



**Physikalisch-Technische Bundesanstalt  
Braunschweig und Berlin**  
Nationales Metrologieinstitut



3<sup>rd</sup> Workshop 2017

*"Software and ICT related Challenges in Legal Metrology"*

Date : 21-22 June 2017

Venue: PTB, Berlin, Germany.

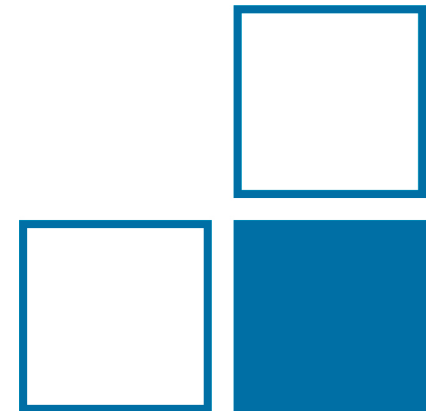
# European Metrology Cloud

## Digital Transformation of Legal Metrology

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22.06.2017, WS Software and ICT related Challenges in Legal Metrology,  
Berlin, Germany



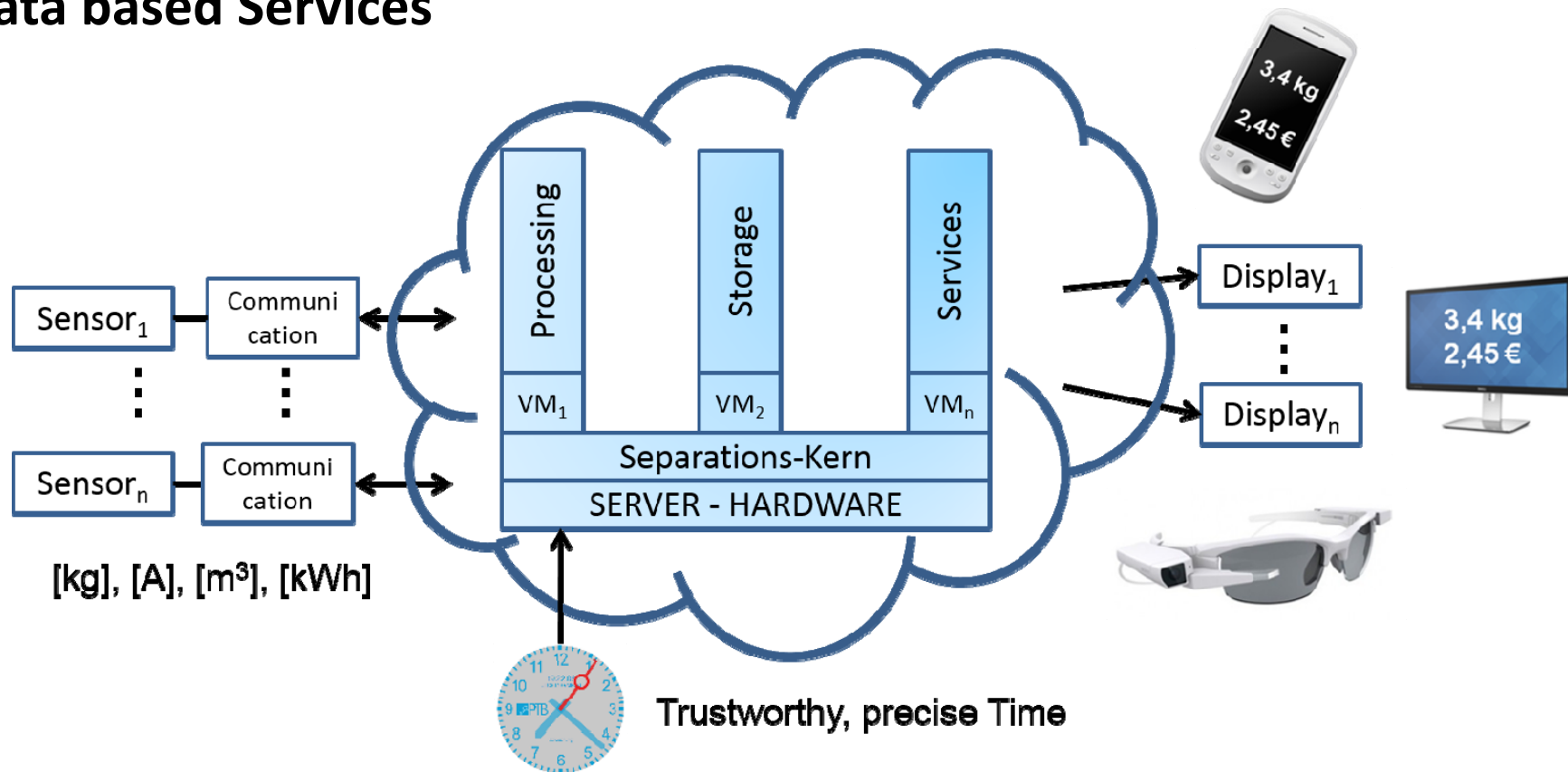


- Protection of customers and users.
- Confidence in the correctness of measurements

Challenging when technologies become complex

# Legal Metrology: Challenges

Transition towards distributed and virtualized components and data based Services



Confidence in Fundamental Technologies?

## **Drivers** of the “digital transformation”

- Increasingly globalized market place
- Ever-increasing drive for efficiency
- Rapidly developing consumer demands

## **Facilitators:**

- Developing IT-Technologies are facilitating the rapid change!
- Global political initiatives (G20/EC/nationally)

## **Inhibitors to Innovation in Legal Metrology:**

- Regulations, i.e. realization of regulated processes
- None harmonized procedures

Criticism: Regulations are an "inhibitor for innovation"!

1. "Streamlining" of processes

2. "Adequate" Security

3. „Knowledge gap“

4. "Real harmonization" in Europe

## Solutions :

⇒ **Reference architectures / procedures** for new technologies (1, 2, 3, 4)

⇒ **Coordination of services** in Europe via a "digital quality infrastructure" (1, 2, 3, 4)

# Examples

- Reference Architectures / Procedures
- Coordination of Services

A Reference Architecture should provide the following:

- Acceptable solution for a whole system
- Adequate security based on an appropriate risk analysis
- Verification method for complex architectures
- Scalable in Security
- Tailorable on the instrument specific requirements

⇒ Is an example how to use new technologies

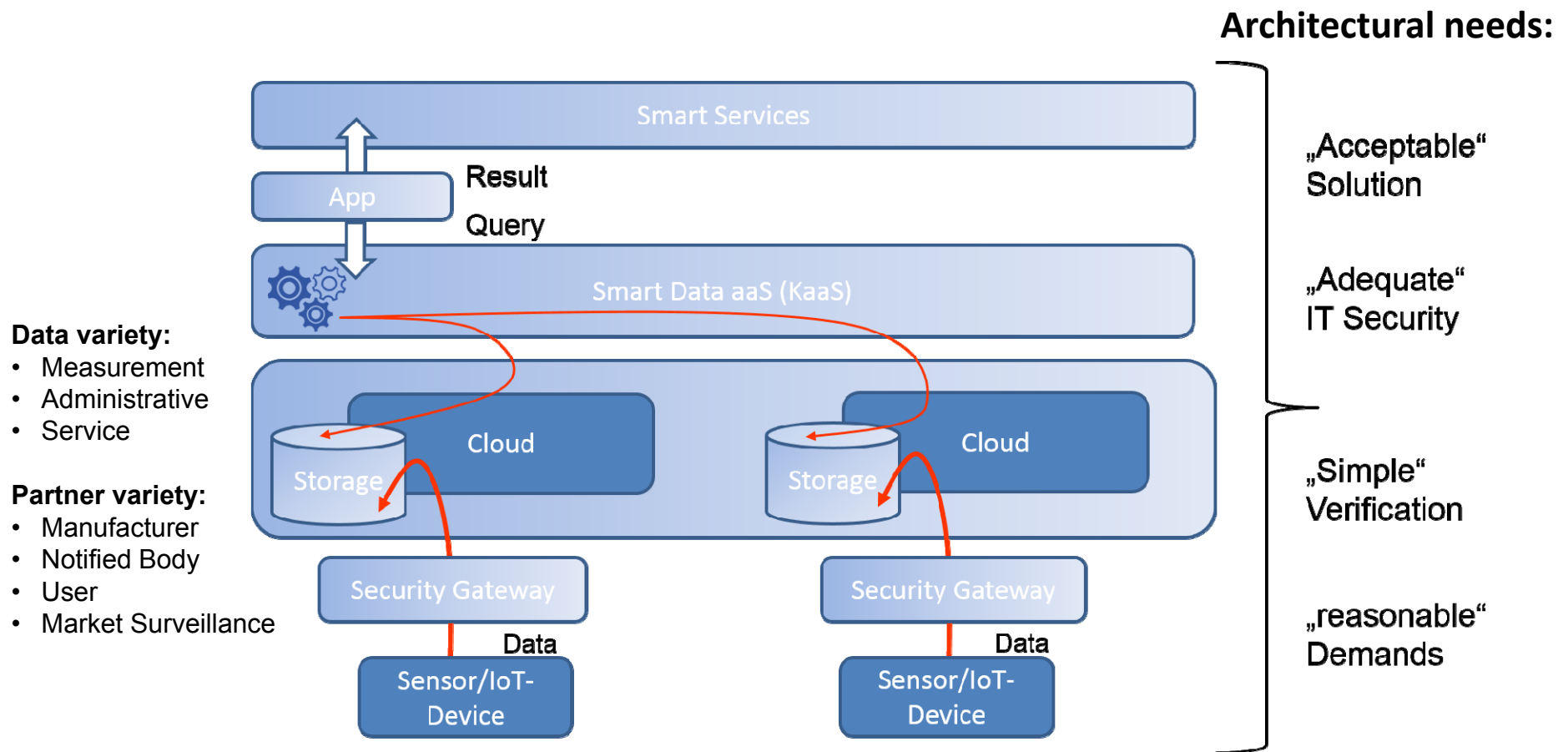
⇒ Streamlines the conformity assessment process

⇒ Defines adequate security

⇒ Helps closing the „knowledge“ gap

⇒ Includes an verification method which produces a simple result

## Technology stack of metrological IT systems:



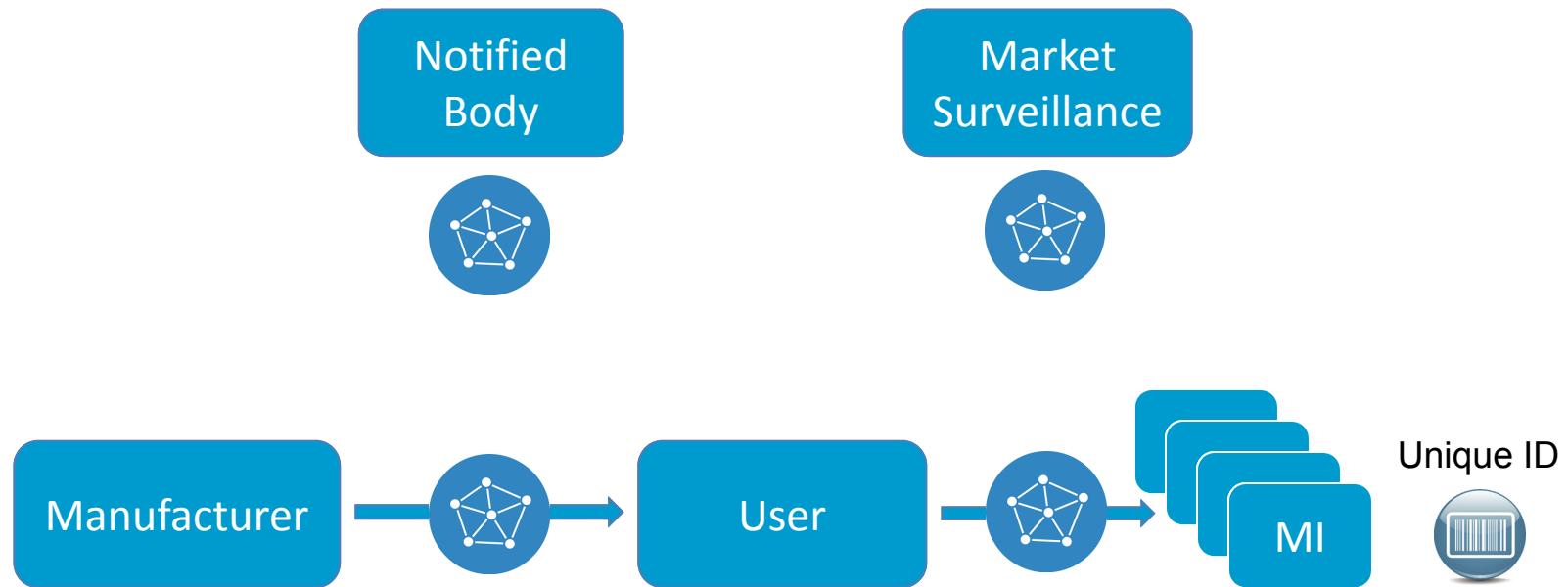
## Reference architectures:

Scalable in security and tailorable on the instrument specific requirements



# Examples

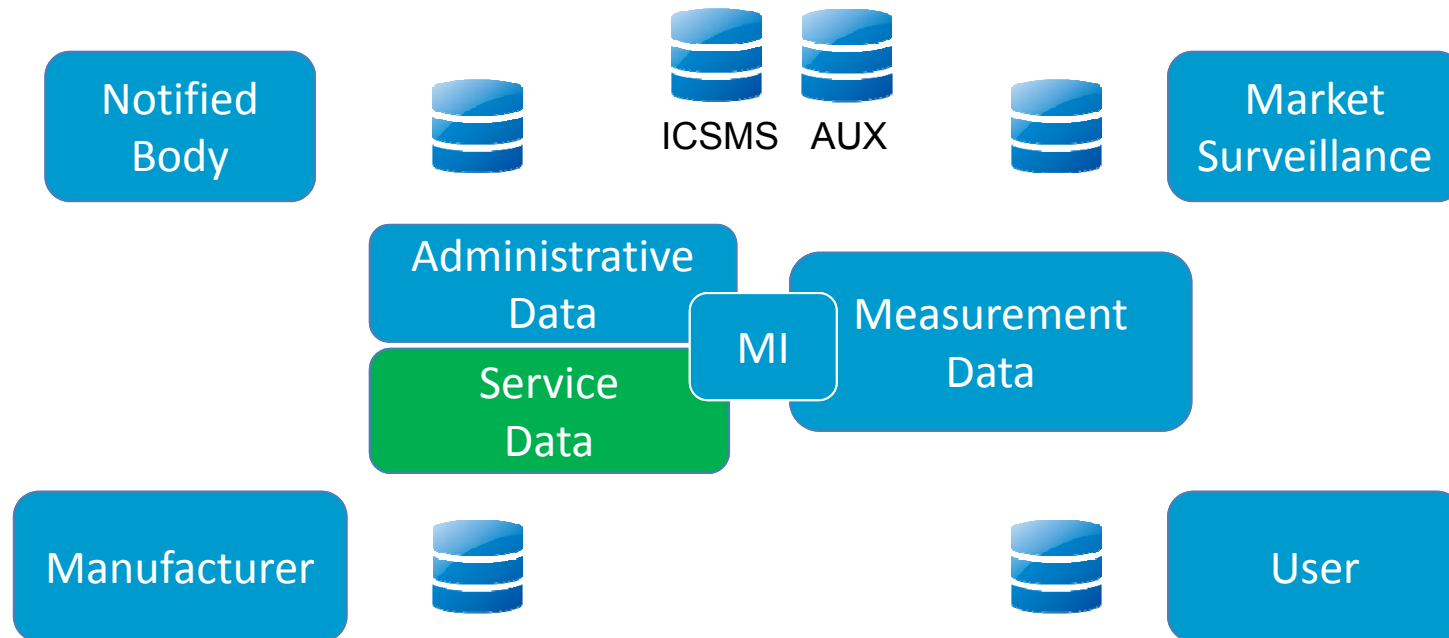
- Reference Architectures / Procedures
- Coordination of Services



## Technology based Services:

- Remote Attestation, e.g. System Integrity
- Remote Diagnostics, e.g. Remote Verification / surveillance
- Remote Maintenance, e.g. Software Update

Prerequisite => Trustworthy access to the MI



- **Within individual “Data Shell”:**

- Identify data potential
- Optimize services
- Derive new services

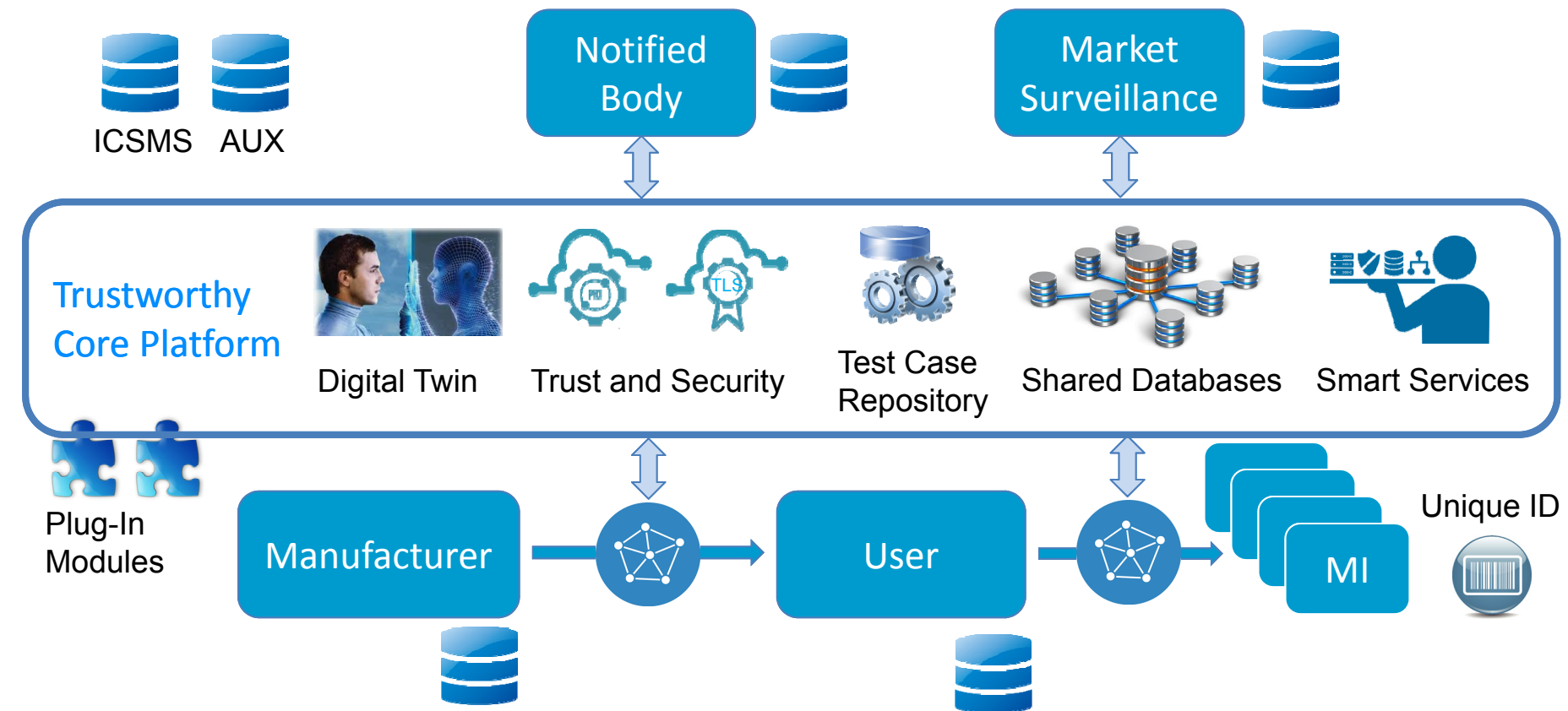
- **Within joined “Data Shells”:**

- Identify valuable data from other sources
  - Integrate these data
- => **Trustworthy** information exchange

**Potentials:**

- Improved Administrative Services
- Individualization:
  - i.) Re-verification Intervals
  - ii.) Risk Assessment and Determination

## The Metrology Cloud: Quality assurance for Data and Services



- e-Calibration Certificates
- e-Conformity Certificates
- e-Verification Marking
- etc.

- A blueprint for the member states' platforms
- Hosted by the Notified Body or an NMI
- A communication and service platform rather than a data dumping environment



Digital Twin

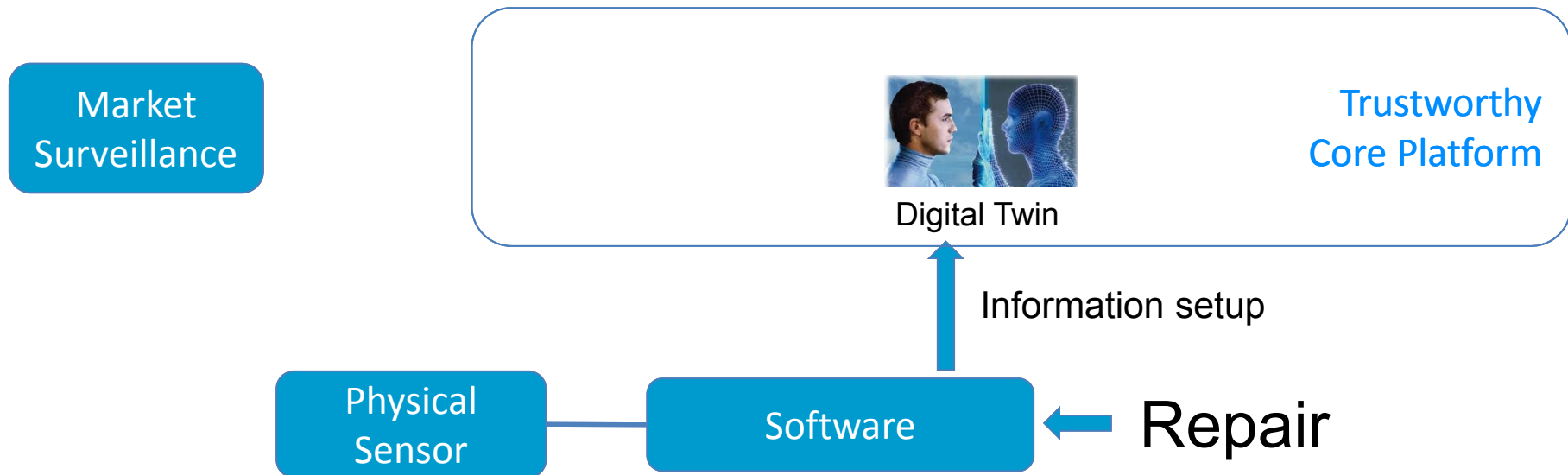
Administrative  
Shell

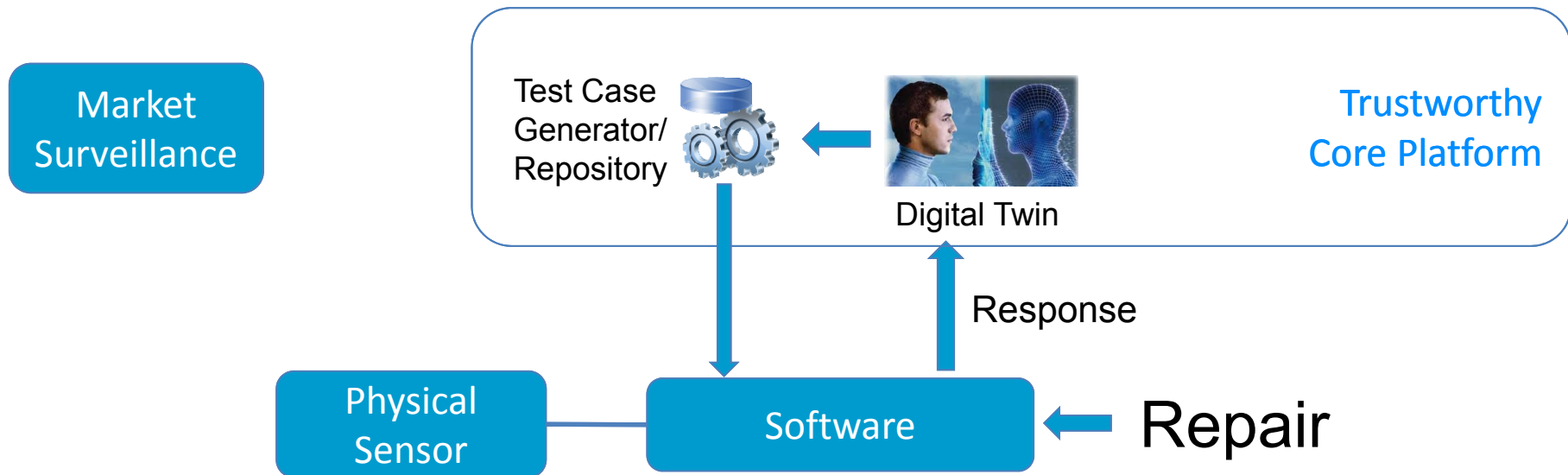
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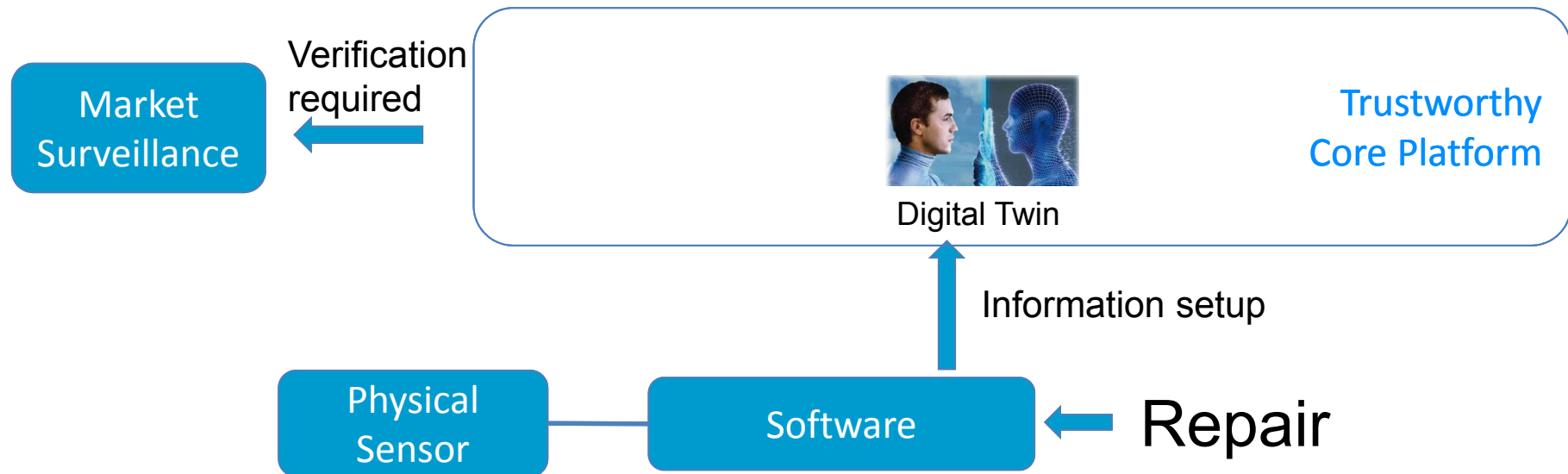


PROCESS

- Administrative Shell of the Measuring Instrument
- Authorized access to Data / Decisions / Services
- Initiate Processes
- Collect Results/Information
- Evaluate Results/Information
- Share Results/Evaluation
- System Model
- ...

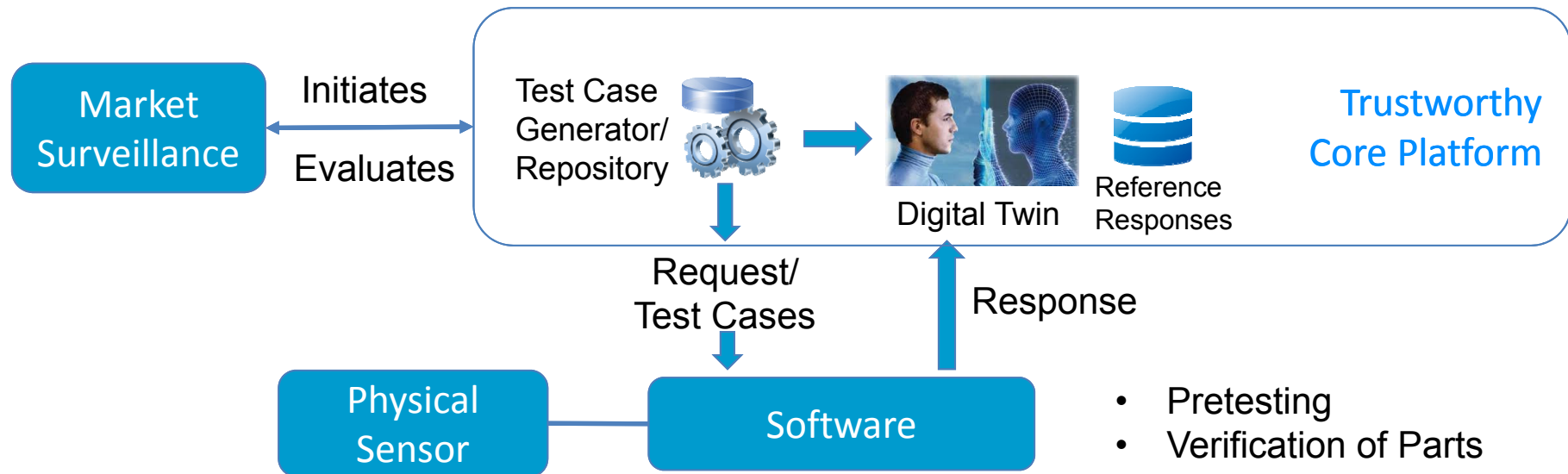








# Use Case 1: Support of Repair/Verification



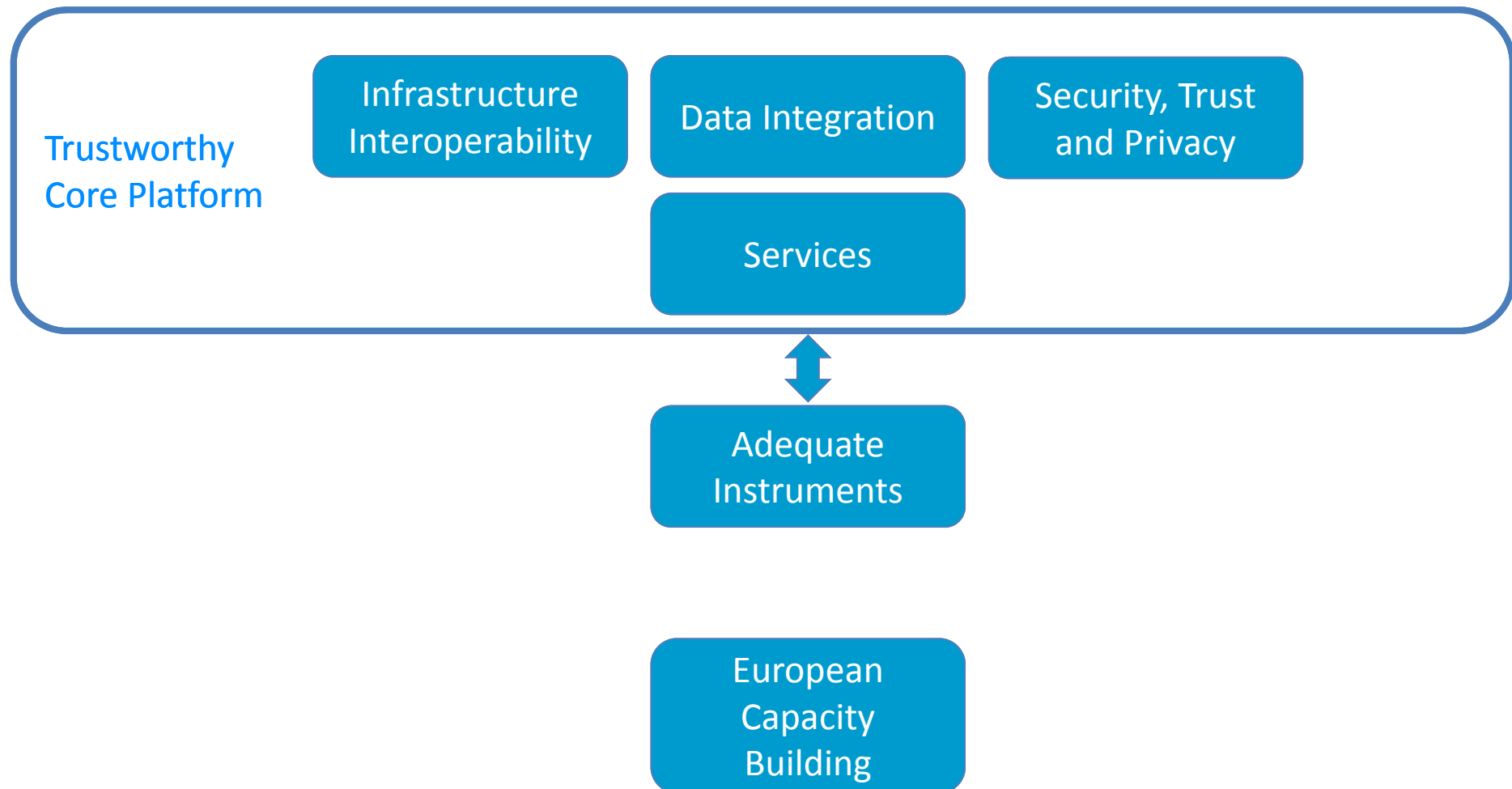
Complexity



## Support of Verification:

1. Check protocol, or log files
2. Check system integrity, e.g. runtime checksum verification
3. Apply test data / test cases and compare with Sensor and System Model Reference
4. Condition Monitoring / verification of file systems

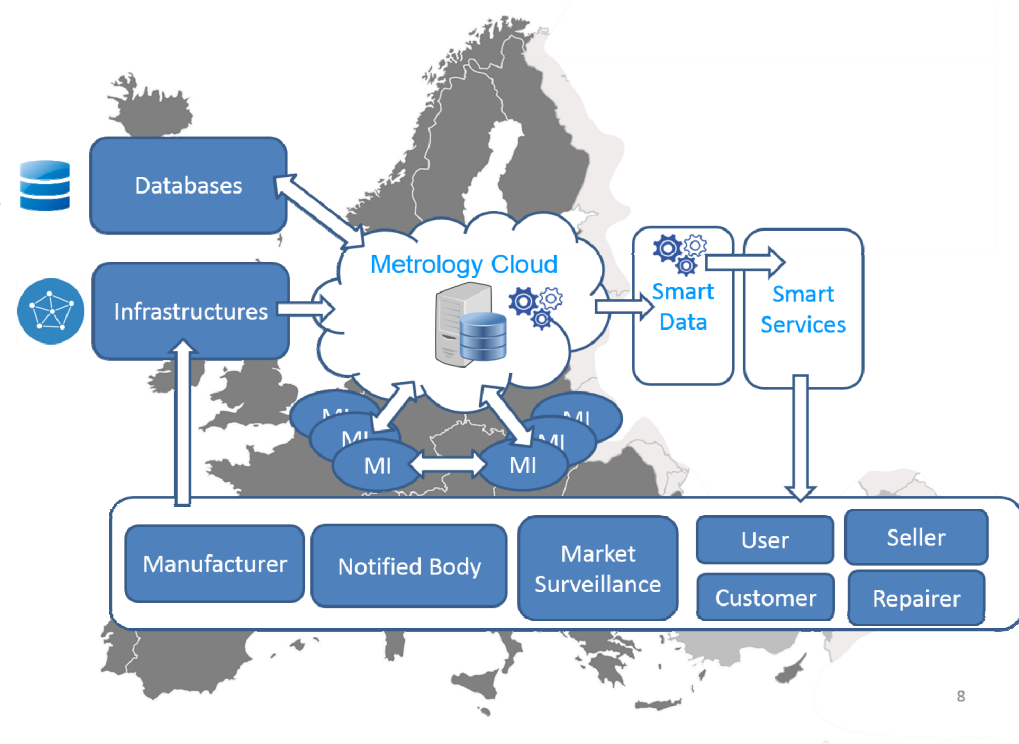
- Streamlining software update
- Trustworthy Metrological Administration
- Closing the risk assessment loop
- Value added data in LM
- Smart contracts in LM
- ...



... a digital quality infrastructure for European Legal Metrology

## Objectives:

- **Streamline** administrative processes of conformity assessment and market surveillance.
- **Integration** of existing IT infrastructures and databases of the partners via a “trustworthy” core.
- **Provision** of broadly applicable reference architectures and processes.
- **Develop** new technology- and data-driven metrological services.
- **Establish** a “European center of excellence for metrological information technology”.
- **Harmonization** via a trustworthy IT infrastructure and the contribution to the relevant standards - development work in WELMEC and OIML.

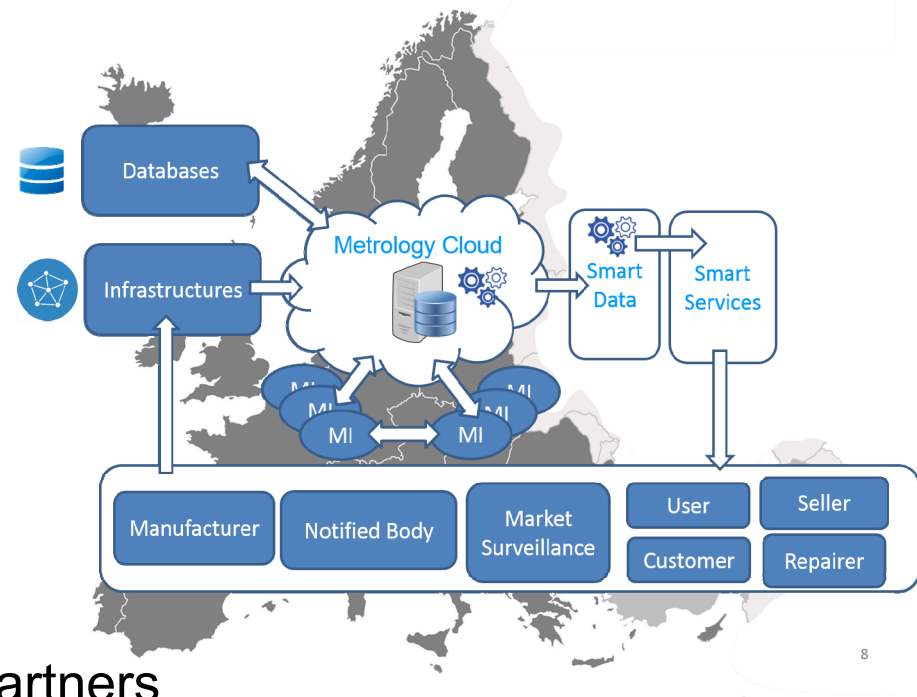


## Initial 3 years interval: Application for funding by EMPIR

## Application for funding by EMPIR

Expected results after 3 years:

- Demonstrator of the platform showing the feasibility of it and of the use-cases / services
- Broad consensus between the stakeholders
- Strong foundation to attract more partners
- To be further developed and maintained by a European Centre



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# PTB EMPIR project “European Metrology Cloud”

EMPIR, Industry Call 2017, Partnering meeting 29./30. June at PTB Berlin, START MAI 2018

**Industry:**



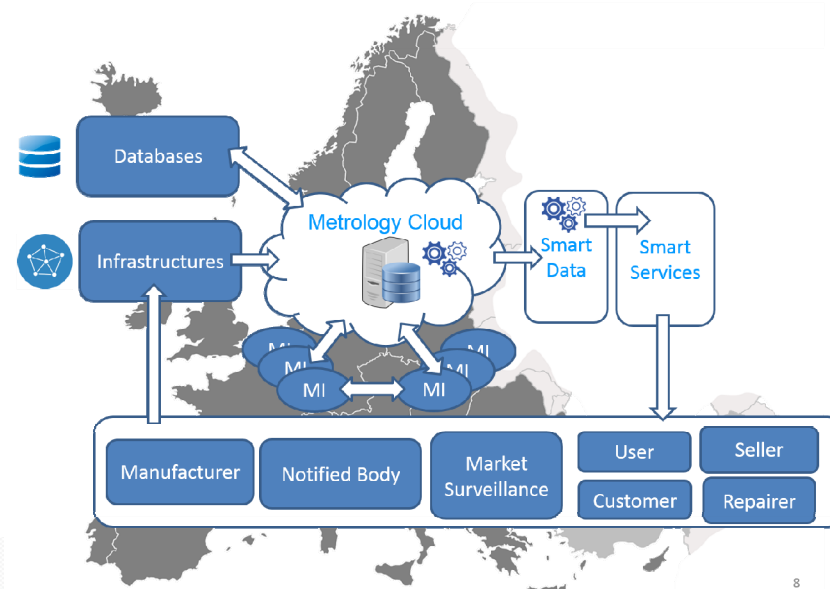
**NMIs:**



**Verification Authorities:**



**Science:**



Supported by:



- It consists of a **core platform** in each member state
- Under the control of a **trustworthy entity**, e.g. a NMI or a Notified Body
- A **restricted stakeholder community** communicates via this platform
- **Exchanges (sensitive) Data** via separated, secure compartments (digital twin)
- Renders regulated processes more efficiently using IT.

## It is not:

- a central European facility for storing of and free access to data from the stakeholders in LM.

- We have summarized the **grand challenges** for the Digital Transformation of Legal Metrology
- We have **identified solutions** to support all stakeholders
- We **provided a vision** and a first step towards a digital quality infrastructure for Europe “The Metrology Cloud”.

**Your are invited to join the consortium!!!**





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