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A woman with dark hair, wearing a white hard hat and a high-visibility safety vest, stands in front of a large stack of colorful shipping containers (orange, blue, green). She is looking directly at the camera with a neutral expression. The background is slightly blurred, emphasizing the woman in the foreground.

Smart Quality Infrastructure: Rebooting QI for Sustainable Development

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1. Quality Infrastructure and Digital Transformation



Industrial Revolutions



1



2



3



4



5

MECHANIZATION
Steam and waterpower

ELECTRIFICATION
Mass production

AUTOMATION
Computers, CAD-CAM

DIGITALIZATION
Cyber-physical systems

SOCIETY 5.0
Quantum Computing

HEALTH & SAFETY

RISK & WORKING CONDITIONS

INTEROPERABILITY & CYBER SECURITY

CONVERGENCE OF NEW TECHNOLOGIES



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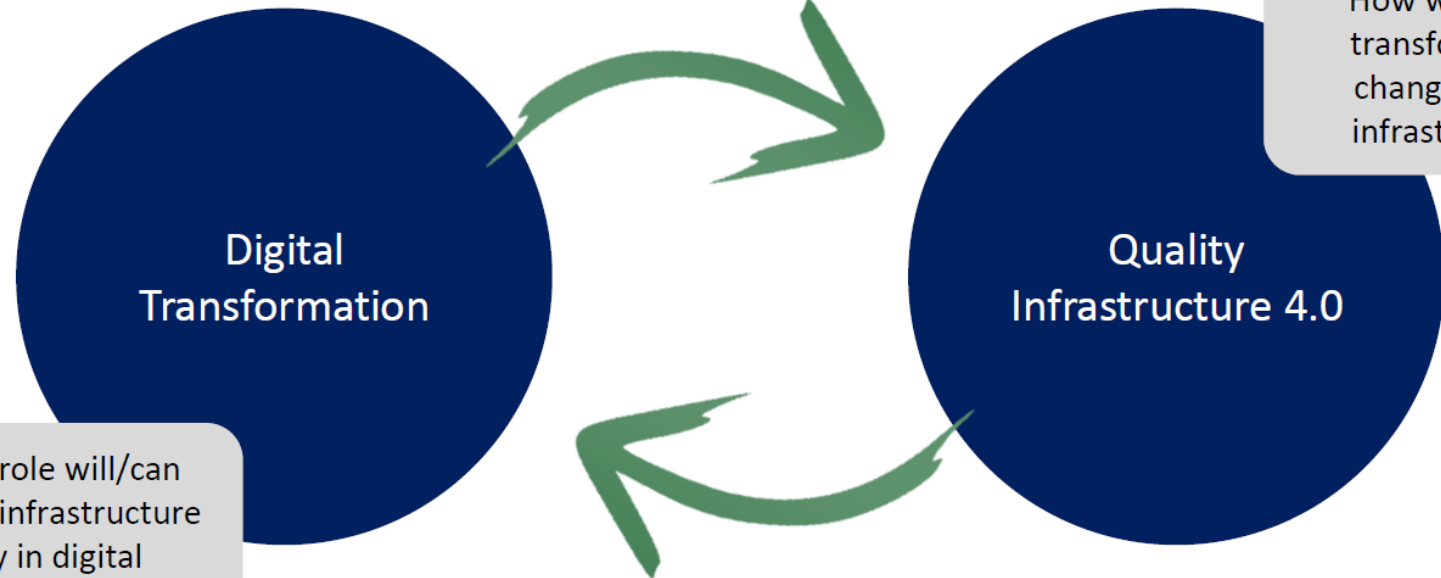


Digital Transformation Impacts People, Planet & Prosperity





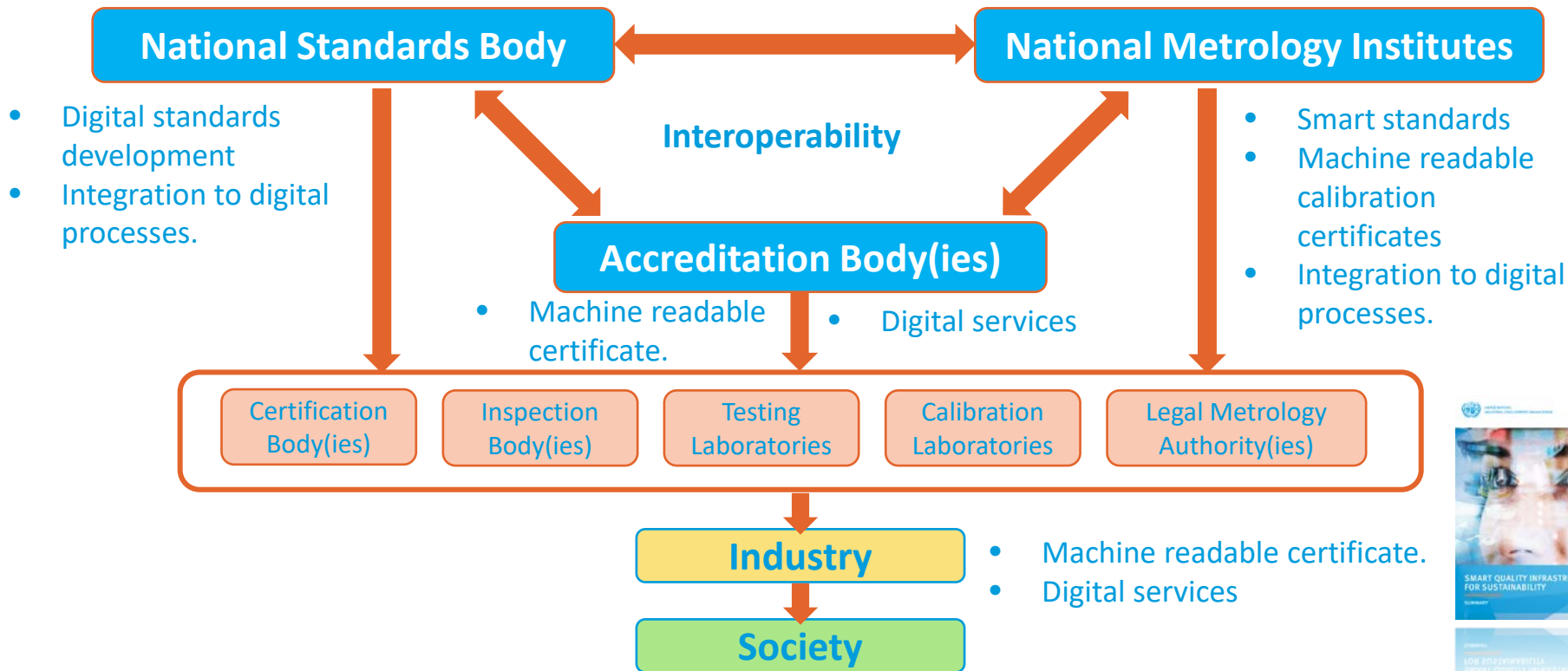
Quality Infrastructure & Digital Transformation



What role will/can quality infrastructure play in digital transformation?

How will digital transformation change quality infrastructure?

Towards a Smart Quality Infrastructure





Standardization 4.0

Digitalization of the NSBs

Virtual standards
development (e.g.
virtual TC work)

Introduction of AI into
the standardization
process



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



Metrology 4.0

- 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*



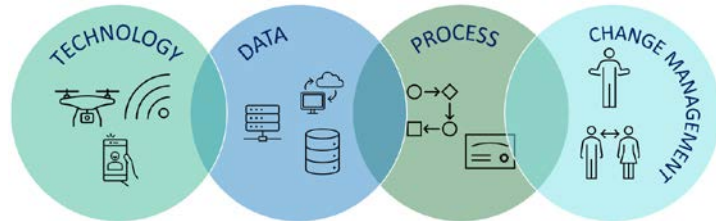


Conformity Assessment in the Digital Age (I)

Remote
Assessment
/ Auditing

Digital
(Calibration)
Certificates

“The facilitation of assessment of a CAB from a location other than that being physically present”. (IAF)





Conformity Assessment in the Digital Age (II)

Smart Laboratories

- AI and machine learning
- Big Data
- Cloud computing



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.



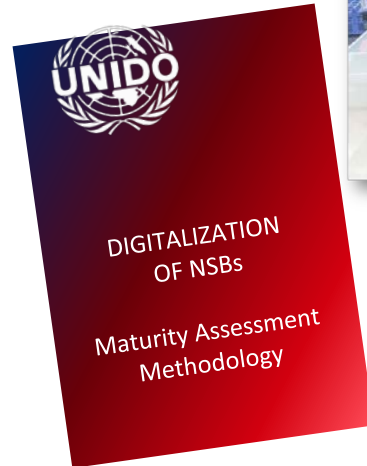
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Other QI Digitalization efforts in UNIDO Projects

Laboratory Information Management Systems (LIMS) and QR codes

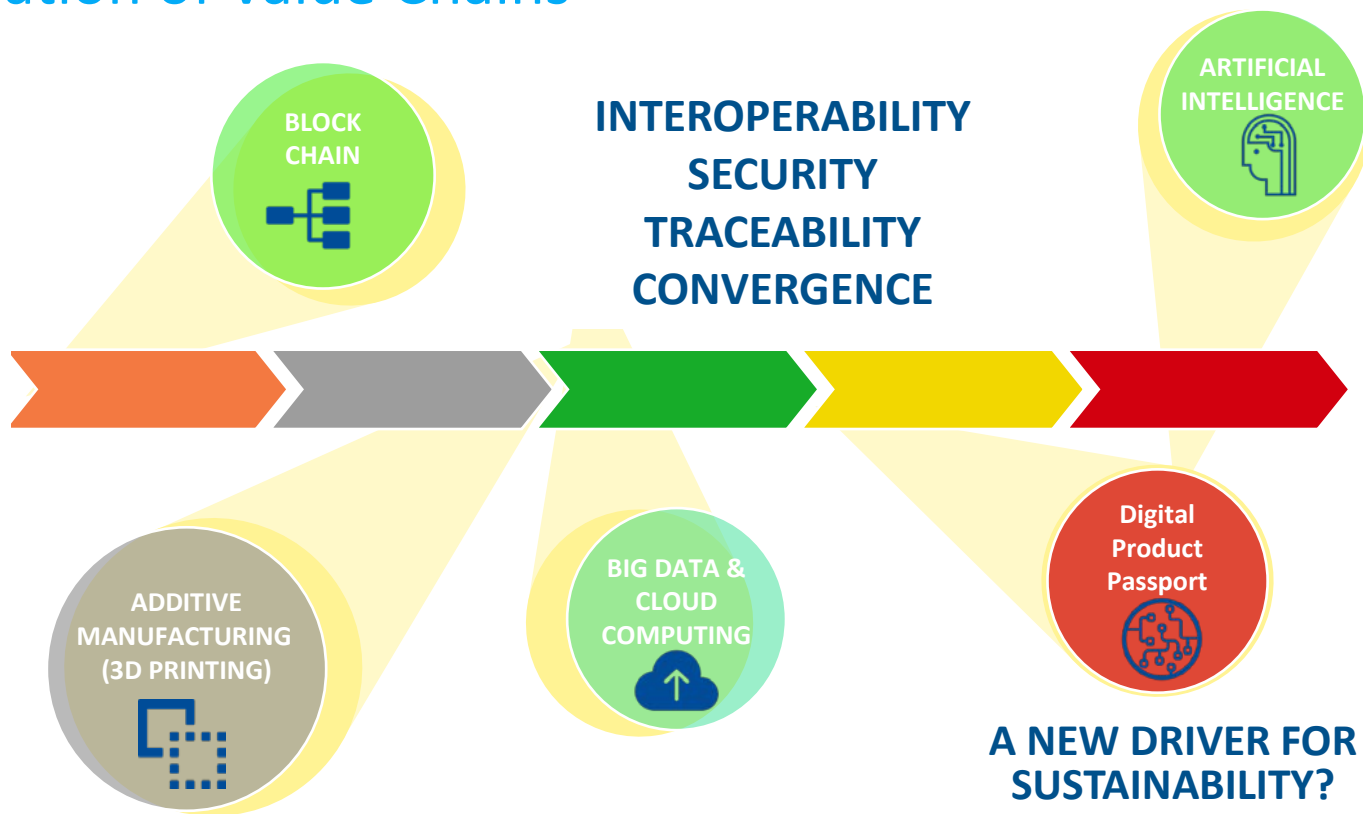
Digital maturity assessment tool for NSBs





Digital transformation of Value Chains

	FOCUS ON
SUPPLY CHAIN	<ul style="list-style-type: none"> » Cost reduction and effectiveness » Operation driven
VALUE CHAIN	<ul style="list-style-type: none"> » Value creation » Innovation » Demand driven
SMART VALUE CHAIN	<ul style="list-style-type: none"> » Introduction of new technologies » Process digitization » Faster response to customers » Improved communication throughout the chain
SUSTAINABLE VALUE CHAIN	<ul style="list-style-type: none"> » Environmental, social and governance practices measured at all tiers » Trust, transparency and full traceability » Net zero carbon » Circular processes minimizing waste





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2. The Quality Infrastructure for Sustainable Development (QI4SD) Index



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QI4SD Quality Infrastructure
for Sustainable
Development Index



What is the QI4SD Index?

To measure the readiness and contribution of Quality Infrastructure to SDGs using a composite indicator approach.

To break down this contribution into the 3 Ps – **People**, **Planet** and **Prosperity**.





Quality Infrastructure for Sustainable Development (QI4SD) Index

QI4SD Quality Infrastructure for Sustainable Development Index

Home QI dimensions Index & SDGs Country profiles About

THE QI4SD INDEX

The Quality Infrastructure for Sustainable Development (QI4SD) Index provides a framework of indicators that summarizes the overall state of development of a country's and/or region's Quality Infrastructure (QI) readiness to support the Sustainable Development Goals (SDGs).



GERMANY

The QI4SD Index summarizes the state of development of Quality Infrastructure (QI) readiness to support the Sustainable Development Goals (SDGs). The value of the QI4SD Index for Germany is 87.6, placing the nation in the 1st position for the countries assessed.

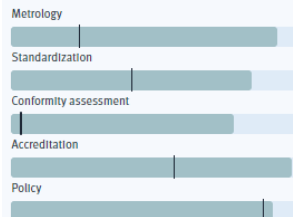
QI4SD INDEX

87.6

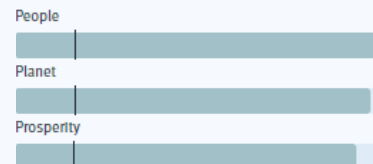
1st world rank



THE 5 DIMENSIONS



THE 3 PS



Scan me!



QI4SD Index Scores for similar economies (GDP values above USD 1 Tn)

Country	Region	Rank	Index	Standards	Conformity	Metrology	Accreditation	Policy
Germany	Europe & Central Asia	1	88	83	77	92	97	90
China	East Asia & Pacific	2	83	84	74	83	92	82
France	Europe & Central Asia	3	83	82	66	83	91	91
United States of America	North America	4	80	84	51	84	100	
United Kingdom	Europe & Central Asia	5	78	89	41	86	95	
Japan	East Asia & Pacific	6	76	79	56	83	87	
Spain	Europe & Central Asia	7	73	67	57	62	95	84
South Korea	East Asia & Pacific	8	73	75	59	77	73	82
India	South Asia	9	67	79	42	52	93	
Italy	Europe & Central Asia	10	67	80	52	61	98	41
Australia	East Asia & Pacific	11	62	61	25	68	93	
Canada	North America	12	62	60	17	64	74	93
Mexico	Latin America & Caribbean	13	59	55	16	53	89	80
Brazil	Latin America & Caribbean	14	58	51	40	63	79	
Russian Federation	Europe & Central Asia	15	58	73	33	82	42	
Indonesia	East Asia & Pacific	16	56	54	13	35	83	95



The Way Forward

QI institutions need to **catch up with the demands of digitalization** 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



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Thank You!

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