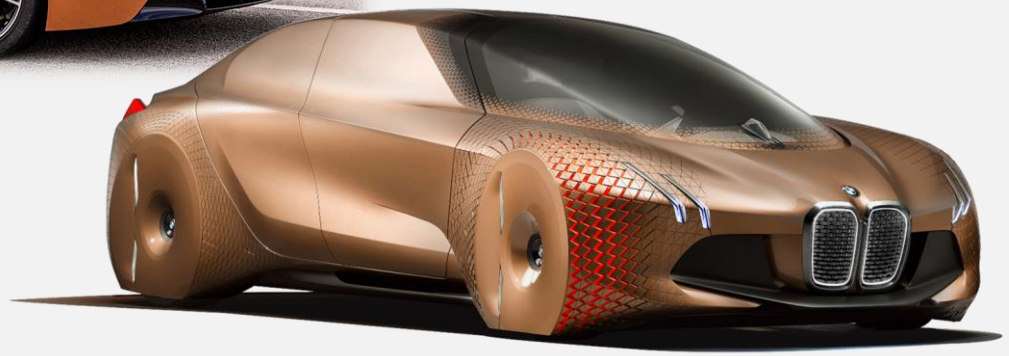
integrate the future



Cars Change – Screws Remain

χMCF – Enabler for Integrated Digital Processes

VDA AK 25, Darmstadt, 2018-06-06

Sources of images: https://mediapool.bmwgroup.com/download/edown/pressclub/publicq?dokNo={P90139733/P90302554/P90223105}&actEvent=image.
Similar images can be found at other OEMs, as well ;-)

Agenda

- 9:45 Welcome & Introduction
- 10:00 Reviewing the Implementation of χMCF Standard 3.0 in CAD/CAE Software
  Ansa, Hypermesh, CATIA, (Simcenter3D, Syncrofit)/Siemens, FEMFAT
- 12:00 χMCF for Production Planning
  PROSTEP, BMW
- 12:30 Lunch
- 13:45 Problems unveiled during the implementation and suggested solutions.
  Is a new release χMCF 3.**1** necessary/helpful at the moment?
- 14:45 Schema and examples for χMCF 3.0
- 15:15 Catalogs for normed joints (bolts etc.)
- 15:45 Terms of use and promotion of χMCF
- 16:15 Next steps (meeting etc.)
- 16:30 End

Welcome & Introduction

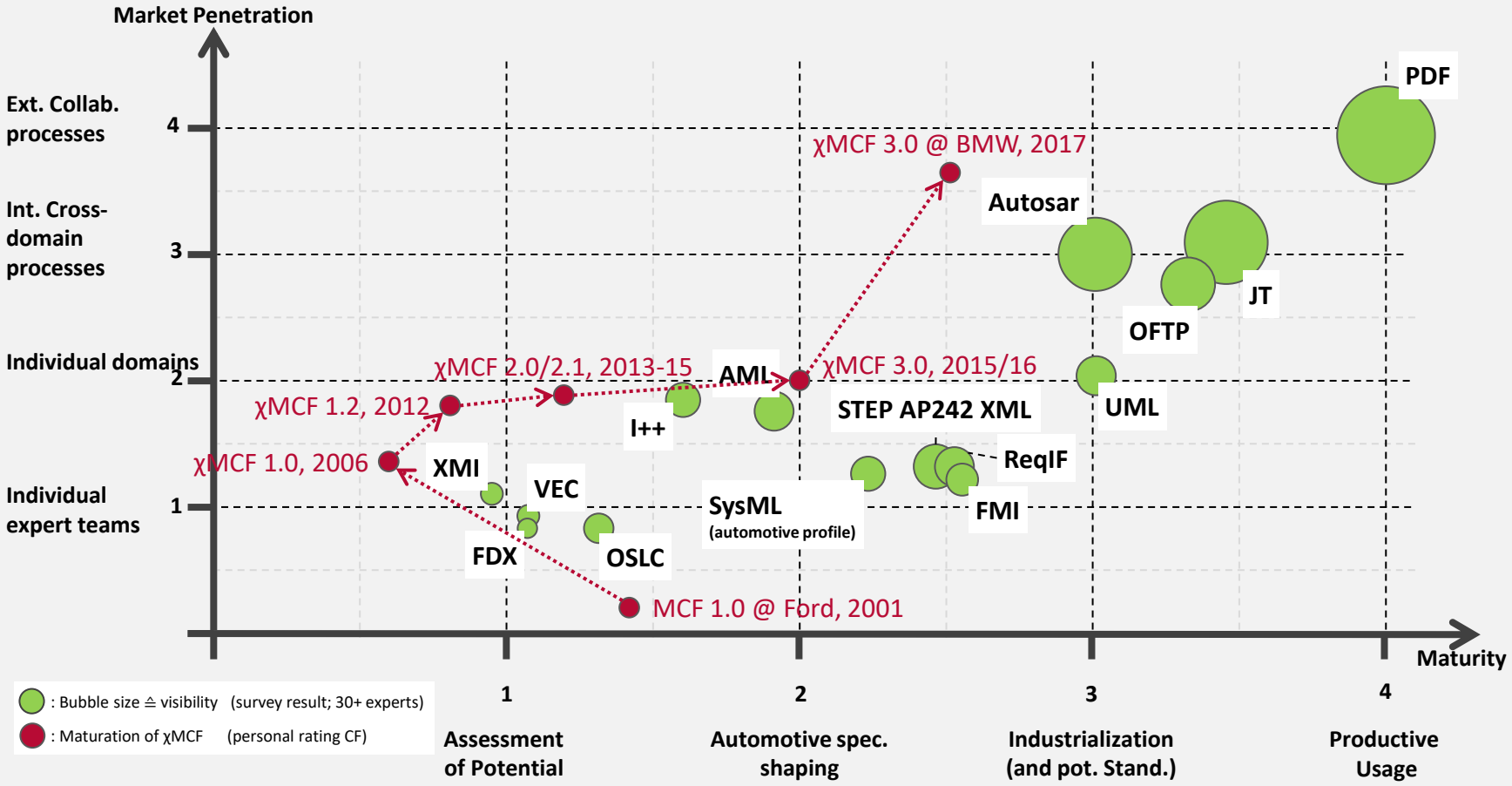
Objectives of this Meeting

Improve cooperation between all process steps and systems involved: No data losses. No ambiguities.

- Present & discuss lessons learned from current implementations
  - If technical questions or flaws are identified, setup measures for fixing them - but don't discuss them in depth, today!
- Add & extend use cases.
- Improve process integration and format efficiency, e.g. by catalogs of standard connections / connection parts
- Increase awareness about χMCF
  - in PLM - incl. Systems Engineering, Design, Validation, Industrialization, Production, Service, …
  - in Partner Integration / Supply Chain, …
  - by publishing χMCF on DIN / EN / ISO level (not "only VDA" – demanded by e.g. AG 2.6.2 / Consider internat. cooperation.)
- Derive measures to achieve these goals, e.g.
  - Support for implementers: XML schema, official examples, test cases, recommendations, best practices, certification, …
  - Marketing χMCF at conferences, workshops, dept. & team meetings, …

χMCF – a Standard Matures

Alignment of χMCF with VDA AK PLM “Standardization Strategy Board (SSB)” Survey Results



- χMCF matured as a standard, over time.
- χMCF reached cross-domain use for external collaboration at BMW in 2017.
- Visibility remains an issue, though.

Reviewing the Implementation of χMCF 3.0 in CAD/CAE Software

Ansa, Hypermesh, CATIA, (Simcenter3D, Syncrofit)/Siemens, FEMFAT

Implementation Review

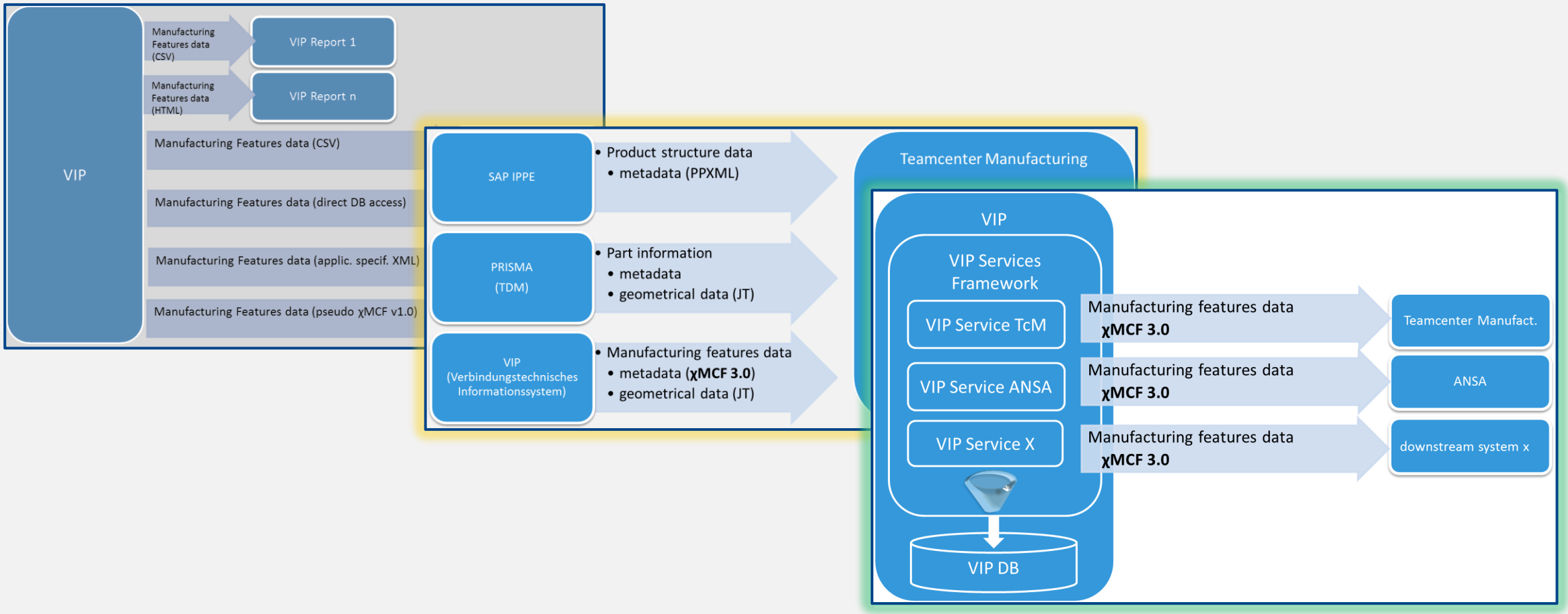
- Ansa
- Hypermesh
- CATIA
- Siemens:
  - Syncrofit
  - Simcenter3D
- FEMFAT

χMCF for Production Planning

BMW & PROSTEP

χMCF for Production Planning

First step of migrating down stream data propagation from many formats to just a single one – χMCF.



χMCF for Production Planning – Lessons Learned

For implementing χMCF *without* the background of 13+ years membership in χMCF working group:

- Standard document needs some more explanation / additional recommendation, e. g. difference between <part/> attributes “label” and “pid”.
- XML schema would be helpful.
- Example files would be helpful.

BMW specific processes motivate extensions & changes to χMCF 3.0 standard:

- Part *instance* identifier for ditto parts (in addition to part *label*/part *code*).

```
<connected_to>
  <part index="1" label="rim_16" instance="5"/>
  […]
```

- Representation of *custom_attribute* with (yet) undefined value in data base.
  ➔ Restriction “*Non-empty* string” in tables 21-24, 26, 28 shall be removed.

Constraints / Remarks
Non-empty string

Lunch

Source of icon: https://www.flaticon.com/free-icon/restaurant-interface-symbol-of-fork-and-knife-couple_37481 - Icon made by Freepik from www.flaticon.com.

What about χMCF 3.1 (new release)?

New χMCF Release – Pros & Cons …

Altair ANSA BMW Ford Siemens VW

Pro

- Implementation of χMCF 3.0 has shown 3.1-demand:
  - ANSA: Review *optional* vs. "*2 to 4*" …
- Wording to be clarified. Typos to be fixed.
  Referenced FATXML version to be updated (citation [7]).
  - ANSA:
    - Some examples do not match XML elem. spec
    - Pictures are not enough, e.g. 3fold overlap seam
    - Examples with full context (conn. group etc.)

  ➔ *Minor bug fixing* release? → 3.0.1
- … (t.b.c.) …

Contra

- Version 3.0 is not (fully) implemented everywhere, yet.
  A new version could increase confusion.
- Accelerate 3.0 implementation by schema & examples.
  Let's first concentrate on them …
- … (t.b.c.) …

Decision: Start review process for 3.0.1 *plus* focus on examples & schema. / No major update, yet.

Schema and Examples for χMCF 3.0

… and what about some „Recommendations“ with lessons learned?

XML Schema & Examples for χMCF

- χMCF 3.0 documents contains following section:

  5.5 XML Schema Definition

  XML-Schema definition (XSD) will be published at a later time on VDA web server.

  This promise should be honored!

- In September 2012, a schema for χMCF 1.0 has been proposed by T-Systems (plus another schema for MEDINA's specific *<appdata/>*).

➔ Maybe, another SW vendor or OEM can contribute, here?

Agreed plan:

1. Maintenance of spec 3.0 (ANSA input as starter.)
2. Examples: From VW & Ford
3. Schema to be created
   - by student(s)?
   - by VDA order?
   Dr. Weinert checks funding via VDA.
   Proposals are welcome!

Documents to be shared on GitHub – ANSA creates repo.

- Siemens asked for examples in 2017 – hand-crafted ANSA & MEDINA examples were provided.
  Most of these examples are χMCF 2.1, and all are purely academic, i.e. without CAD of connected parts.

➔ Some contribution needed here, too.

Catalogs for normed joints (bolts etc.)

Catalogs

Requirements of AG 2.6.2:

- Catalogs of standard parts (screws, nuts, washers, rivets, clips, …)
- Reference to e. g. JT files. – Rationale:
  - Describe geometric details of weld beads (grooves), screws, deformed rivets etc. up to photo realistic quality (DMU).
  - Consider different deformations of the same rivet, applied to different sheet thicknesses.

Additional catalogs, which have been discussed earlier in our working group:

- Catalogs of tools (dies for rivets, …)

Decision: Postponed to χMCF 3.1 or later.

Terms of Use and Promotion of χMCF

χMCF Terms of Use

- Up to now, χMCF does not formulate any terms of use / licensing etc.
- An example taken from “I++” standard reads like:
  “Das Ziel der I++ Arbeitsgruppe ist die flächendeckende Umsetzung der I++DME und I++DMS-Schnittstellen in den einschlägigen Software-Anwendungen.
  Die „Mitgliedsfirmen“ verzichten auf Lizenzgebühren. Auch dürfen sie keinerlei Ansprüche aus dem Patentrecht ableiten. Jedwede Beschränkung der freien Nutzung ist nicht im Interesse der Arbeitsgruppe und wird, wo immer es in der Macht der Arbeitsgruppe liegt, so bald wie möglich aufgehoben.
  Alle Beschreibungen und Dokumente sollen frei verfügbar sein. Die Arbeitsgruppe behält sich die Rechte zur Weiterentwicklung und Erzeugung von Releases vor. Anforderungen oder Änderungen sollen über das I++-Gremium oder die relevanten Foren eingebracht werden.
  Die Arbeitsgruppe lehnt jegliche Haftung bezüglich der Umsetzung und Nutzung der Schnittstellen ab.
  Die „Mitgliedsfirmen“ räumen den Nutzern der I++Schnittstellen ein nichtexklusives Recht zur Nutzung gemäß der jeweiligen eigenen Interessen der Nutzer ein. Da die Schnittstelle kostenlos zur Verfügung gestellt wird, ist jegliche Haftung für Mängel in dem Maße ausgeschlossen, in dem es die Gesetze gestatten.”
- What about using a translation of this for χMCF?

Done wrt. to ISO (incl. STEP) – see mail 2018-06-07 10:50

Decision: PROSTEP translates and shares English draft text. / PROSTEP does research at STEP.
Draft to be checked by VDA lawyer.

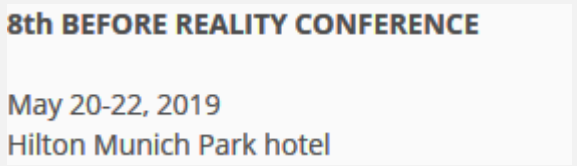
Promotion of χMCF

- χMCF presentation at ANSA User's meeting, Thessaloniki, 2017-06-01.
- χMCF (& FATXML) presentation at Forum "Simulation in Automotive Industry", 2017-04-06.
- …

More to be found!

Ideas:

- Setup vendor neutral χMCF slide set (using SIMVEC 2014 as starter). → CF
- Logo for χMCF → waiting for suggestions / any restrictions at VDA? → VDA lawyer
- More conference presentations. Preferably by the OEMs. Communicate about BMW example …
- ANSA User Meeting Munich, 2019.



ISO Standardization of χMCF

- PROSTEP to describe ISO process & probably expenses, eg. inspecting JT standardization process.
- Dr. Weinert to ask within VDA, since VDA is associated with DIN, which is associated with ISO.

Done – see mail 2018-06-08 08:54

Co-Evolution of χMCF with STEP

- Get in contact with STEP AP 242 XML people and check for co-evolution. → CF

Next steps (meeting etc.)

Other collected topics / Future items on to do list

- χMCF Benchmarks / Software certifications
- Recommendations
- User's Community Web Site / Forum
- Implementer Web Site / Forum – also for synchronizing collaborative work with updating χMCF to new version.

Is partially addressed by planned GitHub facility.

- Step welds aka stepped weld lines.
- Process parameters, e.g. tolerances, maximum permissible welding distortion, electrode material of spot welds, …
- Process codes, e. g. according to American Welding Society.
- Exceeding weld line ends (cf. section 8.2.1 / p. 96)
- Studs (cf. section 7.5.6.1, figure 25, p. 78)
- Clinch with additional material (TOX®-ClinchNiet) & tangential direction (TOX®-TWINpoint). (Requ. by AG 2.6.2)
- STEP can describe part list, but no joint details. For joint details, a reference to a χMCF file could be used.
  To avoid inconsistencies, AG 2.6.2 suggests empty or missing *<connected_to/>* in this case.

Decision: Postponed – unless otherwise stated. **Rationale:** No major χMCF update, yet.

Next Meeting

- When?
  30. January 2019 / alternatively 06. February 2019

- Where?
  PROSTEP AG, Darmstadt (again)

- Agenda:
  - Update draft 3.0.1 – Discuss suggested changes
  - Schema (XSD) – Deadline for proposals: End of August 2018. → Status & outcome to be discussed at meeting.
  - Examples – Status & content
  - ISO – Status
  - Siemens Simcenter 3D – Demo
  - STEP AP 242 XML – Status of co-evolution