

The New Inmetro Seal as a Digitally Verifiable Conformity Mark: Digital Verification, Fraud Detection and Quality Infrastructure

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Abstract - This paper examines the new Inmetro seal as a digitally verifiable conformity mark and as a visible market-facing expression of quality infrastructure outcomes in Brazil. Building on the problem of information asymmetry and on recent discussions about label credibility, digital traceability, and verifiable conformity information, it argues that the seal acquires a new functional role when combined with app-based digital verification. In this configuration, the seal no longer operates merely as a static conformity sign; it becomes a practical mechanism for authentication, traceability, and fraud detection.

The paper is grounded in official Inmetro documentation and in Inmetro Administrative Order No. 314/2025, the 2025 amendment to the conformity-mark requirements for selected regulated products and services, which introduced digital and security requirements under “Inmetro na Palma da Mão” (Inmetro’s mobile authentication app), including QR-code authentication and anti-falsification features. The paper proposes a conceptual sequence linking quality infrastructure, conformity assessment, trust, seal, digital verification, fraud detection, and consumer/industry value. It concludes that digitally verifiable conformity marks can strengthen consumer protection, improve market confidence, and represent an important innovation in the interface between quality infrastructure and end users.

Keywords - quality infrastructure; conformity assessment; trust; conformity mark; digital verification; fraud detection; consumer protection; Inmetro.

I. INTRODUCTION

In regulated markets, product compliance is often not directly observable before purchase or use. This creates information asymmetries that can weaken trust, distort competition, and increase exposure to fraud [1]. Recent research shows that labels and digital product information are only effective when they are accurate, substantiated,

and supported by credible institutional arrangements [2]–[5]. Against this background, this paper examines the new Inmetro seal as a **digitally verifiable conformity mark** embedded in Brazil’s quality infrastructure. It argues that, when combined with app-based authentication and secure identification features, the seal moves beyond static signalling and becomes a practical mechanism for digital verification, fraud detection, and market-facing trust. This framing is especially relevant to IMEKO TC10 because it connects conformity assessment, digital transformation, and diagnostics-oriented verification in a concrete regulatory setting [7]–[10].

This issue has become more pressing in environments marked by counterfeiting, misleading claims, and fragmented signalling systems. Recent studies indicate that trust in labels depends strongly on credibility, transparency, and institutional support, while digital traceability systems are increasingly associated with fraud prevention, compliance verification, and stronger trust formation [3], [4]. In parallel, UNECE’s work on digital conformity credentials frames conformity information as something that can be structured, authority-linked, and digitally verifiable [5].

The paper examines the role of the National Institute of Metrology, Quality and Technology (Inmetro), a Brazilian federal authority and the central executive body of the national metrology and quality system [6]. It argues that the new Inmetro seal can be interpreted as a digitally verifiable conformity mark and as one of the most visible market-facing expressions of quality infrastructure outcomes in Brazil.

II. OFFICIAL AND REGULATORY BASIS OF THE INMETRO SEAL

According to official information, the Inmetro conformity seal is intended for products with assessed conformity and is used by manufacturers, importers, and service providers that obtain certification or registration within the Inmetro system [6]. The official service page identifies Inmetro Administrative Orders (Portarias) Inmetro n° 422/2021, 218/2021, 230/2021, and 231/2021

as part of the regulatory basis governing the service [6].

A decisive recent step was Inmetro Administrative Order No. 314/2025, the 2025 amendment to the conformity-mark requirements for selected regulated products and services, introduced to integrate these regulated objects into **“Inmetro na Palma da Mão” (Inmetro’s mobile authentication app)** [7]. The official text states that the initiative was developed by Inmetro in cooperation with Casa da Moeda do Brasil (CMB), the Brazilian Mint, a federally owned public company specialized in secure printing and related security solutions [7], [8].

The 2025 amendment to the conformity-mark requirements also provides a concrete technical basis for the paper. For the covered product categories, the seal must be indelible, resistant to removal, abrasion, chemicals, and weathering, self-destructive upon attempted removal, and equipped with visible and invisible security elements, a QR code authenticable by smartphone, and a human-readable alphanumeric code for contingency reading [7]. Official Inmetro communication further states that the new seal is linked to the Institute’s database and designed to reinforce consumer protection and anti-fraud action [8], [9].

III. CONCEPTUAL FRAMEWORK: FROM QUALITY INFRASTRUCTURE TO DIGITALLY VERIFIABLE CONFORMITY

The paper proposes the following analytical sequence:

Quality infrastructure → conformity assessment → trust → seal → digital verification → fraud detection → consumer/industry value

In this framework, quality infrastructure provides the institutional and technical foundation; conformity assessment converts that foundation into verified compliance; trust is the intended systemic effect; the seal is the visible market-facing expression of that trust; digital verification makes trust actionable; fraud detection protects the integrity of the signal; and the final result is value creation for consumers, industry, and regulators.

The key analytical distinction is between a static conformity sign and a digitally verifiable conformity mark. A traditional conformity mark primarily signals that conformity has been assessed. A digitally verifiable mark goes further: it allows end users to authenticate the sign itself against an official source and react when suspicion arises. Recent work on digital traceability and digital conformity credentials supports this transition by showing that digital architectures can enhance transparency, support compliance verification, and strengthen trust in information environments [3], [5].

This shift matters because trust increasingly depends not simply on the presence of a label, but on whether the label can be checked, linked to credible evidence, and supported by a robust institutional scheme [2], [4]. In that sense, the Inmetro case is analytically relevant because it

moves from a static conformity sign toward a verifiable trust architecture embedded in the broader quality infrastructure.

This analytical sequence is summarized in Fig. 1.

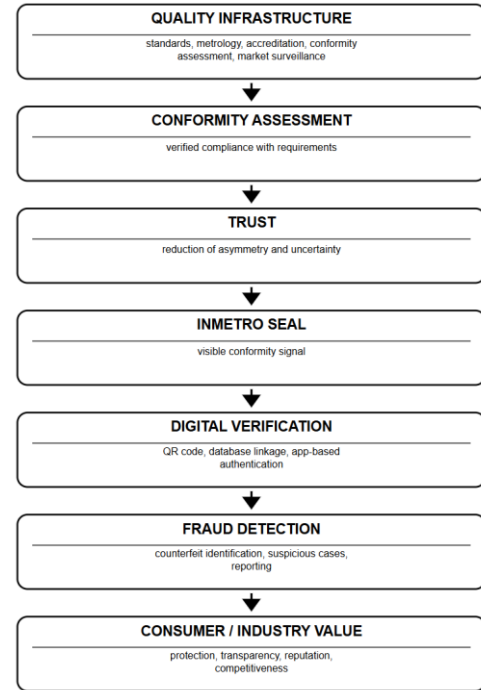


Fig. 1. Conceptual framework linking quality infrastructure, conformity assessment, digital verification, fraud detection, and consumer/industry value.

IV. DIGITAL VERIFICATION AND FRAUD DETECTION

“Inmetro na Palma da Mão” offers a concrete example of digital transformation in conformity marking. Inmetro’s official launch communication states that the app allows consumers to verify the authenticity of regulated products through smartphone-readable security elements and to use the system as a practical anti-fraud and consumer-protection tool [8]. The first implementation covers motorcycle helmets, fire extinguishers, and CNG cylinders, with progressive expansion planned [7], [8].

Analytically, this means that the new seal is no longer only a printed compliance sign. It becomes a hybrid artefact that combines a physical conformity mark, a digital authentication interface, and a gateway for identifying suspicious cases. For TC10 purposes, this is a meaningful contribution because it frames the seal as a diagnostic mechanism for market integrity: it supports authenticity checking, anomaly indication, and escalation of possible fraud. UNECE’s conformity credential logic points in the same direction by treating conformity information as digitally verifiable evidence linked to authoritative issuers and compliance schemes [5].

V. DISCUSSION AND CONCLUSION

The expected value of the digitally verifiable seal is twofold. For consumers, it improves access to trustworthy information and reduces dependence on a static visual symbol that cannot easily be checked. For industry, it may strengthen fair competition, reduce harm caused by counterfeit labeling, and reinforce the reputational value of legitimate conformity assessment [8], [9].

The broader contribution of this paper is therefore conceptual as well as practical. It suggests that the new Inmetro seal should not be interpreted merely as a graphic redesign or an anti-counterfeiting accessory, but as an innovation in the interface between quality infrastructure and the market. In this interpretation, the seal materializes the result of conformity assessment for end users and, through digital verification, transforms institutional assurance into a more visible and operational form of trust. This makes the Inmetro case a timely contribution to current debates on digitally verifiable conformity marks, traceability, and fraud-resistant trust architectures [3], [5], [7].

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