A PROPOSAL FOR A STANDARD CALIBRATION DATA FORMAT

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Fluke Calibration

HISTORY

- MSC 2013
  - Mark Kuster – Metrology: Standardize and Automate!
- NCSLi 2016
  - MII Forum
- MSC 2017
  - MII Session
- NCSLi 2017
  - Discussion Panel
- Over a dozen articles in *Metrologist* and Cal Lab Magazine

MII
Measurement
Information
Infrastructure

- Jan 2013
  - MII Concept Introduced
- June 2017
  - 141 MII & Automation Committee Formed

WHERE TO START?

- MII Session at MSC 2017
  - Focused on Scope of Accreditation
- How to apply those concepts to calibration data?
- How can I leverage Fluke’s market saturation in automation and asset management to push this forward?
- How do I make other products interested in coming on board?
- Customers want it!

EXISTING EFFORTS ELSEWHERE

- 2012
- Association of German Engineers
- VDI/VDE-2623
- Format für den Austausch von Daten im Prüfmittelmanagement
- Format for data exchange in management of measuring and test equipment

SCOPE OF VDI/VDE-2623

"In this guideline a definition is given of the exchange of data which are required and generated during a calibration process. This should make it possible for measuring and test equipment data to be exchanged securely and rapidly between different systems (departments, companies, plants, and so on). The aim here is to collect and collate relevant data for any measuring and test equipment required for the management of measuring and test equipment and thus for process and quality assurance."

Main groups

Orders (data format acc. to VDI/VDE 2623)
- Order "1"
  - Commercial/organizational part
    - Buyer data
    - Supplier data
  - Technical part/item list
    - Order item "1"
      - Master data
        - Properties/designations
          - Property "1"
          - Property "b"
        - Additional ID numbers
          - Additional ID number "1"
          - Additional ID number "i"
        - Accessories list
          - Accessories item no. "1"
          - Accessories item no. "z"
        - Sub-item list
          - Sub-item no. "1"
          - Sub-item no. "u"
      - Buyer data
        - Logistics data
        - Inspection plan
          - Inspection plan characteristics
            - Characteristic "1"
              - Attributes of characteristic
                - Attribute "1"
                - Attribute "a"
            - Characteristic "n"
        - Buyer directives
          - Buyer directive "1"
            - Data instructions
              - Data instruction "1"
                - Dats formats
                  - Data format "1"
                  - Data format "f"
              - Data instruction "di"
          - Buyer directive "e"
      - Supplier data
        - Logistics data
        - Calibration results
          - Calibration result "1"
            - Inspection plan
              - Inspection plan characteristics
                - Characteristic "1"
                  - Attributes to the inspection plan characteristics
                    - Attribute "1"
                    - Attribute "a"
                  - Traceability to the inspection plan characteristics
                    - Traceability "1"
                    - Traceability "r"
                - Characteristic "n"
            - Result list
              - (Requested) results
                - Result "1"
                  - Data instructions
                    - Data instruction "1"
                      - Data formats
                        - Data format "1"
                        - Data format "f"
                    - Data instruction "di"
                - Result "e"
          - Calibration result "k"
    - Order item "n"
- Order "o"

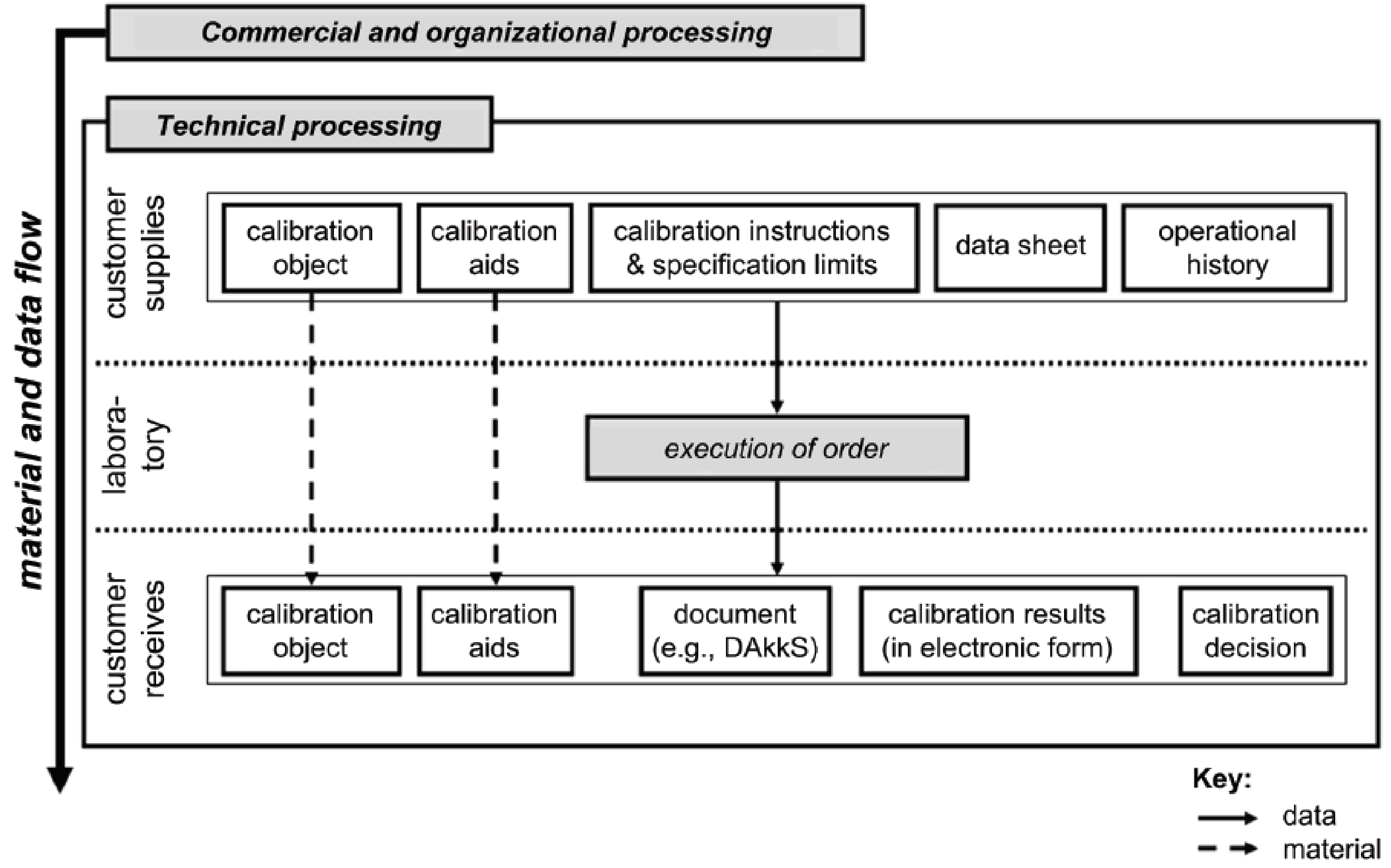

Figure 1. Application case of the CDE data format

6.1 Wirtschaftlich-organisatorischer Teil / Commercial/organizational part

Datengruppe / Data group		Deutsch	English	Erläuterung	Explanation	Muss - optional / Mandatory - optional	Tag	Beispiel / Example
Wirtschaftlich-organisatorischer Teil / Commercial/organizational part				Kopfdaten des Auftrags	header data of order	M	header_section	
		Auftragsnummer	order id	Auftragsnummer	order number	M	id	5029365
		Auftragsdatum	order date	Erstelldatum des Auftrags	date of order	M	date	2012-03-14
		Auftragsuhrzeit	oder time	Uhrzeit der Auftragserstellung	time of order	M	time	12:24:54
		Sprache	language	Sprache entsprechend ISO 639-1	language as per ISO 639-1	M	language	de
		Version	version	Schnittstellen-version	interface version	M	version	2012-06
		System	creating system	erzeugendes System	creating system	M	creator	PM Manager V. 3.54
		Belegnummer	receipt id	Belegnummer	receipt ID	O	receipt_id	987654321
		Bemerkung	remark	Freitext	remark	O	remark	Beispielauftrag
	Einkäuferdaten / Buyer data			Auftraggeber	purchaser	M	buyer	
	Lieferantendaten / Supplier data			Auftragnehmer, z.B. Kalibrierlabor	supplier such as calibration laboratory	M	supplier	

CALIBRATION DATA FORMAT

- 9 “categories”
- Each category contains a field count for that category
- Fields and subfields
- Full field count found in first category

- Order
- Technical Items
- Order ID
- Buyer
- Supplier Data
- Inspection Plan
- Inspection Plan Characteristics
- Calibration Results
- Additional Data Fields

ORDER

This category lists the total expected fields in the data package, and must match the total fields used throughout the package.

1. Order
    a. Expected fields

TECHNICAL ITEMS

Technical Items (Assets: DUT's and Standards)

- a. Expected fields count
- b. Header for technical list
- c. "Master Data"
  1. Unique ID
  2. Description
  3. Manufacture
  4. Model number
  5. SN
  6. Supplier ID
  7. Properties
     - a. Amount of additional Properties
     - b. Value of property
  8. Secondary IDs
  9. Accessories
     - a. Amount of Accessories
     - b. Value of accessories
       - i. 6b1, 6b2,6b3, 6b4
  10. Sub-items
      - a. Amount of sub-items
      - b. Value of sub-items
        - i. 6b1, 6b2,6b3, 6b4
  11. Traceability of standard
      - a. Unique ID – 6b1, 6b2,6b3, 6b4
      - b. Last calibration date
      - c. Next calibration due date
      - d. Service hash ID of calibration, 8a
  12. Additional fields as needed

This category houses details about the device under test, standards in use, and all additional references. All assets in use for the maintenance or calibration event need to be associated to a unique identifier.

ORDER ID

Order ID describes the specific details about where, when and who will be doing the calibration of maintenance.

3. Order ID (Work Order Number)
    a. Expected fields count
    b. Date/Time (Service Date/time)
    c. ISO 639-1 (language)
    d. Interface Version
    e. Creator (Technician)
    f. Purchaser/Buyer (Customer ID)
    g. Supplier (Cal Lab)
    h. Additional fields as needed

BUYER

4. Buyer (unique customer ID)
    a. Expected fields count
    b. Company name (facility)
    c. Street address
    d. Zip Code
    e. City/State
    f. Additional fields as needed

This category describes the device provider or owner details, like address and names.

SUPPLIER DATA

This category houses all details about the calibration laboratory, company name and addresses.

5. Supplier Data
    a. Expected fields count
    b. Supplier (lab unique identifier)
    c. Company name
    d. Supplier street address
    e. Zip Code
    f. City/State
    g. Country
    h. Additional fields as needed

INSPECTION PLAN

6. Inspection Plan (Service)
    a. Expected fields count
    b. Service Type Description
    c. Accreditation
    d. Service Type ID (Procedure Name or ID#)
    e. Date/time
    f. Additional fields as needed

This category describes the specific procedure that will be performed during the calibration or maintenance.

INSPECTION PLAN CHARACTERISTICS

Inspection Plan Characteristics describes what data and how much data is expected to be collected.

7. Inspection Plan Characteristics
    a. Expected fields count
    b. Service Type ID (hash of ST, and a run ID and date)
        i. 6c
        ii. 3a
    c. Description
    d. Service Type
    e. Amount of tests
    f. Amount of test points
    g. Nominal Value
    h. Upper Limit
    i. Lower Limit
    j. Units
    k. Comment
    l. Additional fields as needed

CALIBRATION RESULTS

This category houses the collected results per section.

8. Calibration Results
    a. Expected fields count
    b. Service Type ID (hash of ST, and a run ID) PK
    c. Section I#ID
    d. Result
        i. Result value
        ii. Unit
        iii. Uncertainty
        iv. Unit uncertainty
        v. Coverage factor
        vi. Date/time
        vii. Comment
    e. Temp
        i. Unit
    f. Humidity
        i. Unit
    g. Location of test
        i. Supplier (Calibration Lab) PK
    h. Primary Technician
    i. Additional fields as needed

ADDITIONAL DATA FIELDS

This final category is designed to house any additional data that the device designer, procedure creator, accreditation or law requires.

9. Additional data fields as needed
   a. Expected amount of fields
   b. Additional fields as needed

FILE FORMAT

- XML is prescribed by VDI/VDE-2623
- MII efforts are focusing on Mimosa
- Other options?

- External Machine Interface (EMI)
- Commonly used in Short Message Service (SMS) applications
- String-based
- Can generate other formats
- Uses hexadecimal and ASCII encoding
- Encryptable

EXAMPLE

^A01/552035853/85335853/5//5/50/300/1000/N1000/VDC/3R/031420181355/23C/40PRH/35853AJC/5001/5099/500001/1000001/N100001/21/B01^

This is a Fluke 5520 calibrating a Fluke 85 III and its results. This can then be parsed in XML, PYTHON JAVA, etc.

WHY OUR PROPOSAL?

- Builds on existing work that has been in place for six years
- Flexible and convertible
- Built around existing technologies with widespread use