



**DANISH
TECHNOLOGICAL
INSTITUTE**



Working with DCX

Lessons learned and
tools developed

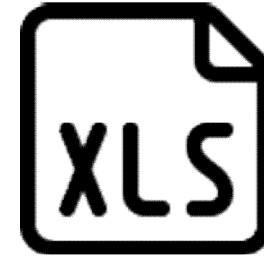
Agenda

- Getting started with DCX
- Machine readability and human readability
 - Structure
 - Developing for the different formats
- Learnings and challenges in working with DCX
- Tools developed
 - DCC and DCX interpreter
 - DCX Generation tool

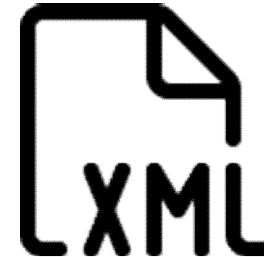
Getting started with the DCX

- Where did we start?

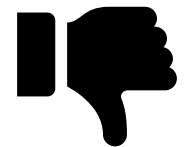
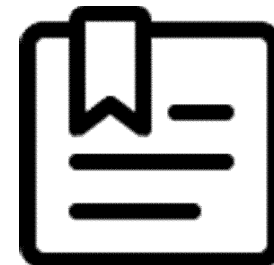
XLS Schema



XML Example



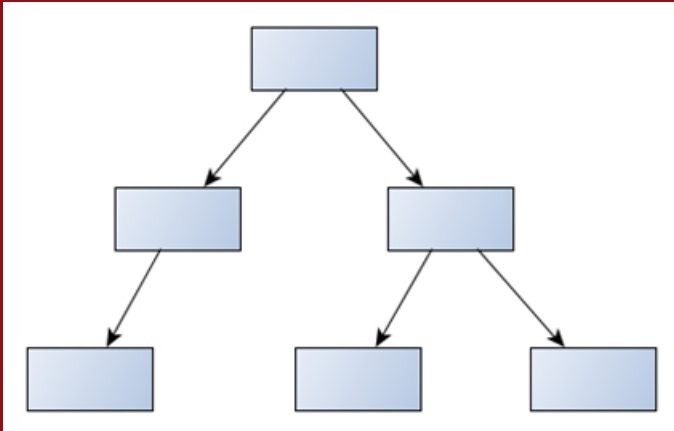
Documentation



Machine readability and human readability

DCC

Tree structure



Good for organizing complex data
Designed with a lot of options in mind

Complex

DCX

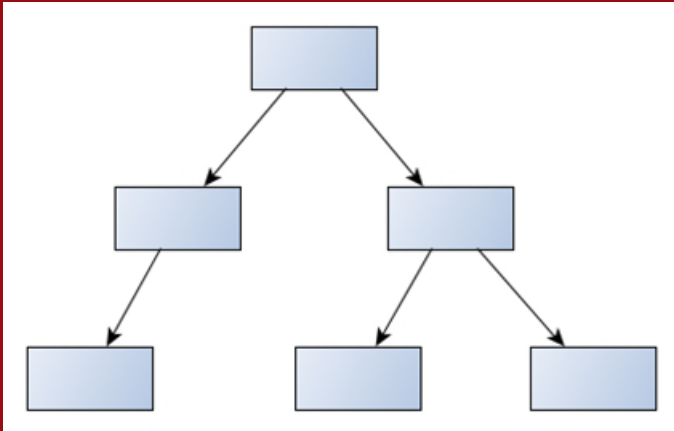
Tabular structure

Well structured
More rigid

Simpler

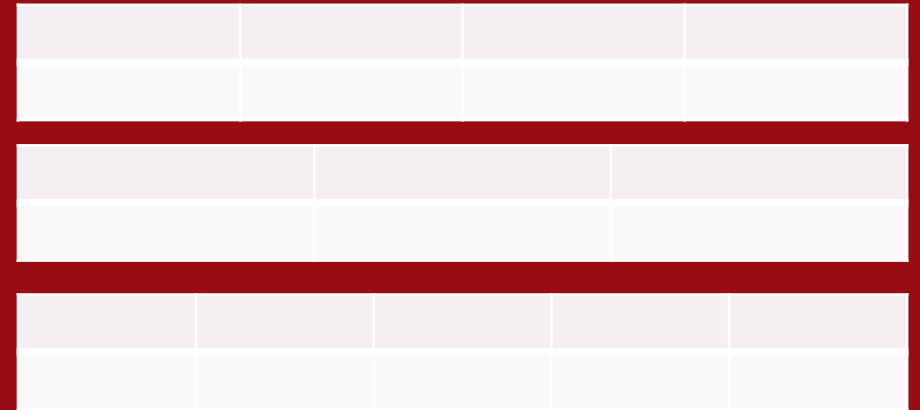
Developing tools for each format

DCC



Good naming convention
Deep data structure
Lots of options
→ Demands a lot of software

DCX



Good naming convention
Shallow data structure
More rigid
→ Easier to build tools for

Learnings and challenges in working with DCX

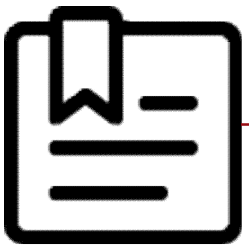
DCX – DCR and DCC combined

documentIdentifier: "customerDCR"



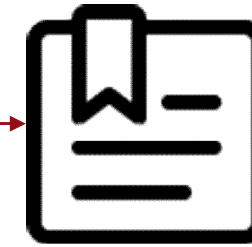
DCX - DCR

Target value	Reference value	DUT value
10		
20		



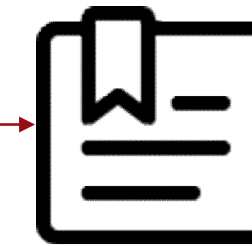
DCX - DCR

documentIdentifier: "laboratoryDCC"



DCX - DCC

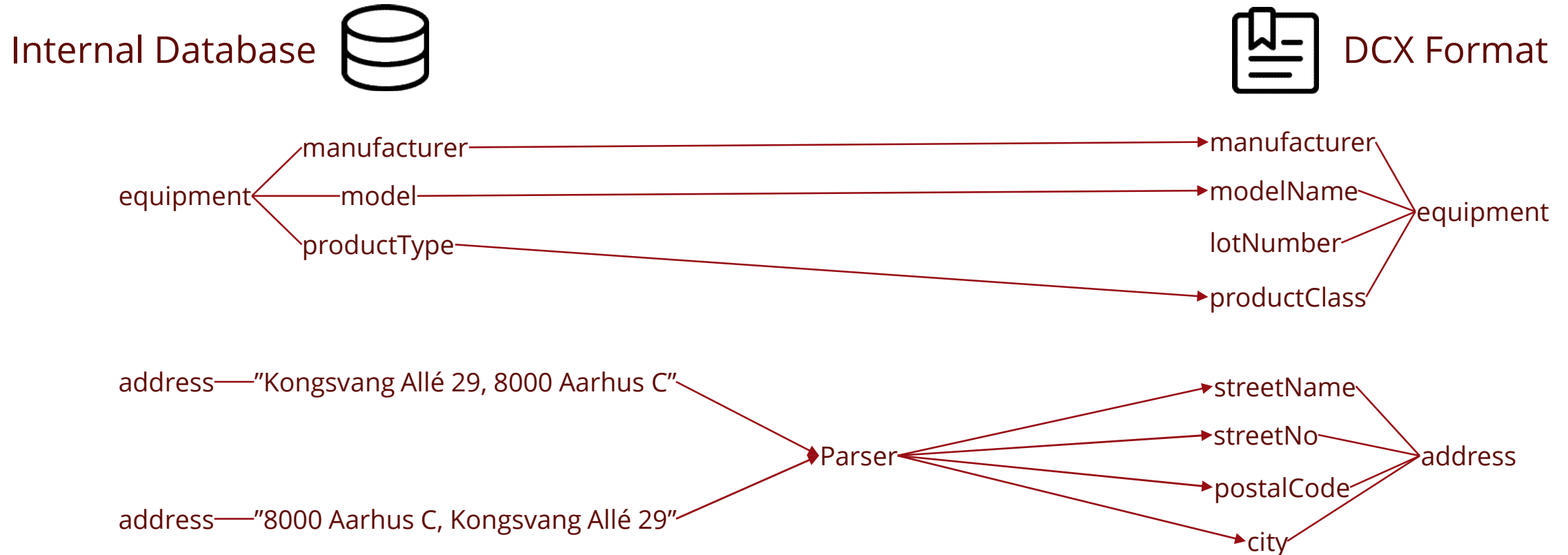
Target value	Reference value	DUT value	Comment
10	10,02	9,91	Some comment
20	19,96	20,21	



DCX - DCC

Learnings and challenges in working with DCX

- Reviewing how you save data
 - Data you save vs data in the format
 - Saving in the right format



Tools developed

- DCC showcase tool
- DCX showcase tool
- DCX generator

DCC (Digital Calibration Certificate)

DCC-fortolkeren er et værktøj til visuelt at få fremvist en DCC. Værktøjet er stadig under udvikling og kan kun bruges med version 3.3.0.

DCC fil *

dcc_gp_temperature_extensive.xml Browse Download eksempel Choose language *

About
DCC Version: 3.3.0
Company name: Kalibrierfirma GmbH
Calibration date: 1970-08-13 - 1970-08-13
Calibration location: Musterstraße 1 DE Musterstadt (00900)
Calibrated by: Michaela Musterfrau; Michael Mustermann
Customer: Kunde GmbH
Customer ID: Customer ID no. 1024418
Instrument type: Temperature sensor

Calibration conditions

Immersion depth in water bath: 0.1 m
Ambient condition temperature
temperature min: 293 K
temperature max: 299 K
These values were not measured, but were given based on typical
Ambient condition relative humidity
humidity min: 20 %
humidity max: 70 %
These values were not measured, but were given based on typical
Adjustment
Reference value:
Indicated measured value probe:
Measurement error:

Measuring results

Reference value (K)	Reference value (°C)	Indicated measured value probe (K)	Indicated measured value probe (°C)	Measurement error (K)	Reference
306.248	33.098	306.32	33.17	0.072	306
373.121	99.971	373.21	100.06	0.089	373
448.253	175.103	448.36	175.21	0.107	448
523.319	250.169	523.31	250.16	-0.009	523
593.154	320.004	593.07	319.92	-0.084	593

Download as Excel

Search:

Choose 1st axis *

Choose 2nd axis

Vælg fil Der er ingen fil valgt

Download eksempel

Ryd form

Filer	Titel	Bemærkninger	Administrativt - Kalibrering	Administrativt - Fakturering	Udstyr	Indstillinger	Målings konfiguration	Måleresultater
Administrativt data								
Klient								
Klient overskrift								
Klient overskrift 1 Klient overskrift 2 Tilføj ny Klient overskrift								
Sprog * Indhold * Customer								

DCX (Digital Calibration Exchange)

Dette værktøj er udviklet til visuelt at fremvise indholdet i en DCX. DCX er udviklet af DFM og er et alternativt format til DCC, som forsøger at kombinere DCC og DCR delen i et format.

DCX file *

dcc-example.xml Browse

Download example *

Download eksempel

Calibration certificate

Pipettes

Type: certificate

Meta Data	Used equipment	Measuring Systems Under Calibration
Version: 1.0.0 Document number: SKH_10112_2 Main signer: Erling T. Nielsen etn@dandag.dk Lab technician: Hans H. Andersen Calibration laboratory: Dandag A/S Baldersvej 19, 2635 Ishøj, DK Kontakt person rln@dandag.com mobile: 2342 4556 Performance date: 2022-02-10 - 2022-02-10 Customer: Dandag A/S Baldersvej 19, Ishøj, DK Kontakt person Scott Kenney Hansen skh@dandag.com Phone: 23 34 3456 Billing information John Doe Main Street 123, 7890 Sample City, US Kontakt person Jane Smith jane.smith@example.com Phone: +1-234-567-8902 mobile: +1-234-567-8901	Device for measurement Pipette with 12 channels 50-1200 µm category: deviceForMeasurement ID: Item1 Manufacturer: Blohit Product name: Picus Serial number: 12008522 Pipette tip (1200 µl) category: deviceForMeasurement ID: Item2 Manufacturer: Satorius Product name: Optilift Serial number: ss23987 Balance, resolution: 0.00001 g, calibrated: 2021-11-25. category: referenceStandard ID: ref1 Manufacturer: Satorius DFM number: ID148	Channel 1 Equipment ref. Pipette with 12 channels 50-1200 µm Pipette tip (1200 µl) Setting ref. Channel 1 Speed in 5 Same speed is used in all measurements speed out 5 Same speed is used in all measurements referenceStandardRefs Balance, resolution: 0.00001 g, calibrated: 2021-11-25. Method ref. Used method The calibration is carried out by using the gravimetric performance test method. The used method is based on the O5/ISO 8655 standard. The used liquid is water according to O5/EN ISO 3696, grade 3. The conversion from mass to volume is done by using the calculation in O5/ISO/TR 20461. Operational status.: as found Channel 2 Equipment ref. Pipette with 12 channels 50-1200 µm Pipette tip (1200 µl) Setting ref. Channel 2 Speed in 5 Same speed is used in all measurements

DCC Showcase tool

- Updated to support DCC V3.3.0

DCC (Digital Calibration Certificate)

DCC-fortolkeren er et værktøj til visuelt at få fremvist en DCC. Værktøjet er stadig under udvikling og kan kun bruges med version 3.3.0.

DCC fil *

dcc_gp_temperature_extensive.xml

Browse

Download eksempel

Choose language ▾

About

DCC Version: 3.3.0

Company name: Kalibrierfirma GmbH

Calibration date: 1970-08-13 - 1970-08-13

Calibration location: Musterstraße 1 DE Musterstadt (00900)

Calibrated by: Michaela Musterfrau; Michael Mustermann

Customer: Kunde GmbH

Customer ID: Customer ID no. 1024418

Instrument type: Temperature sensor

Calibration conditions

Immersion depth in water bath: 0.1 m

Ambient condition temperature

temperature min: 293 K

temperature max: 299 K

These values were not measured, but were given based on typical weather conditions at a time of year. [°1]

Ambient condition relative humidity

humidity min: 20 %

humidity max: 70 %

These values were not measured, but were given based on typical weather conditions at a time of year. [°1]

Adjustment

Reference value:

Indicated measured value probe:

Measurement error:

Download as Excel

Measuring results

Search:

Choose 1st axis *

Choose 2nd axis *

Reference value (K)↕	Reference value (°C)↕	Indicated measured value probe (K)↕	Indicated measured value probe (°C)↕	Measurement error (K)↕	Reference
306.248	33.098	306.32	33.17	0.072	306
373.121	99.971	373.21	100.06	0.089	373
448.253	175.103	448.36	175.21	0.107	448
523.319	250.169	523.31	250.16	-0.009	523
593.154	320.004	593.07	319.92	-0.084	593

4

3

2

1

-

DCX Showcase tool

- New feature! DCX Showcase tool

DCX (Digital Calibration Exchange)

Dette værktøj er udviklet til visuelt at fremvise indholdet i en DCX. DCX er udviklet af DFM og er et alternativt format til DCC, som forsøger at kombinere DCC og DCR delen i et format.

DCX file *

dcc-example.xml

Browse

Download example *

Download eksempel

Calibration certificate

Pipettes

Type: certificate

Meta Data	Used equipment	Measuring Systems Under Calibration
<p>Version: 1.0.0</p> <p>Document number: SKH_10112_2</p> <p>Main signer: Erling T. Nielsen etn@dandiag.dk</p> <p>Lab technician: Hans H. Andersen</p> <p>Calibration laboratory Dandiag A/S Baldershøj 19, 2635 Ishøj, DK</p> <p>Kontakt person nln@dandiag.com mobile: 2342 4556</p> <p>Performance date: 2022-02-10 - 2022-02-10</p> <p>Customer Dandiag A/S Baldershøj 19, Ishøj, DK</p> <p>Kontakt person Scott Kenney Hansen skh@dandiag.com Phone: 23 34 3456</p> <p>Billing Information John Doe Main Street 123, 7890 Sample City, US</p> <p>Kontakt person Jane Smith jane.smith@example.com Phone: +1-234-567-8902 mobile: +1-234-567-8901</p>	<div><div>Device for measurement</div><div>Pipette with 12 channels 50-1200 µm</div><div>category: deviceForMeasurement</div><div>ID: item1</div><div>Manufacturer: Biohit</div><div>Product name: Pícus</div><div>Serial number: 12008522</div></div> <div><div>Pipette tip (1200 µl)</div><div>category: deviceForMeasurement</div><div>ID: item2</div><div>Manufacturer: Satorius</div><div>Product name: Optifit</div><div>Serial number: ss23987</div><div>Balance, resolution: 0.00001 g, calibrated: 2021-11-25.</div><div>category: referenceStandard</div><div>ID: ref1</div><div>Manufacturer: Satorius</div><div>DFM number: ID148</div></div>	<p>Channel 1</p> <p>Equipment ref. Pipette with 12 channels 50-1200 µm Pipette tip (1200 µl)</p> <p>Setting ref. Channel 1 Speed in 5 Same speed is used in all measurements speed out 5 Same speed is used in all measurements</p> <p>referenceStandardRefs Balance, resolution: 0.00001 g, calibrated: 2021-11-25.</p> <p>Method ref. Used method The calibration is carried out by using the gravimetric performance test method. The used method is based on the DS/ISO 8655 standard. The used liquid is water according to DS/EN ISO 3696, grade 3. The conversion from mass to volume is done by using the calculation in DS/ISO/TR 20461.</p> <p>Operational status.: as found</p> <p>Channel 2</p> <p>Equipment ref. Pipette with 12 channels 50-1200 µm Pipette tip (1200 µl)</p> <p>Setting ref. Channel 2 Speed in 5 Same speed is used in all measurements</p>

DCX Generator

- New feature: DCX Generator tool

Vælg fil Der er ingen fil valgt Download eksempel Ryd form

Filer	Titel	Bemærkninger	Administrativt - Kalibrering	Administrativt - Fakturering	Udstyr	Indstillinger	Målings konfiguration	Måleresultater
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Administrativt data

Klient

Klient overskrift

Klient overskrift 1 Klient overskrift 2 Tilføj ny Klient overskrift

Sprog * Indhold *

English Customer

Metadata

ID Reference til fil

Navn * VAT ID URL

Kalibreringskunde A/S

Adresse

Gade * Gade nr. *

Kundegade 123

Postnummer * By * Land *

1234 Kundeby Denmark

Kontaktinfo

Tilknyttet person Email Fax

Henrik Henriksen henrik.henriksen@kalibreringskunde. Denmark

Mobil Telefon

- Get started with generating DCX
- Use examples to get a solid base
- Still Work-in-Progress – Some features have yet to be implemented

Try it now!



[Link](#)

Contact

- Question or feedback regarding the tools? Want to collaborate on DCX?
- Contact us



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Thank you

Danish Technological Institute