Swiss Quality Infrastructure in Transition

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Abstract – **In response to the accelerating digitalization of society, the Swiss Quality Infrastructure (QI) is undergoing a strategic transformation. To support this, METAS organized a two-part workshop series in 2024 and 2025. The first workshop mapped the complex stakeholder landscape and explored key QI concepts like competence and trust, highlighting both formal and informal relationships. The second workshop moved from analysis to action, identifying pain points and generating digital solution ideas, including AI, and machine-readable standards. Participants identified possible initiatives such as a QI Data Space, Digital Calibration Certificate, and quality-IoT systems, while also addressing internal readiness challenges. Key outcomes included the need for shared infrastructure, international alignment, and seed funding to support implementation. The workshops provided a starting point for shaping a resilient, digitally enabled QI system tailored to Switzerland's strengths and future needs.**

I.   INTRODUCTION

The accelerating digitalization of society is catalysing profound transformations across all sectors—and the Swiss Quality Infrastructure (QI) is no exception, quite the opposite. In response to these shifts, a two-part workshop series was launched in 2024 and 2025 to explore and co-create the future of the QI system in Switzerland. The workshops were initiated by the chair of the Technical Committee INB NK 195 Conformity Assessment, which is the Swiss mirror committee of the ISO CASCO, and they were hosted by the Federal Institute of Metrology (METAS). METAS is mandated by the Swiss Federal Council to coordinate the Swiss Quality Infrastructure [1]. It convened a diverse range of stakeholders, including accreditation bodies, regulators, certification and inspection organizations, industry leaders, standardization experts, and consumer protection representatives.

This initiative acknowledges the dual challenge that QI faces today: leveraging digital technologies to improve performance, meet stakeholder requirements, and ensure trust and transparency; while simultaneously navigating the disruptions these technologies can bring to long-standing organizational structures, concepts, and roles. Particular attention has been paid to the concept of competence, a cornerstone of accreditation and conformity assessment, which is increasingly being tested by technologies such as ML/AI-powered systems

II.   WORKSHOP 1: MAPPING STAKEHOLDERS AND EXPLORING CORE CONCEPTS

The first workshop focused on understanding the architecture of the Swiss QI system, specifically by identifying its key stakeholders and mapping their functional relationships.

Accreditation Bodies	NGOs
Accreditation Organizations	NMIs
Accredited Labs	Notified Bodies
Calibration Laboratories	Regional & International
Certification Bodies	Organizations
Consumers	Regulators Legislators
Customs	Standardisation Bodies
Financial Service Providers	Technical Committees
Industrial Value Chain	Technical Experts
Inspection Bodies	Testing Laboratories
Market Surveillance	Tribunal Court

Fig. 1. List of QI Stakeholder.

Through co-constructive and gamified group exercises, participants collaboratively:
• Drafted a map of QI stakeholders, identifying about 20 classes, including accreditation bodies, certification bodies, testing and calibration laboratories, and more (see Fig 1).
• Distinguished types of relationships between stakeholders (e.g., legal, normative, utilitarian, hierarchical, cooperative, and informal). An example of relationship in the QI is shown in Fig. 2.

• Selected and analysed pillar QI concepts, such as competence, trustworthiness, standard, and metrological traceability, and examined how these are "used" across the network—explicitly (e.g., documented competence requirements in accreditation) and implicitly (e.g., assumed trustworthiness between certification bodies and regulators).

Key findings from Workshop 1 included:

• The diversity of stakeholder relationships—ranging from cooperative to competitive—highlights the systemic complexity that digital solutions must address.
• The most dominant and strongest relationships are of type "financial" and "legal", followed by "normative".
• The concept of competence is deeply embedded throughout the network, appearing not only in formal accreditation paths but also in informal exchanges of expertise and judgment.
• Participants recognized the need to distinguish between internal digital transformation (within organizations) and external transformation (across the stakeholder network), setting the stage for deeper exploration in the second workshop.

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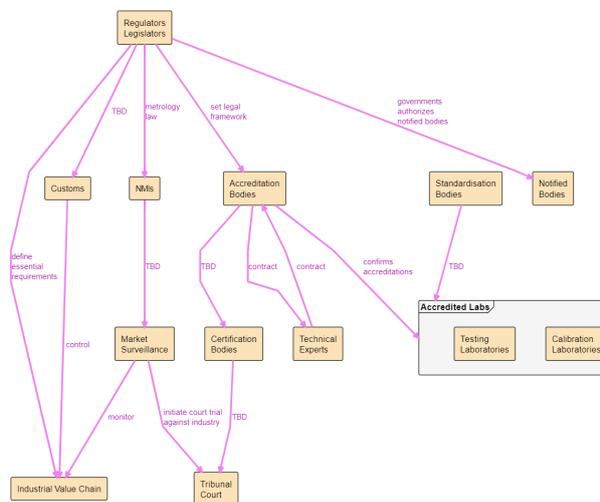

Fig. 2. Example of outcome of workshop 1: relationships of the QI (focus on legal)

III. WORKSHOP 2: FROM CONCEPTS TO ACTION – DESIGNING DIGITAL INITIATIVES

Building on the conceptual groundwork of the first workshop, the second session shifted from mapping the system to designing practical and visionary digital transformation initiatives. It followed a structured, stepwise approach designed to transform abstract challenges into actionable digital solutions for the Swiss Quality Infrastructure (QI). The day unfolded in several interlinked phases, combining systemic analysis, collaborative ideation, and organizational reflection. The group worked in teams, which intermediately exchanged their views and ideas.

A. Identifying Pain Points – Market Pull in the Swiss QI Network

The workshop began by revisiting the functional network of the Swiss QI, as established in the first session. Participants worked in groups to identify concrete pain points and systemic challenges within this network—areas where current processes, interactions, or concepts fall short or face increasing pressure due to digitalization. More than 10 specific pain points or market-driven needs were identified across different stakeholder relationships.

B. Generating Techno-Push Ideas

In the next step, each team co-ideated at least three digital technology-based initiatives—so-called techno-push solutions—which could potentially enhance or transform current QI operations. These ideas were inspired by emerging or underutilized technologies, such as AI, blockchain, digital identities, and data spaces, and were not necessarily tied to previously identified pain points.

C. Designing Systemic Digital Solutions

The market-pull and techno-push results were then brought together. For each pain point or opportunity, participants identified one or more digital solutions, selecting relevant technologies or business models, and reusing techno-push ideas where applicable.

D. Categorizing External Initiatives by Domain of Action

Before turning to internal implications, participants categorized their external digital initiatives based on their domain of action:
• Optimization, referring to solutions that improve or streamline existing processes (e.g., high-speed communication infrastructure).
• Disruption or Revolution, referring to transformative interventions that fundamentally alter stakeholder interaction or compliance mechanisms (e.g., secure data spaces, fully interoperable IoT ecosystems covering the full QI, or machine-actionable standards that only permit device operation if (potentially evolving) standard requirements are met).

This categorization helped assess both the ambition level and implementation maturity of each proposed initiative

and served as a transition point to consider internal readiness.

E. Focusing on Internal Organizational Gaps

Following the external categorization, each team reflected on their institution's ability to engage with the proposed digital solutions. Participants reflected on internal impediments, capability gaps, or structural limitations that could hinder effective participation—ranging from missing harmonization of in-house and international standards (including terms and definitions), outdated IT infrastructure, and lack of in-house digital competencies, up to unclear governance for innovation.

F. Ideating Internal Digital Readiness Initiatives

In response to these internal challenges, teams co-created targeted digital initiatives aimed at enhancing organizational readiness. These were similarly categorized as either:

•   Optimization-oriented (e.g., process automation, internal data management systems, more active contributions to international standardization), or

•   Disruptive (e.g., redefinition of internal roles, adoption of agile regulatory tech approaches).

This step ensured that institutions not only envision future participation in digital QI ecosystems but also define concrete pathways to get there.

G. Connecting the Dots: Synergies and Conflicts

To conclude the workshop, participants reviewed the landscape of developed initiatives—external and internal. They were asked to assess:

•   Whether the use cases were interconnected, and if so, how.

•   Where synergies or potential conflicts existed.

•   Which initiatives could benefit from shared infrastructure, mutual learning, or coordinated funding.

It was interesting to observe that high similarities in the ideas of the different teams emerged.

IV.   OUTCOME

The initiatives that emerged from the collaborative design sessions included:

•   QI Data Spaces: Participants emphasized the importance of creating secure, interoperable data spaces to facilitate trusted information exchange across stakeholders, including aspects like identity management. The idea aligns with existing national initiatives [2]—five data space projects have already been identified by the Swiss Federal Chancellery —and a dedicated QI Data Space could be a promising avenue for further exploration.

•   Digital Calibration Certificate (DCC): The DCC and its enabling infrastructure were recognized as a crucial element for digital metrology, with attention given not only to the certificate itself but also to the entire end-to-end process leading to its issuance and use within industry and their ERP systems.

•   IoT and Big Data: The potential of networked infrastructure and large-scale data analytics to support real-time conformity, monitoring, and predictive maintenance was discussed. These technologies open up transformative opportunities for market surveillance, certification, and traceability.

•   Smart Standards: Participants identified the need for machine-interpretable and self-updating standards that could support automation in conformity assessment and regulatory compliance, reducing interpretation ambiguity and manual workload.

In addition to these thematic initiatives, several cross-cutting structural needs were articulated to support implementation:

•   The development of business models and value propositions tailored to different stakeholder perspectives, to ensure long-term viability of digital initiatives.

•   The establishment of seed funding mechanisms to support prototyping and piloting of digital QI tools.

•   The importance of exchange and alignment with international initiatives, particularly through collaboration and learning from the European and global harmonization efforts.

These findings point to the necessity of not only designing technical solutions, but also establishing the financial, legal, and collaborative frameworks that can sustain and scale them.

V.   LOOKING FORWARD

Together, the two workshops laid a foundational architecture for the digital transformation of the Swiss Quality Infrastructure (QI). Switzerland's strengths—its compact stakeholder ecosystem, culture of pragmatism, and excellence in precision—position it well to lead by example in QI digitalization. Building on this momentum, we will begin developing a concept for a QI data space to enable trusted, interoperable, and secure data exchange across stakeholders. Additional workshops will focus on identifying and addressing the need for harmonization in digital calibration certificates, a critical element for cross-sector and cross-border interoperability. Informal collaborations have also emerged within the DACH region (Germany, Austria, and Switzerland), pointing to a growing regional interest in aligning efforts and fostering mutual learning. These workshops mark the beginning of a coordinated and forward-looking journey toward a digitally enabled QI system.

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