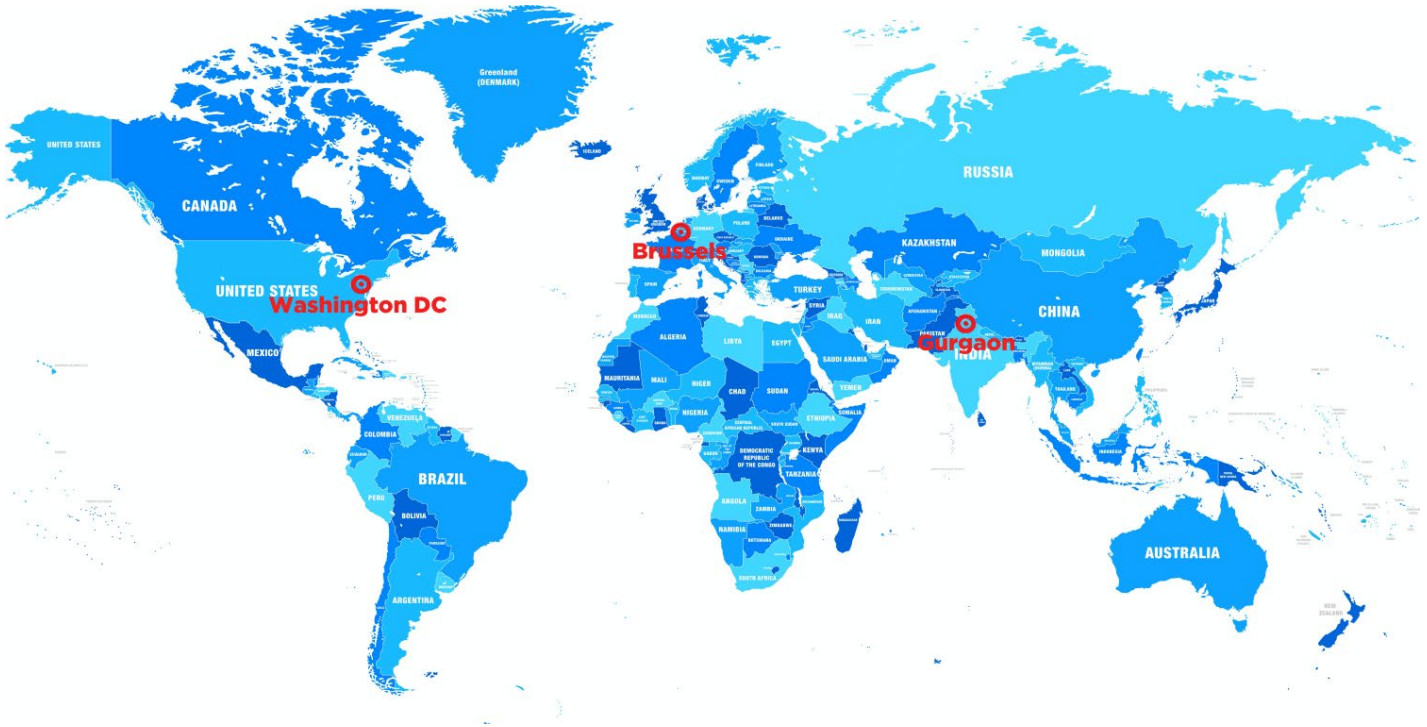
Ken Boyce, senior director, principal engineering, UL

26 October 2021

TIC Council

The Independent Voice of Trust

- Born from the merger of IFIA and CEOC
- ~90-member companies & organizations active in more than 160 countries (HQ mapped)
- TIC Council has its head office in Brussels. It is also present in Washington DC, China and India.

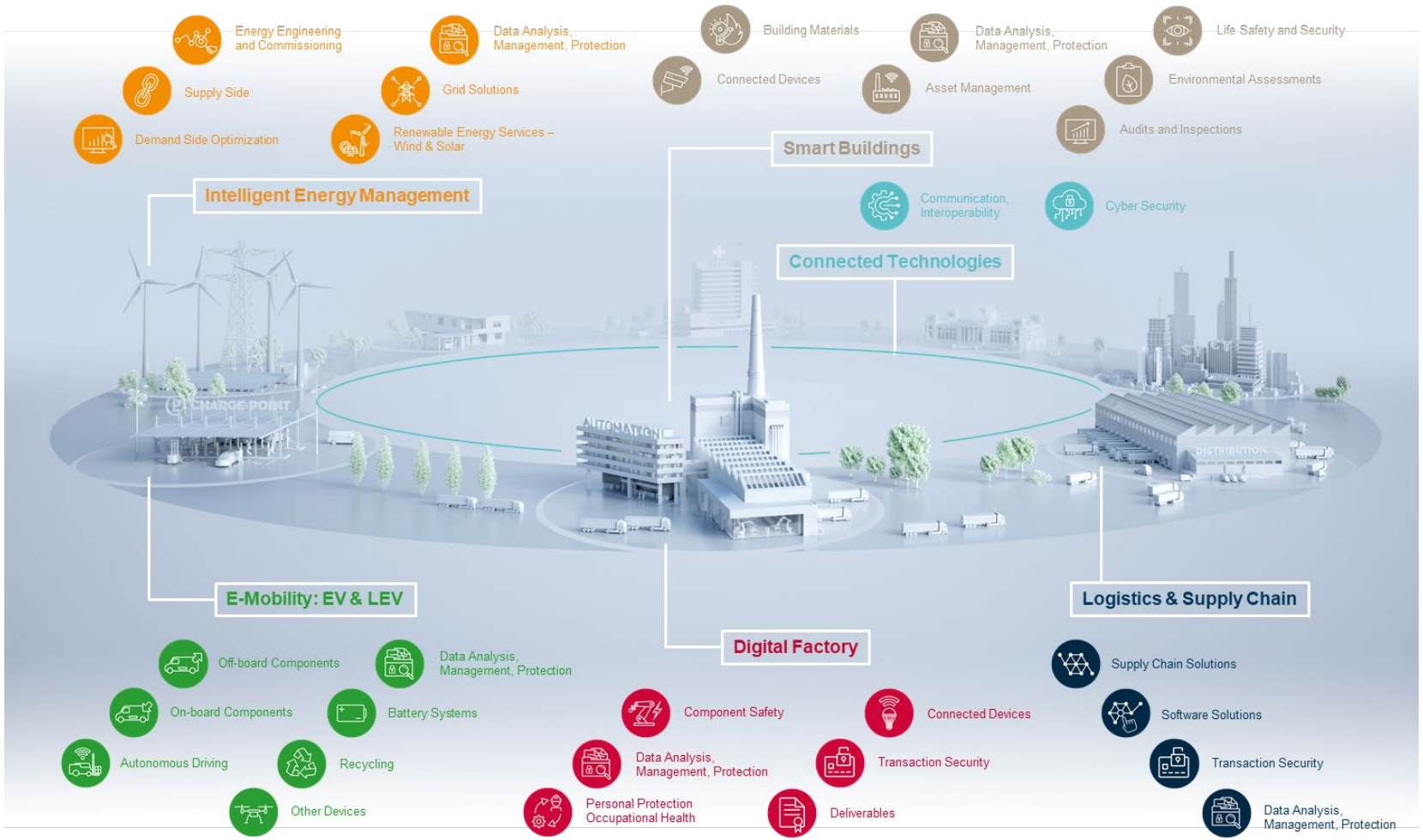


TIC Council Mission

As the voice of the global independent testing, inspection and certification industry, the TIC Council engages governments and key stakeholders to advocate for effective solutions that protect the public, support innovation and facilitate trade.

The TIC Council works with its members to promote best practices in safety, quality, health, ethics and sustainability.

Smart infrastructure of the future



Technical enablers lead to new & emerging issues

Internet of Things & increasingly sophisticated ecosystems

Increased intelligence, computing speeds, 5G communications, cloud solutions & fungible protection schemes

Digital twins and advanced simulations

Artificial Intelligence & reliance on algorithms

Battery technology supporting mobility, autonomy & decentralization

Efficacy of Functional Safety, communications, & interoperability over the entire product/ecosystem lifetime

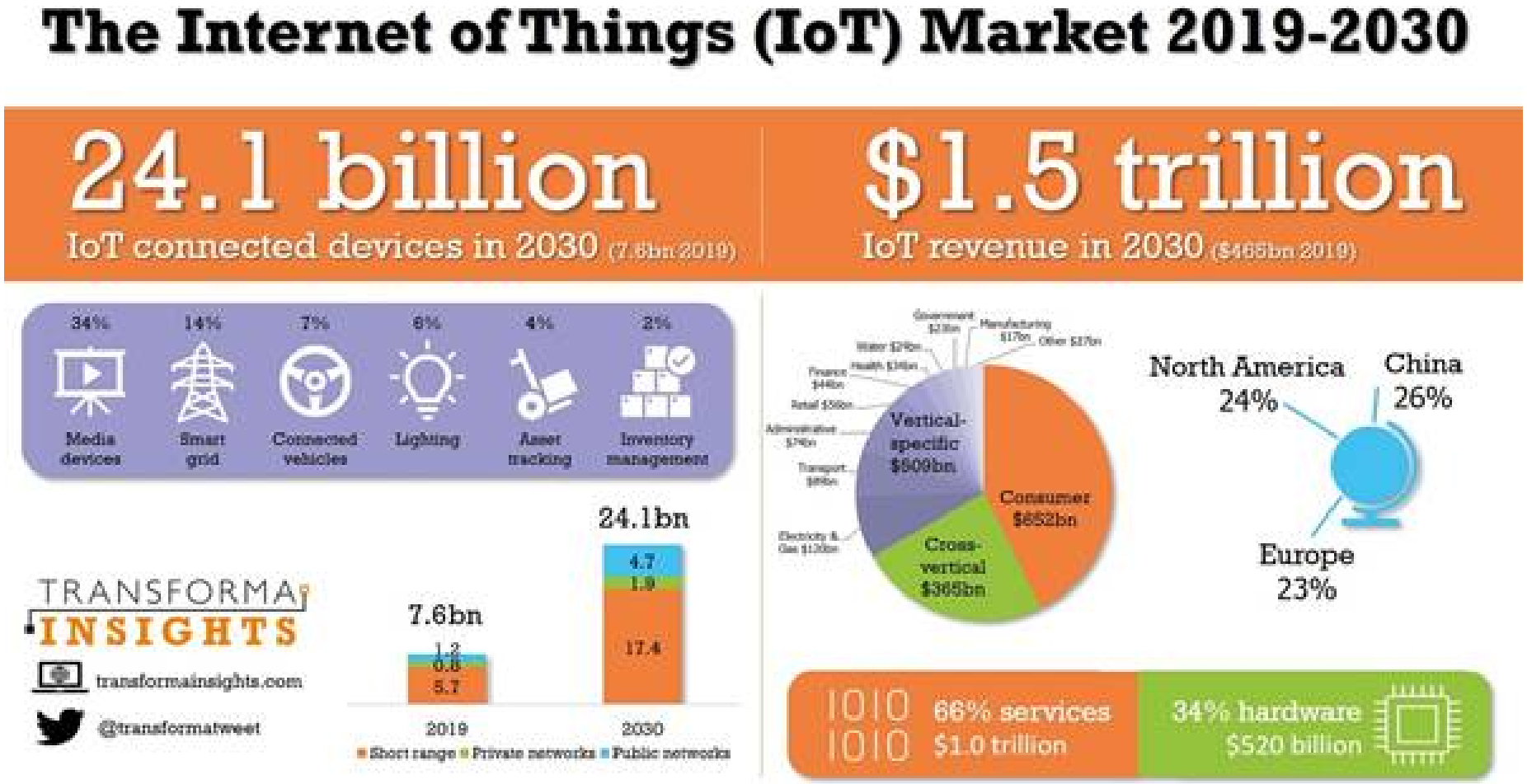
Data integrity & management

Visible to virtual validation

More decisioning moving from people to automation

Cybersecurity threats

IoT: anticipated growth



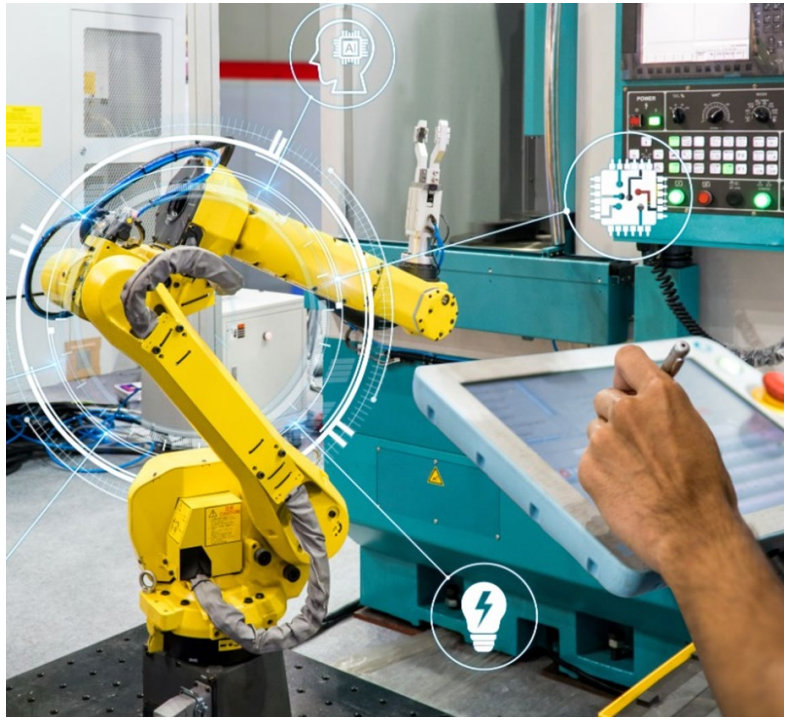
Challenges for Industry 4.0 scaling

- We know we need to advance safety in data-driven systems on communications, interoperability, electromagnetic immunity, human/machine interfaces, rigorous assessments of data-reliant devices and systems, functional safety, and safety software updates

- Systems engineering and validation for the increasingly complex ecosystems will need to span the physical and virtual domains

- AI and machine learning will need suitable datasets, training and validation

- Cybersecurity will be increasingly important through the evolution



IoT and cybersecurity

Among 524 breached organizations, the average cost of a data breach was $3.86 million – *IBM Cost of Data Breach annual report*

The percent of companies that consider themselves to be **totally secure** from cyber disruption.

The percent of companies that consider themselves **partially secure** from cyber disruption.

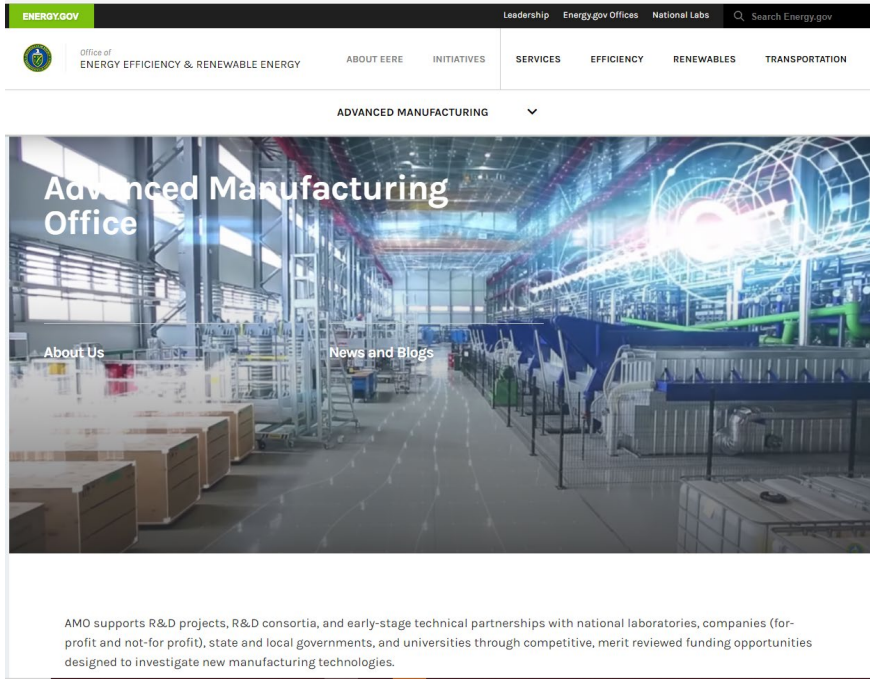
Source: Manufacturing Leadership Council's 2021 survey on Factories of the Future.

The role of public-private partnerships

- Public-private partnerships can catalyze new methods and architectures to tackle difficult strategic issues

- Funding from government bodies can bring together expert teams from industry, research institutions and industry to advance solutions

- Initiatives through government agencies, such as U.S. Department of Energy's Advanced Manufacturing Office or the National Institute of Standards & Technology's U.S. Strategy for Resilient Manufacturing Ecosystems through AI, are supporting sound innovation for advanced manufacturing technologies



The future will reveal exciting new opportunities driven by technological advancement and increasing sophistication.

New challenges will need to be addressed by establishing a strong foundation of trust and advancing validation methodologies at the speed of technologies.

Testing, inspection and certification will play critical roles in unlocking the full promise of the future.

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Questions?

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Wikipedia page:
Testing, inspection and certification

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