

Standardized Formats for Visualization – Application and Development of JT

19th ISPE International Conference on Concurrent Engineering
– CE2012
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Rudolf Dotzauer



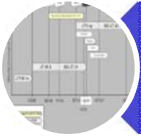
Dr. Sebastian Handschuh

DAIMLER

Dr. Arnulf Fröhlich

PROSTEP

Content



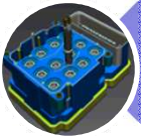
JT Development



Use Cases



Quality Assurance

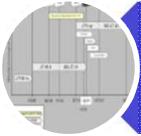


Proof of Concept



Outlook

Content



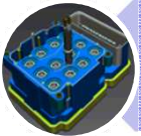
JT Development



Use Cases



Quality Assurance

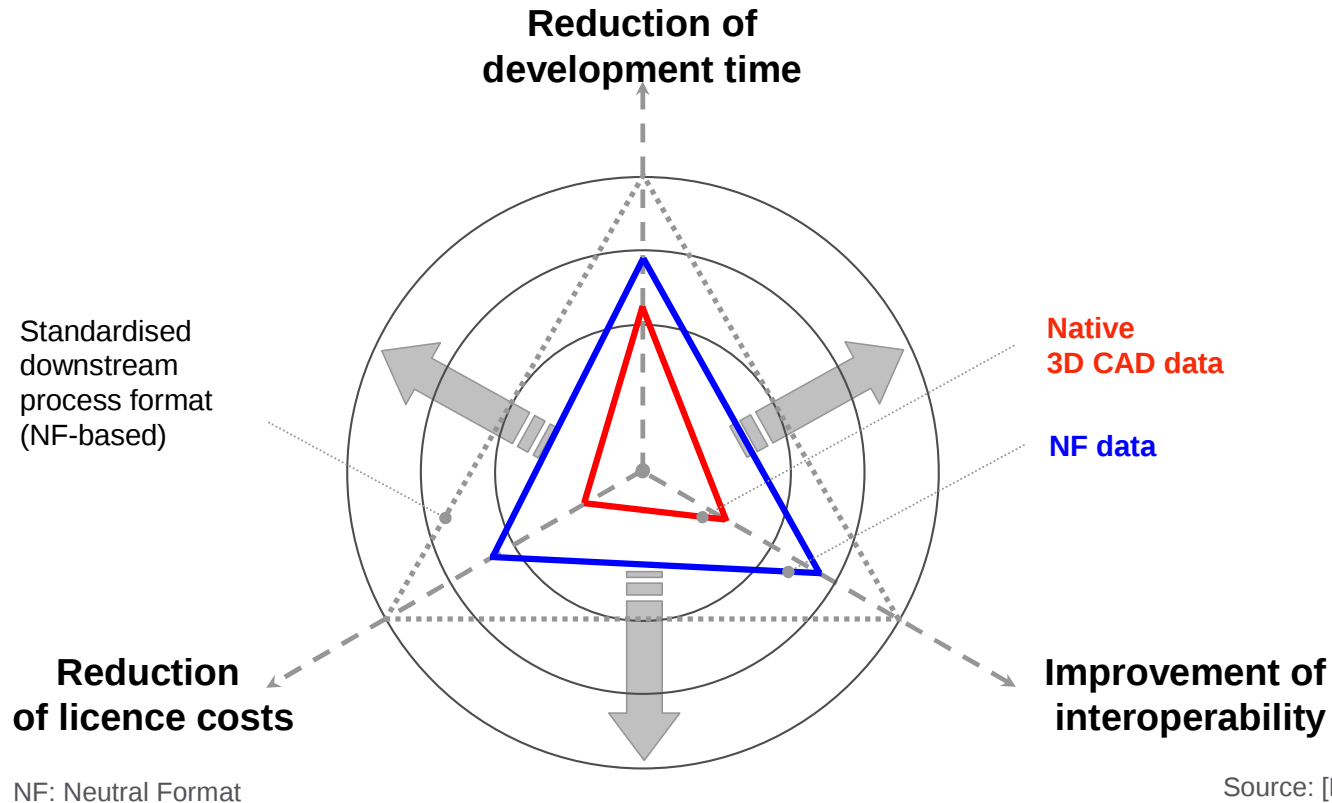


Proof of Concept



Outlook

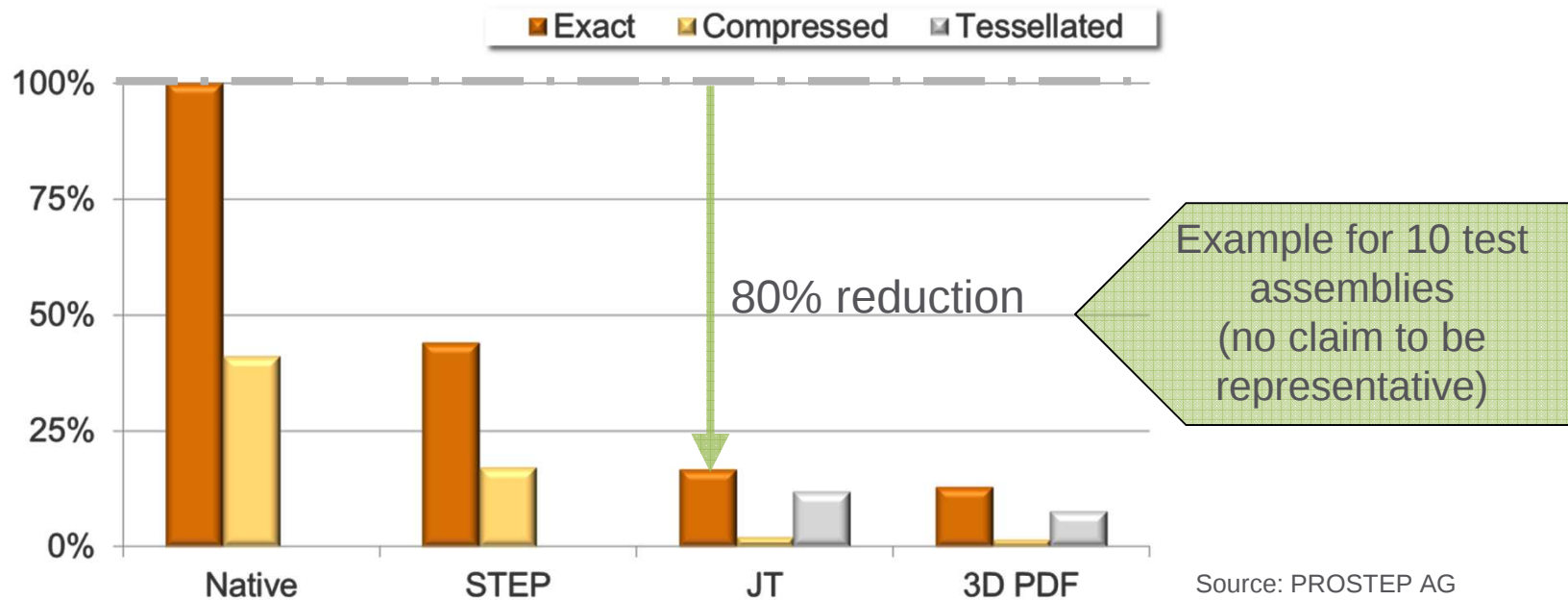
The “Magic Triangle” of Engineering Data



Conclusion: Standardized Visualization formats offer a bunch of new opportunities in heterogeneous CAX-landscapes

Neutral 3D formats

Comparison of the formats' sizes



- Significant reduction in file size by neutral formats
- Size depends on geometry representation (e.g. BREP, ULP, LOD within JT)

History of the JT Format

1990s

The JT format was developed in the 1990s by the US company Engineering Animation Inc. in order to visualize complex crime scenes at the court.

1999

Engineering Animation Inc. was taken over by the UGS Corporation in 1999

2007

In 2007, Siemens acquired the company, which is now called “Siemens PLM Software” and is a business unit of the Siemens Industry Automation division

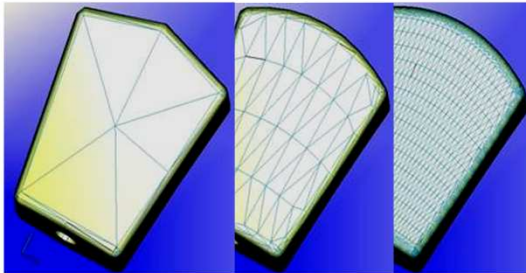
2012

The ISO standardization process is currently under way for the recently published JT version 9.5

Technical Overview of JT

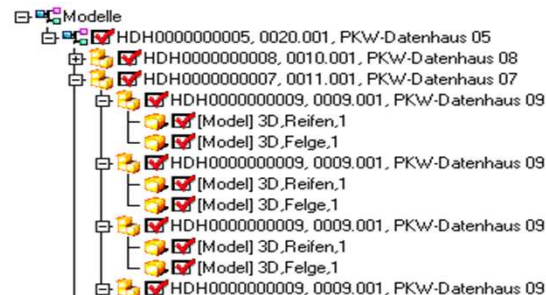
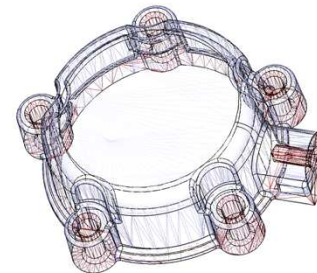
1.) Tessellated Data

Several levels of detail for performant visualization.



2.) Exact Geometry (NURBS)

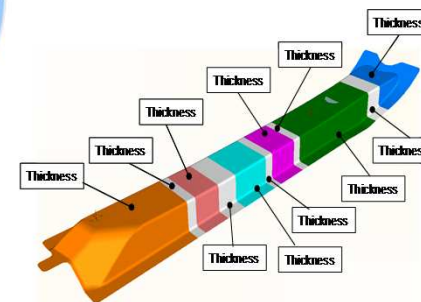
Mathematical surface description for exact measurements.



e. g., CATIA V5 master data

3.) Product Structure / Part Attributes

1
2
3
4
JT
Content

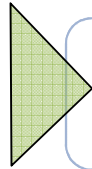


e. g., dimensions, tolerances...

4.) Product- and Manufacturing Information

According to: Siemens PLM

Motivation for Activities of ProSTEP iViP / VDA



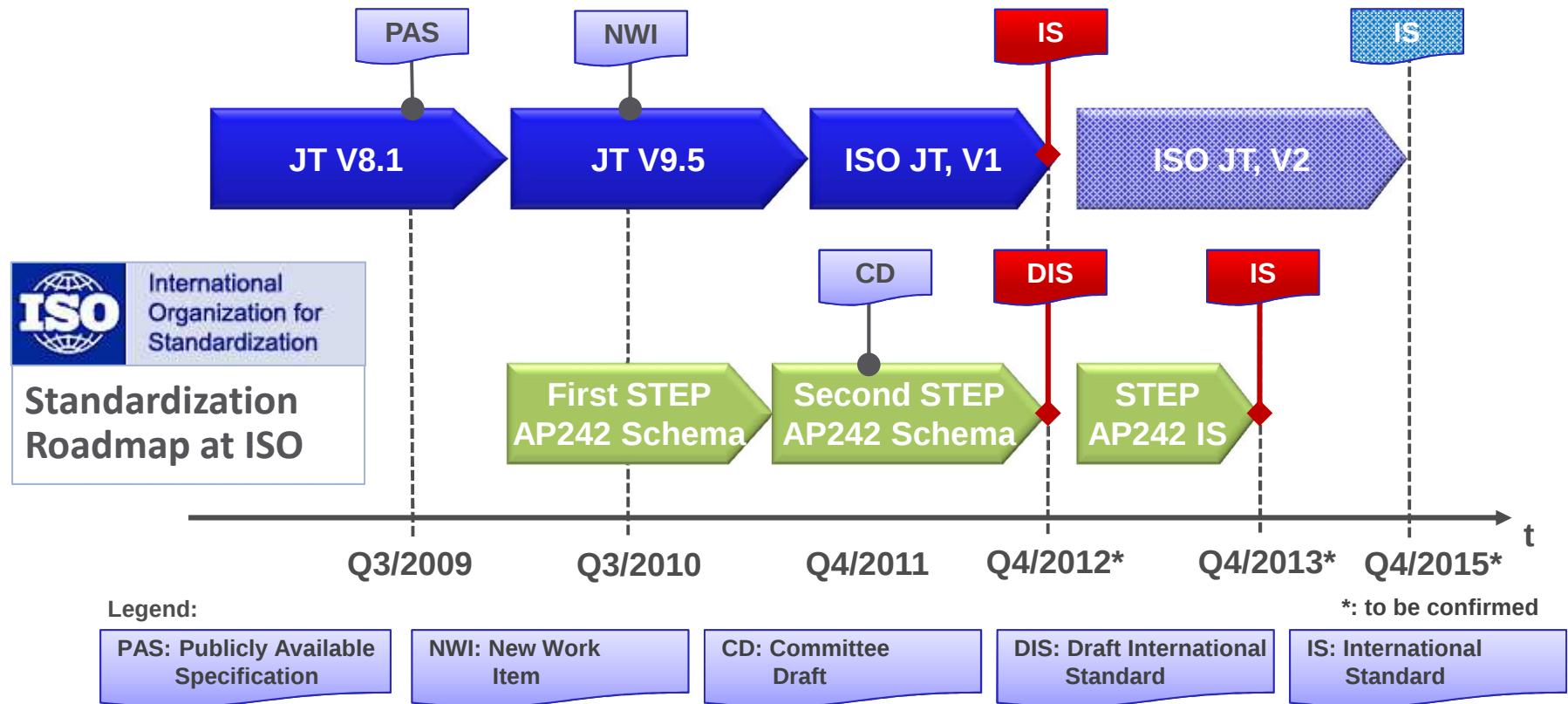
Industry needs simple solutions for the efficient use of CAx information incl. consistency in process

Light weight 3D formats for the visualization and downstream processes → JT

Complementary format in order to exchange meta data, structure data and kinematics data → STEP AP242 XML

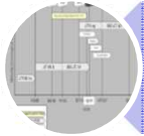
Open and standardized formats to reduce total cost of ownership and to minimize dependency of single vendors

ISO Standardisation Roadmap für JT and STEP AP242



- JT becomes ISO IS end of 2012
- STEP AP 242 XML becomes ISO DIS & IS end of 2012 & 2013

Content



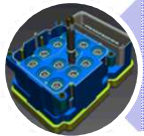
JT Development



Use Cases



Quality Assurance



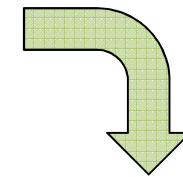
Proof of Concept



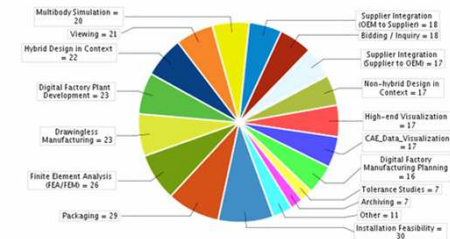
Outlook

22 Use Cases Elaborated by JT Workflow Forum

Usage of JT for...	
Archiving	Hybrid Design in Context
Bidding / Inquiry	Installation Feasibility
CAE Data Visualization	Material Specification
Digital Factory Building Planning	Multibody Simulation
Digital Factory Manufacturing Planning	Non-hybrid Design in Context
Digital Factory Material Handling	Packaging
Digital Factory Plant Development	Pressline Simulation
Drawingless Manufacturing	Supplier Integration (OEM to Supplier)
Factory DMU	Supplier Integration (Supplier to OEM)
Finite Element Analysis (FEA/FEM)	Tolerance Studies
High-end Visualization	Viewing

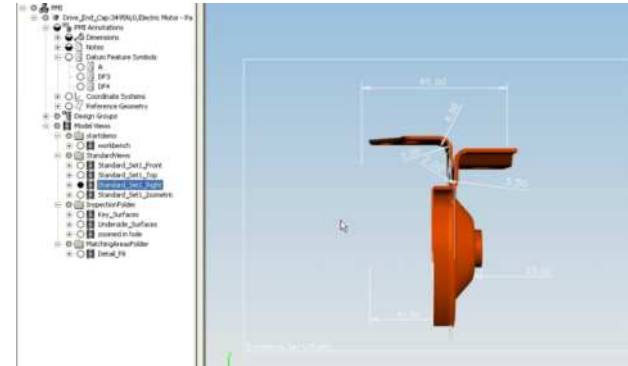
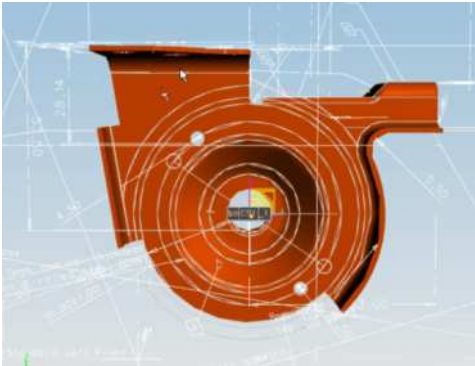


~ 250
Requirements
derived yet



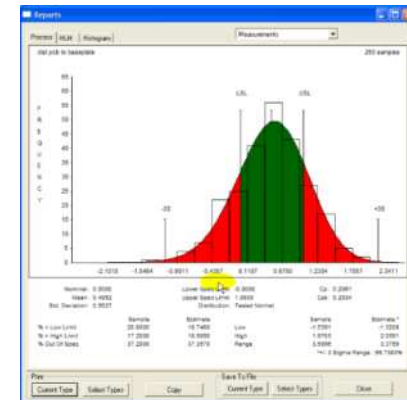
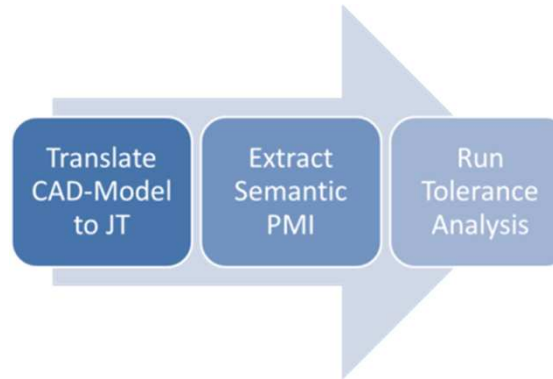
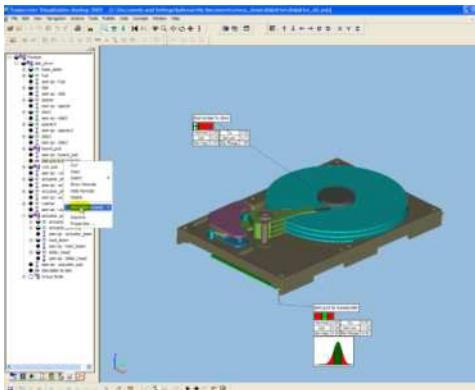
- PMI Visualization

Tc_Vis_PMI_demo_46.avi

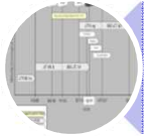


- Tolerance Simulation

Tolerance_Simulation.avi



Content



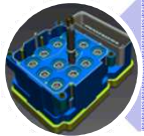
JT Development



Use Cases



Quality Assurance

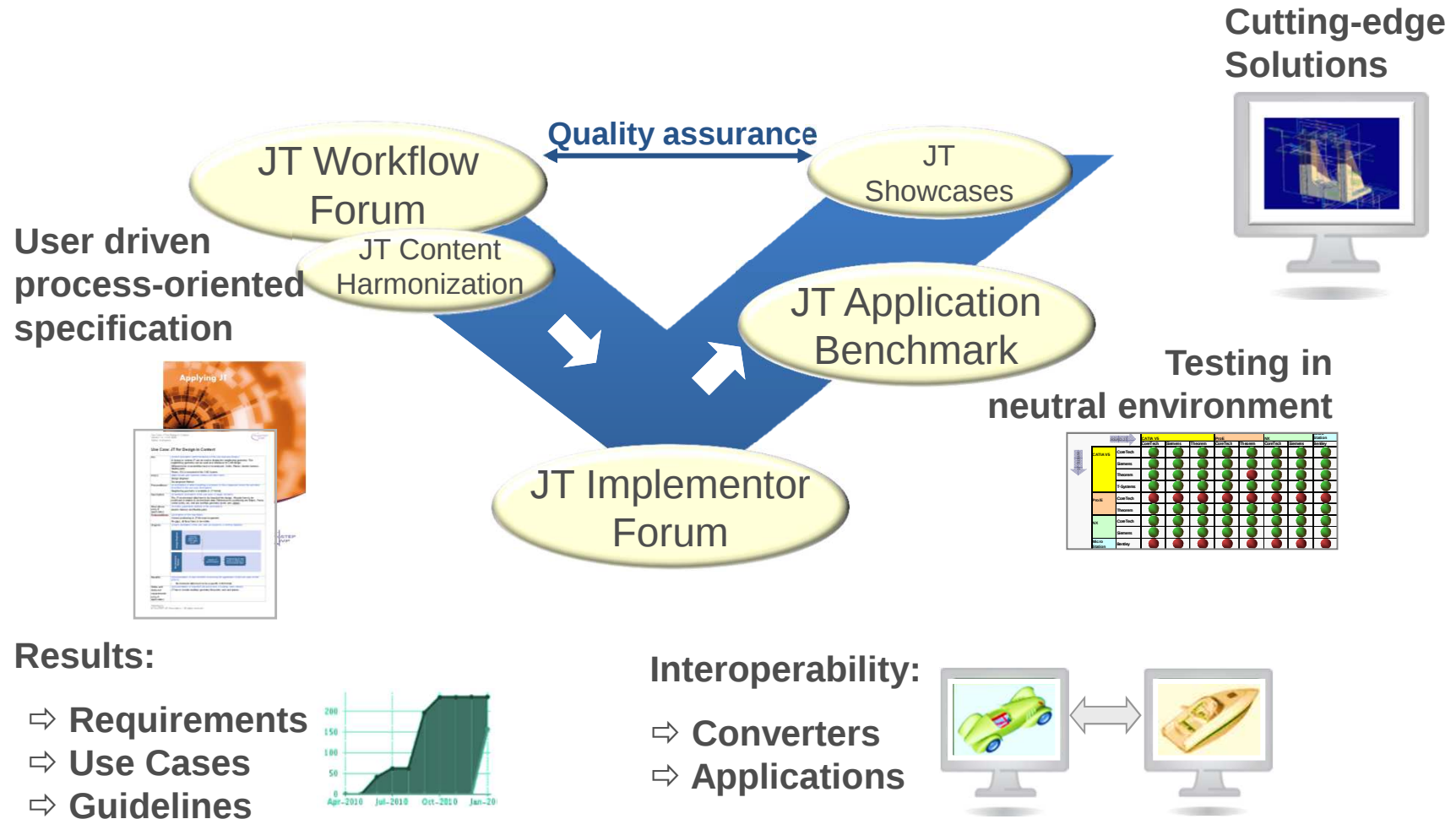


Proof of Concept



Outlook

Quality Assurance



Participants 2012

JT Workflow Forum

- Airbus
- Audi
- Behr
- BMW
- Continental
- Daimler
- Ford
- InMediasP
- Johnson Controls
- MAN Trucks & Bus
- Porsche
- PROSTEP
- Robert Bosch
- Siemens
- SSC-Services
- Volkswagen
- ZF Friedrichshafen
- *Siemens PLM (as advisor)*
- *VPE Kaiserslautern (Uni)*

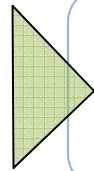
JT Implementor Forum

- CoreTechnologie
- Elysium
- Geometric
- ITI TranscenData
- PTC
- Siemens PLM
- Spaceclaim
- T-Systems
- Theorem Solutions
- Transcat PLM

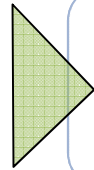
JT Application Benchmark

- Steered by JT-WF participants
- Technically supported by JT-IF vendors
- Conducted by PROSTEP AG

ProSTEP iViP / VDA JT Workflow Forum



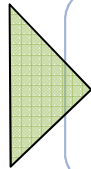
22 Use Cases specified, more than 250 requirements derived yet



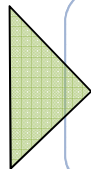
**Technical requirements harmonized with JT ISO V1
App. 92 % in place, remaining input for JT ISO V2**



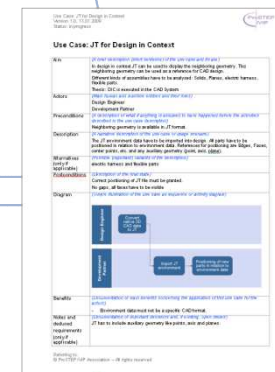
Content Harmonization



Guideline Version 1 on harmonized content representation released in 2011



Allocation of content representation to respective format (JT | AP 242 XML)

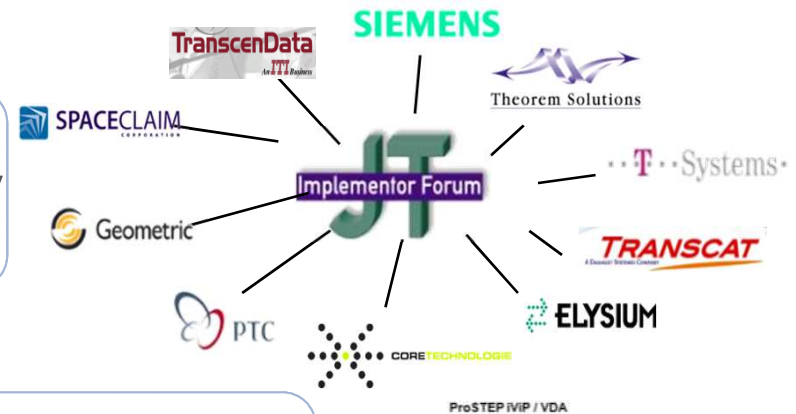


ProSTEP iViP / VDA JT Implementor Forum

▶ **Safeguarding interoperability**

▶ **2 test rounds per year**
Focus on specific topics, e.g. PMI, Layer

▶ **Developing of Implementation Guidelines for harmonization between the implementations**



JT Implementor Forum
Implementation Guidelines
Version 1.1, 16.06.2012



© ProSTEP iViP Association, VDA

ProSTEP iViP / VDA JT Application Benchmark

Neutral comparison of JT translators and applications with regard to selected test criteria

Two benchmarks effected successfully in 2009 & 2010
Third benchmark 2012 in progress (3 building blocks)

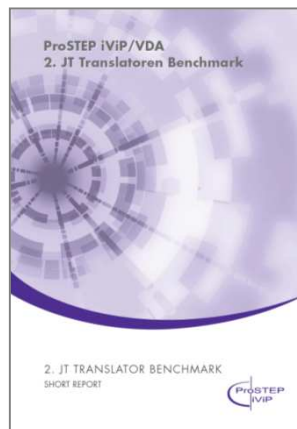


Figure 19: Result matrix for exact geometry (BREP)

		CATIA V5				Pro/E		NX	
		CoreTech	Siemens	Theorem	T-Systems	CoreTech	Theorem	CoreTech	Siemens
JT Import	CATIA V5	CoreTech	Siemens	Theorem	T-Systems	CoreTech	Theorem	CoreTech	Siemens
	Siemens								
	Theorem								
	T-Systems								
JT Export	Pro/E	CoreTech	Siemens	Theorem	T-Systems	CoreTech	Theorem	CoreTech	Siemens
	Siemens								
	Theorem								
	Siemens								
JT Export	NX	CoreTech	Siemens	Theorem	T-Systems	CoreTech	Theorem	CoreTech	Siemens
	CoreTech								
	Siemens								
	Siemens								

1) With Heal- and Stitch-Functionalities and higher tolerances
2) Manual deletion of isolated 3D curves within converter
3) Option "Sev Faces" activated

● correctly converted
⊗ not correctly converted / not supported

Figure 19: Result matrix for exact geometry (BREP)

Benchmarking of viewing applications

Assembly conversion with STEP AP 242 XML and JT

JT translation, focus on LOD and PMI

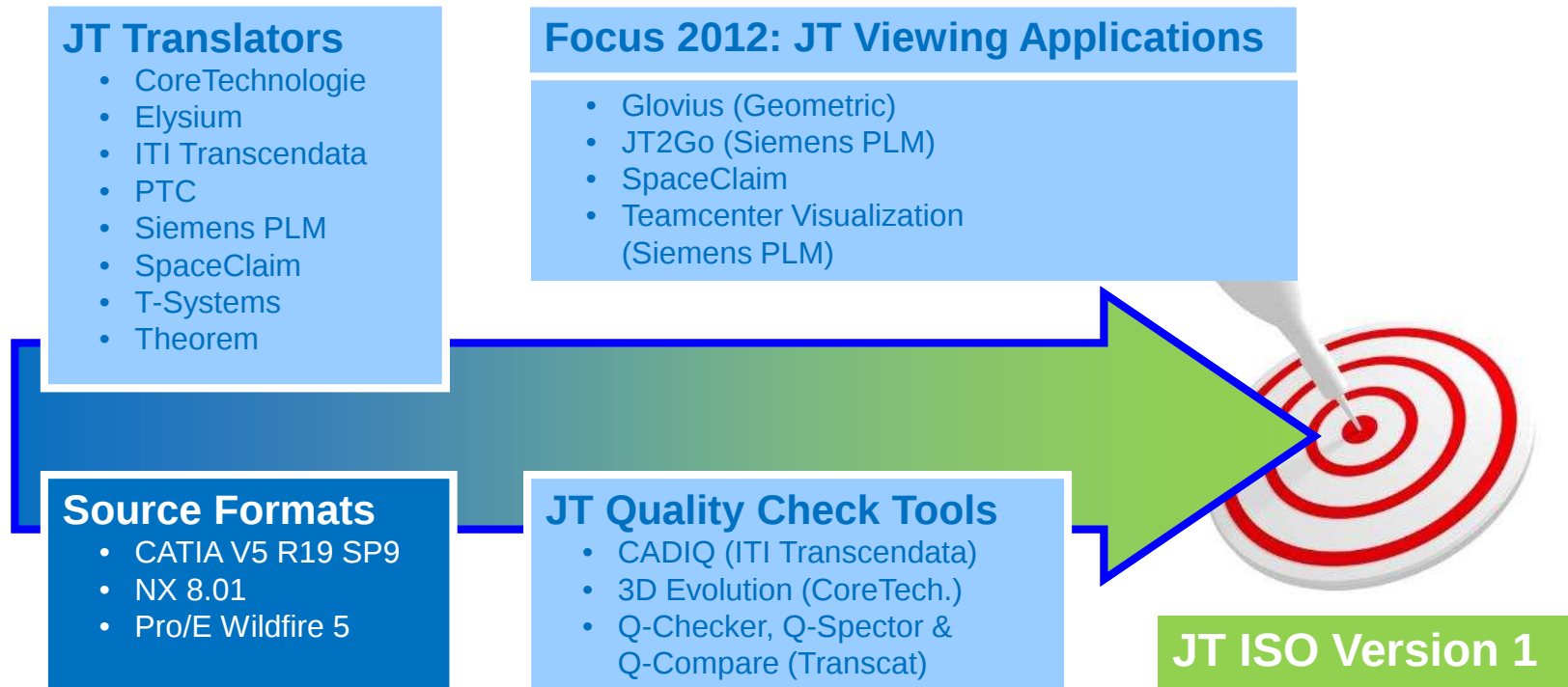
Translator	CoreTechnologie	Siemens	Theorem	T-Systems	Elysium	SpaceClaim	PTC	ITI Transcendata
CATIA V5 R19 SP9	X	X	X	X	X	X	-	X
Pro/E Wildfire 5	X	X	-	-	X	X	X	X
NX 8.01	-	X	-	-	X	X ¹⁾	-	-

2009

2010

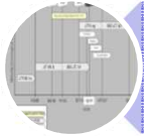
2012

JT Application Benchmark 2012: Involved Tools



Conclusion: Broad Vendor support of JT Benchmark 2012

Content



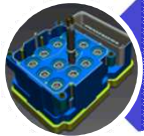
JT Development



Use Cases



Quality Assurance



Proof of Concept



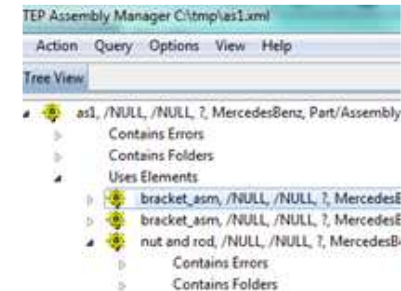
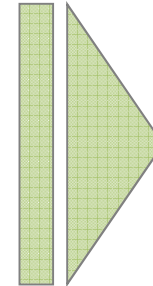
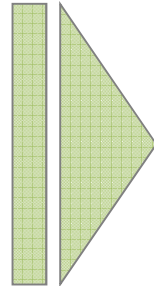
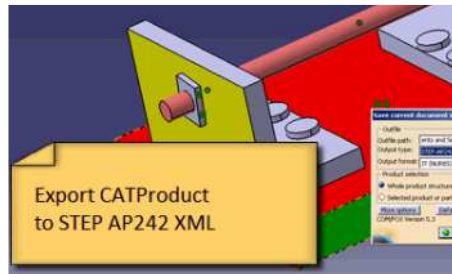
Outlook

Screencasts

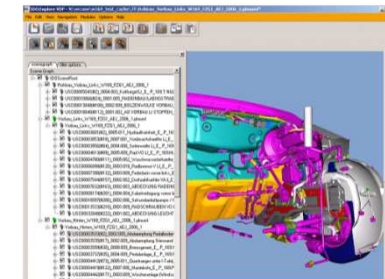
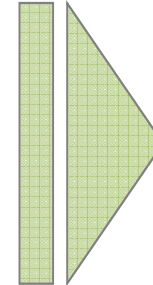
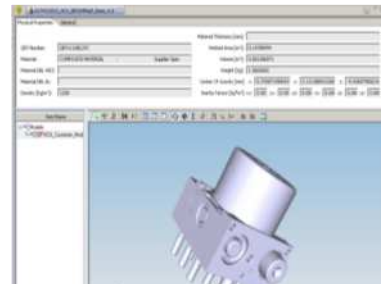
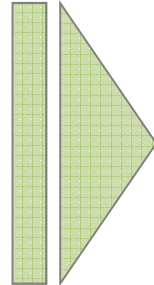
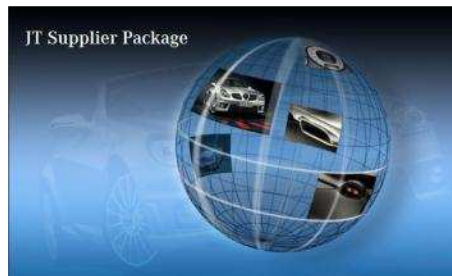
- STEP AP 242 XML with JT (by T-Systems)



COMFOX_CATIA-AP242_2.exe



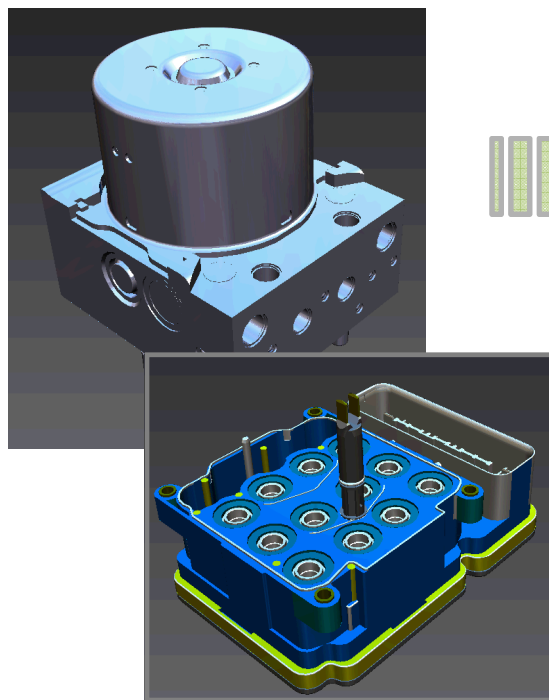
- Daimler/Continental JT Pilot (UC: Supplier to OEM)



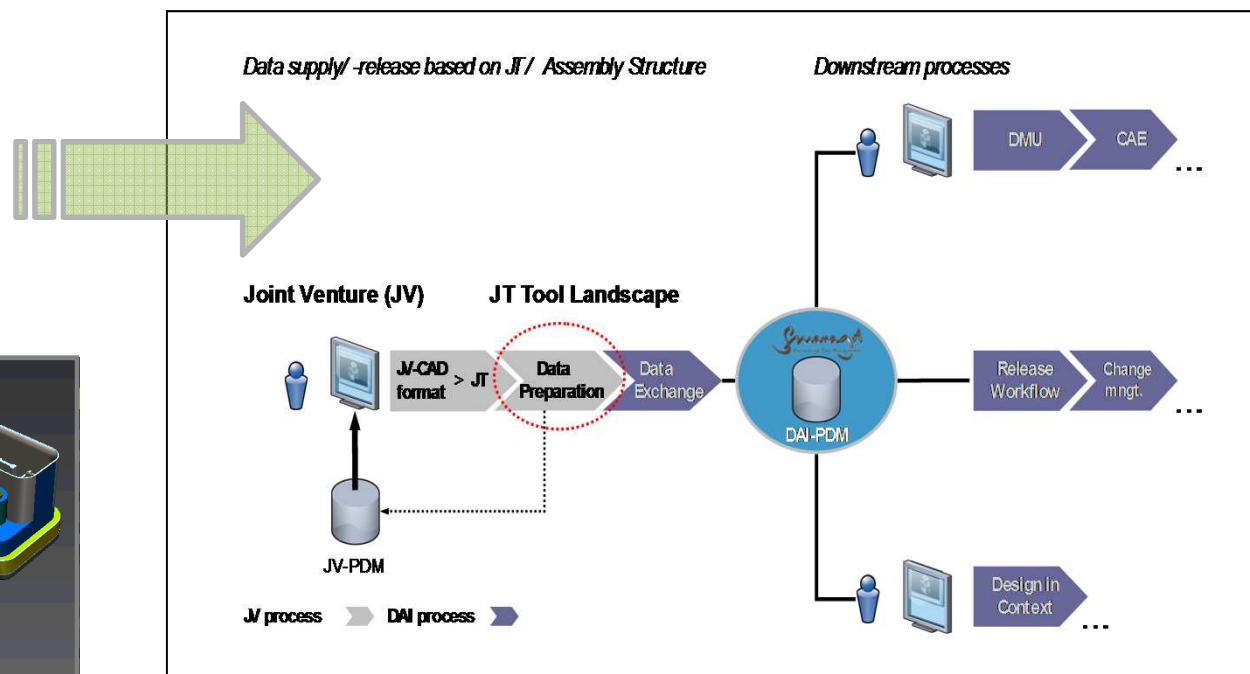
DAIMLER / Continental JT Pilot



JT-TEST-Daimler-Supplier-Package-1Minute_002.exe

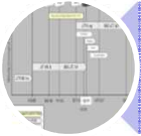


ESP hydraulic- and control-unit



Daimler JT Masterdata Editor

Content



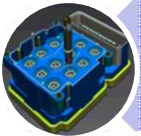
JT Development



Use Cases



Quality Assurance

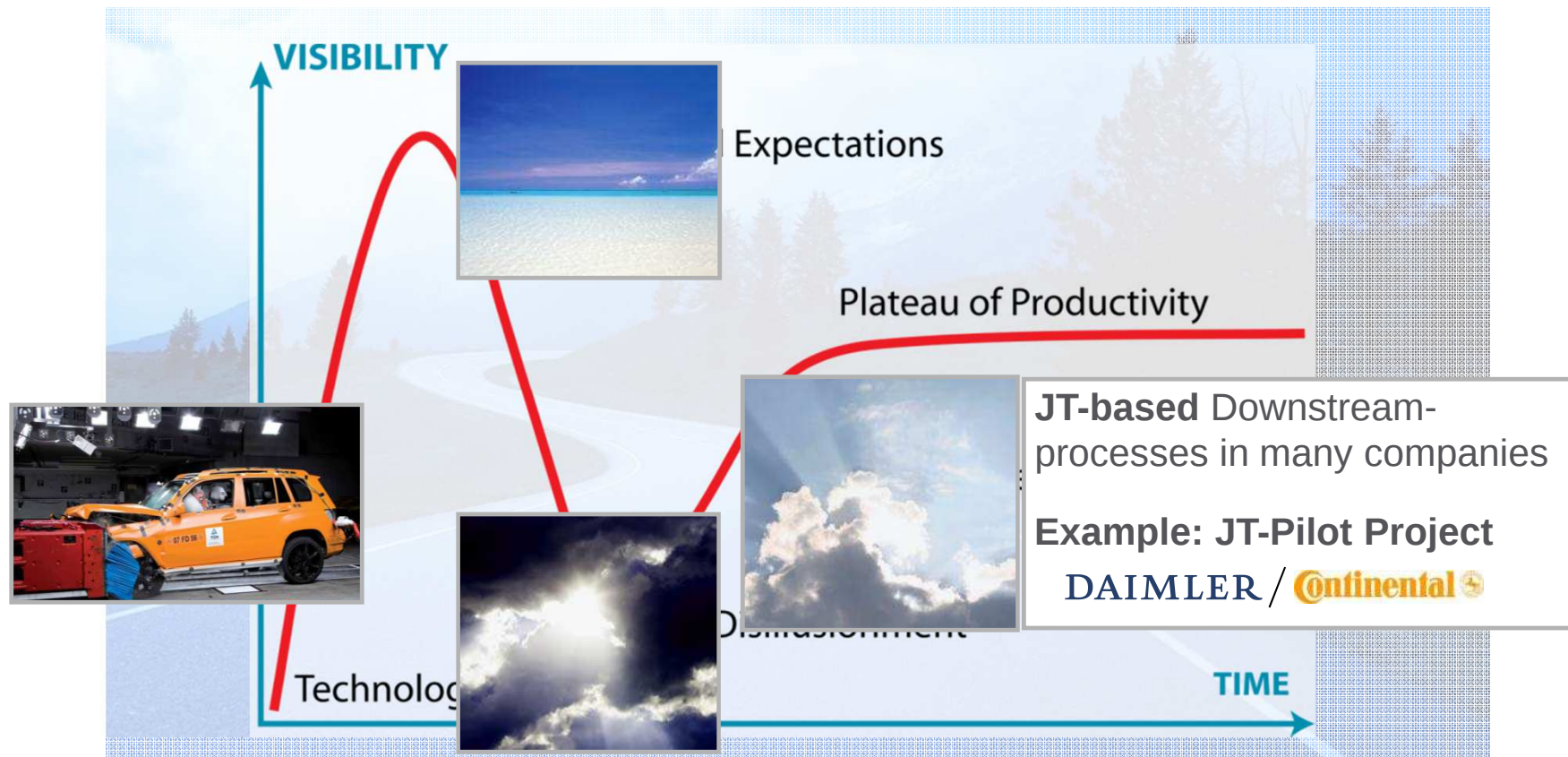


Proof of Concept



Outlook

JT on the Path of Enlightenment



Conclusion: The combination of JT and STEP AP 242 XML helps to reach the Plateau of Productivity

Standardized Formats for Visualization – Application and Development of JT

Thank you for your attention !



Rudolf Dotzauer

Director Customer Supplier Integration

Continental Automotive Group

rudolf.dotzauer@continental-corporation.com

DAIMLER

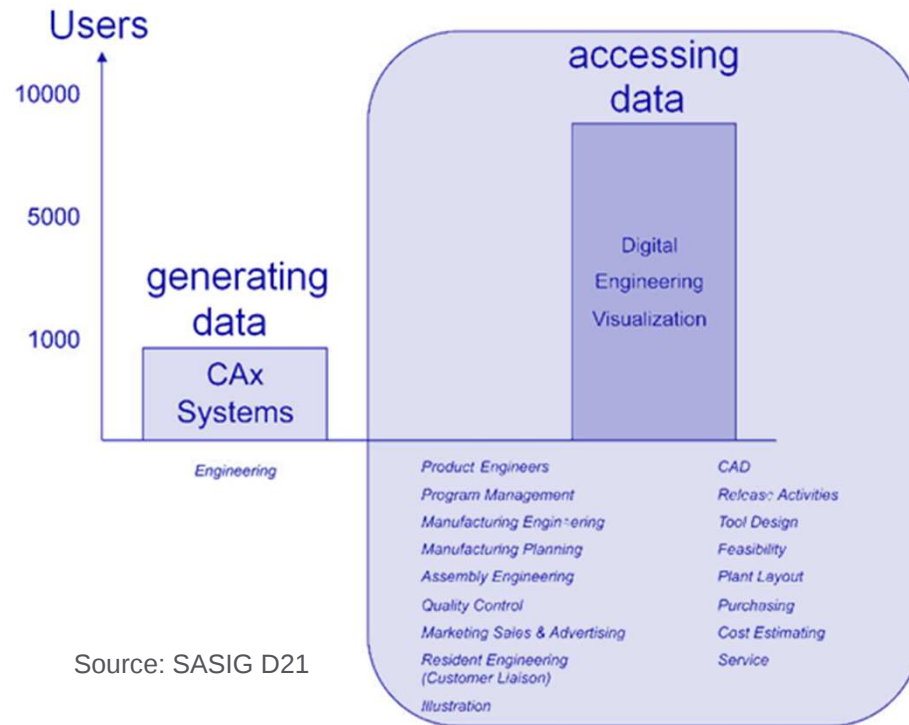
Dr. Sebastian Handschuh

PLM2015 Teilprojekt PDM

Daimler AG

sebastian.handschuh@daimler.com

Does everyone need a full CAD-System?



Powerful CAx systems are essential for product design

- Product and production cost are driven by design
- Keep the follow-up costs in mind if you want to save here!

Potential savings in downstream processes by using neutral 3D formats

- No risk to increase follow-up costs!

Conclusion: 10 times more data consumers than data creators means that not everyone needs a full CAD-System

Mission of ProSTEP iViP / VDA

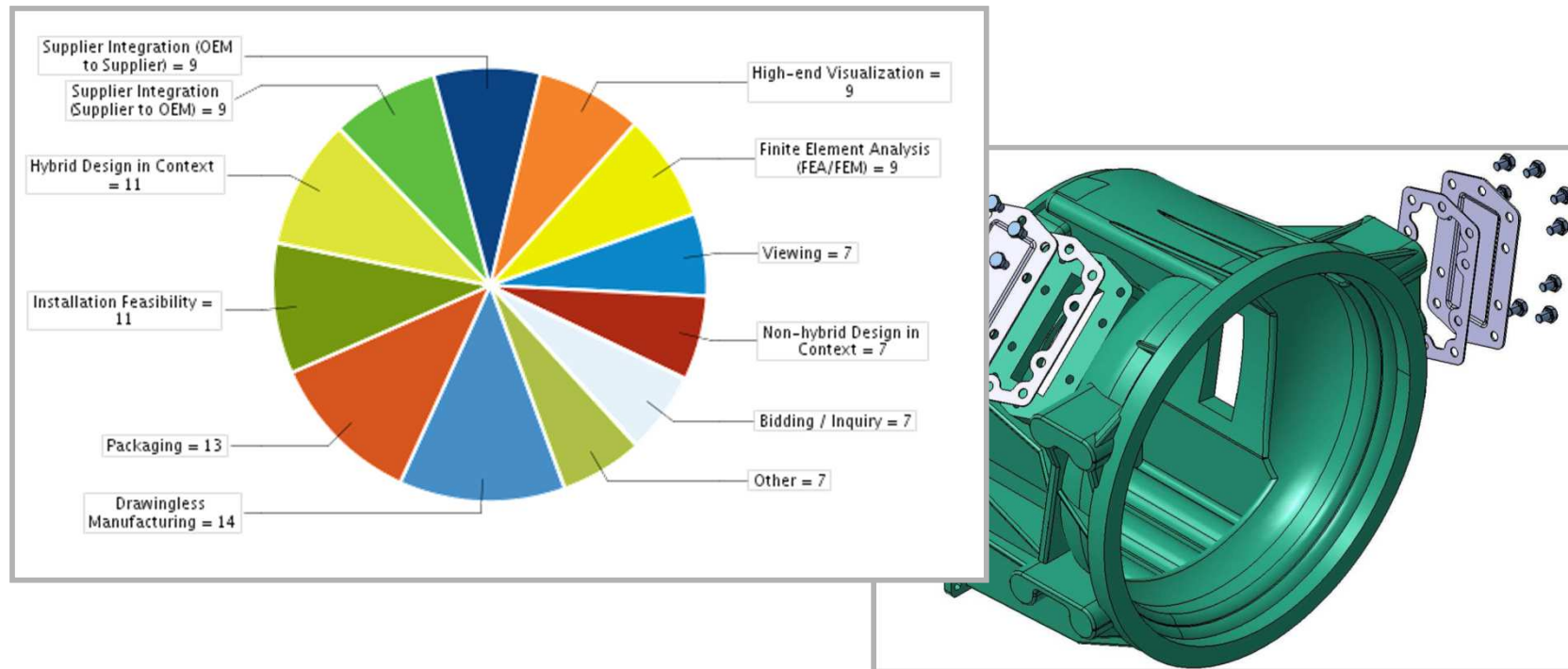
- With regard to visualization data exchange there is a strong demand in industry to use JT (ISO 14306) and STEP AP 242 (ISO 10303-242) as complementing standards:

STEP AP 242 XML for assembly, meta, kinematic data etc.

JT as lightweight visualization format for 3D industrial data

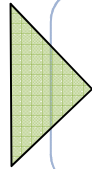
- The ProSTEP iViP Association and the VDA (German Association of the Automotive Industry) drives three coordinated JT-specific projects:
 - JT Workflow Forum
 - JT Implementor Forum
 - JT Translator Benchmark
- Additionally, ProSTEP iViP and Siemens PLM worked hand in hand with regard to the JT Standardization in ISO.*

Focus on JT Format and Application Requirements



Conclusion: Focus of 2012 is to verify the usability of JT ISO Version 1 in downstream engineering applications.

JT Showcases



Use case & process demo in preparation by vendors

- Drawingless Manufacturing
- High-end Visualization
- Hybrid Design in Context
- Packaging
- Tolerance Studies
- Viewing

(by Elysium & ITI TranscenData)

(by T-Systems)

(by Siemens PLM)

(by T-Sytems)

(by Siemens PLM)

(by Transcat PLM)

