

## Quality infrastructure as an emerging research field



**Report on the first QI research workshop  
on 27 April 2023 at PTB in Berlin**

Dr Ulrich Harmes-Liedtke

Ann Ramkisson

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## Introduction

### The context

The concept of quality infrastructure (QI) describes the system of metrology, standardization, accreditation, and conformity assessment, which contributes to the safety and quality of products and supports international trade. Also included in this system are technical regulations and market surveillance.

All exporting nations have a differentiated national quality infrastructure system. International development cooperation institutions promote the establishment of QI in developing and emerging countries. At the international level, the leading QI institutions and promoters cooperate in the International Network on Quality Infrastructure (INetQI).

QI is a relatively new and largely unfamiliar term outside the QI expert circle. However, over the past few years, there has been an increasing number of scientific papers on QI and its contribution to economic development and sustainability.

### The workshop

On 27 April, the Physikalisch-Technische Bundesanstalt (PTB) and the Chair of Innovation Economics at the Technical University of Berlin hosted the first international QI research workshop. The event took place in the cupola hall of the historic Werner-von-Siemens building on the PTB campus in Berlin. In the hybrid format, more than 20 local and around 80 online participants from a total of 36 countries took part. The participants represented national and international QI organisations, such as the International Bureau of Weights and Measures (BIPM), International Organization for Standardization (ISO), the International Accreditation Forum (IAF), and the International Laboratory Accreditation Cooperation (ILAC); researchers from various universities and research and funding institutions; as well as practitioners and experts in international development cooperation. The number and composition of participants confirmed the worldwide interest in the scientific debate on QI.

### The speakers

Dr Frank Lienesch, Head of PTB's Division 9, Legal and International Metrology, opened the workshop. He underlined PTB's extraordinary interest in systematic research on QI and that PTB's core activity is research. In addition, PTB carries out German development cooperation projects in this subject area through Group 93, International Cooperation. Scientific research is central to the evaluation of project impacts.

In his introductory speech, Prof. Dr Knut Blind, TU Berlin, from the Institute for Technology and Management, Chair of Innovation Economics and Head of the Innovation and Regulation Unit, Fraunhofer ISI, explained the research development into standardization

towards QI research. In doing so, he presented various graphical representations that describe the QI system in varying degrees of detail and elements (see Figure 1).

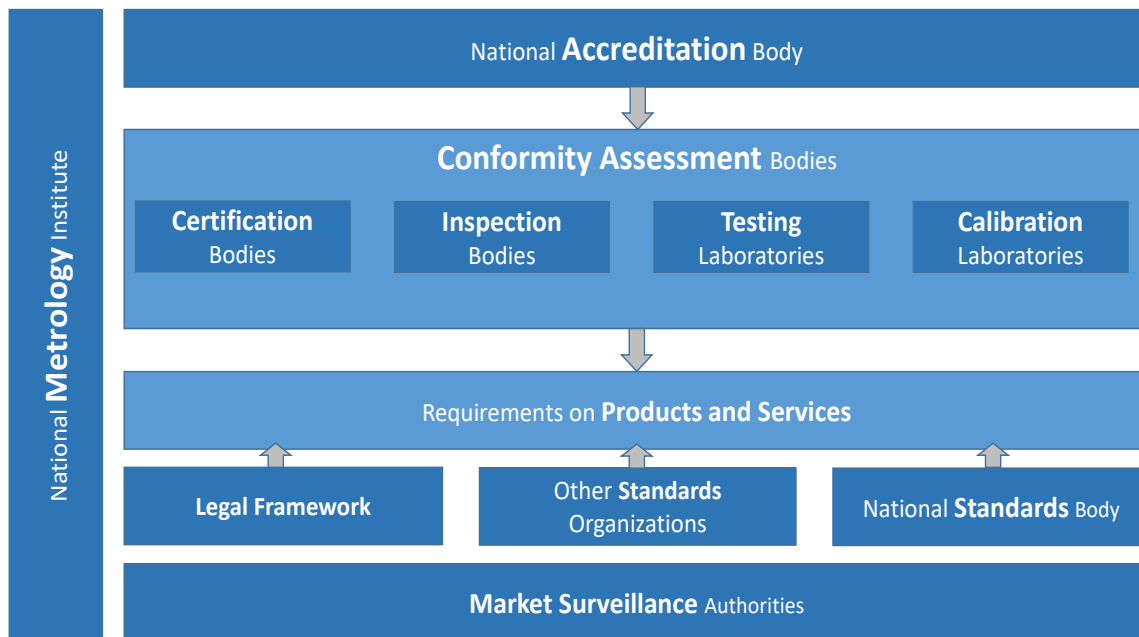


Figure 1: The QI system

Source: Blind and Koch in OECD 2018

Prof. Dr Blind drew attention to the fact that there are still very few scientific papers on QI, but the number of publications has risen sharply in recent years. Current research areas include impact research; relation to regulation and innovation policy; and questions of digitalisation, sustainability and complexity. He sees the challenges for QI research as needing a theoretical foundation, a more extensive database, and more visibility for policymakers and within the industry.

From a practitioner's perspective, Emanuele Riva, Chair of IAF, Vice General Manager in Accredia, and past chair of INetQI, explained the interest of QI bodies in researching QI. In his presentation, he explained the IAF project of building a database, which currently contains information from 73 accreditation bodies, 1,312 certification bodies and 888,928 certificates for quality management systems. The database first serves the accreditation and certification bodies to monitor and analyse their activities and enable benchmarking. At the same time, regulators and economic operators can verify the validity of certificates. Finally, the database should also open up possibilities for scientific analysis. Here, Riva emphasised the possibilities for integration with QI indices such as the Global Quality Infrastructure Index (GQII) or the Quality Infrastructure for Sustainable Development (QI4SD) Index.

Dr Ulrich Harmes-Liedtke and Ann-Sara Ramkissoon from Mesopartner gave an overview of the state of QI research. In their presentation, they asked whether QI already fulfils the requirements of a scientific discipline. They explained that scientific disciplines typically evolve sequentially over the course of four phases, but with respect to QI, progress is

ongoing in all four phases at the same time. They also highlighted the fact that QI application is rooted in natural and engineering sciences while QI research is rooted in social sciences and this dual nature has contributed to the varying levels of development in each phase.

Using different QI research areas (macroeconomic and case-based impact research, (global) value chains and NQI assessment) as examples, Ramkissoo presented specific research questions and the knowledge generated. She emphasised that QI knowledge generation has been dominated by grey or silver literature rather than academically recognised peer-reviewed journal articles. To establish QI as a research field, there is a need for database consolidation, systematic peer evaluation and publication of research results, formalisation of the research community and appropriate research funding.

The following two presentations were related to examples of applied QI research:

Dr Luana Ladu, TU Berlin, from the Institute for Technology and Management, Innovation Economics and the Federal Institute for Materials Research and Testing (BAM), Section 2, Department: Digitalization of the quality infrastructure, presented a project on how QI services can accompany the transition to a sustainable bio-based economy. The problem is that the QI still needs to monitor the proliferation of misleading commercial practices related to environmental sustainability. This makes it difficult for consumers to compare products and make environmentally conscious consumption decisions. The research project aims to establish a monitoring system to assess the effectiveness and robustness of existing sustainability certificates and labels.

Prof. Dr Frank Ebinger, Professor of Sustainable Innovation and Transformation Management, Nuremberg Institute of Technology, presented how QI in developing countries can support the integration of companies into global value chains. Using the example of value chains for clothing in Ethiopia and hazelnuts in Georgia, he showed how the Calidena methodology could identify gaps in the availability of QI services. At the same time, he also pointed out the increasing importance of meeting sustainability requirements. Here, finding a “smart mix” between using voluntary standards and certification schemes and fulfilling legal requirements would be essential. Ebinger concluded by recommending a comparison of the numerous studies on the importance of QI for specific value chains.

### The brainstorming

The facilitation team orchestrated discussions in small groups to animate the exchange of all participants. The group work culminated in recording many research questions on a digital whiteboard. The participants asked why QI should be researched and how QI institutions could approach academic research centres. Methodologically, questions about practical methods for communicating the benefits of QI and its contribution to innovation were asked. The need for research approaches in the field of QI was also highlighted. The basis for QI research is generated data; participants had questions about data collection and use. In

addition, the brainstorming session resulted in numerous research topics being raised, ranging from QI 4.0, governance, and power in the QI system to the consideration of gender. Finally, the considerable need to apply QI-related research, education, and training to effectively develop and expand QI systems, especially in developing and emerging countries, was underscored.

### Summary and way forward

From a participant's point of view, Prof. Dr Carlo Pietrobelli, Professor of Economics of the Department of Economics at University Roma Tre, Italy; Professorial Fellow at UNU-MERIT, Maastricht, and Adjunct Professor at Georgetown University, Washington D.C., had the opportunity to give a detailed closing speech. He emphasised that the workshop was a powerful learning experience. During the event, it became apparent that several theories could be applied to the study of QI. The presentations and discussions also showed a need for much more research than previously thought.

Prof. Dr Pietrobelli listed some insights, stressing that the order is not meant to express a ranking of importance:

- QI shows up as part of a broader system in which companies operate.
- Regarding the need for more visibility of QI among policymakers, he wondered if this was the result of a lack of rigorous impact evaluation.
- QI research is challenged to address the impact of digitalisation and artificial intelligence systematically. In doing so, it is essential to ask how the digitalisation of QI can contribute to building trust.
- Due to his interest in researching value chains, he was pleased with the contributions of QI to this and wondered to what extent QI research can contribute to a renewal of the research paradigm.
- He highlighted the need for research into the "distributional effects" of good QI: How does QI affect different types of companies (e.g., SMEs and large companies)? He also wondered about the contribution to innovation types: Does QI contribute more to incremental or radical innovation?
- The effect of QI on different sectors of the economy is also yet to be discovered: Is it mainly helpful in existing industries, or can it contribute significantly to developing new future sectors? From a development economics perspective, the relationship between QI and structural change still needs to be explored.

Finally, Prof. Dr Pietrobelli confirmed the usefulness of the various proposals for setting up a QI research network and stated that he was happy to contribute to its success.

# Comments and questions on introductory statements

Frank  
Lienesch

Knut Blind

Emanuele  
Riva

I found the Scopus study results to be really interesting

Could you please list the main themes currently involved in IQ research?

Is the database on certificates organized decentralized (hopefully) or centralized?

I would like to mention that there is also another understanding of Quality infrastructure launched especially by Japan that refers to the quality of physical infrastructure with focus on improving investment.

The challenge of QI that is not owned by a ministry or a department in a firm is a constraint

All presentations are available on the right of the Mural board

Please distinguish precisely between information platforms and research approaches

Status of (in the form of numbers) approved Accreditation bodies within the each nation must be listed.

Can Knut share his slides? Some of the data was quite interesting, especially for people in lower - middle-income countries.



# Comments and questions on presentations

Harmes-  
Liedtke/  
Ramkissoon

INetQI - International Network on Quality Infrastructure (previously called DCMA5) has currently 14 members

In Brazil, the term TIB (Basic Industrial Technology) was used for IQ

I think that such workshops are really useful and necessary for all researchers and experts in this field. PIB as a meeting point for all of us should consider that such initiatives be more frequent and perhaps organize an International Conference on Quality Infrastructure where most of us will gather, network and collaborate in various QI fields.

Official mention of QI in publications were in 2007 by Sanetra/Maban (PTB) and UNIDO

What would be the priority areas from the social sciences to promote more research from the QI?

The evolution of science have to consider nowadays also the digital transformation (applying Artificial Intelligence, etc.), a phenomena that in the 1960s was not so present...

I note that there has not yet been any mention of "the political origins of or influences on QI: 2 the demand-side of the question, i.e., pressure from firms, and 3 whether the national innovation systems literature is of any relevance. I hope that these issues can be discussed later.

look at this blog post, for instance: <https://qi4d.org/2023/02/19/the-qi-user-survey-to-assess-the-demand-of-quality-infrastructure/#more-1015>

Please distinguish precisely between information platforms and research approaches

The QI toolbox includes more tools than mentioned in the previous presentation, e.g. a representative QI service user survey which mostly targets enterprises. The purpose is to explore the QI service demand side.

I want to mention the "Universal Advantages" mission put forth at the 27th CGPM (Resolution 6) in November 2022. So the status of metrological infrastructure in different countries plays an important role specifically for their QI.

It bears note that QI has been discussed extensively among technocrats and, to some extent, multinational corporations, in Thailand over the past 10 years.

More trainings on QI should be organised to extend cross all continents

Luana  
Ladu

QI Research as an effective strategy to improve knowledge and consensus around emerging concepts

Interesting link between research, policy making and market surveillance

Frank  
Ebinger

Are there studies/research projects on the impact of the quality infrastructure and/or its components?

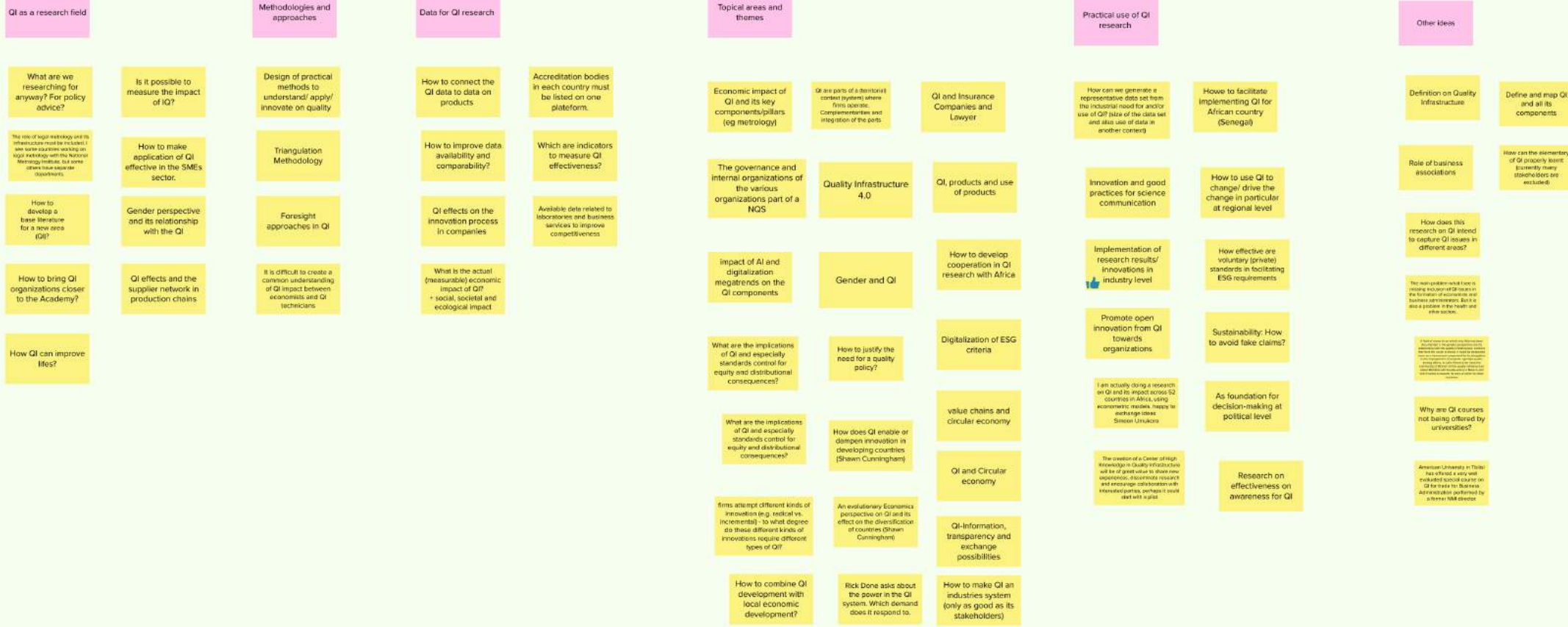
Smart mix

What companies need to know about QI

Caлдana and similar methods have only an practical impact if all the stakeholders come together and there also an action programme is implemented. Needs a lot of preparation



# Research questions



# QI research community



Special issue of a peer reviewed journal on the topic of QI research

Publication of a QI handbook

Preparation of a QI reserach conference

Creation of a QI Research communication channel

Establishment of a QI research website

Establishment of a coordination group

# Journals



European Review

International Journal of Quality and Innovation

Indian Journal of Pure and Applied Physics

Journal of Scientific & Industrial Research

World Development

Management: Journal of Sustainable Business and Management Solutions in Emerging Economies

Electronics

African Journal of Science, Technology, Innovation and Development

Open Engineering

Accreditation and Quality Assurance

Advances in Social Science, Education and Humanities Research

Journal of Physics

MATEC Web of Conferences

International Journal of Environmental Research and Public Health

IOP Conference Series: Earth and Environmental Science (EES)

Acta Metrologica Sinica

Key Engineering Materials

Periódico Tchê Química

Read the attached link to the paper we have recently published with special case study of 9 leading countries' economics. <http://iop.niscair.res.in/>

International Journal for Quality Research

Nature Physics, the series: "Measure for Measure?" <https://www.nature.com/topics/naturemeasure>

IEEE Transactions on Instrumentation and Measurement

Serbian Journal of Management

I would add journals: Total Quality Management and Business Excellence, Engineering Management Journal and

MAPAN  
Journal of Metrology Society of India  
<https://www.springer.com/journal/12647>

Metrologia

Nature Physics, "Measure for Measure"

## Links and publications shared by participants



**How do Public Policy-makers Perceive National Quality Infrastructure? The Case of Serbia as an EU Pre-accession Country | European Review | Cambridge Core**

... and (2016), Measuring the impact of quality infrastructure in Latin America: Experiences, achievements and limitations. Project document. Economic Commission for Latin America and the Caribbean. Google

Cambridge

**Indian Journal of Pure & Applied Physics (IJPAAP)**

Abstract Each country has its own system of Quality Infrastructure (QI) developed for the effective operations, management, regulations, control of national trade, international exchanges of goods & collaborations and recognition of their products and services to enable them to

Niscair

If you interested in NQI and policy making, read the article "How do Public Policy-Makers Perceive National Quality Infrastructure? The Case of Serbia as an EU Pre-Accession Country"

Article published in the Journal of Quality Research, Volume 1, Issue 1, 2017. <https://www.ijqr.org/>

**Journal of Scientific & Industrial Research**

Improved Model of Global Quality Infrastructure Index (GQII) for Inclusive National Growth Rab, Shantay, Yadav, Srinjay, Haleem, Abid, Jaiswal, S. K, Atwal, D. K Abstract The Quality Infrastructure (QI) of a country relies on 4 major pillars i.e. metrology, standardization,

Niscair

Identificação da demanda brasileira por serviços de infraestrutura para o setor de saúde pública: a saúde por meio da inovação tecnológica. <http://www.metrolab.org.br/revista/view/1729>

<https://ojs.aaai.org/2023/02/19/the-qii-user-survey-to-assess-the-demand-of-quality-infrastructure/>  
#more-1015

# Institutional and financial support

PTB

UNCTAD

ISO Research

ADB

The World Bank

IDB

WTO/ ITC

OECD

UNIDO

BMZ

DAAD

## QI Research Workshop Agenda

27 April 2023

PTB, Berlin/ Charlottenburg, Abbestrasse 2, Werner-von-Siemensbau, Kuppelsaal

Objective: Exchange information on QI research and create a research community

<b>Time (CET)</b>	<b>Activity</b>	<b>Speaker</b>
2:00 pm	Welcome	Dr. Frank Lienesch, Head of PTB's Legal and International Metrology Division 9, PTB
2:10 pm	Opening remarks: From research on standards to QI	Prof. Dr. Knut Blind, TU Berlin, Institute for Technology and Management, Chair of Innovation Economics and Head of the Innovation and Regulation Unit, Fraunhofer ISI.
2:20 pm	Opening remarks: Interest of QI bodies in research	Emanuele Riva, Chair of IAF, and past chair of INETQI (and Vice General Manager in Accredia)
2:30 pm	Presentation: Research on QI: Object and state of the art	Dr. Ulrich Harmes-Liedtke and Ann-Sara Ramkissoon, Mesopartner
2:50 pm	QI research example 1: Sustainability Certification Schemes (SCS) and labels supporting the transition to a sustainable bio-based economy	Dr. Luana Ladu, TU Berlin, Institute for Technology and Management, Innovation Economics
3:10 pm	QI research example 2: Quality Infrastructure services to enhance product value chains in Ethiopia	Prof. Frank Ebinger, Professor of Sustainable Innovation and Transformation Management, Nuremberg Institute of Technology
3:30 pm	Interchange of research topics, questions, and funding opportunities: 1-2-4-All <sup>1</sup> . Documentation on a Digital Whiteboard (MURAL)	All participants
4:45 pm	Outlook on a global QI research agenda and community	Prof. Carlo Pietrobelli, Professor of Economics of the Department of Economics at University Roma Tre, Italy; Professorial Fellow at UNU-MERIT, Maastricht, and Adjunct Professor at Georgetown University, Washington D.C.
5:00 pm	End of the event	

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<sup>1</sup> <https://www.liberatingstructures.com/1-1-2-4-all/>

# Opening remarks: From research on standards to QI

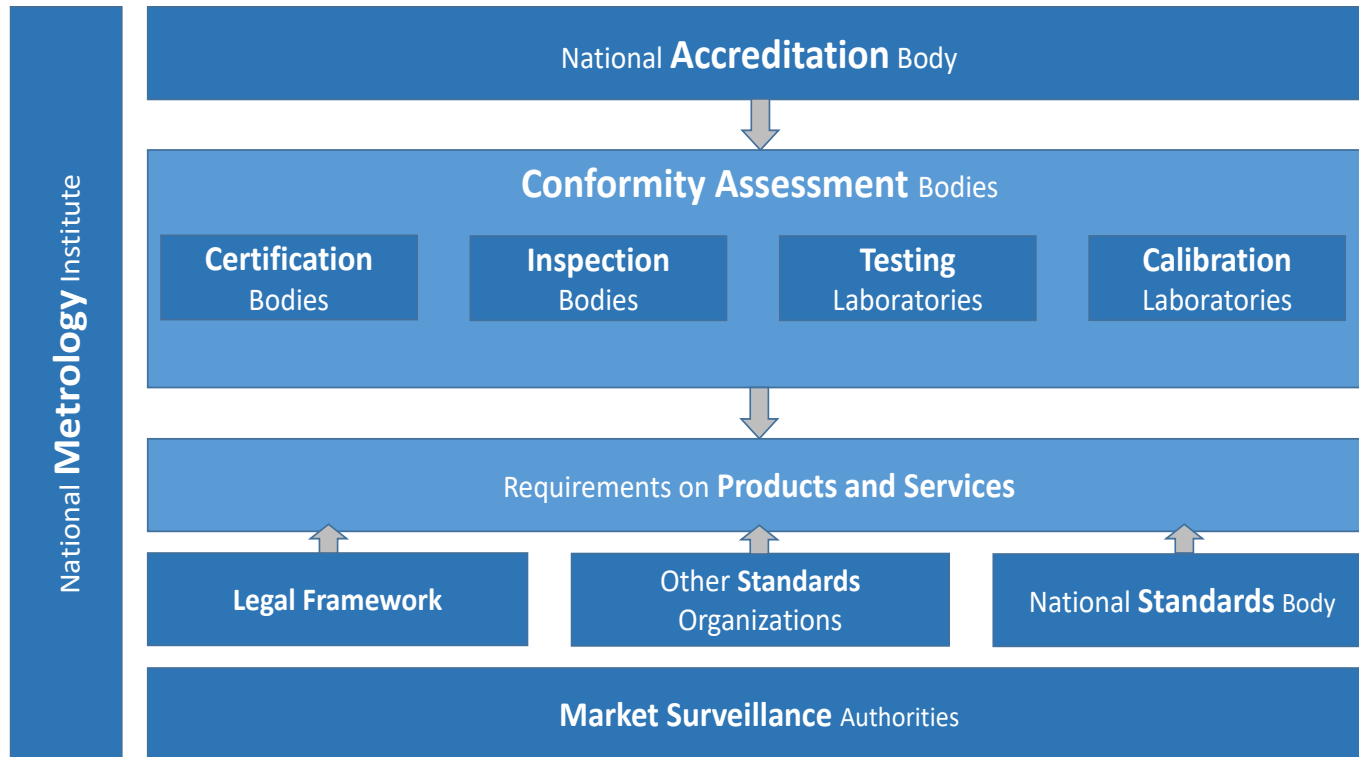
QI Research Workshop

Prof. Dr. Knut Blind

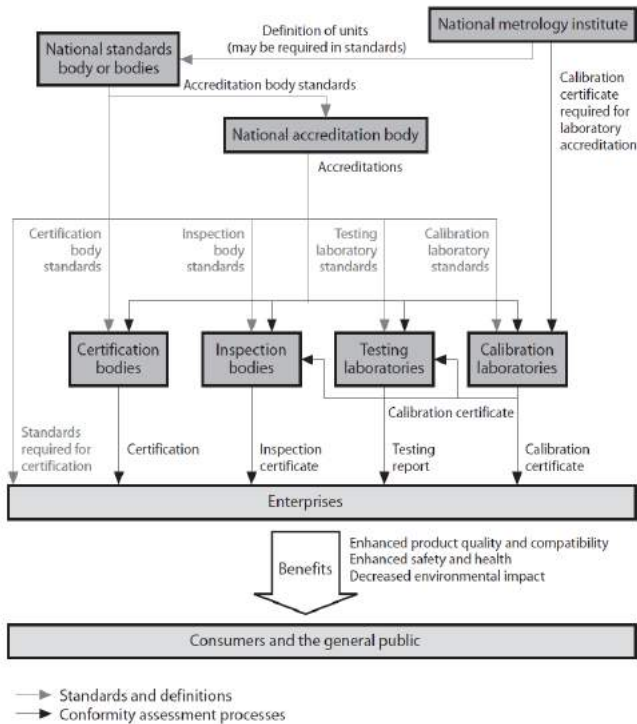
PTB, 27th April 2023

Berlin

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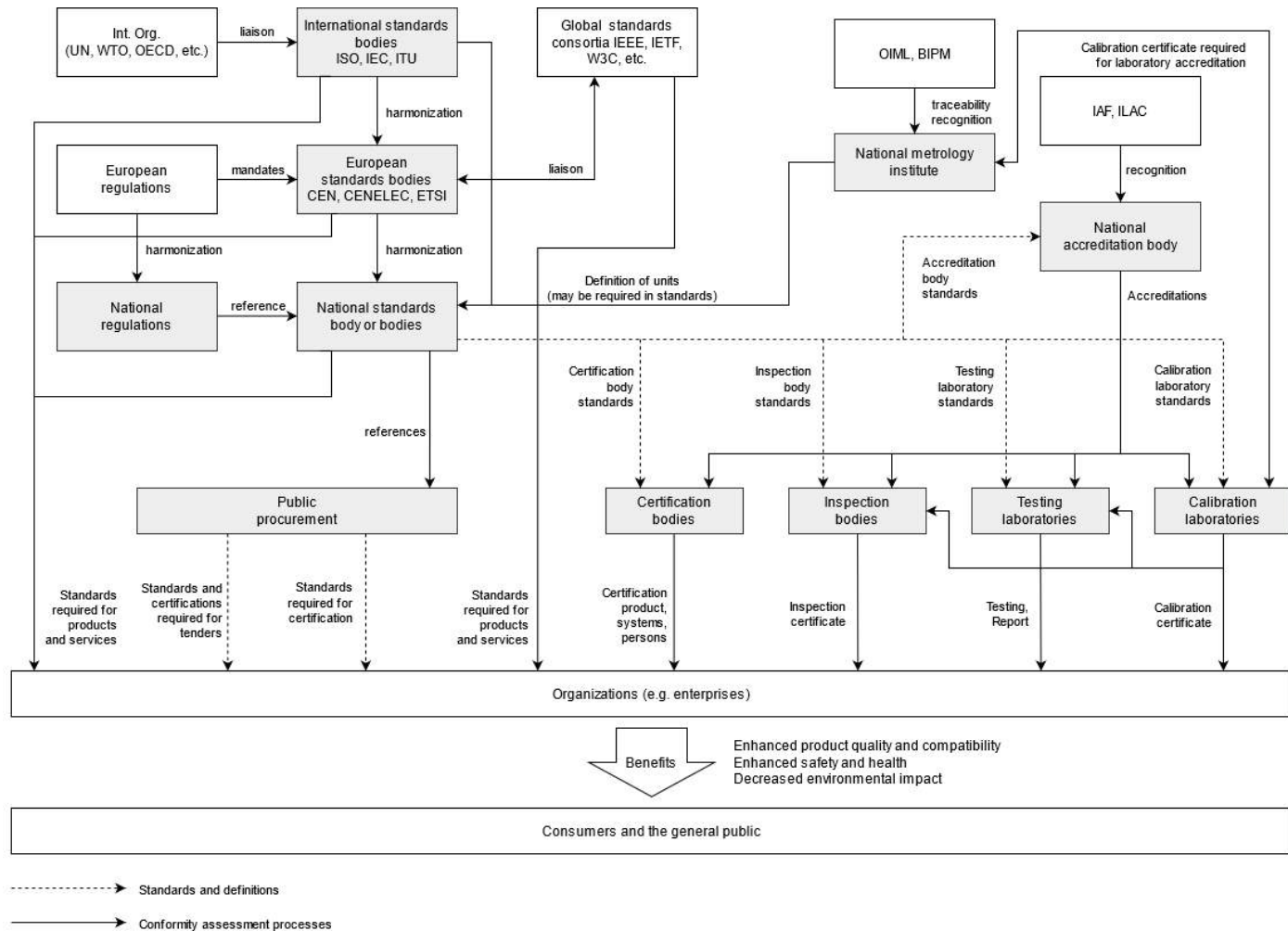




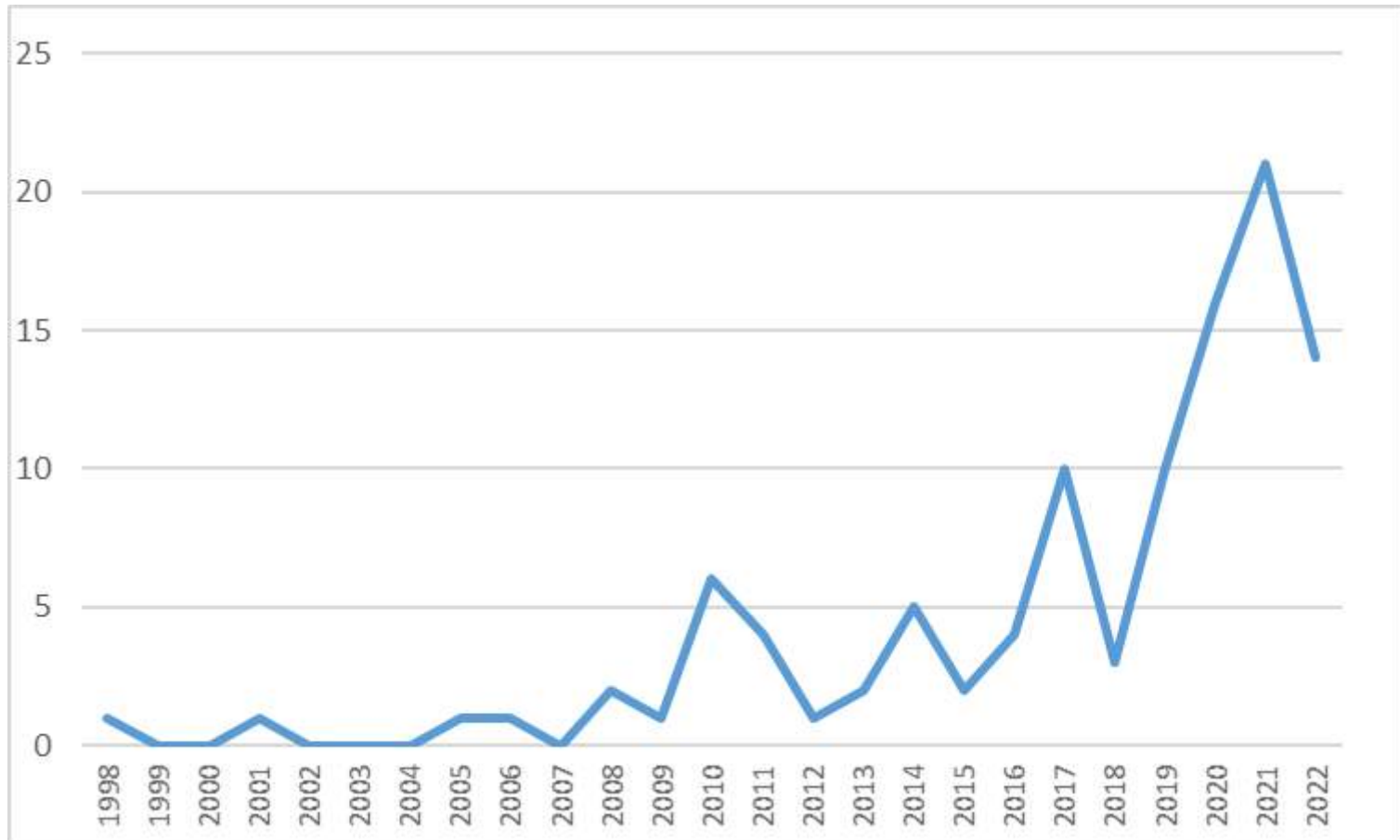
Source: Guasch et al. 2007

**UNIDO 2018:**

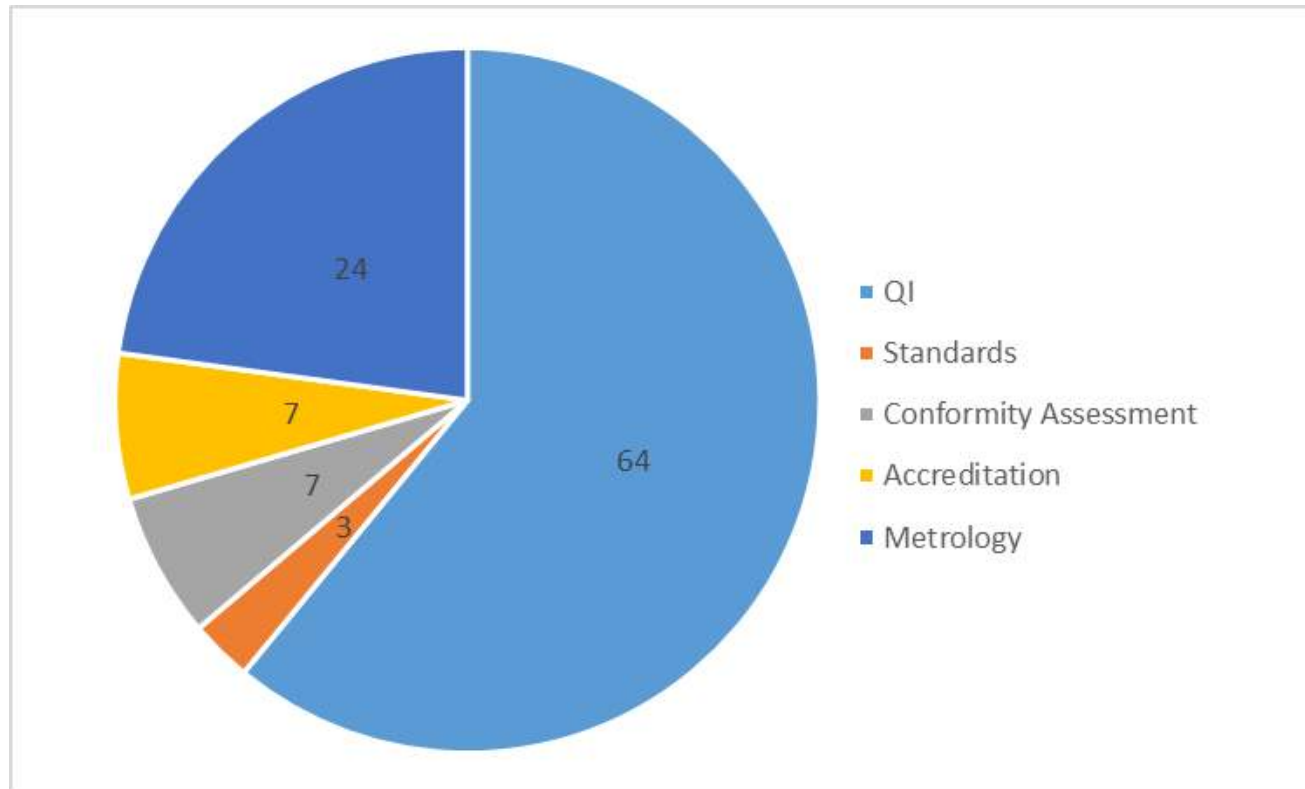
'the system comprising the organizations (public and private) together with the policies, relevant legal and regulatory framework, and practices needed to support and enhance the quality, safety and environmental soundness of goods, services, and processes. The quality infrastructure is required for the effective operation of domestic markets, and its international recognition is important to enable access to foreign markets. It is a critical element in promoting and sustaining economic development and environmental and social well-being. It relies on metrology, standardization, accreditation, conformity assessment, and market surveillance".



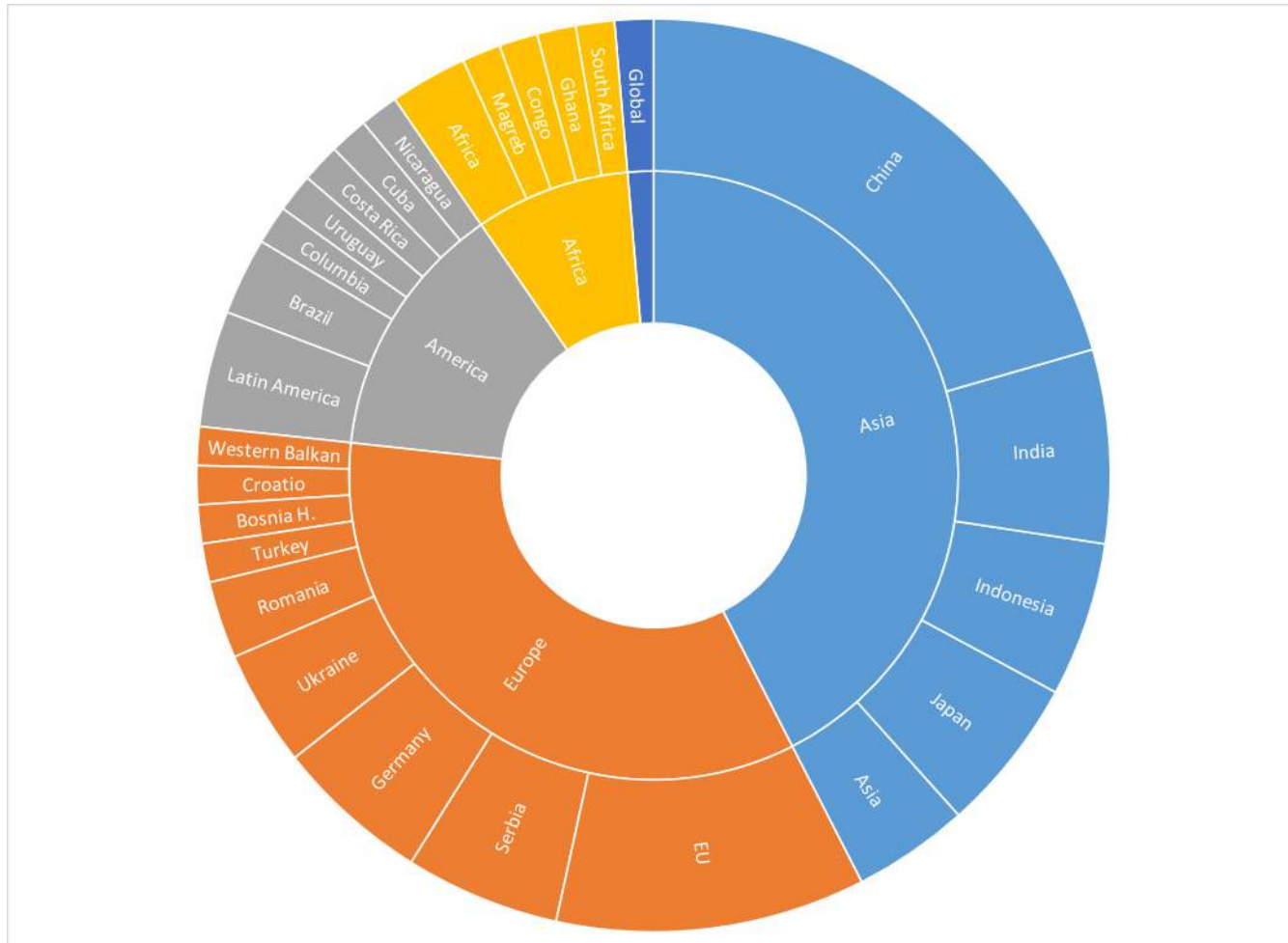
## Research about QI: Publications per year



## Research about QI: Topics covered



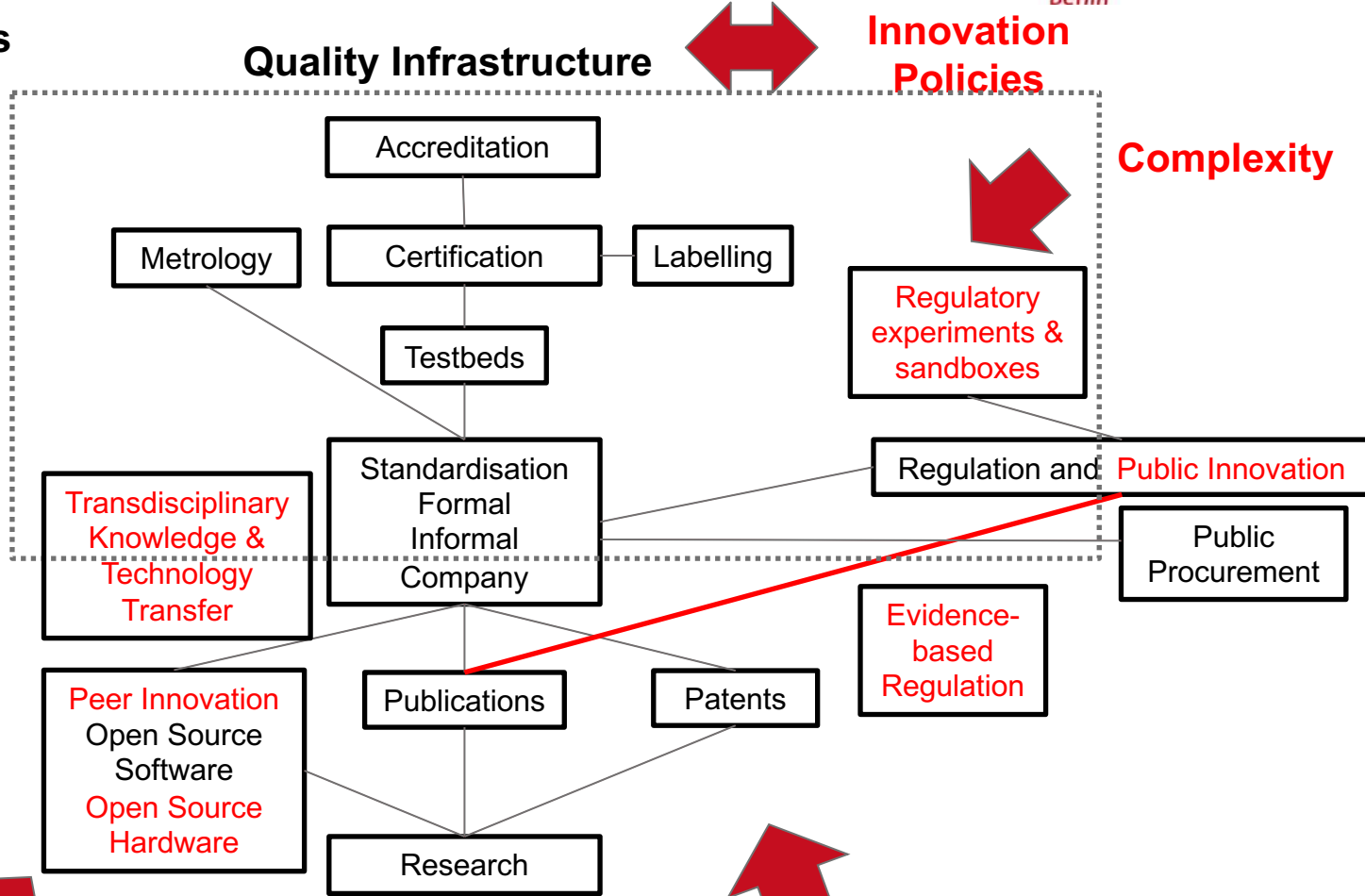
# Research about QI: Countries covered



- Integration of standardisation as an innovation activity in the 4th edition of the OECD Oslo Manual in 2018.
- Increased importance of quality infrastructure in the OECD's SME and innovation policy (2022), but also at the World Bank and WTO.
- Increasing role of quality infrastructure for Sustainable Development Goals at UNIDO, World Bank and WTO.
- China's Belt and Road Initiative includes research and education on quality infrastructure
- Integration of standardisation into cluster funding and BMBF programmes, e.g. FONA
- Standardisation established as a pillar of knowledge and technology transfer by the Joint Science Conference (GWK), e.g. measured with standard-essential publications
- Contribution to standardisation established as a KPI in Horizon 2020 or Horizon Europe
- Publication of a European Standardisation Strategy in February 2022
- Publication of a Code of Practice on Standardisation by the EC in March 2023

**Impact Dimensions**

- SDGs
- Economic Performance
- Global Value Chains
- Trade
- Competition
- Platforms
- Clusters
- Innovation
- Start-Ups
- Transformation
- Geopolitics



**Digitalisation  
(incl. WebMining as  
methodology)**

**Sustainability (SDGs)**



- Regulation, standardisation and certification in the bioeconomy (BMBF)
- Certification in the Bioeconomy (Horizon Europe)
- Standardisation in the Circular Economy (BMBF)
- Role of QI in monitoring the global hydrogen economy (BMWK)
- Role of QI in the Eastern European Countries (OECD)
- Role of standardisation for climate change (SDG 13) (DNP 2021)
- Role of standardisation for the energy transition (SDG 7) (DNP 2022)
- Standardisation and Conformity Assessment in the Context of Resilience (COVID 10) (DNP 2020 and QI FoKuS 2020)
- Digital Maturity in the Conformity Assessment Industry (QI FoKuS 2021)
- QI and socio-technical transformation (Fhl ISI internal)
- QI Impact (BAM)
- QI in the data economy (BMBF)
- Standards and standardisation processes as a recursive transfer channel for transdisciplinary knowledge (BMBF)
- Standardisation in Horizon 2020 Evaluation (DG Research)
- Promotion of Europe in international ICT standardisation (StandICT 2026) and blockchain (DG Connect)
- European Standardisation Panel (DG R&I)

## German Standardization Panel (DNP)



### DNP facts & figures

- Launched in 2012 (pilot, not part of the panel)
- 1000+ participating companies per year
- ~19.000 responses since first survey wave
- 7.000 different companies in total
- >50% of DAX-30 + large number of SMEs



- Indicator reports, presentations at workshops & conferences, DIN communications, scientific publications (peer-reviewed)

### Goal:

- Building up a panel in order to be able to examine trends and causal relationships
- Accompanying timely current topics-tool for standardization and innovation research and policy advice
- Be a communication channel between standardization organizations, standardization experts, and science

### Latest news:

11th survey, started Oct. 14, 2022 (World Standards Day) and ended Jan. 4, 2023. Results presentation est. June 2023. [www.normungspanel.de](http://www.normungspanel.de)

## Survey Questionnaire

### Company Information

Industry, size, turnover, export, R&D etc.

### Importance of standards & certification

- Number of standards applied
- Importance of standards
- Impact of standards on success factors
- Certification of key standards

### Standardization activities

- Active in standardization org
- Standardization organizations vis-à-vis consortia
- Standardization departments in companies

## Special Section

2012:  
Certifications

2013:  
TTIP

2014:  
Trade  
with  
China

2015:  
Digitali-  
zation

2016:  
Indus-  
try 4.0

2017:  
Digital  
Stan-  
dards

2018:  
Public  
Law

2019:  
SDGs

2020:  
COVID-  
19

2021:  
Climate  
Change

2021:  
Affordable  
& Clean  
Energy

## European Standardisation Panel

### Research and innovation

[Home](#) > [News](#) > [All research and innovation news](#) > [Commission Plans to launch a European Standardisation Panel survey](#)

NEWS ARTICLE | 24 April 2023 | Brussels | Directorate-General for Research and Innovation

## Commission Plans to launch a European Standardisation Panel survey

## Challenges

- Lack of theory
- Lack of data
- Limited visibility among policy makers and within industry

## Contact

**Prof. Dr. Knut Blind**

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Chair of Innovation Economics

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also

Fraunhofer Institute for Systems and Innovation Research ISI

Business Unit Innovation and Regulation

<http://www.isi.fraunhofer.de>

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Twitter: @KnutBlind



# Database Participation



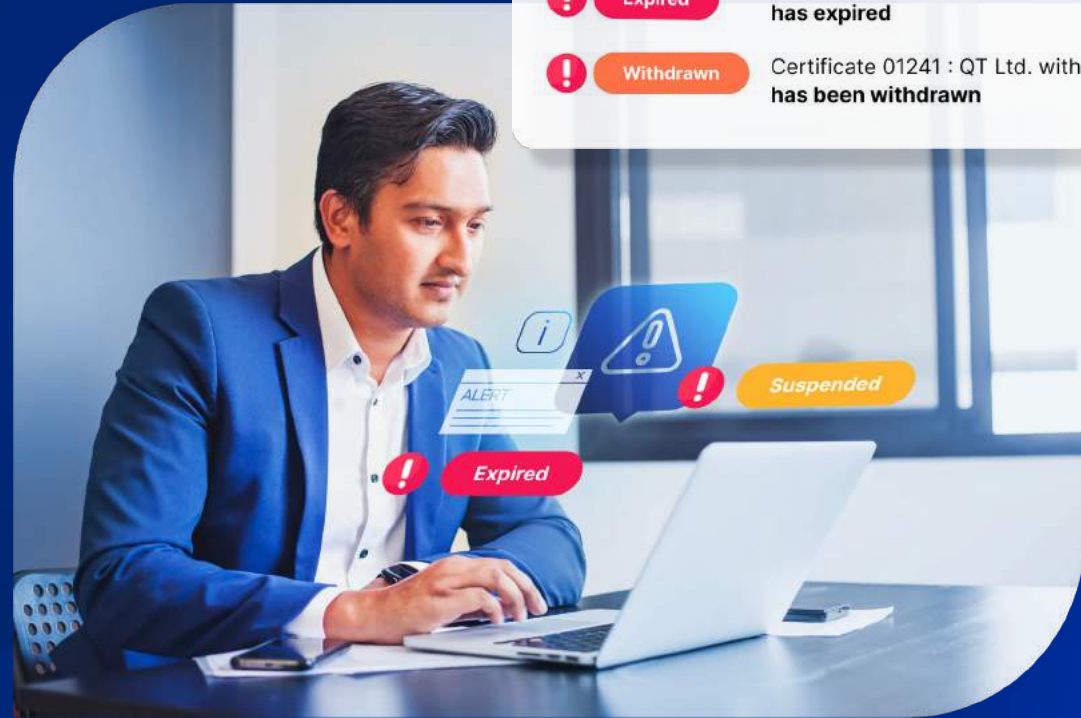
Note: Certifications total are all certifications which have been uploaded since inception which include all status'





# Perpetual and real time monitoring

Compliance, procurement and governance teams can take **action in real time.**

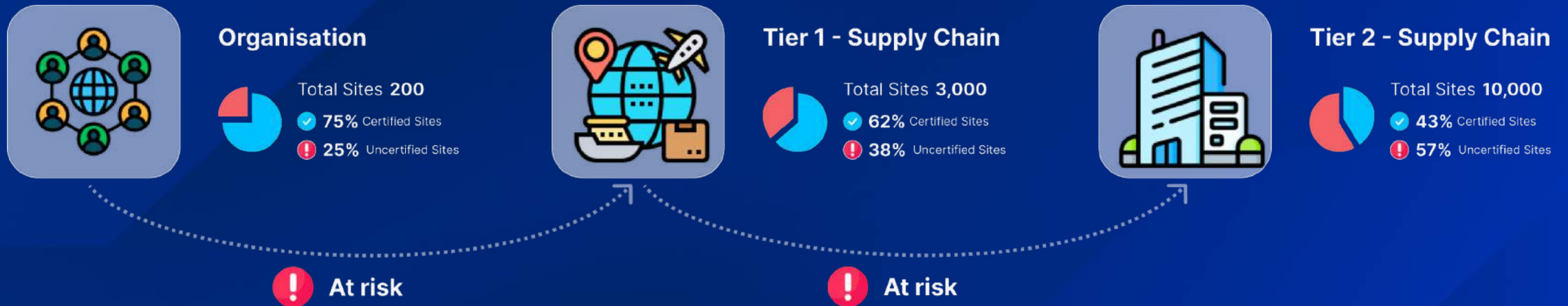
The IAF Database “watchlist” automatically informs organizations when certification body auditors have identified non compliance relating to certifications i.e. suspended, withdrawn, expired. This enables organisations be proactive and mitigate risk.



**Notifications**

-  **Suspended** Certificate 124214 : ABC Corporation with 12 sites **has been suspended**
-  **Expired** Certificate 01241 : XYZ Limited with 102 sites **has expired**
-  **Withdrawn** Certificate 01241 : QT Ltd. with 102 sites **has been withdrawn**

Aggregating the worlds certification information, helps organisations gain full visibility of their supply chains via the IAF Database, enabling real time verification and monitoring of each and every certified site.



# Database features for Accreditation Bodies

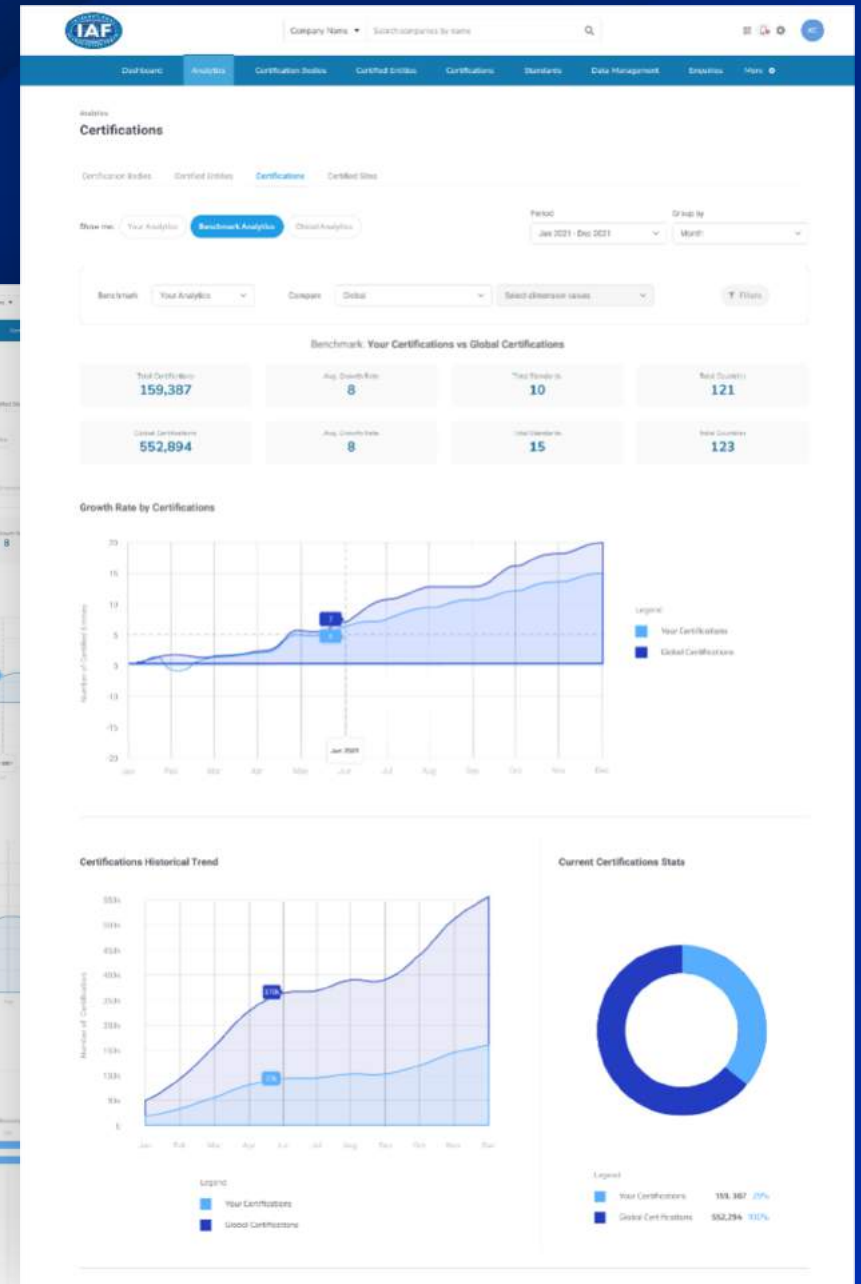
+ **AB Analytics** - including aggregated analytics on certification bodies, certified entities, certifications, certified sites, verification activity on CBs and their certificates.

Individual certification body analytics. Filters and benchmarks.

+ **Global Analytics** - anonymised aggregated analytics for all standards, sectors and locations (regional, country, state)


+ **Benchmarks** - the ability to compare your “AB

Analytics” to global benchmarks, such as :  
Standard, location, sector





# Verification Users: Bulk Verification

Enter your name:  Enter your name:  US Select Language  Powered by Google Translate

OVERVIEW

- Dashboard

ENTITIES

- Certified Entities
- Certifications
- Company Lists
- Watchlist
- Bulk Verification**

MESSAGES

- Enquiries

SETTINGS

- Users and Permissions
- Company Profile
- Billing
- Settings

User Guide

- IAF CertSearch Mark

## Bulk Verification

Company Verification | FTP Settings | API Integrations | Verification History

Want to verify company certifications?  
Import and verify your data by choosing from the verification methods below:

- File Upload**  
Verify using the IAF CertSearch Web Uploader
- FTP Server**  
Verify data from your FTP server
- API**  
Imports data using API
- Apps**  
Imports data from other application

### Verification Activities

File Name	Status	Details	Matched at	Ver	Import Completed	Actions		
ID: 0000-0001	100%	Imported 100,000 records	Web Uploader	Certification version 1	12/27/2023 01:00:00	12/27/2023 01:00:00	12/27/2023 01:00:00	<button>View</button> <input checked="" type="checkbox"/> Imported
certs_1.xlsx	100%	Imported 10,000 records	Web Uploader	Certification version 1	12/27/2023 01:00:00	12/27/2023 01:00:00	12/27/2023 01:00:00	<input checked="" type="checkbox"/> Imported
certs_2.xlsx	100%	Imported 10,000 records	Web Uploader	Certification version 1	12/27/2023 01:00:00	12/27/2023 01:00:00	12/27/2023 01:00:00	<input checked="" type="checkbox"/> Imported
certs_3.xlsx	100%	Imported 10,000 records	Web Uploader	Certification version 1	12/27/2023 01:00:00	12/27/2023 01:00:00	12/27/2023 01:00:00	<input checked="" type="checkbox"/> Imported
certs_4.xlsx	100%	Imported 10,000 records	Web Uploader	Certification version 1	12/27/2023 01:00:00	12/27/2023 01:00:00	12/27/2023 01:00:00	<input checked="" type="checkbox"/> Imported
certs_5.xlsx	100%	Imported 10,000 records	Web Uploader	Certification version 1	12/27/2023 01:00:00	12/27/2023 01:00:00	12/27/2023 01:00:00	<input checked="" type="checkbox"/> Imported



# Verification Users: Watchlist

The screenshot displays the IAF CertSearch Watchlist interface. The left sidebar contains navigation options: OVERVIEW (Dashboard), ENTITIES (Entities, Certifications, Company Lists, Watchlist), MESSAGES (Enquiries), SETTINGS (Users and Permissions, Company Profile, Billing, Settings), and User Guide (User Guide, IAF CertSearch Mark). The main content area shows a search bar with filters for Company List, Status, Country, Standard, and State. A notification box in the top right corner indicates that 'Electrical Services Southern Ltd' certification has expired and 'Electrical Services Southern Ltd' has been suspended. Below the filters, a progress bar shows 9 Valid and 1 Expired entries. A table lists the following companies:

Company Name	Country	CIN	Certification Status	Certification Detail	Company List	Last Updated	Actions
360 Services Srl	United States	CIN-12510	Valid	ISO 9001:2018 Quality Management System	Aerospace Supply Chain	January 01, 2023 at 12:12	View
3M	United States	CIN-12511	Valid	ISO 9001:2018 Quality Management System; ISO 14001 Environmental Management System	Aerospace Supply Chain	January 01, 2023 at 12:12	View
ABC Corporation	Italy	CIN-12512	Valid	ISO 14001 Environmental Management System	Aerospace Supply Chain	January 01, 2023 at 12:12	View
ALPHA Inc.	United Kingdom	CIN-12513	Suspended	ISO 9001:2018 Quality Management System; ISO 50001 Energy Management Systems	Aerospace Supply Chain	January 01, 2023 at 12:12	View
Electrical Services Southern Ltd	United Kingdom	CIN-12514	Expired	ISO 14001 Environmental Management System	Aerospace Supply Chain	January 01, 2023 at 12:12	View
Micro Systems	United Kingdom	CIN-12515	Unverified	-----	Aerospace Supply Chain	January 01, 2023 at 12:12	View
GRASSANO SPA	Australia	CIN-12516	Valid	ISO 9001:2018 Quality Management System	Aerospace Supply Chain	January 01, 2023 at 12:12	View
INTEGRATED SOLUTIONS CONSULTANCY LIMITED	Australia	CIN-12517	Valid	ISO 50001 Energy Management Systems	Aerospace Supply Chain	January 01, 2023 at 12:12	View
ARTGALE	Australia	CIN-42672	Valid	ISO 14001 Environmental Management System	Aerospace Supply Chain	January 01, 2023 at 12:12	View
BoardML	Australia	CIN-23627	Valid	ISO 9001:2018 Quality Management System	Aerospace Supply Chain	January 01, 2023 at 12:12	View

Rows per page: 10

# Verification Users: Dashboard

## Dashboard Overview

**Total Valid Certificates** 324k ↑ 1%

**Total Certified Entities** 120k ↑ 1%

**Total Invalid Certificates** 12k ↓ 1%

**Total Unverified Entities** 1k ↓ 1%

### Top 5 Countries with Valid Certificates

1. Italy	42.6k	↑ 1%
2. United Kingdom	25k	↑ 1%
3. United States	14k	↑ 1%
4. China	12k	↑ 1%
5. Australia	8k	↑ 1%

[View all Certificates](#)

### Top 5 Companies with most Certificates

1. ABC Company	124	↑ 1%
2. XYZ Limited	63	↑ 1%
3. 123 Corporation	45	↑ 1%
4. 0 Manufacturing	32	↑ 1%
5. QWERTY Industries	16	↑ 1%

[View all Certified Companies](#)

### Top Standards

1. ISO 9001	124	↑ 1%
2. ISO 14001	63	↑ 1%
3. ISO 13485	45	↑ 1%
4. ISO/IEC 27001	32	↑ 1%
5. ISO 50001	16	↑ 1%

[View all Certificates](#)

### Nearing Expired Certificates

1. Company 1 - ISO 9001	Expiring in 2 weeks
2. Company 2 - ISO 15001	Expiring in 3 weeks
3. Company 3 - ISO 14001	Expiring in 3 weeks
4. Company 4 - ISO 50001	Expiring in 1 month
5. Company 5 - ISO 50001	Expiring in 2 months

[View all Expiring Certificates](#)

## Recently Updated Certifications

[View all Certificates](#)

Company Name	Country	CIN	Certification Status	Certification Detail	Update Details	Last Updated	Actions
360 Services Srl	United States	CIN-12510	Valid	ISO 9001:2018 Quality Management System	Status Change	January 01, 2023 at 12:12	<a href="#">View</a>
3M	United States	CIN-12511	Valid	ISO 9001:2018 Quality Management System; ISO 14001 Environmental Management System	Status Change	January 01, 2023 at 12:12	<a href="#">View</a>
ABC Corporation	Italy	CIN-12512	Valid	ISO 14001 Environmental Management System	Updated Certification Scope	January 01, 2023 at 12:13	<a href="#">View</a>
ALPHA Inc.	United Kingdom	CIN-12513	Valid	ISO 9001:2018 Quality Management System; ISO 50001 Energy Management Systems	Status Change	January 01, 2023 at 12:13	<a href="#">View</a>
Electrical Services Southern Ltd	United Kingdom	CIN-12514	Expired	ISO 14001 Environmental Management System	Updated Standard	January 01, 2023 at 12:12	<a href="#">View</a>

## Recently Verified Companies

[View all Certified Companies](#)

Company Name	Country	CIN	Certification Status	Certification Detail	Company List	Last Updated	Actions
360 Services Srl	United States	CIN-12510	Valid	ISO 9001:2018 Quality Management System	Aerospace Supply Chain	January 01, 2023 at 12:12	<a href="#">View</a>
3M	United States	CIN-12511	Valid	ISO 9001:2018 Quality Management System; ISO 14001 Environmental Management System	Aerospace Supply Chain	January 01, 2023 at 12:13	<a href="#">View</a>
ABC Corporation	Italy	CIN-12512	Valid	ISO 14001 Environmental Management System	Aerospace Supply Chain	January 01, 2023 at 12:13	<a href="#">View</a>
ALPHA Inc.	United Kingdom	CIN-12513	Valid	ISO 9001:2018 Quality Management System; ISO 50001 Energy Management Systems	Aerospace Supply Chain	January 01, 2023 at 12:13	<a href="#">View</a>
Electrical Services Southern Ltd	United Kingdom	CIN-12514	Expired	ISO 14001 Environmental Management System	Aerospace Supply Chain	January 01, 2023 at 12:12	<a href="#">View</a>



# Verification Users: Verification and monitoring list

The screenshot shows the IAF CertSearch Mark web application interface. The top navigation bar includes the IAF logo, search fields, and utility icons. The sidebar on the left contains navigation menus for Overview, Entities, Messages, and Settings. The main content area displays the 'Company Lists' page with a table of verification data.

Company List Name	Total Companies	Total Certificates	Active	Suspended	Withdrawn	Expired	Unverified	Watching	Last Updated	Action
All Companies	279	330	257	8	5	16	40	240	January 01, 2023 at 12:12	<a href="#">View</a>
Aerospace Supply Chain	100	100	80	1	1	1	13	100	January 01, 2023 at 12:12	<a href="#">View</a>
Energy Supply Chain	90	120	94	2	1	3	20	90	January 01, 2023 at 12:12	<a href="#">View</a>
Manufacturers	80	110	83	5	3	12	7	50	January 01, 2023 at 12:12	<a href="#">View</a>

Rows per page: 10

1 2 3



# Quality Infrastructure

A scientific discipline in the making

Dr. Ulrich Harmes-Liedtke

Ann-Sara Ramkissoon

First International Research Workshop on Quality Infrastructure

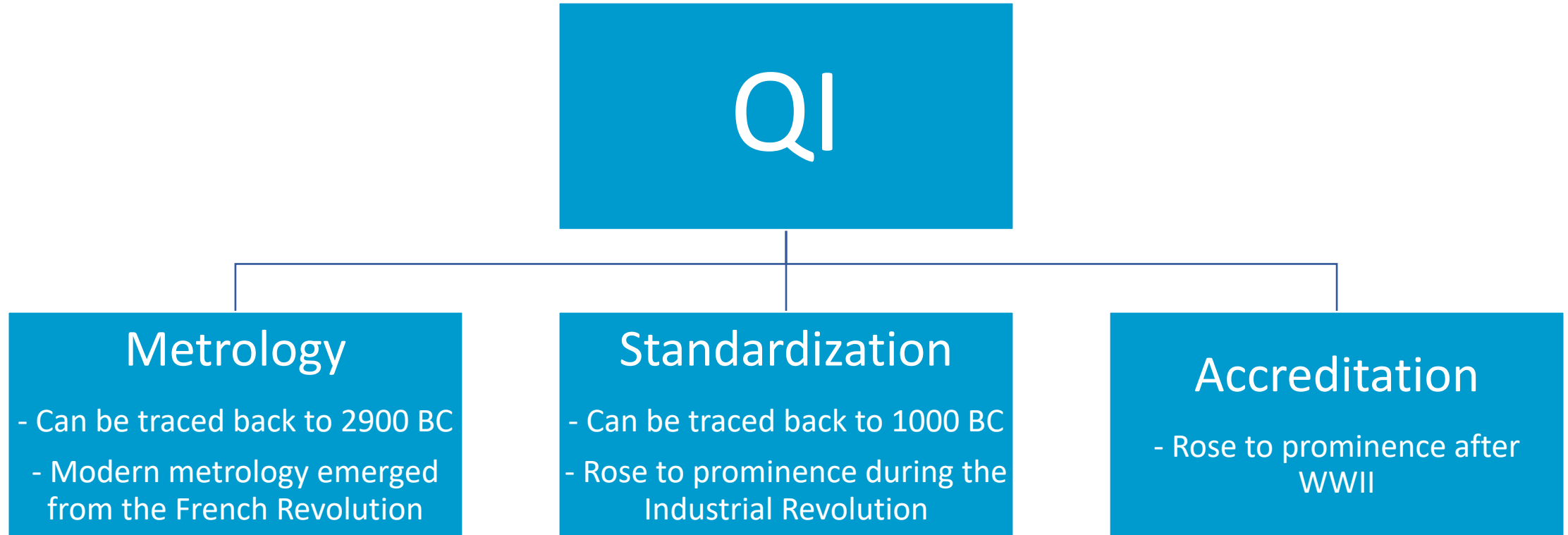
April 27<sup>th</sup>, 2023

Siemens Building, PTB, Charlottenburg, Berlin, Germany

# Introduction

- Although, the term “Quality Infrastructure” is relatively new, its components can be traced back to around 2900 BC
- QI is not yet recognized as a scientific discipline
- QI is different from other scientific disciplines:
  - Not following the evolutionary process chronologically – concurrent progress in all four stages
  - QI Application: Natural and engineering sciences
  - QI Research: Social sciences
  - QI research following application rather than application following research

# History of QI



# Introduction and definition of the term “Quality Infrastructure”

- First use of the term “Quality Infrastructure” can be traced back to the PTB in 2004
- Previously referred to by using acronyms of the technical components: MSTQ, SQAM, STRACAP
- Formally defined and endorsed by INetQI in 2017:

*“The system comprising the organizations (public and private) together with the policies, relevant legal and regulatory framework, and practices needed to support and enhance the quality, safety and environmental soundness of goods, services and processes.*

*The quality infrastructure is required for the effective operation of domestic markets, and its international recognition is important to enable access to foreign markets. It is a critical element in promoting and sustaining economic development, as well as environmental and social wellbeing.*

*It relies on*

*metrology,  
standardisation,  
accreditation,  
conformity assessment, and  
market surveillance.” - INetQI (2022)*

- Challenge: Confusion between “Quality Infrastructure” and “Quality of Infrastructure”

A discipline comprises a homogeneous communication context, an accepted corpus of scientific knowledge, and a set of questions, research methods, and paradigmatic solutions to problems.

- Prof. Dr. Rudolf Stichweh (2014)

*Leading German sociologist renowned for his research on the structure and history of the modern system of science*

# Evolution of a scientific discipline

---

START

- Introduction of new objects and phenomena
- Introduction of new language to describe subject matter
- Informal networks

## Stage 1

## Stage 2

- Development of a toolbox of methods and techniques
- Rethinking, adjustment and re-application of methodologies from other scientific fields to solve new problems
- Formal organizations

# Evolution of a scientific discipline

- Application of research methods and techniques from Stage 2
- Most of the data and specific knowledge generated
- Highest number of original publications produced
- Professional meetings

## Stage 4

## Stage 3

- Maintaining and passing on scientific knowledge generated in previous stages
- Comprehensive reviews and textbooks are produced
- Application of previously generated knowledge for practical purposes
- Journals and handbooks

END

Source: Own elaboration based on Shneider (2009) and Engwall et al. (2018)

*Both papers built on Dr. Thomas S. Kuhn's "The Structure of Scientific Revolutions" (Kuhn, 1962), one of the most cited academic books of all time. Dr. Kuhn was an American historian and one of the most influential philosophers of science of the twentieth century. He is credited with inaugurating a new style of philosophy of science that brought it closer to the history of science, thereby changing the way the development of science was viewed by the world.*



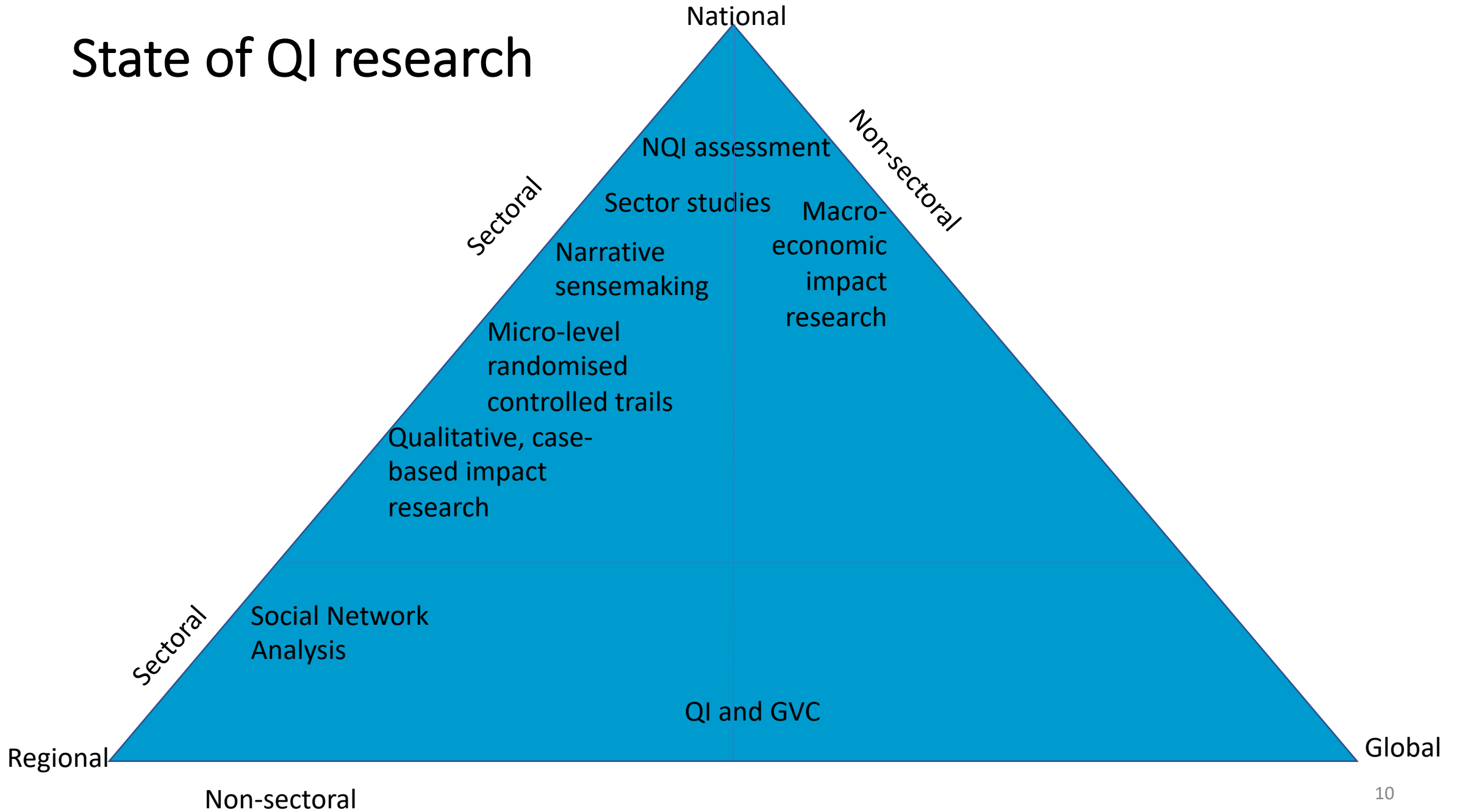
## QI networks

- QI research:
  - Small informal networks scattered around the world: limited collaboration with each other
  - First event geared towards connecting informal networks of QI researchers
- QI application:
  - Collaboration among international development organizations, regional bodies and national governments to develop and harmonise QI
  - INetQI: consortium of the leading institutions and promoters of QI

# QI toolbox

- QI research
  - Adaptation and re-application of qualitative and quantitative methods from in social sciences
- QI application
  - Rapid Diagnostic Tool: Provides an overview of a country's QIS capacity and highlights the areas that would benefit from further development
  - Calidena Methodology: Analyses QI services needs for value chains
- QI data
  - GQII: Available for 184 countries for 2020 and 2021
  - QI4SD: Available for 137 countries for 2022
  - PAQI: Available for 55 African countries for 2014, 2017 and 2020

# State of QI research



# Macroeconomic impact research

- Main research questions:
  - How does India's NQI system compare with that of the United States? How does the state of India's NQI affect its economy? What are the positive contributions of QI India's economy and how can they be enhanced?
  - What is the role of QI in facilitating innovation in and competition among Latin American countries?
  - Does QI play a significant role in the economic and social development of Germany's partner countries?
- Knowledge gained:
  - While the main pillars of QI are strong in India, they should be strengthened to boost economic growth. QI is particularly important for the development of MSMEs in India, which account for a significant portion of the country's exports. A robust, internationally harmonized QIS is needed to facilitate trade as deficiencies have resulted in Indian goods being rejected at international borders.
  - The QI systems of Latin American countries provide mechanisms and services across multiple sectors. It promotes the competitiveness of companies and facilitates the implementation of public policies related to health, the environment and consumer protection, among others.
  - QI supports sustainable development and economic diversification, increases productivity in manufacturing and service delivery, promotes job creation and encourages investment.
- Examples of publications:
  - Aswal, D. K. (2020). Quality Infrastructure of India and Its Importance for Inclusive National Growth. *MAPAN*, 35(2), 139–150. <https://doi.org/10.1007/s12647-020-00376-3>
  - BMZ. (2004). *Quality Infrastructure, Conformity Assessment—Metrology, Standardization, Testing, Quality Management (MSTQ)*. Federal Ministry for Economic Cooperation and Development Division of "Development Education and Information."
  - CEPAL, N., Cooperation, G. S. for I., Metrología, A. I. N. de, & Desarrollo, A. M. F. de C. E. y. (2011). *Impacto de la infraestructura de la calidad en América Latina: Instituciones, prácticas y desafíos para las políticas públicas*. <https://repositorio.cepal.org/handle/11362/3846>

# Case-based impact research

- Main research questions:
  - Does the QIS of Country X meet the needs of Sector X?
  - Are there any weaknesses in Country X's QIS that affect Sector X? How is Sector X affected by this?
  - Which areas of Country X's QIS need improvement to boost Sector X?
- Knowledge gained:
  - The capability of Country X's QIS to meet the demands of Sector X.
  - The areas of Country X's QIS that require investment and development to facilitate growth in Sector X.
- Examples of publications:
  - Ayansa, A. (2019). *Assessing Performance of National Quality Infrastructure on Cooking Utensil Products in Ethiopia*. Addis Ababa University.
  - Demissie, M., Tsegaye, D., Beshah, B., & Ebinger, F. (2021). Quality infrastructure services capability assessment in the coffee value chain. *International Journal of Quality and Innovation*, 5(2), 158–180. <https://doi.org/10.1504/IJQI.2021.117189>
  - Wipplinger, G., Phongsathorn, V., & Watanakeeree, G. (2006). *Quality Infrastructure—A Vital Aspect of Business Environment for Enterprise Development: A Case of Thai Fresh Fruit and Vegetables Industry*. PTB. <http://www.businessenvironment.org/dyn/be/docs/129/Session2.3-Paper2.3.1Phongsathorn.pdf>

# QI and GVCs

- Main research questions:
  - Does QI have an impact on GVC participation? Is it necessary for African countries to develop their QI ecosystems to become more integrated into GVCs?
  - What are the implications of QI on the organisation and governance of GVCs in developing countries?
  - Does QI play a role in GVC-driven learning and innovation processes?
- Knowledge gained:
  - QI plays an important role in GVC engagement, with the positive effects being driven mainly by standardization and metrology. It is crucial for African countries seeking to become embedded in GVCs to invest in the development of their QI ecosystem.
  - A well-structured QIS makes the handling of complex transactions and the organization of local GVC networks easier. It supports the transition from hierarchical and captive value chains to modular and relational chains.
  - The main QI institutions play a crucial role in GVC-driven learning and innovation processes through technology diffusion and extension services, particularly in developing countries where there may be insufficient universities, R&D labs, and research institutes.
- Examples of publications:
  - Pietrobelli, C., & Rabellotti, R. (2011). Global Value Chains Meet Innovation Systems: Are There Learning Opportunities for Developing Countries? *World Development*, 39(7), 1261–1269. <https://doi.org/10.1016/j.worlddev.2010.05.013>
  - Ramkissoon, A.-S., Harmes-Liedtke, U., & Giovannetti, G. (2023). *The Impact of Quality Infrastructure on Global Value Chain Participation*. [Working paper in preparation]

# NQI assessment

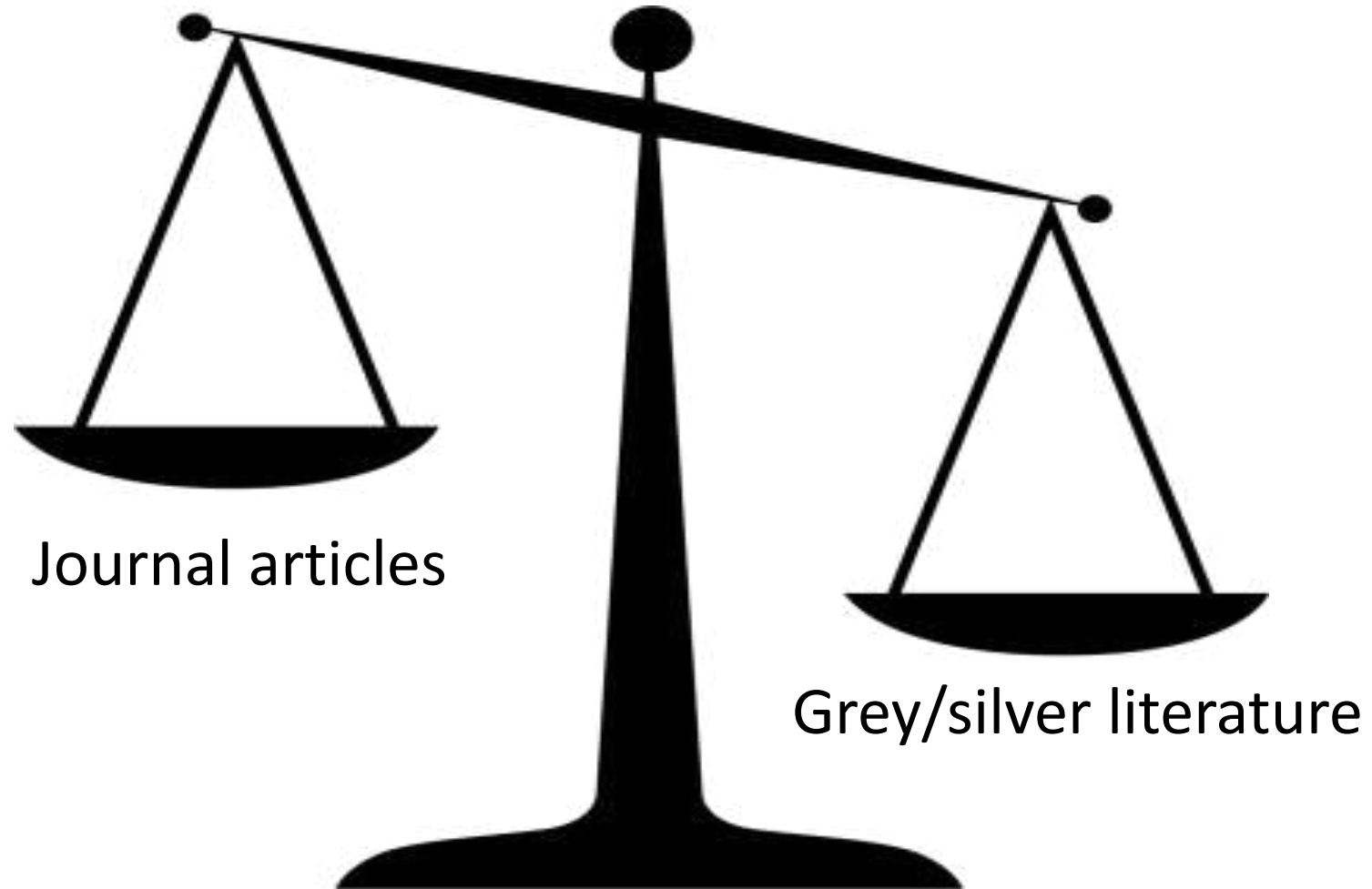
- Main research questions:
  - What is the capacity of Country X's QIS?
  - Does Country X's QIS meet the demand of businesses/ enterprises/ manufacturers/ companies operating in internal markets, as well as regional and international markets?
  - Which areas of Country X's QIS require further investment and development?
  - Are Country X's citizens aware of the QI services available and understand the importance of QI?
  - To what extent do businesses/ enterprises/ manufacturers/ companies comply with national, regional and international QI requirements?
  - To what extent do regulators refer to international requirements and regulations when developing national regulations related to QI?
- Knowledge gained:
  - Specific information about the strengths and areas for improvement of Country X's QIS.
- Examples of publications:
  - Aranki, W. (2018). *Kingdom of Saudi Arabia Rapid Diagnostic Assessment of Quality Infrastructure*. World Bank Group.
  - Frota, M. N., Racine, J. L., Blanc, F., Rodrigues, P., Ibragimov, S., Torkhov, D., & Osavolyuk, S. (2010). Assessment of the Ukrainian Quality Infrastructure: Challenges Imposed by the WTO and Commitments to EU Accession. *Key Engineering Materials*, 437, 611–615.  
<https://doi.org/10.4028/www.scientific.net/KEM.437.611>
  - Mesopartner PartG. (2022). *Assessment of the National Quality Infrastructure in St. Kitts and Nevis*. CROSQ.



# Journals with QI publications

Natural and Engineering Sciences	Social Sciences	Both
MAPAN - Journal of Metrology Society of India	International Journal of Quality and Innovation	European Review
Indian Journal of Pure and Applied Physics	Management: Journal of Sustainable Business and Management Solutions in Emerging Economies	International Journal of Environmental Research and Public Health
Journal of Scientific & Industrial Research	World Development	IOP Conference Series: Earth and Environmental Science (EES)
Electronics	Advances in Social Science, Education and Humanities Research	International Journal for Quality Research
Accreditation and Quality Assurance	Serbian Journal of Management	
Journal of Physics		
Open Engineering		
Acta Metrologica Sinica		
MATEC Web of Conferences		
Periódico Tchê Química		
Key Engineering Materials		
IEEE Transactions on Instrumentation and Measurement		
African Journal of Science, Technology, Innovation and Development		

# State of QI research



# What requirements still need to be met to solidify QI's position as a scientific discipline?

- Data collection on a systematic basis to develop solid databases, including time series data
- Introduction of more foundational publications, like toolkits and handbooks
- Organization of a research congress
- Establishment of a research association
- Intensive cooperation between QI institutions and research funding agencies

# Contact

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# Star4bbs



***Sustainability Certification Schemes (SCS) and labels supporting the transition to a sustainable bio-based economy***

***First international research workshop on Quality Infrastructure (QI)***  
***Berlin, 27.04.2023***

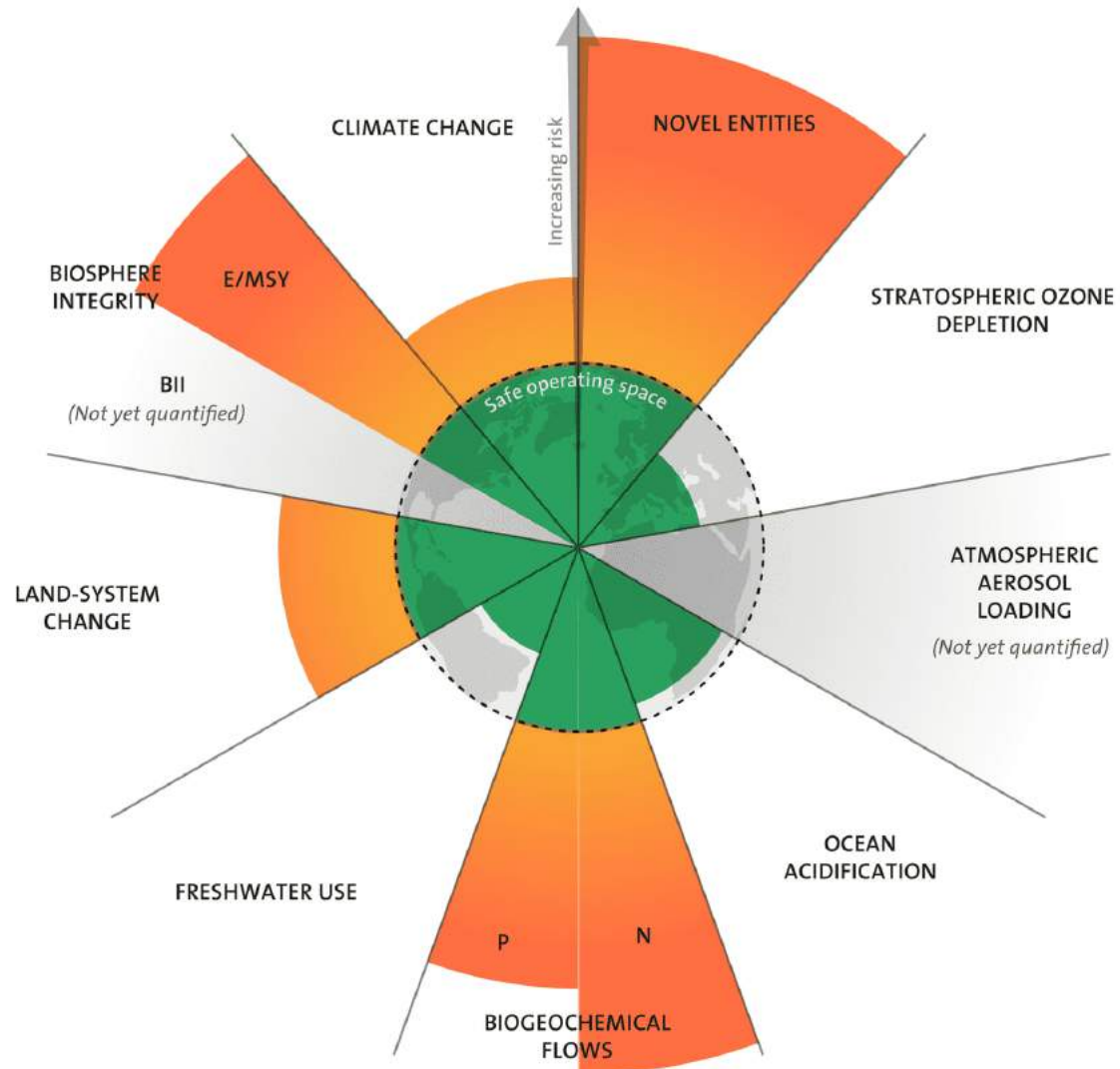
Luana Ladu – Coordinator  
Technische Universität Berlin  
Bundesanstalt für Materialforschung und -prüfung



Funded by  
the European Union

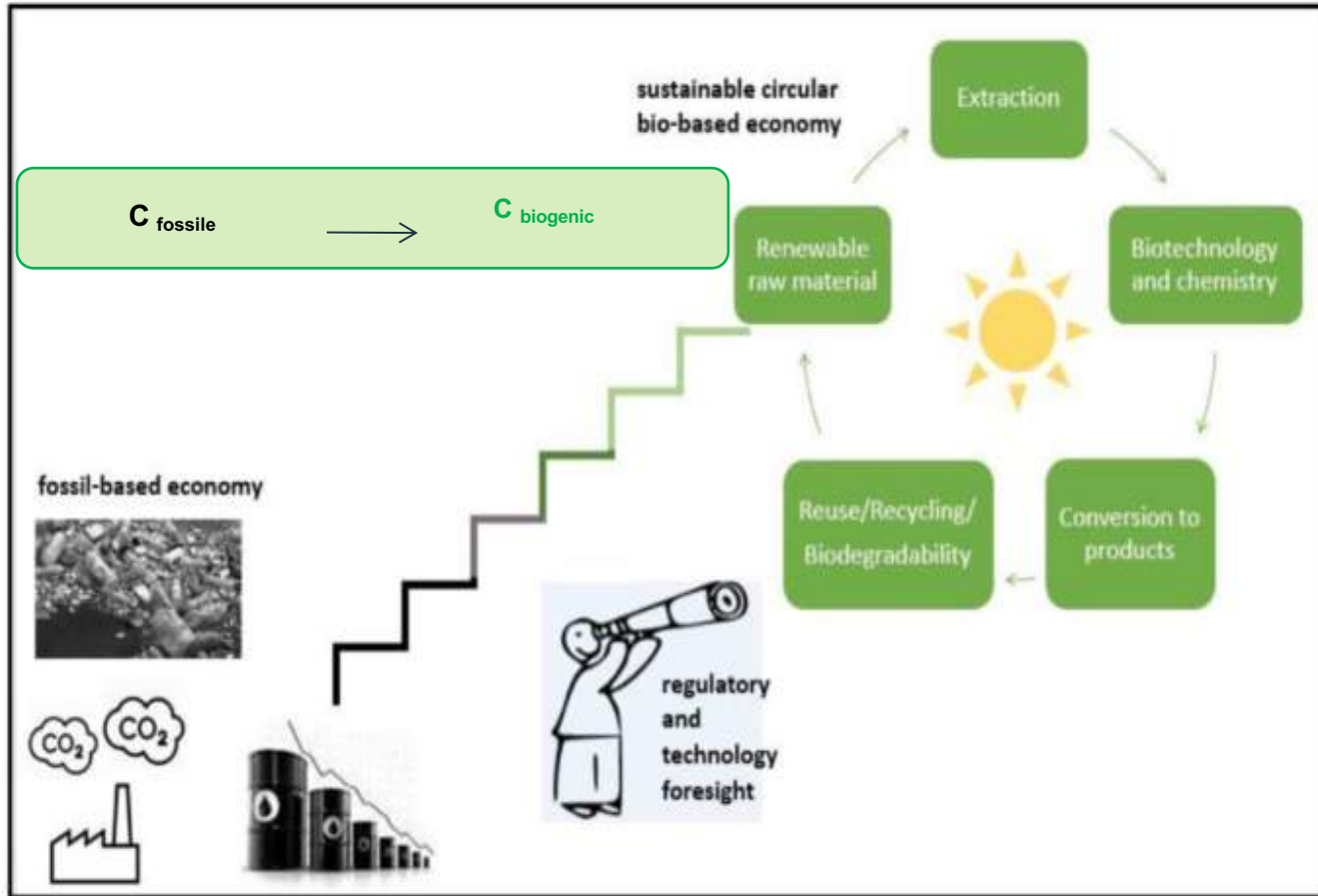


# CURRENT ISSUES HUMANITY IS FACING





# WHAT IS NEEDED: SUSTAINABLE TRANSITION TO A CIRCULAR BIO-BASED ECONOMY



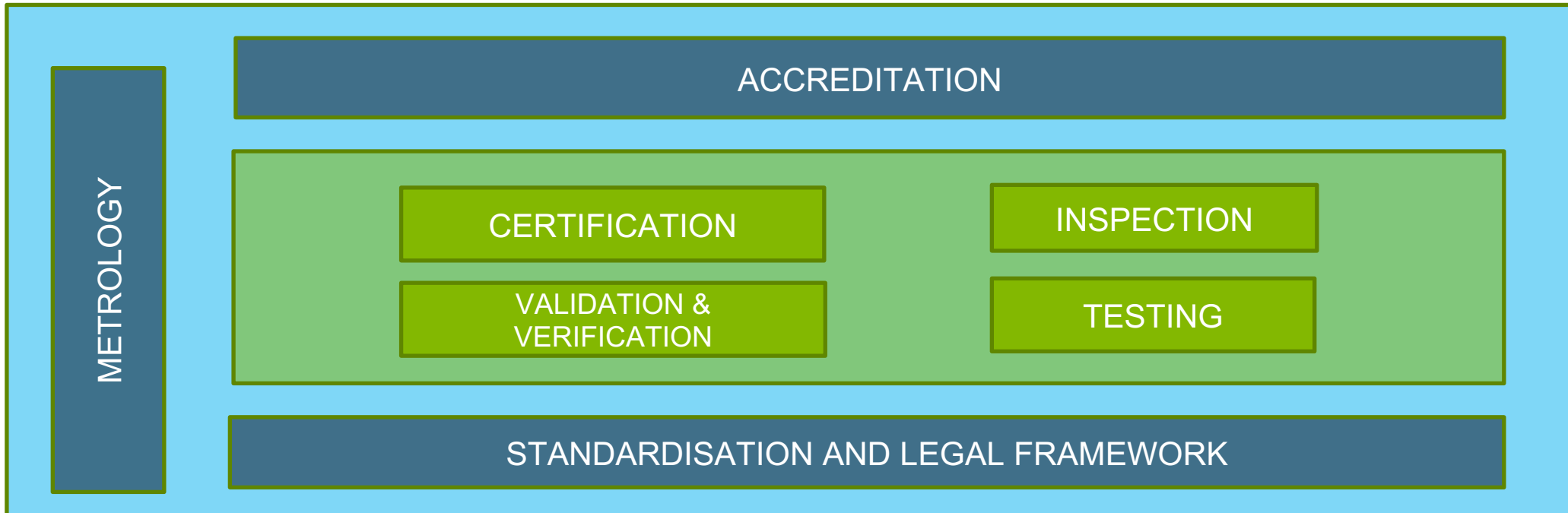




## QUALITY INFRASTRUCTURE AS IMPLEMENTATION APPROACH



- Assessment tools and methodologies to assess and verify sustainability claims (e.g. LCA methodologies)
- Sustainability Certification Schemes (SCS) and Labels





## BARRIERS TO LABELING AND CERTIFICATION SCHEMES

**Proliferation** of misleading commercial practices related to the environmental sustainability, not covered by QI supervision

Lack of **transparency** and **harmonization** (making comparability across products increasingly difficult for consumers)



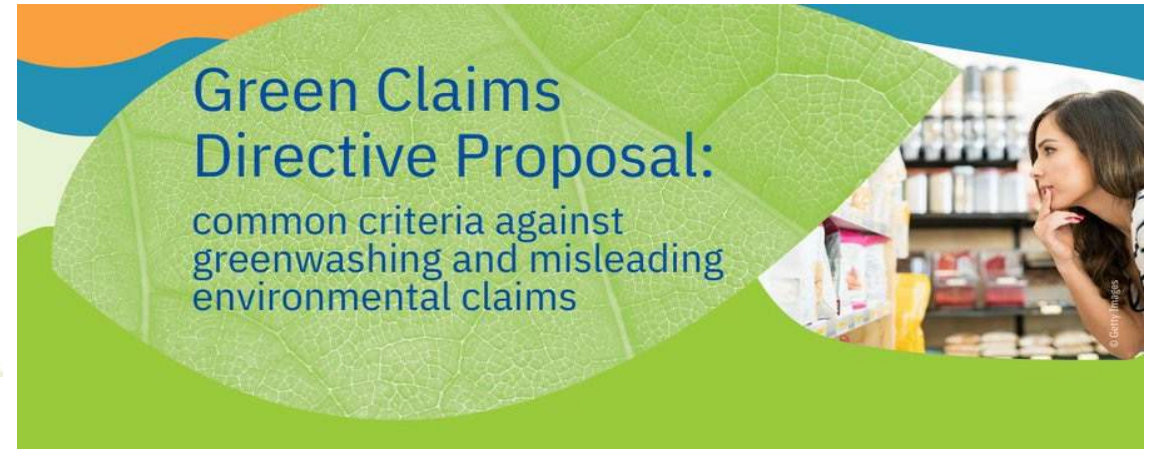
of green claims on products and services make **vague, misleading or unfounded** information



of claims have **no supporting evidence**



**Consumer trust** in green claims is **extremely low**





# STAR4BBS: Sustainability Transition Assessment Rules for Bio-Based Systems

## HORIZON-CL6-2021-ZEROPOLLUTION-01-07:

International and EU sustainability certification schemes for bio-based systems

**1st of September 2022 – 31st of August 2025**

**Aim:** to maximize the potential of Sustainability Certification Schemes (SCS) and labels to support a successful transition to a sustainable bio-based economy.

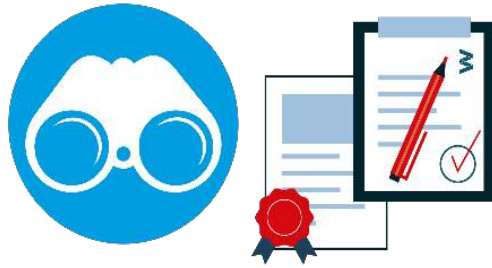
Develop a monitoring system to assess the effectiveness and robustness of existing certification schemes (SCS) and labels that apply to biological raw materials and biobased materials and products



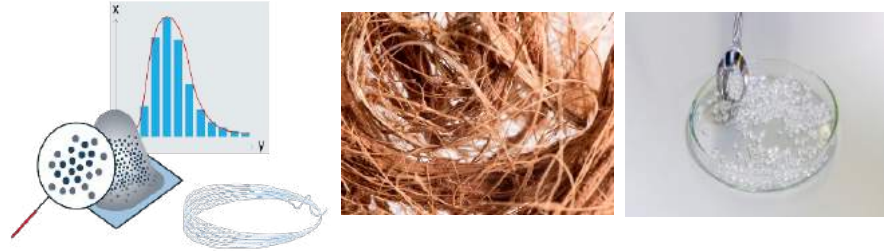


# PROJECT MAIN OBJECTIVES

1 Analysis of existing CSLs



2 Evaluation of global trade flows



3 Development of indicators and a monitoring system



4 Determination of the contribution of CSLs



5 Policy recommendations regarding the use of CSLs to promote this transition



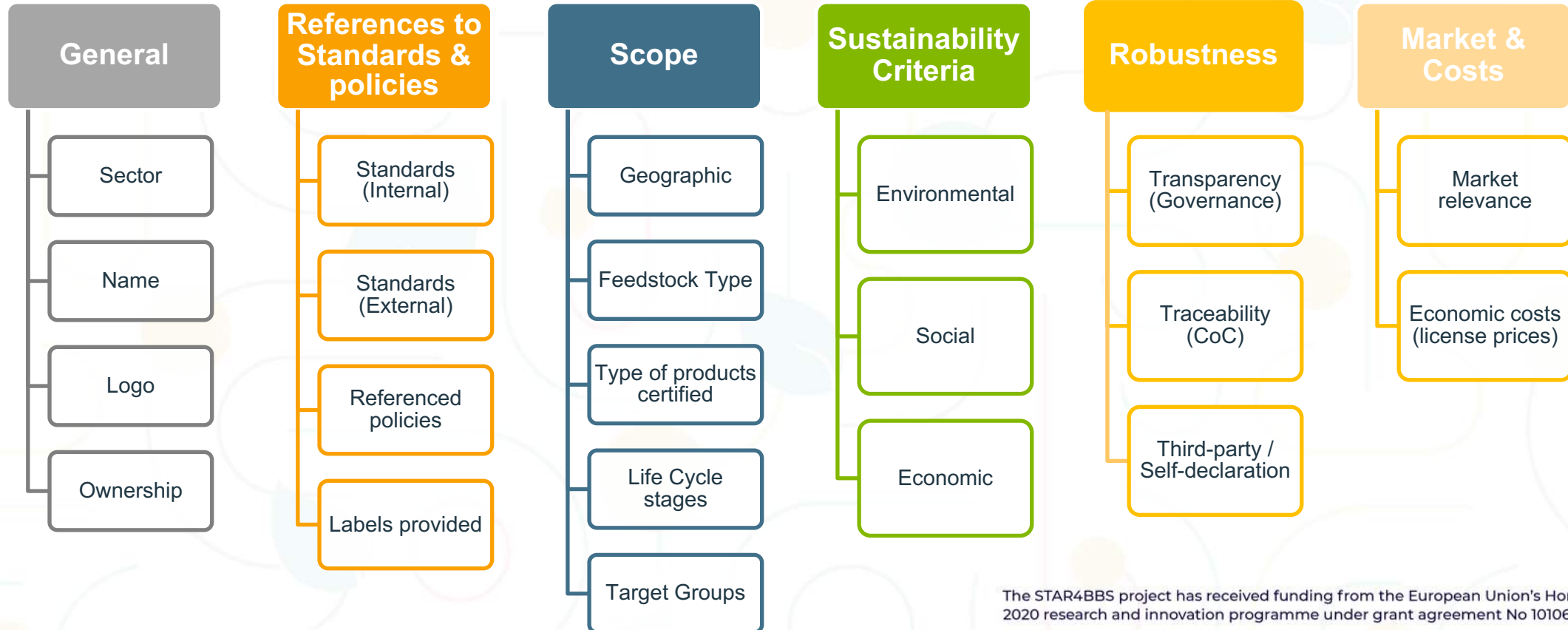




# OVERVIEW OF SCS AND LABELS



biobased %





## EFFECTIVENESS : SUSTAINABILITY POLICY TARGETS



(<https://agricultureandfood.dk/climate-neutral-2050>)

by 2030

GHG **-55%**

**+ 45%**

use renewable  
energy

**+ 20% c**

biogenic  
chemicals plastics

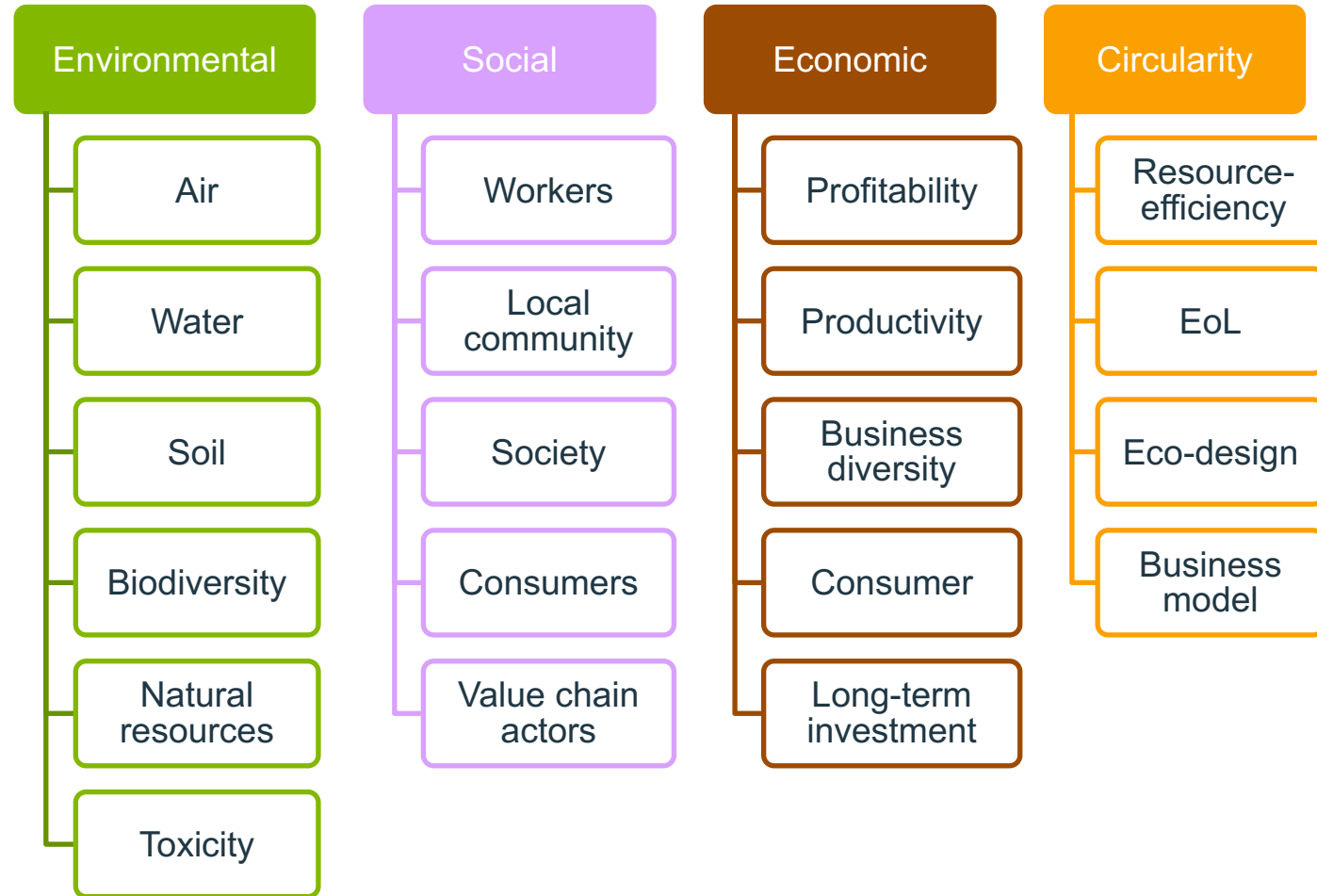
**- 20%**

use fertilizer



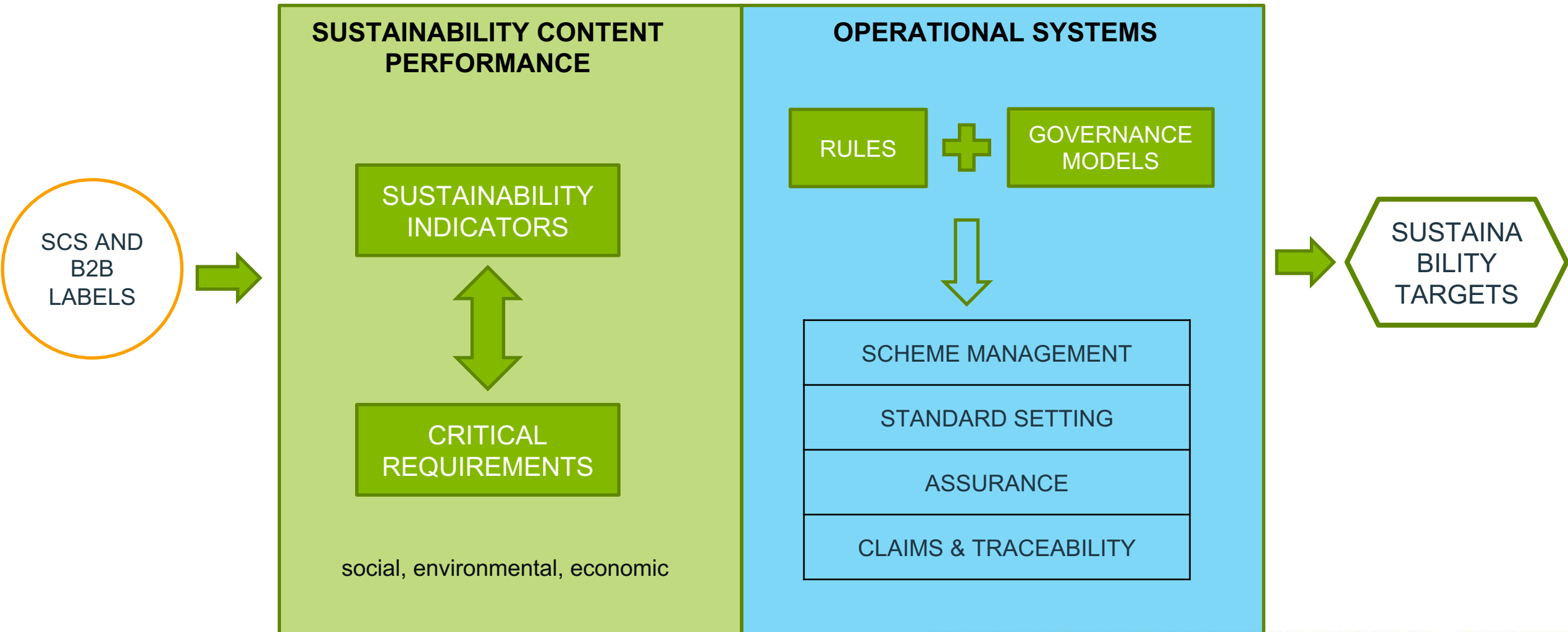


## EFFECTIVENESS: KEY SUSTAINABILITY AREAS





## Elements of the STAR4BBS monitoring system



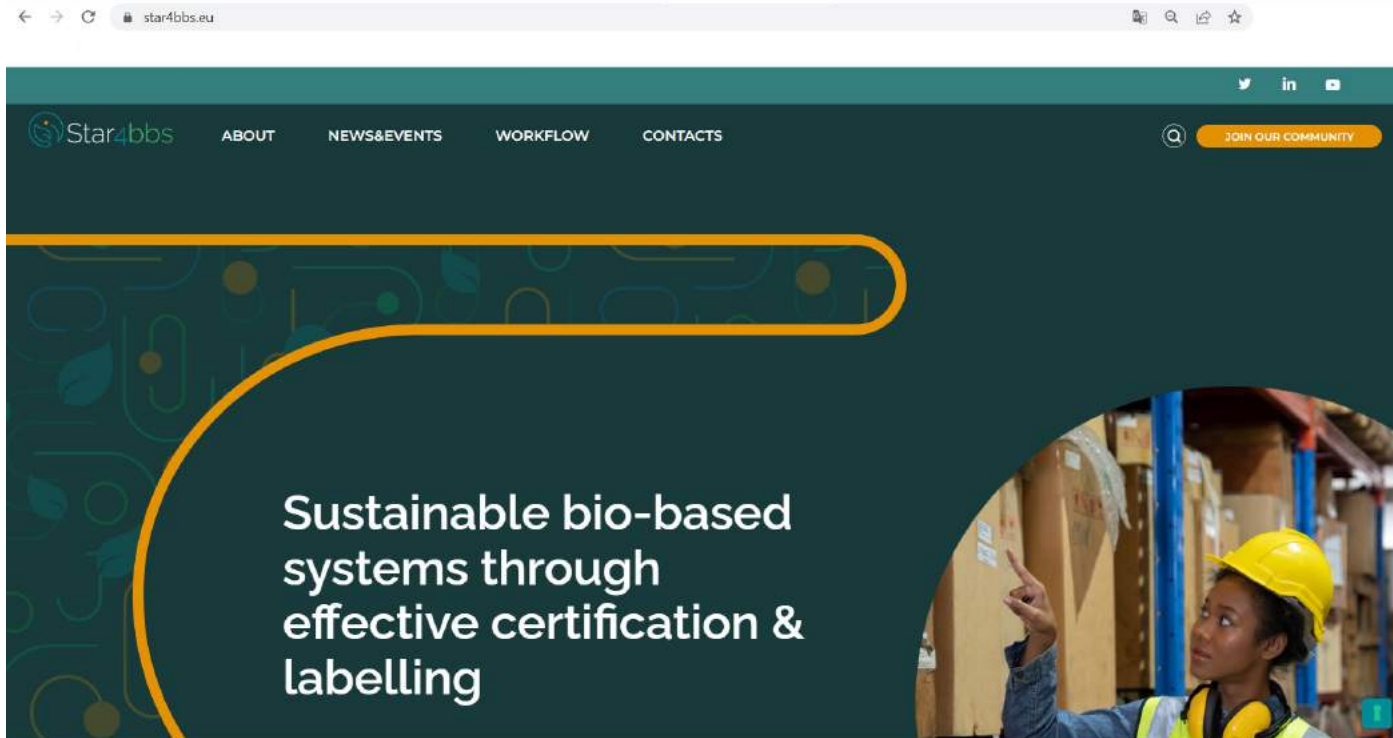




- The transition is unavoidable
  - To accelerate the transition we need to reduce the uncertainty by using **robust** and **substantial** sustainability claims, supervised by the QI system
  - **Comparability** and **transparency** among SCS and labels should be promoted to reduce confusion and costs for businesses and consumers
- This will make it possible to use robust SCS and labels in public regulation “co-regulation”

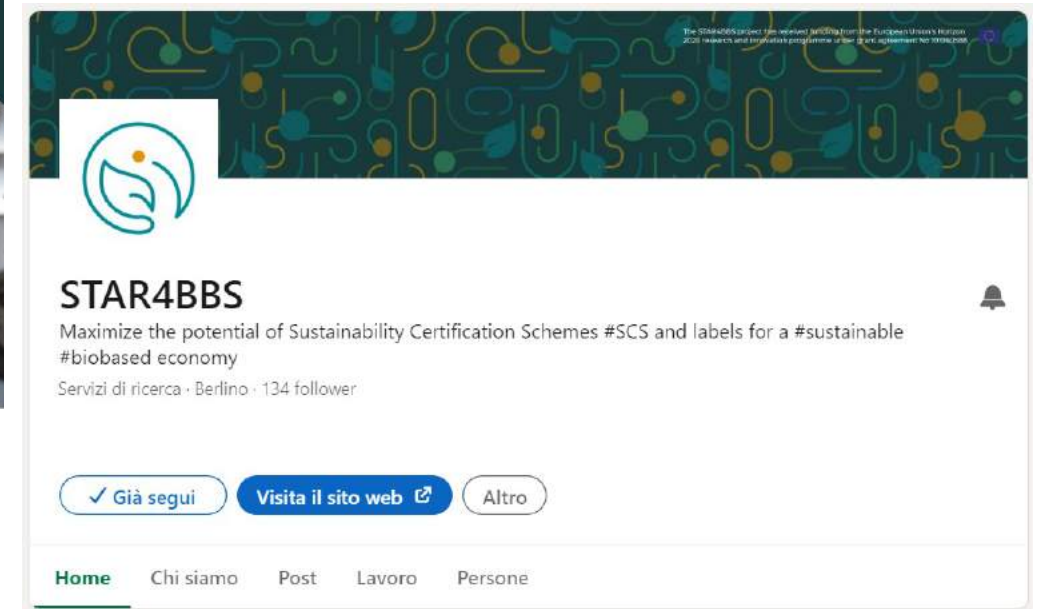


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*Luana Ladu (STAR4BBS Coordinator)*

*Technische Universität Berlin*

*luana.ladu@tu-berlin.de*

*STAR4BBS Coordinator*

# Thank you for your attention!



 [www.star4bbs.eu](http://www.star4bbs.eu)

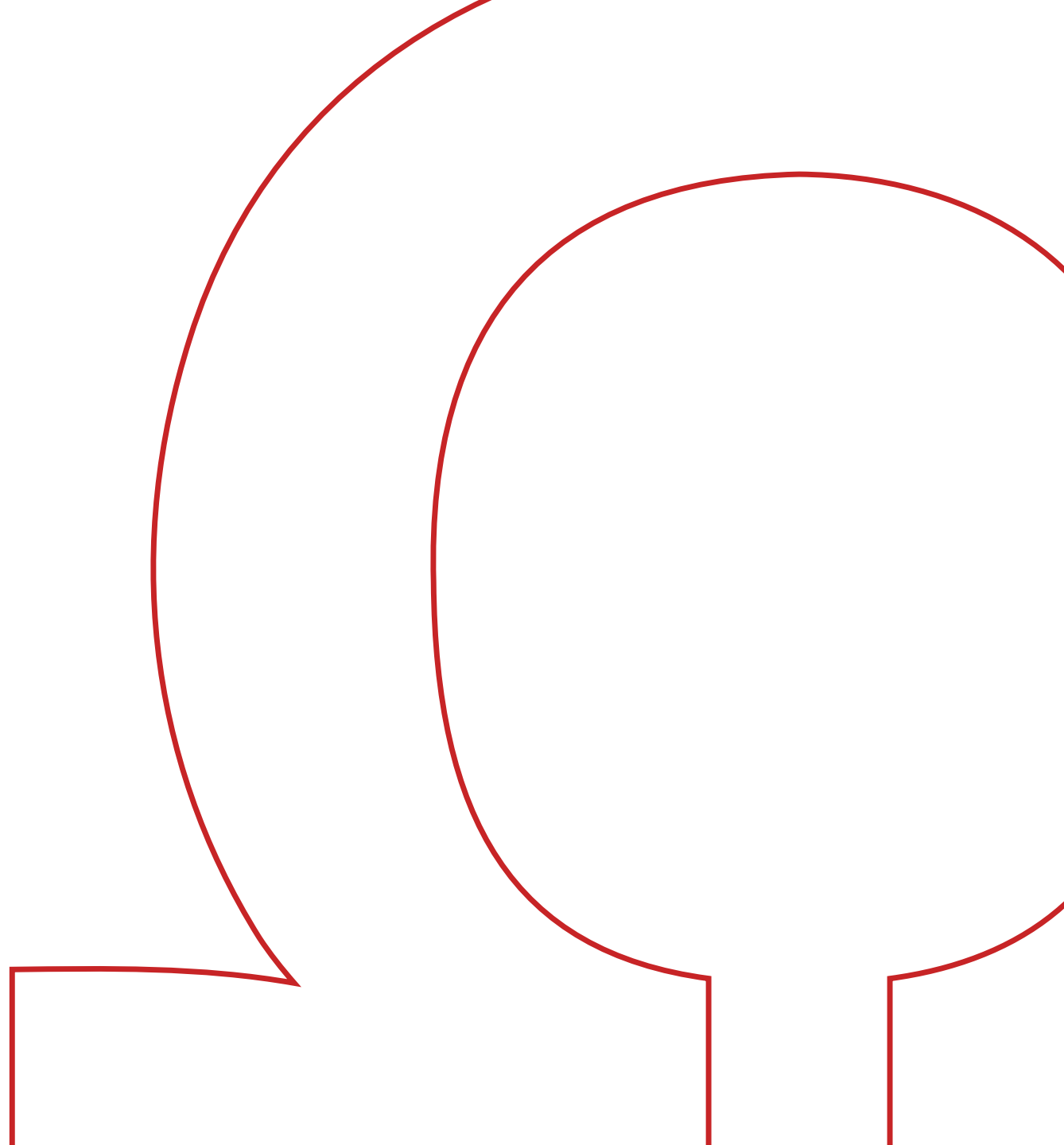
 [info@star4bbs.eu](mailto:info@star4bbs.eu)

**#STAR4BBS**



# Quality Infrastructure services to enhance product value chains in Ethiopia -

PTB/TU Berlin QI Research Workshop, 27.04.2023





1. **Why is QI in Value Chains crucial?**
2. **NQI in Value Chains**
3. **Three short cases of the Ethiopian and Georgian VC**

1.

**Why is QI in Value  
Chains crucial?**





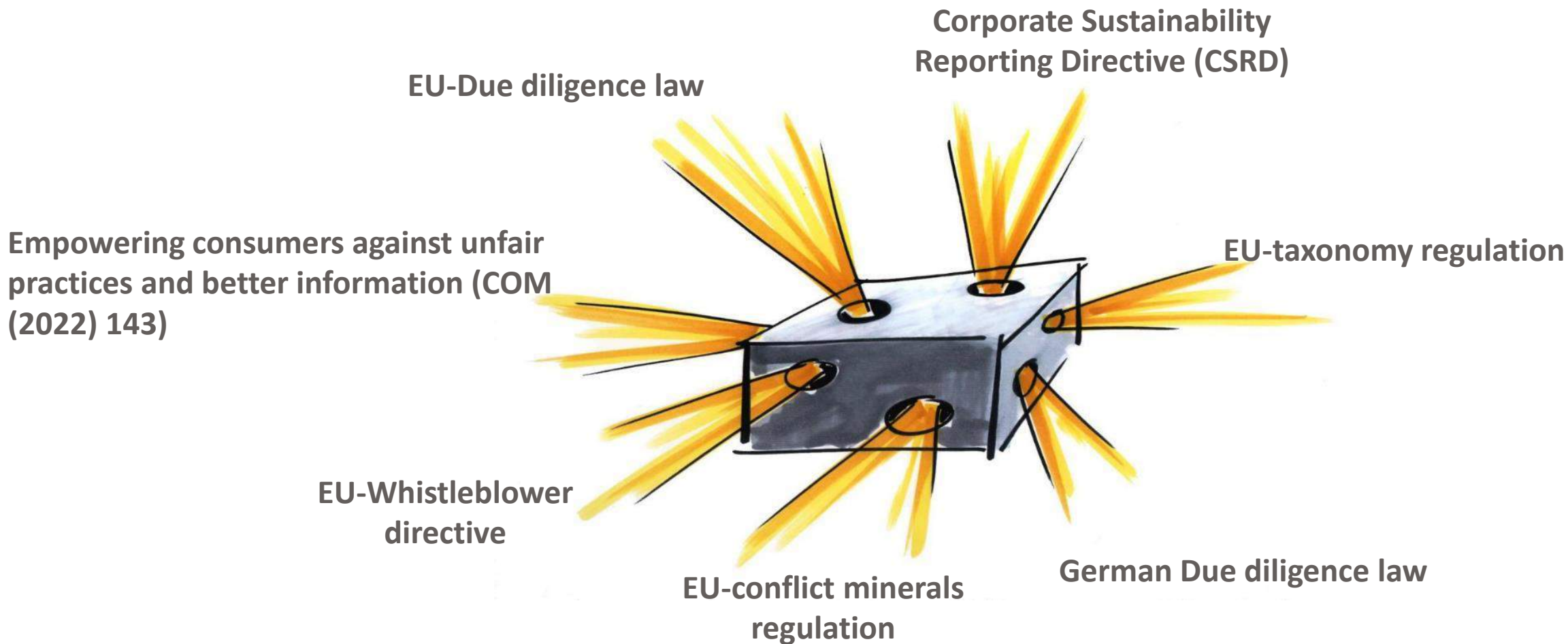


## Global Value Chains

- Are a growing phenomenon in international trade.
- About a 60% of parts and components production is carried out within the framework of GVC.
- These chains are often dominated by a *global buyer, who sets the ground rules for other members.*
- *The chains are often not transparent, complex, and often there are several environmental as well as social risks embedded*

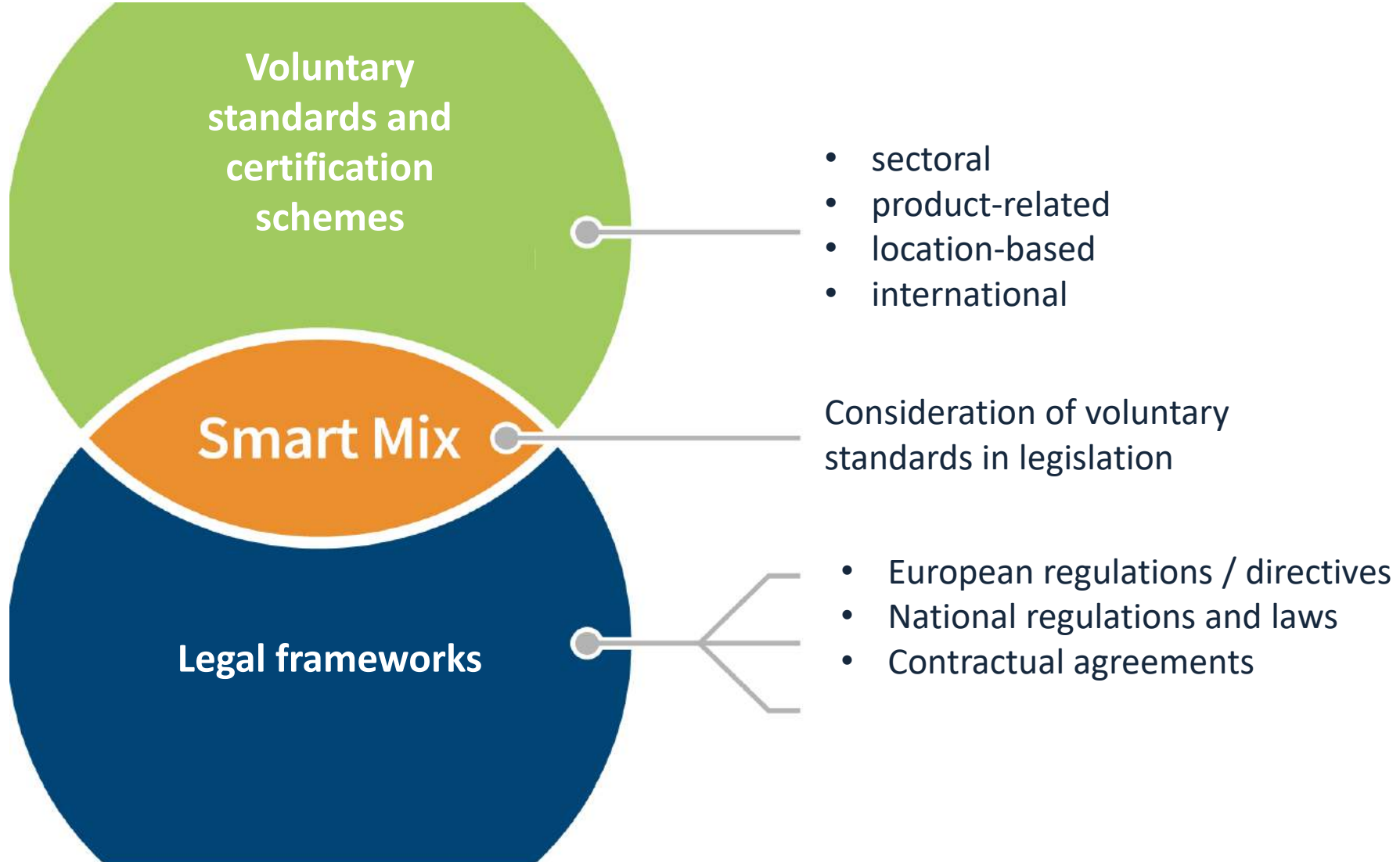


# The Sustainability Box of Pandora has been opened...



...will it create Bentham's panopticum and tyranny of light?

## Smart Mix Approach in CSR



# A jungle of voluntary frameworks exists already...



Deutscher  
NACHHALTIGKEITS  
Kodex



VALUE  
REPORTING  
FOUNDATION  
SASB  
STANDARDS



UN GUIDING PRINCIPLES

REPORTING / FRAMEWORK



NATURAL  
CAPITAL  
COALITION



VALUE  
REPORTING  
FOUNDATION  
INTEGRATED  
REPORTING  
FRAMEWORK



United Nations  
Global Compact



EMAS  
GEPRÜFTES  
UMWELTMANAGEMENT



GEMEINWOHL  
ÖKONOMIE Ein Wirtschaftsmodell  
mit Zukunft



DISCLOSURE INSIGHT ACTION



Climate  
Disclosure  
Standards  
Board



Leitfaden für Unternehmensaktivitäten  
zu den SDGs

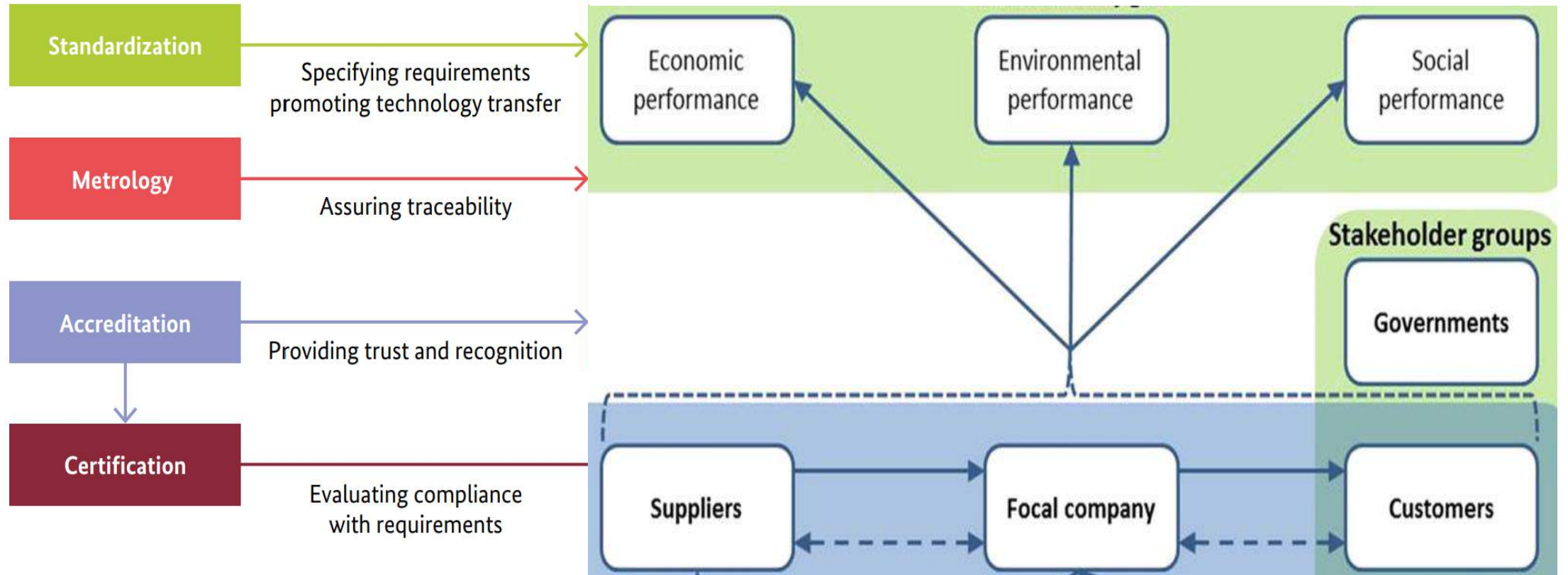
# 2.

## NQI in Value Chains





# NQI in Value Chains



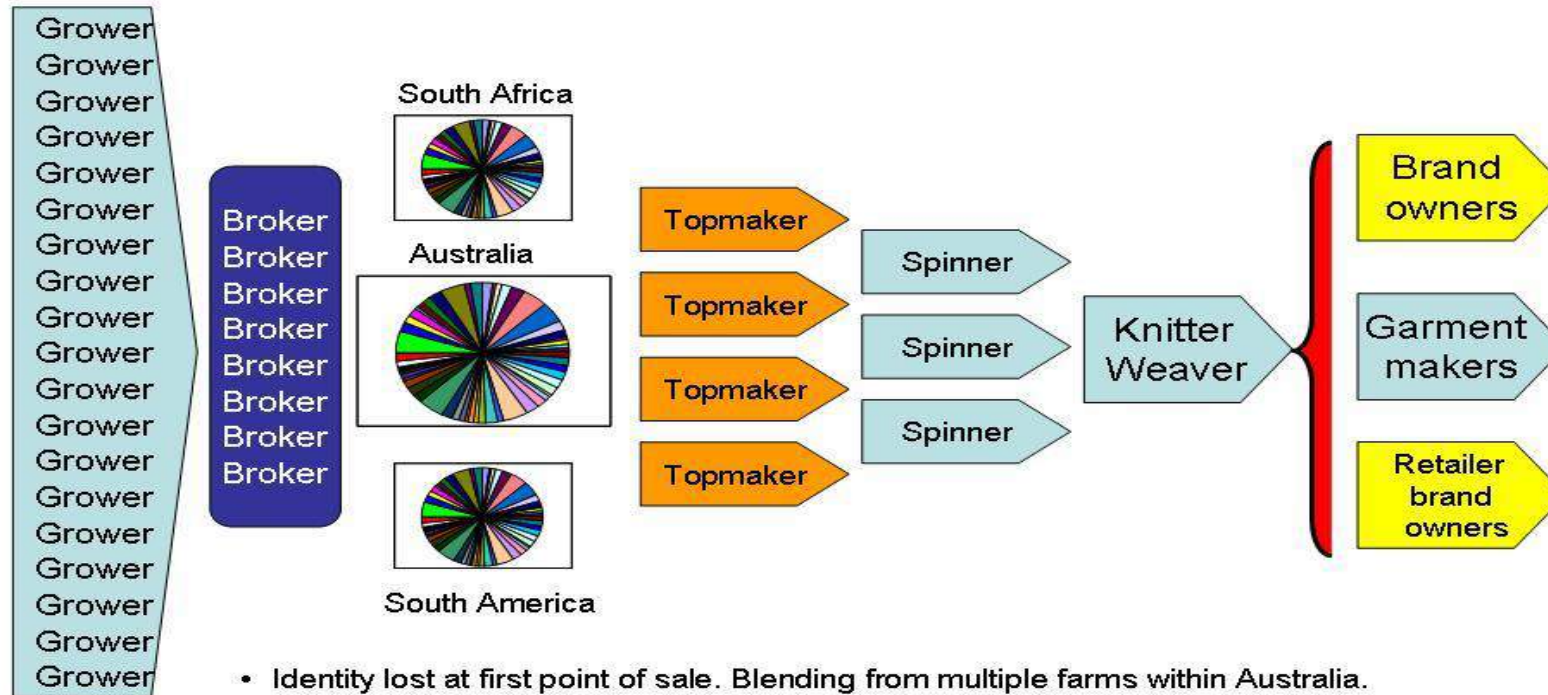
## Example: The Textile Value Chain



[http://www.organiccotton.org/oc/wGlobal/layout/images/items/cotton\\_value\\_chain.jpg](http://www.organiccotton.org/oc/wGlobal/layout/images/items/cotton_value_chain.jpg)

# The Commodity System – Example: Merino Wool

## The Commodity System



- Identity lost at first point of sale. Blending from multiple farms within Australia.
- Topmakers blend Australian wool with wool from many countries.
- Adversarial transactions, price driven, variable quality, impossible to trace back to origin.

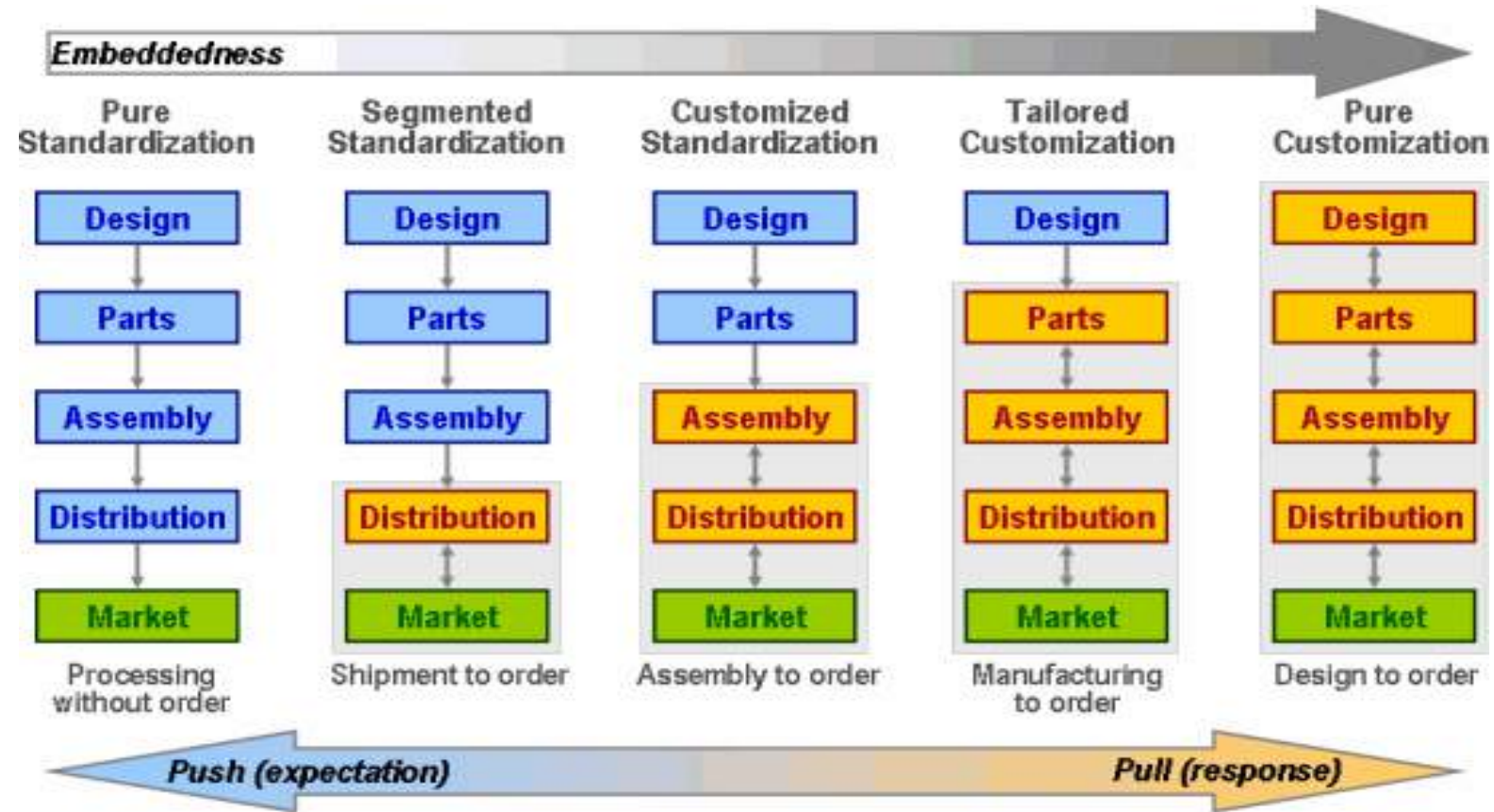


# Example: The Textile Value Chain

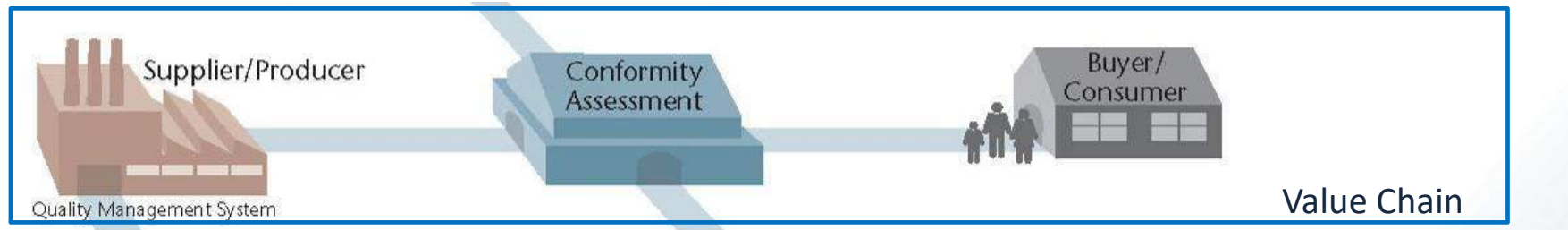


[http://www.organiccotton.org/oc/wGlobal/layout/images/items/cotton\\_value\\_chain.jpg](http://www.organiccotton.org/oc/wGlobal/layout/images/items/cotton_value_chain.jpg)

# The Production System



# Value Chain and NQI Structure



# 3.

## Three short cases of the Ethiopian and Georgian VC

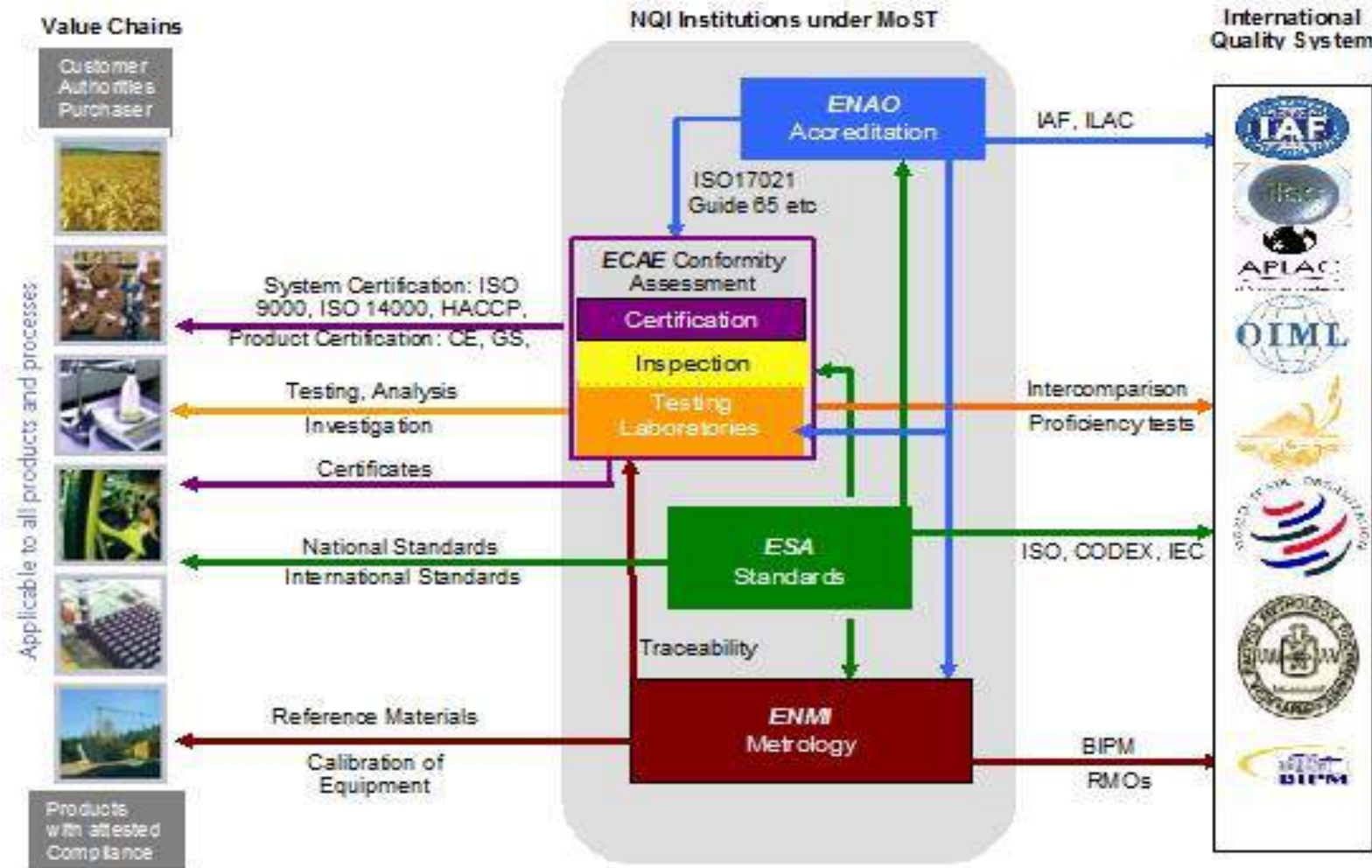


## NQI research in VC

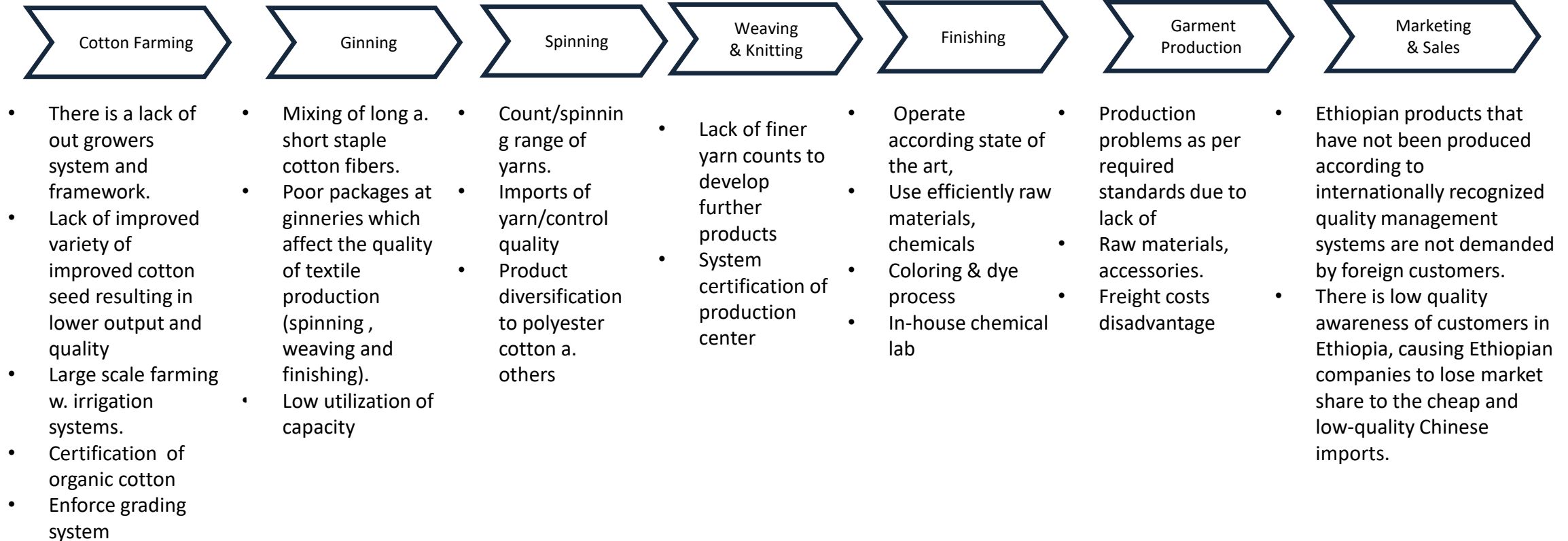
### Methodological approach

- Action research,
  - CALIDENA as tool for the qualitative parts in the research process,
  - Expert-interviews and expert based workshops,
  - Results presented in management and policy suggestions
- 
- Time period: 12 months in 2020/2021
  - Funded by GIZ, within the ecbp-program

# The case of the Ethiopian NQI









**Cotton Farming**

There is a lack of out growers system and framework. Lack of improved variety of improved cotton seed resulting in lower output and quality. Large scale farming w. irrigation systems. Certification of organic cotton. Enforce grading system.

**Ginning**

Mixing of long a. short staple cotton fibers. Poor packages at ginneries which affect the quality of textile production (spinning, weaving and finishing). Low utilization of capacity

**Spinning**

Count/spinning range of yarns. Imports of yarn/ control quality. Product diversification to polyester cotton a. others

**Weaving & Knitting**

Lack of finer yarn counts to develop further products. System certification of production center

**Finishing**

operate according state of the art, use efficiently raw materials, chemicals. Coloring & dye process. In-house chemical lab

**Garment Production**

Production problems as per required standards due to lack of Raw materials, accessories. Freight costs disadvantage

**Marketing & Sales**

Ethiopian products that have not been produced according to internationally recognized quality management systems are not demanded by foreign customers. There is low quality awareness of customers in Ethiopia, causing Ethiopian companies to lose market share to the cheap and low-quality Chinese imports.

Elements of NQI:  
 Standardization  
 Conformity assessment  
 Metrology  
 Accreditation

**With NQI\*:**  
 Standardization – Cotton-seeds standards f. correct purchase. Standards f. fertilizers, pesticides a. chemicals f. state of the art farming. Standards f. irrigation systems a. equipment  
 Conformity assessment – product certification f. organic cotton, (accredited) labs to prove

**Without NQI\*:**  
 Standardization – poor determination of seeds quality, difficult to specify fertilizers, pesticides a. chemicals.  
 Conformity assessment – incapable to differentiate quality levels, organic from non organic cotton.

**With NQI\*:**  
 Standardization – standards for range of yarns. Standards for polyester cotton ease purchase and proper production  
 Conformity assessment – product certification, system certification  
 Metrology – calibrated measurement devices for yarn characteristics (physical/chemical), certainty for business partners.

**Without NQI\*:**  
 Standardization – different in-house practices applied lead to inappropriate purchase and deviation of customer requirements  
 Conformity assessment- lack of proof of QM systems affects business relations with purchasers.  
 Metrology – non-calibrated measurement devices means uncertainty for business partners

**With NQI\*:**  
 Standardization – sector standards, operation procedure standards reduce consumption of chemicals, reduce hazardous waste.  
 Conformity assessment – proof of QM-systems (environmental and management), proof of laboratory inspections boost exports  
 Metrology – calibrated measurement devices (in-hc use lab) are beneficiary to society and environment, meet regulations

**Without NQI\*:**  
 Standardization – varying in-house standards increase chemical consumption and hazardous waste.  
 Metrology – non-calibrated measurement devices give different values and cannot proof if regulations are met.

**With NQI\*:**  
 Standardization – trade related standards applied easing and enabling international trade (technical barriers of trade)  
 Ecotex –standard 100/1000, SA 8000 (social accountability)  
 Metrology – calibration of various measurement devices (measurement of deviation before and after transport)  
 Conformity assessment – retailer/customer can rely on labels (material, design, certified producer in environmental management systems, applied social standards)  
 proof of management and environmental systems, evidence of whether or not importer country's regulations are met, proof of laboratory inspections, no compliance cost due to repetition of tests in the importer's country  
 Accreditation – evidence of credibility of certification bodies and laboratories in the exporting country

**Without NQI\*:**  
 Standardization – exporters/importers lack clear communication in trade and technical specifications (technical barriers of trade)  
 Metrology – non-calibrated measurement devices create uncertainty and risks for exporters/importers  
 Conformity assessment – retailer/customer cannot rely on labels  
 no proof of exporter management and environmental systems, no evidence whether or not importer country's regulations are met, no proof of laboratory inspections, compliance cost due to repetition of tests in the importer's country  
 Accreditation – certification bodies and laboratories in the exporting country are not acknowledged in the importer's country

**With NQI\*:**  
 Standardization – standardize grading and staple length, base commercial terms a. payments on these standards  
 Metrology – calibration of various measurement devices (balances/meters) enabling more exact measurement

**Without NQI\*:**  
 Standardization – difficult determination of technical conditions, consequently time consuming handling of commercial terms.  
 Metrology – uncalibrated measurement devices, (balances, meters), uncertainty for business partners.

**With NQI\*:**  
 Standardization – weaving and knitting standards. Stone washing, peaching standards (ES ideally “adopted” export market-standard)  
 Conformity assessment – proof of QM-systems (environmental and management), proof of laboratory inspections  
 Metrology – calibrated testing devices for yarn characteristics creates trust for business partners, allows technical comparison with competitors.

**Without NQI\*:**  
 Standardization – different in-house practices applied lead to manufacturing defects or in acceptability in export markets.  
 Metrology – non-calibrated measurement (size/weight/length) and testing devices for yarn characteristics (physical and chemical) cause uncertainty for business partners and customers  
 Conformity assessment – lack of proof of QM-systems leads to reduced export chances. lack of credible laboratory results leading to non-compliance with regulations

**With NQI\*:**  
 Standardization – pattern standards will increase productivity, reduce failure rate.  
 Metrology – calibrated measurement devices e.g. rulers guarantee to meet customer specifications and reduction of e.g. cutting losses

**Without NQI\*:**  
 Standardization – producer/customers lack clear communication in technical specifications resulting in the production of products not fulfilling customer needs  
 Metrology – non-calibrated measurement devices e.g. rulers lead to inefficient production and defective products

\* NQI = National Quality Infrastructure Strategy Document Nov 2007;

at present a NQI is in place only partially, interest-conflicting, lacks standards, lacks coordinated regulations, provides insufficient Metrology, insufficient QM-systems, insufficient Conformity Assessment (un-accredited laboratory results are not reliable for export markets)





Up to 50% of the available skins in Ethiopia is lost due to ecto-parasites, which cause holes in skins and hides make them unusable for the Ethiopian leather industry.

Up to 60% of the remaining skin is lost because the slaughtering is done at homes instead of professional slaughter-houses. Also inappropriate cutting of the skin is a problem at this stage.

Another 20-30% of the skins is lost due to the fact that most traders do not handle and store the hides and skins properly (exposure to sun, heat, water). There is no functioning grading system for quality, providing no incentive for quality.

Companies produce 10-20% rejects that do not meet international quality standards (international benchmark is less than 1% rejects). International buyers report losses because of a lack of constant quality of Ethiopian products.

Main problems in trading concern inappropriate storage and handling. Inner-Ethiopian trade is vital for the domestic shoe industry and hence needs special attention focussing on quality issues.

Incomplete standards for shoe sizes cause losses for Ethiopian companies (Europe demands shoe sizes up to 50). A high rate of rejection is also a problem.

Ethiopian products that have not been produced according to internationally recognized quality management systems are not demanded by foreign customers.

There is low quality awareness of customers in Ethiopia, causing Ethiopian companies to lose market share to the cheap and low-quality Chinese imports.

Elements of NQI:  
 Standardization  
 Conformity assessment  
 Metrology  
 Accreditation

**With NQI\*:**  
**Standardization** - Veterinary standards e.g. the correct and regular treatment of skin diseases (ectoparasites) and disease management (planning and monitoring of treatment), standards for breeding and farming e.g. standards for brandmarking and animal handling (scratches) applied to fulfill minimum quality requirements  
**Conformity assessment** - proof of skin quality through testing laboratories, proof of regular animal treatment through certification system

**Without NQI\*:**  
**Standardization** - different disease treatment practices applied and lack of disease management standards cause the re-breakout of diseases and an insufficient coverage of treatment, wrong brandmarking and animal handling practices lead to further quality deficiencies  
**Conformity assessment** - incapable to differentiate good quality from poor ones

**With NQI\*:**  
**Standardization** - standards for hides and skin-preservation and storage applied avoids loss of material through e.g. putrefaction, smoked hide and red heat ensures maximum usage of raw material  
**Metrology** - calibrated measurement devices for skin characteristics (weight/length), certainty for customers

**Without NQI\*:**  
**Standardization** - different in-house practices applied and inappropriate or various preservation methods used lead to rotten or low-quality raw material through e.g. putrefaction, smoked hide and red heat and hence impede the maximum usage  
**Metrology** - non-calibrated measurement devices for skin characteristics (weight/length), uncertainty for customers

**With NQI\*:**  
**Standardization** - sector standards, technical specifications to ease trade applied  
**Metrology** - calibrated measurement devices (measurement of deviation before and after transport) enable trade, where trading partners can rely on declarations due to exact measurements

**Without NQI\*:**  
**Standardization** - buyers, sellers lack clear communication in technical specifications imposing trade barriers  
**Metrology** - non-calibrated measurement devices give different values and cause uncertainty for sellers/buyers in gross/net-weights

**With NQI\*:**  
**Standardization** - trade related standards applied easing and enabling international trade (technical barriers of trade)  
**Metrology** - calibration of various measurement devices (measurement of deviation before and after transport)  
**Conformity assessment** - proof of exporter management and environmental systems, evidence of whether or not importer country's regulations are met, proof of laboratory inspections, no compliance cost due to repetition of tests in the importer's country  
**Accreditation** - evidence of credibility of certification bodies and laboratories in the exporting country

**Without NQI\*:**  
**Standardization** - exporters/importers lack clear communication in trade and technical specifications (technical barriers of trade)  
**Metrology** - non-calibrated measurement devices create uncertainty and risks for exporters/importers  
**Conformity assessment** - no proof of exporter management and environmental systems, no evidence whether or not importer country's regulations are met, no proof of laboratory inspections, compliance cost due to repetition of tests in the importer's country  
**Accreditation** - certification bodies and laboratories in the exporting country are not acknowledged in the importer's country

**With NQI\*:**  
**Standardization** - veterinary standards, standards for slaughtering e.g. standards in cutting (flay cuts and holes) and tools (lack of hygiene) used in the process applied ensures maximum efficiency in usage and maximum quality of skin and hide, standards for food processing hygiene applied ensures usage of side products for other value chains  
**Metrology** - calibration of various measurement devices (balances/meters) enabling more exact measurement

**Without NQI\*:**  
**Standardization** - different in-house practices in slaughtering e.g. using inappropriate standards in cutting and tool handling applied leading to inefficient use and quality deficiencies of main and side products  
**Metrology** - uncalibrated measurement devices, uncertainty for customers

**With NQI\*:**  
**Standardization** - tannery and garment standards applied concerning fleshing, shaving and other processes enable a low rate of manufacturing defects, environmental and waste disposal standards applied to comply with regulatory requirements  
**Metrology** - calibrated measurement devices for skin characteristics e.g. physical (tensile, flexing, tear strength) and chemical testing, electronic size measurement enable certainty for customers  
**Conformity assessment** - proof of tanneries, quality and environmental systems, proof of laboratory inspections

**Without NQI\*:**  
**Standardization** - different in-house practices applied lead to manufacturing defects and contamination of the environment due to inappropriate waste disposal  
**Metrology** - non-calibrated measurement (size/weight/length) and testing devices for skin characteristics (physical and chemical) cause uncertainty for customers  
**Conformity assessment** - lack of credible laboratory results leading to non-compliance with environmental regulations

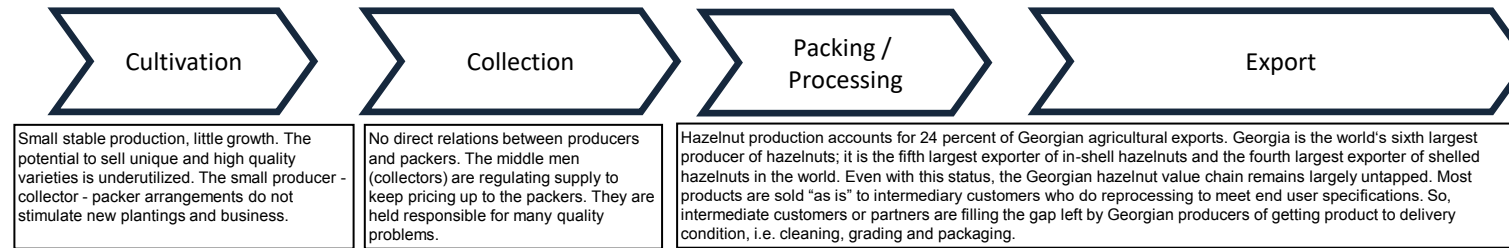
**With NQI\*:**  
**Standardization** - general standards for fabric processing, standards for sample models (shoe sizes) applied to provide a product benchmark  
**Metrology** - measurement devices e.g. rulers guarantee to meet customer specifications and reduction of e.g. cutting losses

**Without NQI\*:**  
**Standardization** - producer/customers lack clear communication in technical specifications resulting in the production of products not fulfilling customer needs  
**Metrology** - non-calibrated measurement devices e.g. rulers lead to inefficient production and defective products

**With NQI\*:**  
**Standardization** - general standards for trade and transport, social responsibility standards applied  
**Metrology** - measurement, e.g. shoe numbers correspond to sizes, customer can be confident  
**Conformity assessment** - retailer/customer can rely on labels (cover leather, certified producer in environmental management systems)

**Without NQI\*:**  
**Standardization** - lack of clear communication between distributors and retailers, uncertainty if producer applies social responsibility standards e.g. children work  
**Metrology** - non-calibrated measurement devices, shoe numbers may not correspond to sizes, customer satisfaction cannot be met  
**Conformity assessment** - retailer/customer cannot rely on labels (e.g. cover leather, if producer is certified in environmental management systems)

# QI in the Hazelnut Value Chain Georgia



Small stable production, little growth. The potential to sell unique and high quality varieties is underutilized. The small producer - collector - packer arrangements do not stimulate new plantings and business.

With NQI:

**Standardization** – Good Agricultural Practices (selection of cultivars, fertilization, pesticide treatments, irrigation, harvest and post-harvest treatments) ensure good quality of raw material.  
**Conformity assessment** – Official controls of inputs (quality hazelnut rootstocks, fertilizers, pesticides); soil analysis  
 - Certification of producers (GlobalG.A.P., organic)

Without NQI:

**Standardization** – different practices in production and storage lead to quality deficiencies  
**Conformity assessment** – incapable to differentiate good quality from poor one

No direct relations between producers and packers. The middle men (collectors) are regulating supply to keep pricing up to the packers. They are held responsible for many quality problems.

With NQI:

**Standardization** – Quality and safety requirements for hazelnuts defined by legislation (technical regulations). Technical specifications defined by standard (adoption of Turkish standard or own Georgian standard).  
 - Good manufacturing practices and HACCP are legally required and well implemented in packing/processing companies.  
**Metrology** – NQI services to processors and laboratories comprise calibration of measurement devices for moisture content, internal decay, temperature, air humidity; laboratory equipment for measurement of aflatoxin, free fatty acids, heavy metals, pesticide residues, microbiological contaminants etc.  
**Conformity assessment** – Inspection mechanism in place at packer level for incoming and outgoing produce. Results are used as the basis for the payment to growers and for market pricing by buyer and seller.  
 - Packing/processing companies are certified to HACCP, IFS or equivalent and "do what is written".  
 Accreditation – accredited laboratories in sufficient number and located near the places of packing/processing are able to certify compliance with technical specifications. This will allow sellers to negotiate better prices with the buyers, accelerate the payment process upon product delivery, and be a valuable protection tool in case of disputes on the product quality after delivery.

Without NQI:

**Standardization** – Without clearly defined and legally binding quality and safety requirements, the perception of quality will remain that of a slogan with very little commitment behind. Preferred customers will remain those who are content with cheap prices and do not push for world class packaging and products.  
**Metrology** – Without calibration of measurement devices important parameters cannot be measured in a reliable way. Compliance with technical specifications cannot be assessed nor certified.  
**Conformity assessment** – without an inspection mechanism at packer/processor level for incoming and outgoing produce, collectors will continue with fraudulent practices (e.g. mixing sand to increase weight, mixing different species, storage under unsanitary conditions). Without reliable certification of GMP/HACCP there is no basis to reward good manufacturing practices.  
 Accreditation – In the absence of a laboratory with internationally recognized accreditation, sellers will entirely depend on analytical services provided by their clients. In case of disputes sellers are always getting the short end of the stick.

Hazelnut production accounts for 24 percent of Georgian agricultural exports. Georgia is the world's sixth largest producer of hazelnuts; it is the fifth largest exporter of in-shell hazelnuts and the fourth largest exporter of shelled hazelnuts in the world. Even with this status, the Georgian hazelnut value chain remains largely untapped. Most products are sold "as is" to intermediary customers who do reprocessing to meet end user specifications. So, intermediate customers or partners are filling the gap left by Georgian producers of getting product to delivery condition, i.e. cleaning, grading and packaging.

With NQI:

**Standardization** – trade related standards applied easing and enabling international trade (technical barriers of trade)  
**Metrology** – calibration of various measurement devices (measurement of deviation before and after transport)  
**Conformity assessment** – proof of exporter management and environmental systems, evidence of whether or not importer country's regulations are met, proof of laboratory inspections, no compliance cost due to repetition of tests in the importer's country  
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Elements of NQI:

**Standardization**  
**Conformity assessment**  
**Metrology**  
**Accreditation**

**Thank you for your attention...**

## QI Websites

QI4D, <https://qi4d.org>

TU Berlin, Chair Innovation Economics,  
<https://www.tu.berlin/en/inno/research/projects/ongoing>

PTB, International Cooperation,  
<https://www.ptb.de/cms/en/ptb/fachabteilungen/abt9/gruppe-93.html>

GQII, <https://gqii.org>

International Network on Quality Infrastructure, INetQI, <https://www.inetqi.net>

QI-FoKuS - Research for conformity assessment and safety,  
<https://netzwerke.bam.de/Netzwerke/Content/EN/Standard-Articles/Networks/Qi-Fokus/qi-fokus.html>

QI-Digital, <https://netzwerke.bam.de/Netzwerke/Navigation/EN/Networks/QI-Digital/qi-digital.html>

Mesopartner, <https://www.mesopartner.com/research/quality-infrastructure>