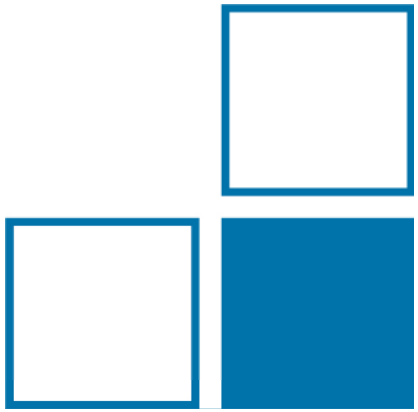
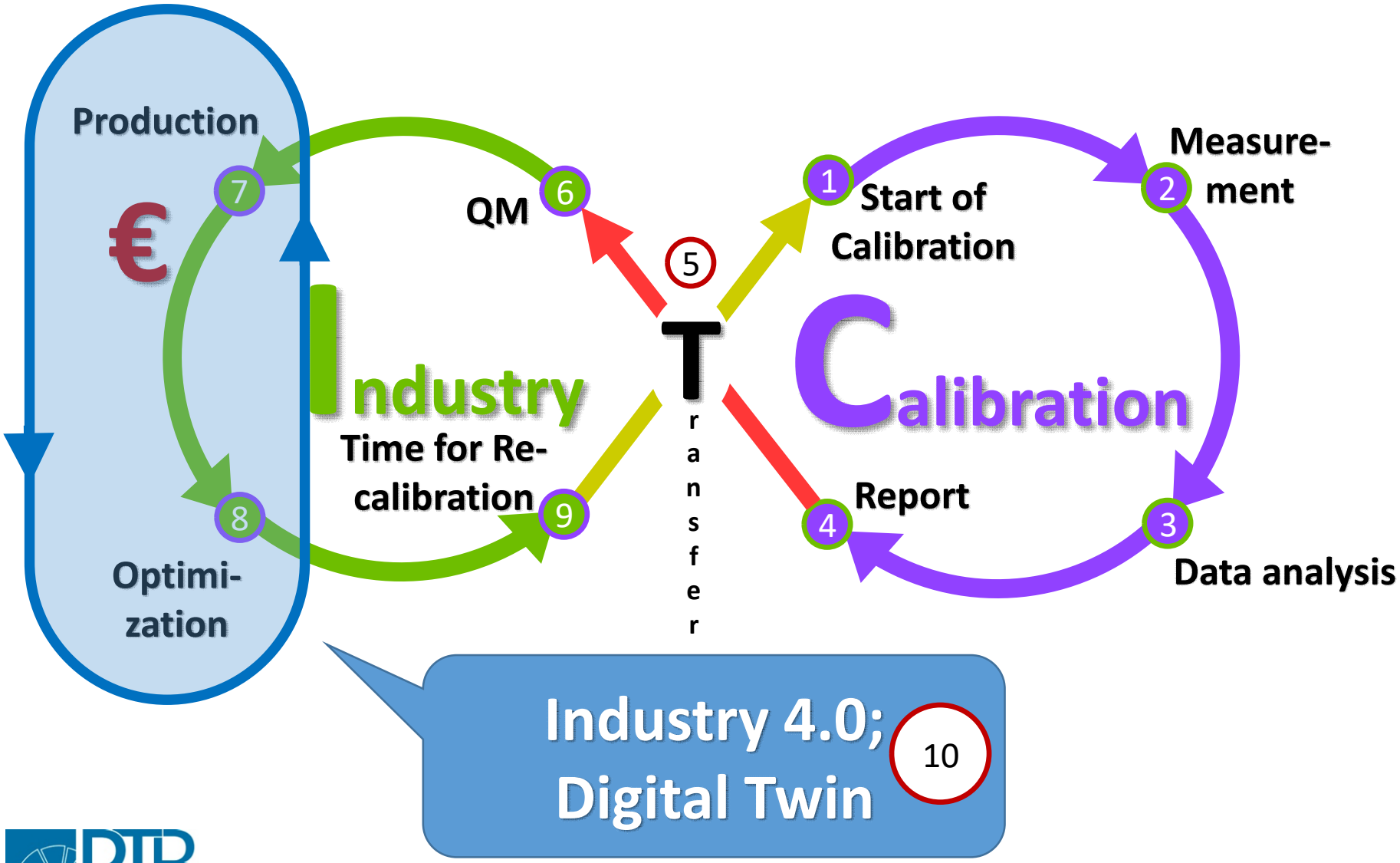
Physikalisch-Technische Bundesanstalt
Braunschweig und Berlin
Nationales Metrologieinstitut

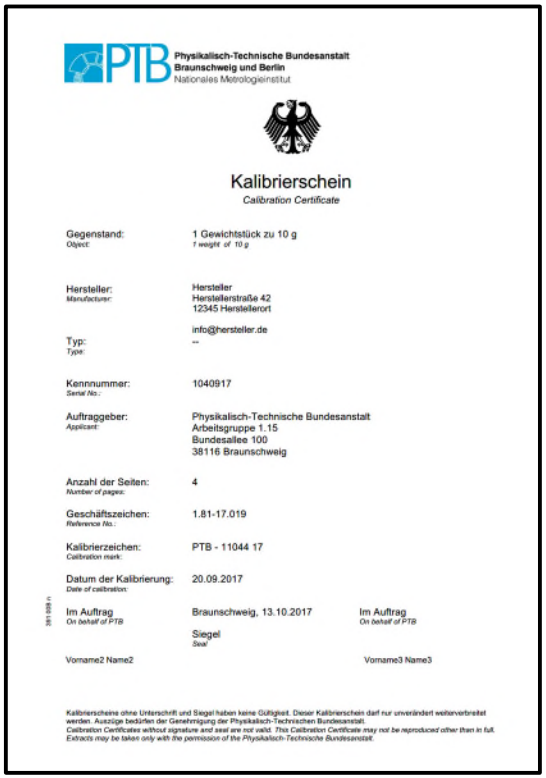
The Digital Calibration Certificate (DCC)

Siegfried Hackel



The Role of Calibration





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Kalibrierschein
Calibration Certificate

Gegenstand: *Object:*	1 Gewichtstück zu 10 g *1 weight of 10 g*
Hersteller: *Manufacturer:*	Hersteller Herstellerstraße 42 12345 Herstellerort info@hersteller.de
Typ: *Type:*	--
Kennnummer: *Serial No.:*	1040917
Auftraggeber: *Applicant:*	Physikalisch-Technische Bundesanstalt Arbeitsgruppe 1.15 Bundesallee 100 38116 Braunschweig
Anzahl der Seiten: *Number of pages:*	4
Geschäftszeichen: *Reference No.:*	1.81-17.019
Kalibrierzeichen: *Calibration mark:*	PTB - 11044 17
Datum der Kalibrierung: *Date of calibration:*	20.09.2017

Im Auftrag *On behalf of PTB* — Braunschweig, 13.10.2017 — Im Auftrag *On behalf of PTB*

Siegel *Seal*

Vorname2 Name2 — Vorname3 Name3

Kalibrierscheine ohne Unterschrift und Siegel haben keine Gültigkeit. Dieser Kalibrierschein darf nur unverändert weiterverbreitet werden. Auszüge bedürfen der Genehmigung der Physikalisch-Technischen Bundesanstalt.
Calibration Certificates without signature and seal are not valid. This Calibration Certificate may not be reproduced other than in full. Extracts may be taken only with the permission of the Physikalisch-Technische Bundesanstalt.

Compare

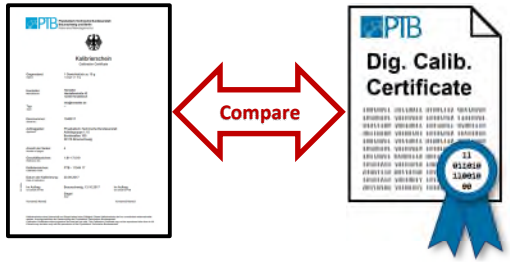
First of all:

The DCC contains the ACC

Advantages (1):

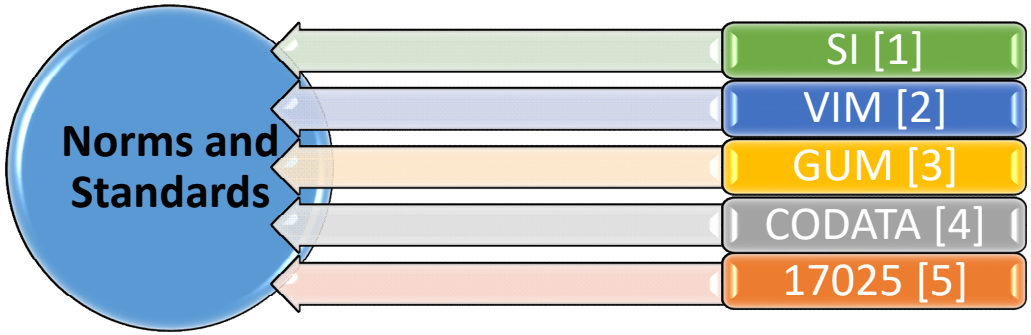
- Free of media discontinuity
  - ✓ In the calibration laboratory
  - ✓ On transmission
  - ✓ In the factory
- Unambiguousness
  - ✓ Clear and error-free data
  - ✓ Globally unique and clear
- Important Industry 4.0 - component
  - ✓ RAMI 4.0
  - ✓ Administrative shell (Verwaltungsschale)

Advantages (2):



- Safety and security
  - ✓ Long term preservation
  - ✓ Integrity
  - ✓ Authenticity
- Rapid standardization
  - ✓ Is achieved via the metrology network
  - ✓ You are part of this!
- Economically
  - ✓ Low migration effort (if the laboratory has adequate IT penetration)
  - ✓ Higher process efficiency

The Digital Calibration Certificate



Digital SI (**D-SI**): see https://zenodo.org/record/3522631#.YQeLio4zbq8

[1] *Le Système international d'unités/The International System of Units (Brochure sur le SI/SI brochure), 2019*

[2] Brinkmann, B.: Internationales Wörterbuch der Metrologie. Grundlegende und allgemeine Begriffe und zugeordnete Benennungen (VIM); ISO/IEC-Leitfaden 99:2007 = Vocabulaire international de métrologie. Wissen: Messwesen. Berlin, Wien, Zürich: Beuth 2012

[3] Norm JCGM 104:2009; Juli 2009. *Auswertung von Messdaten – Eine Einführung zum "Leitfaden zur Angabe der Unsicherheit beim Messen" und zu den dazugehörigen Dokumenten (GUM)*

[4] Mohr, P. J., Newell, D. B. u. Taylor, B. N.: CODATA recommended values of the fundamental physical constants. 2014. Reviews of Modern Physics 88 3, S. 337

[5] DIN EN ISO/IEC 17025:2018-03 General requirements for the competence of testing and calibration laboratories

1.: Administrative Data

- regulated

2.: Results of the Calibration

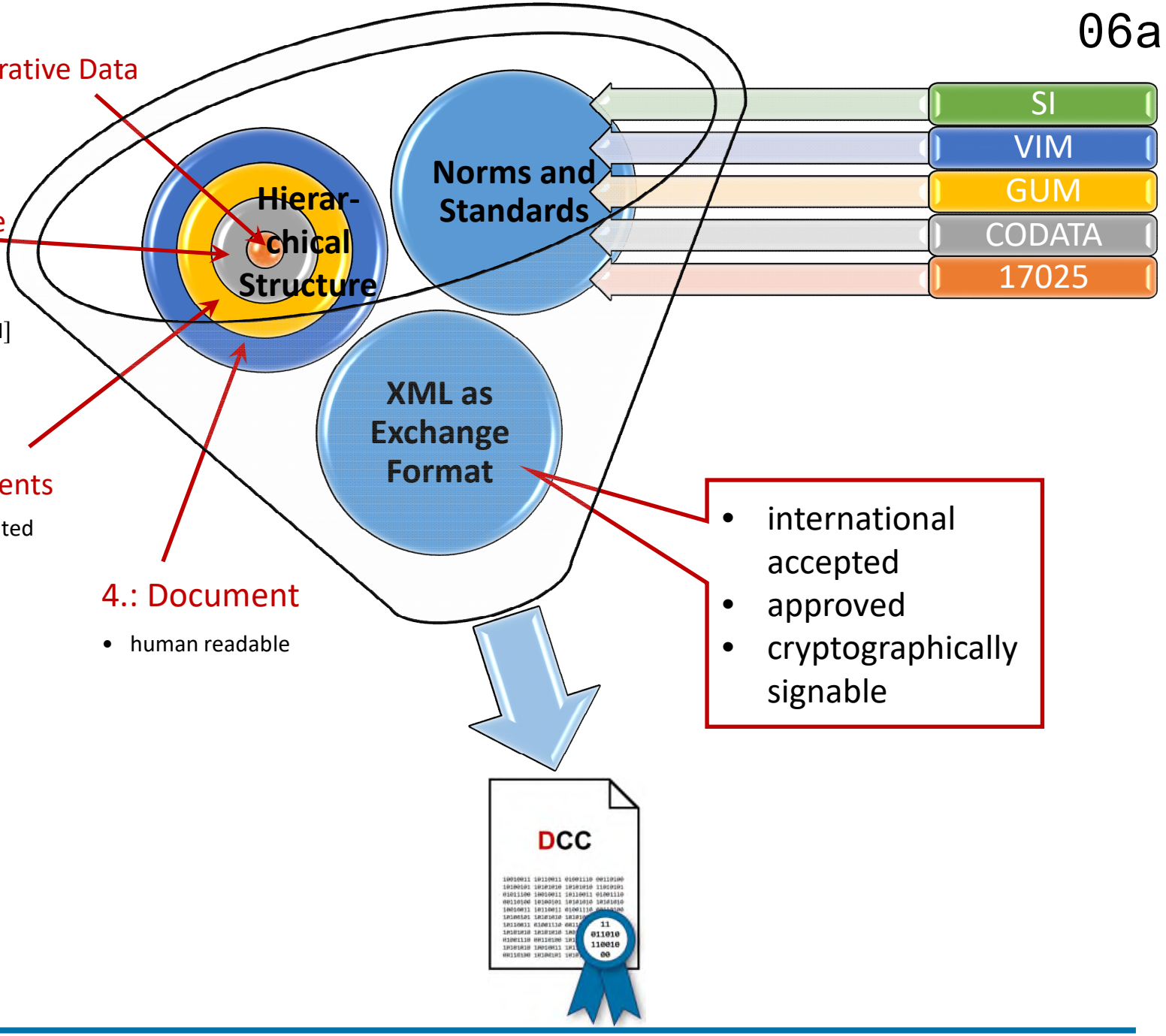
- regulated:
  - $Y = y \quad U(k)$ [SI]
- not regulated:
  - individual data
  - …

3.: Comments

- not regulated

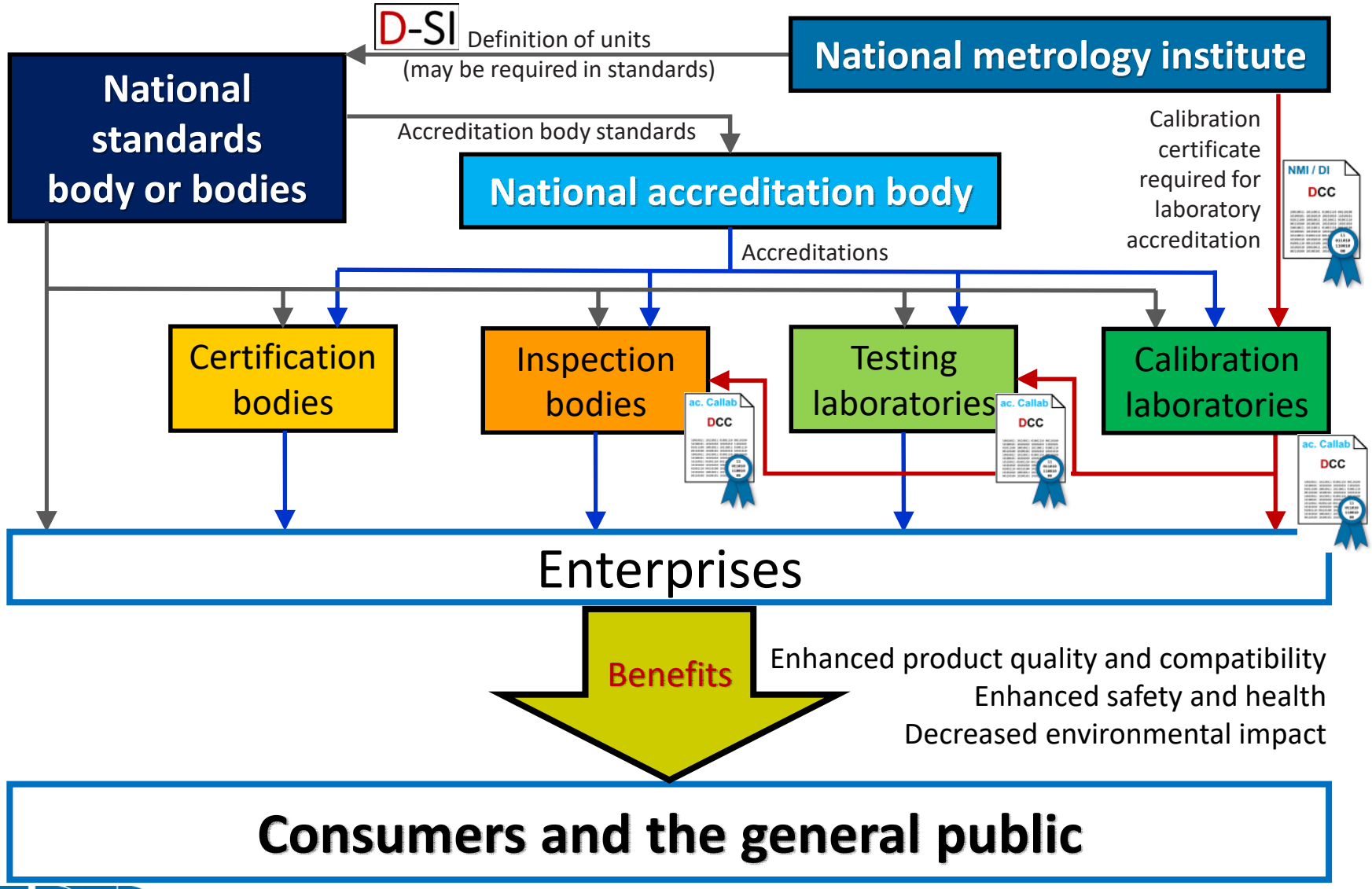
4.: Document

- human readable



- international accepted
- approved
- cryptographically signable

National Quality Infrastructure



Source: Adapted from Guasch et al., Quality Systems and Standards for a Competitive Edge, The World Bank, 2007

Cryptographic Protection Methods

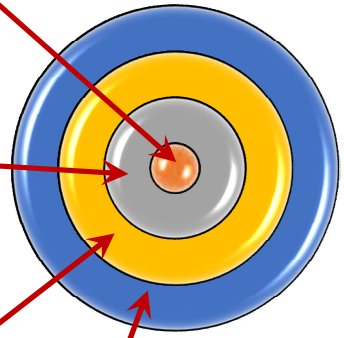
1.: Administrative Data

2.: Results of the Calibration

3.: Comments

4.: Document

- human readable



Electronic Signature

eIDAS-Directive

More than ten years in use:

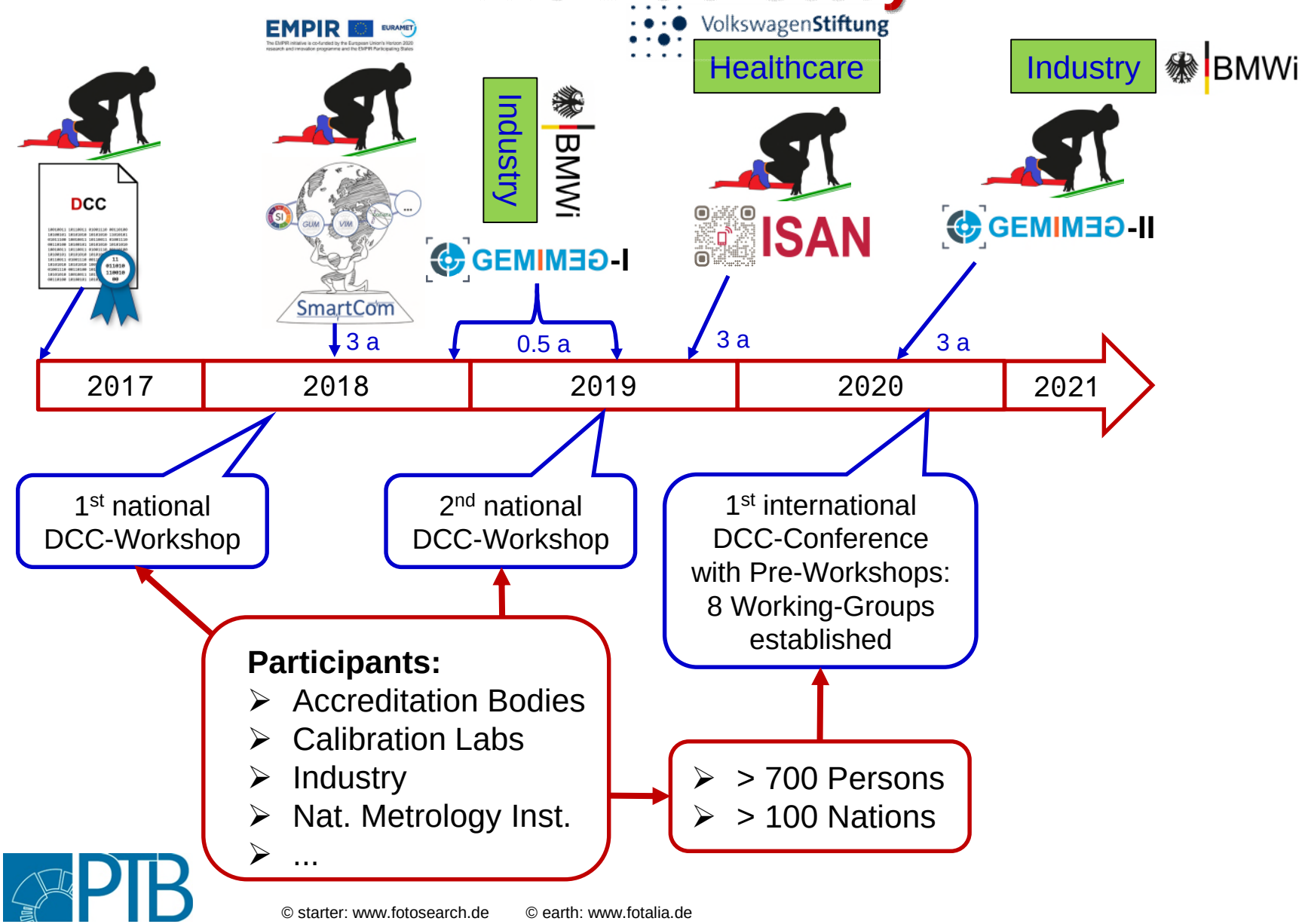
- Civil register office (“Standesamt”)
- Waste management
- Purchasing development
- …

Area of validity:
All over Europe!

How is the regulation in other countries?
Please give us some hints

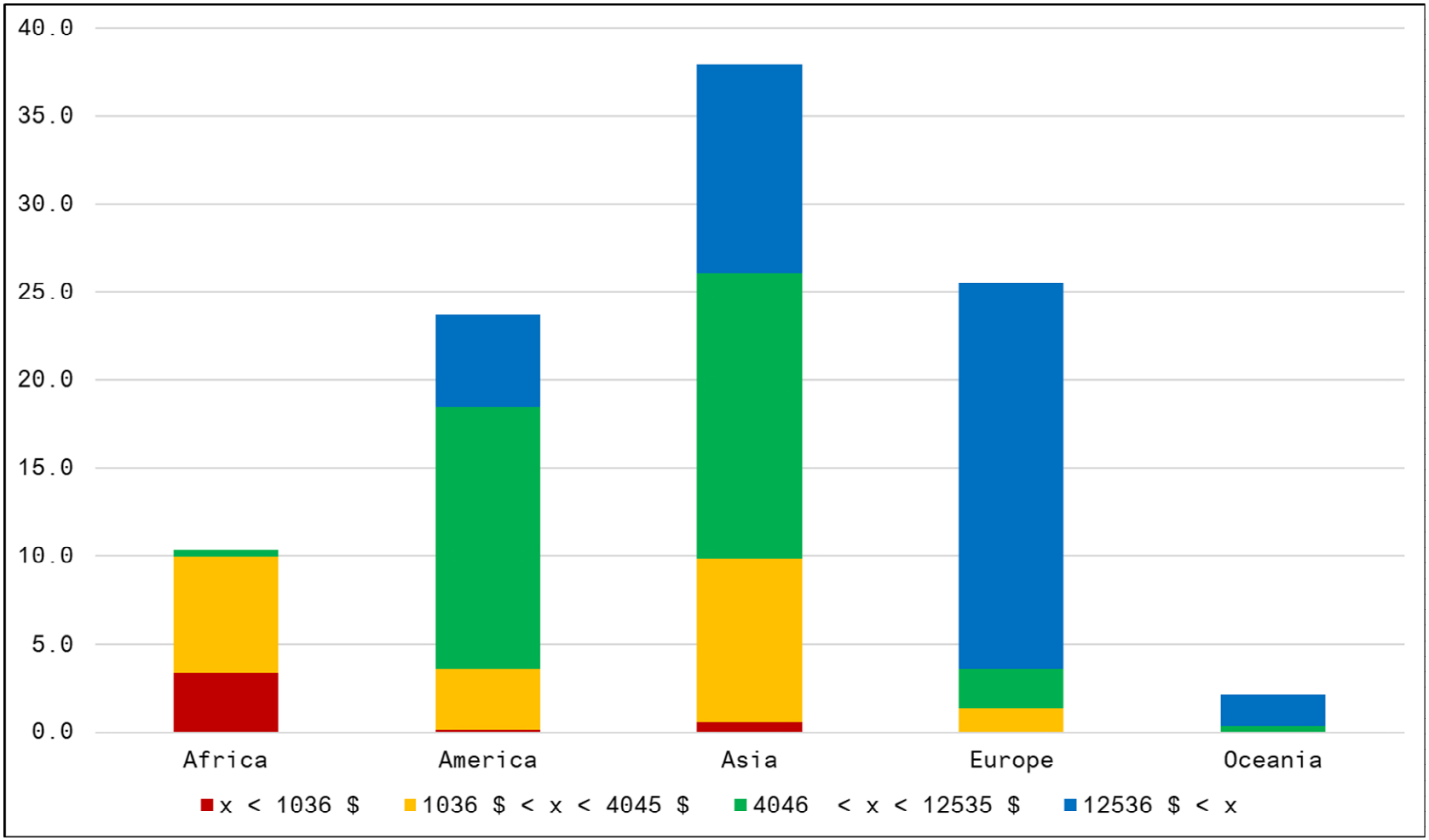
eIDAS-Directive

The DCC-Story

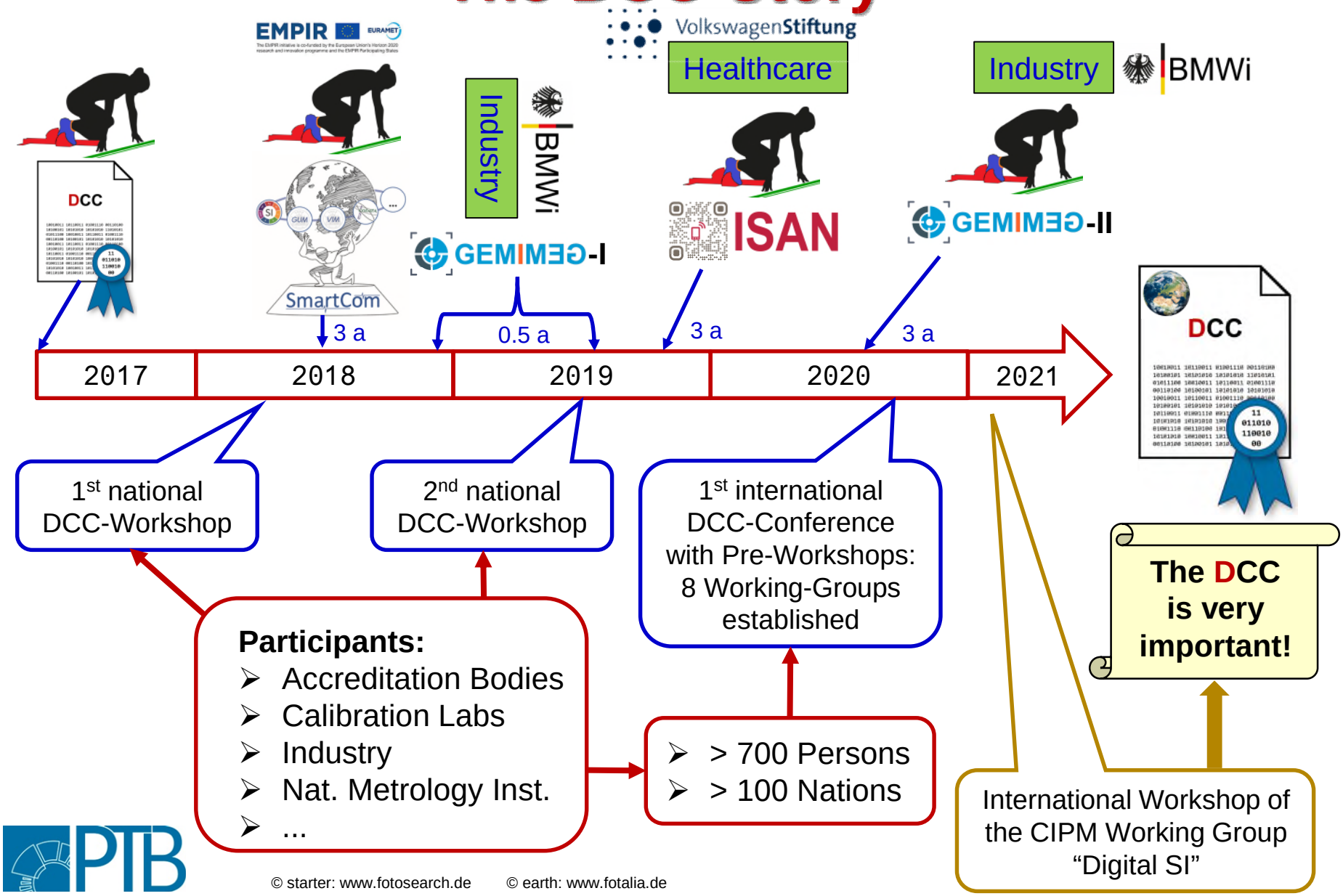


Participants Distribution DCC-Conference 2020

Classification according to: https://datahelpdesk.worldbank.org/knowledgebase/articles/906519



The DCC-Story



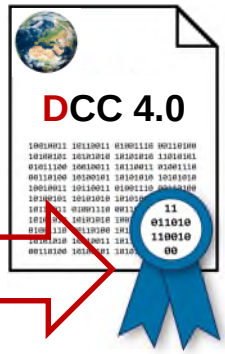
Evaluation of Good Practise (GP)

Documentation in many languages

GP Temperature

GP for
- Pressure
- Humidity
- Flow
- ...

POC Pharma: DCC (Temp); DCR; DCA



2020 | 2021 | 2022

1st int. DCC-Conference

The DCC is very important!

Evaluation of a Uniform Syntax for Digital Certificates (DCC; DCR; DCA; ...)

2nd int. DCC-Conference (Week No 9)

DCC-Summerschool (Week No 24+25)

International Workshop of the CIPM Working Group "Digital SI"

Long-term DCC Scheme V. 3.X

How to get more Information around the DCC

https://www.ptb.de/dcc

Downloads	Development-Platform	FAQ
Wiki	XML	Good Practise
Videos	Miscellaneous	Links

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