The Digital Calibration Certificate (DCC)

What is it and how does it work for the weighing industry

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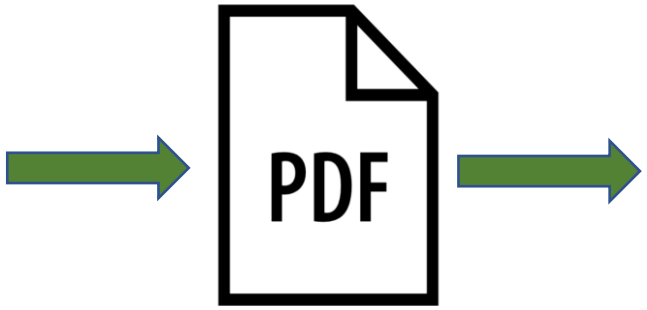
DCC - What it is (Definition)

- DCC is technically a text document provided in XML (Extensible Markup Language) structure. XML documents are saved as plain text files based on the Unicode character set, which has become the internationally recognized data exchange format
- DCC is the digital equivalent of the current analogue calibration certificate
- The information and data in the file is structured in a clear format allowing unambiguous access through software and machines
- Machine-readable electronic file providing all information and data that needs to be reported from calibration
- DCC has the same status as a paper-based calibration certificate, but it is enabling an easy integration into digital applications

Source: https://www.ptb.de/dcc/

DCC - What it is (How does it look like ?)




```
▼<dcc:data>
  ▼<dcc:quantity refType="maximumPermissibleError">
    ▼<si:real>
       <si:value>10</si:value>
       <si:unit>\kilogram\metre\tothe(-3)</si:unit>
     </si:real>
   </dcc:quantity>
 </dcc:data>
</dcc:metaData>
</dcc:measurementMetaData>
</dcc:quantity>
</dcc:data>
</dcc:influenceCondition>
▼<dcc:influenceCondition refType="temperature">
  ▼<dcc:name>
     <dcc:content lang="de">Temperatur</dcc:content>
     <dcc:content lang="en">temperature</dcc:content>
   </dcc:name>
  ▼<dcc:data>
```

Hard copy
→ Printed Paper

Digitization
Digital form of hard copy
→ No machine readable

Digitalization
XML-file, validated against DCC scheme:
→ **Machine readable**
XML-file, validated against DCC scheme and using DCC-GP (Harmonised Good Practice conventions):
→ **Machine interpretable**

DCC – What it is (How does it look like ?)

Goal:
DCC = Machine interpretable

- XML-file, validated against consolidated DCC-scheme
- Good Practice conventions (DCC-GP) based on the DCC-scheme

DCC – GP (Good Practice by conventions)

DCC - GP is the implementation of harmonized conventions agreed with experts from the relevant communities, to which the calibration partners adhere

Example:

One of the conventions defined in DCC-GP NAWI:

Good Practice convention for denoting nominal and calibrated weighing ranges of a weighing instrument https://gitlab1.ptb.de/d-ptb/dcc/TCs/nawi/-/issues/1

DCC – GP (Good Practice by conventions)

Good Practice convention for denoting nominal weighing ranges of a weighing instrument

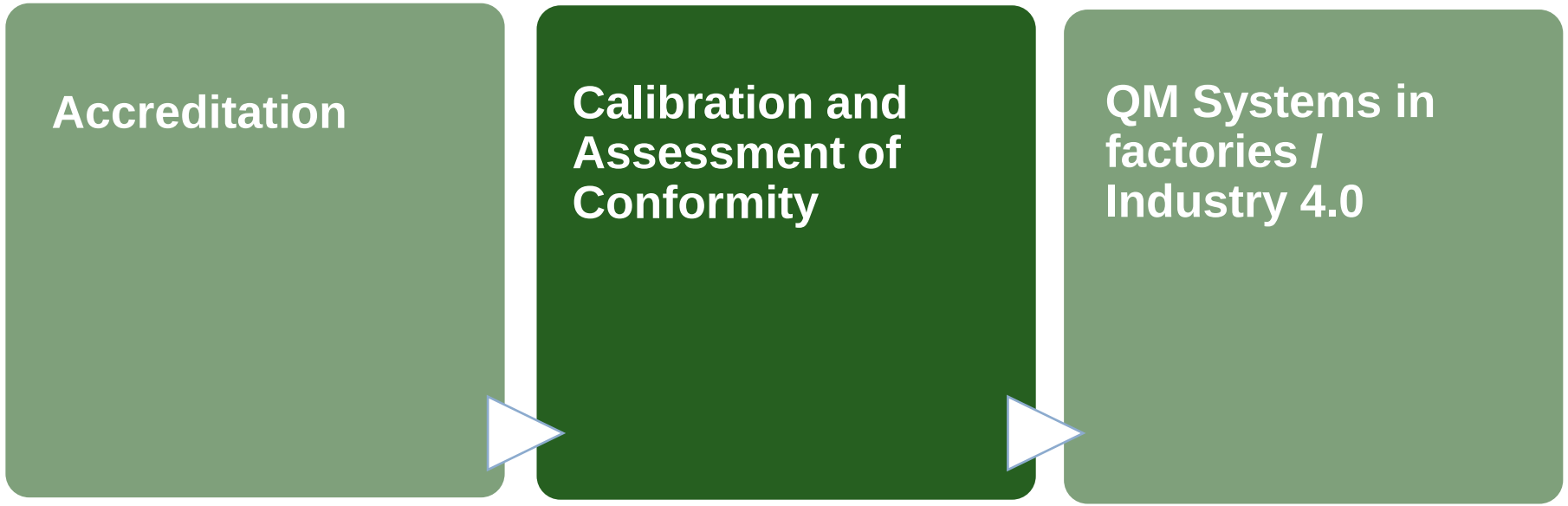
Example:

1. **Specification of the nominal metrological data of the range(s) of the instrument:**

- Preferred solution is to specify the (nominal) metrological data of the instrument in one **dcc:influenceCondition** element per (partial) range.
- Identification of these elements should be done with dedicated refTypes (to be defined yet - suggestion: NAWI_range1, NAWI_range2,....)
- Within these elements, the subelements **dcc:name** and/or **dcc:description** can be used for human readable identification (e.g. "Range 1") and a **dcc:data** element can be used to have **dcc:quantity** elements for the relevant metrological data (Max and d (and optionaly Min and e) for NAWIs).

Source: https://gitlab1.ptb.de/d-ptb/dcc/TCs/nawi/-/issues/1

DCC – Part of D-QI



Digital Accreditation Symbol
e-attestation
Proof of Authenticity

Digital information and data reported from calibration

DCC

Digital transmission; encryption / digital signature

DCC – Available for Weighing Industry ?

DCC- NAWI (Non-Automatic Weighing Instruments)

DKD Deutscher Kalibrierdienst

PTB Physikalisch-Technische Bundesanstalt Braunschweig und Berlin

DCC- Mass (weights and weight sets)

- PTB hosted DCC-scheme used
- Based on DCC-GP developed by expert groups: PTB + German Calibration Service (DKD)
- DCC-GP getting published by DKD-Expert Report
- Introduced at the International DCC Conference
- Practical use started

Source of pictures:
https://www.google.com/search

DCC – NAWI

DCC- NAWI (Non-Automatic Weighing Instruments)		
Validated against **DCC-scheme**	✓	https://www.ptb.de/dcc/
Based on **DCC-GP** NAWI	✗	DKD-Expert Report **DCC-GP** NAWI / Work is still in progress
Accepted by accreditation body	✓	e.g. DAkkS: If DCC-scheme is used
Intended to be implemented into accreditation	✓	e.g. DAkkS: The digital accreditation symbol is available
First practical realisations started	✓	

DCC – MASS

DCC- MASS (Weights and Weight Sets)		
Validated against **DCC-scheme**	✓	https://www.ptb.de/dcc/
Based on **DCC-GP** MASS	✓	DKD-Expert Report **DCC-GP** MASS published → **DKD-E 7-2**
Accepted by accreditation body	✓	e.g. DAkkS: If DCC-scheme is used
Intended to be implemented into accreditation	✓	e.g. DAkkS: The digital accreditation symbol is available
First practical realisations started	✓	

DCC – NAWI + MASS : Prospects

2024:
GP-NAWI expert report will be published
→ DCC-GP MASS and DCC-GP NAWI are available for use

2024 - 2025:
Available software solutions made for calibration laboratories can generate the DCC-NAWI or DCC-MASS
→ Calibration laboratories will be able to offer the DCC to their customers

DCC – Conclusions

The DCC is an important part of the modern digital quality infrastructure.
It improves the efficiency, safety and sustainability of calibration processes and contributes significantly to the optimization of quality management systems.

Use of a harmonised DCC scheme needed
A harmonised scheme is required so that every DCC can be read and interpreted internationally and interchangeably by machines. The PTB-hosted scheme is suitable, published and recognised. → https://www.ptb.de/dcc/

DCC-GP: Good Practice for a successful DCC
Do not hesitate to create or use a DCC. The preconditions are there. You don't have to be an expert. More and more tools, guides and examples are becoming available.

THANK YOU FOR YOUR INTEREST

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