CPO:
Openness in IoT / Industry 4.0
Openness 4.0: Business & Freedom

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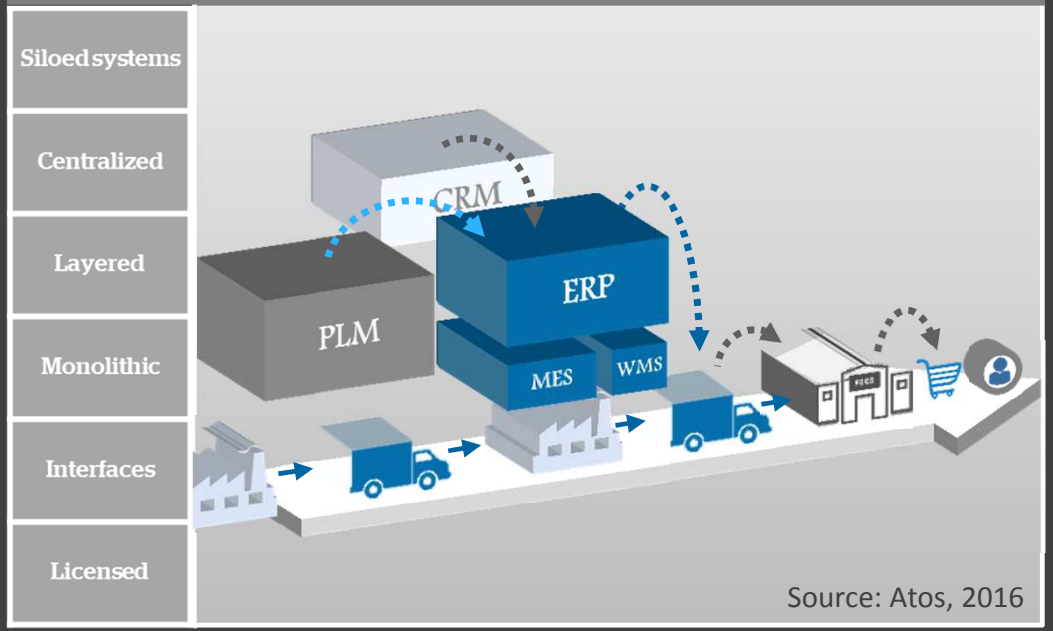
“There is nothing permanent except change.”

Heraclitus of Ephesus (535 BC – 475 BC)

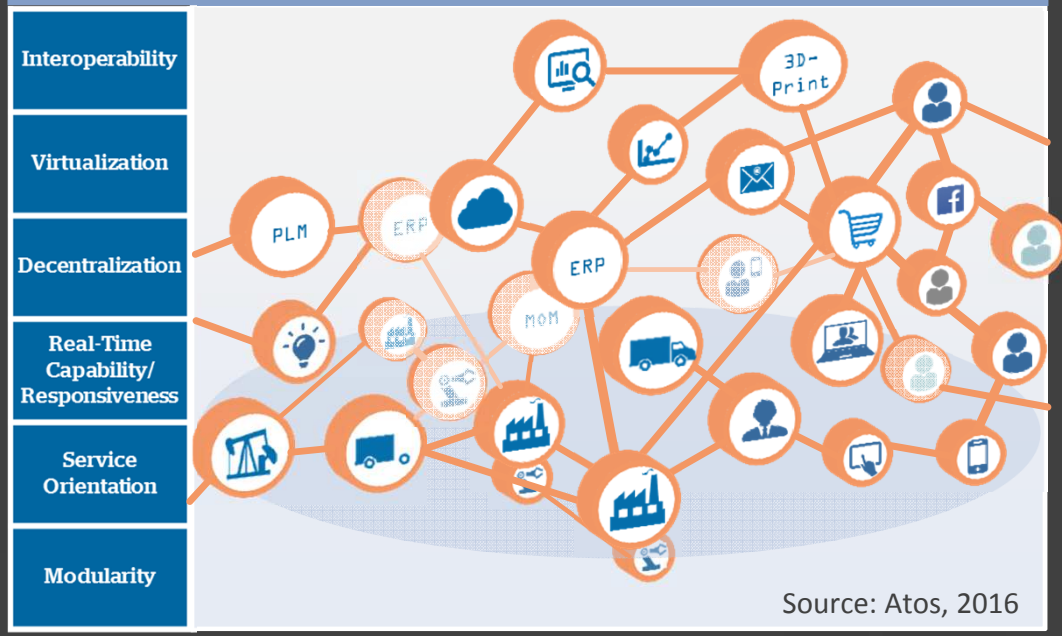
RIGID PAST

While todays production is linearly organized and optimized within the boundaries of organizational and system siloes…



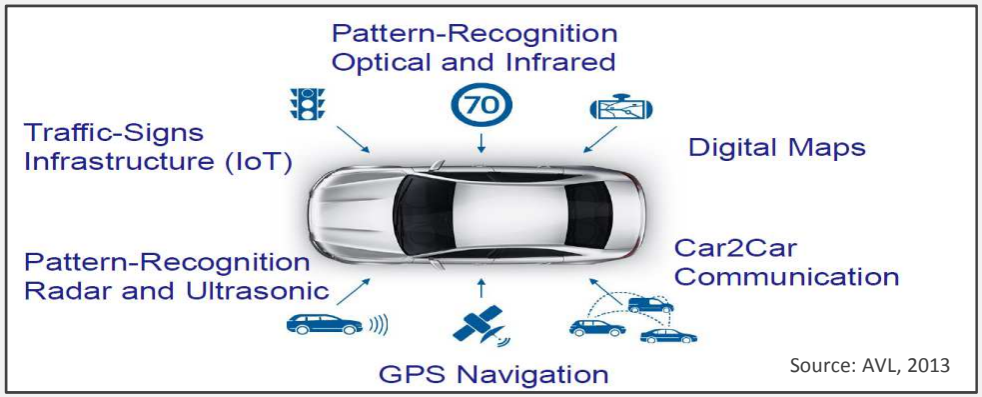
SMART FUTURE

… manufacturing of the future will fulfill individual customer needs by a collaborative and agile network of capabilities



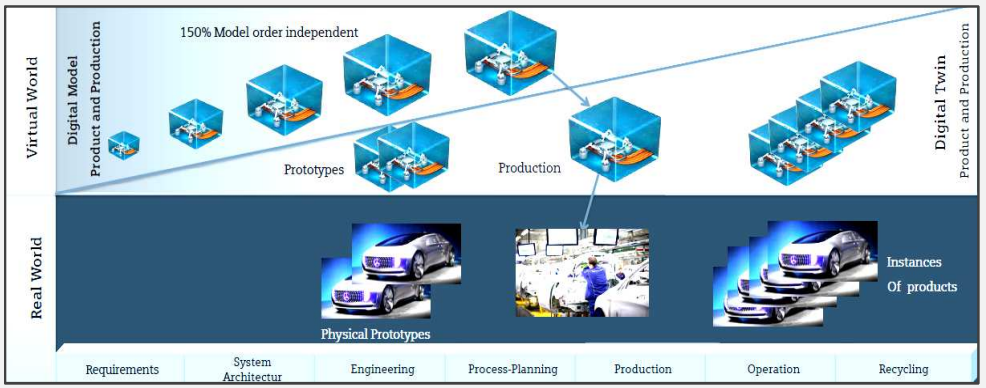
Industry 4.0, IoT & Digital Transformation

Smartness & Business Success relies on Openness



Smart products continuously provide and consume information within its environment and the Internet via interfaces.

No smart product without smart engineering, simulation and validation, manufacturing, logistics etc., where IT is interlinked via interfaces.



Source: Siemens, 2016

Openness: Assuring that smart products and services can be offered and applied globally!

BMWi Patronage for the ProSTEP iViP CPO

Need for Interoperability, Standards & Trust

CODE of PLM OPENNESS

Federal Ministry
for Economic Affairs
and Energy

*"The German industry relies on the fact, that **smart products and services** can be offered and applied globally. With regard to this, **interoperability is the key**. A **certification assures trust** with regard to the broad application of information and communication technology (ICT), **removes technological barriers and boosts the power of the German economy**."*

Sigmar Gabriel
German Federal Minister for Economic Affairs and Energy (BMWi)

CPO: Defining a Baseline for Openness

Everybody talks about Openness, everybody needs it – CPO defines it!

CODE of PLM OPENNESS

Relevant for Openness:

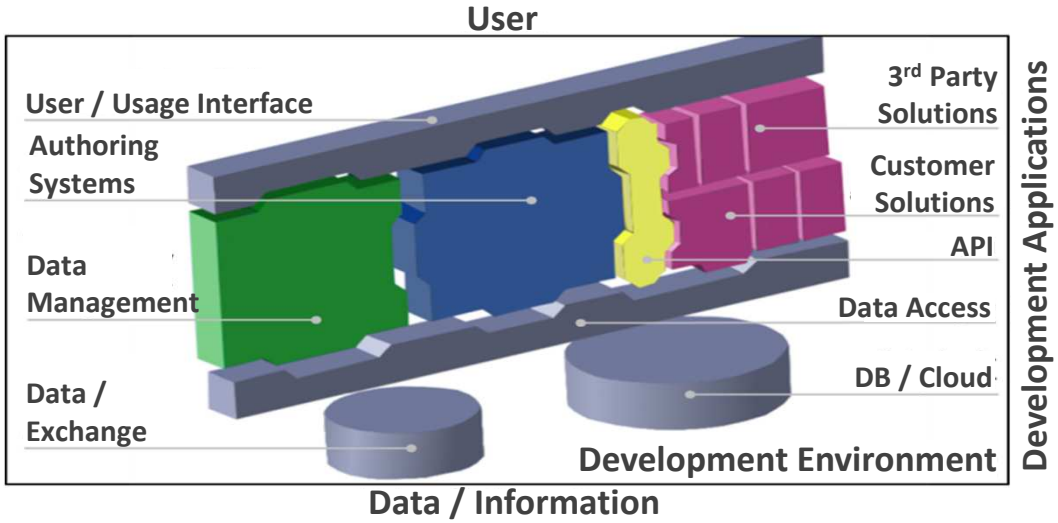
- Interoperability
- Portability
- Extensibility

Thereby to be considered:

- Supply & Purchase Processes
- License Models
- Contracts
- Organizational Aspects and Partnerships

Realization by:

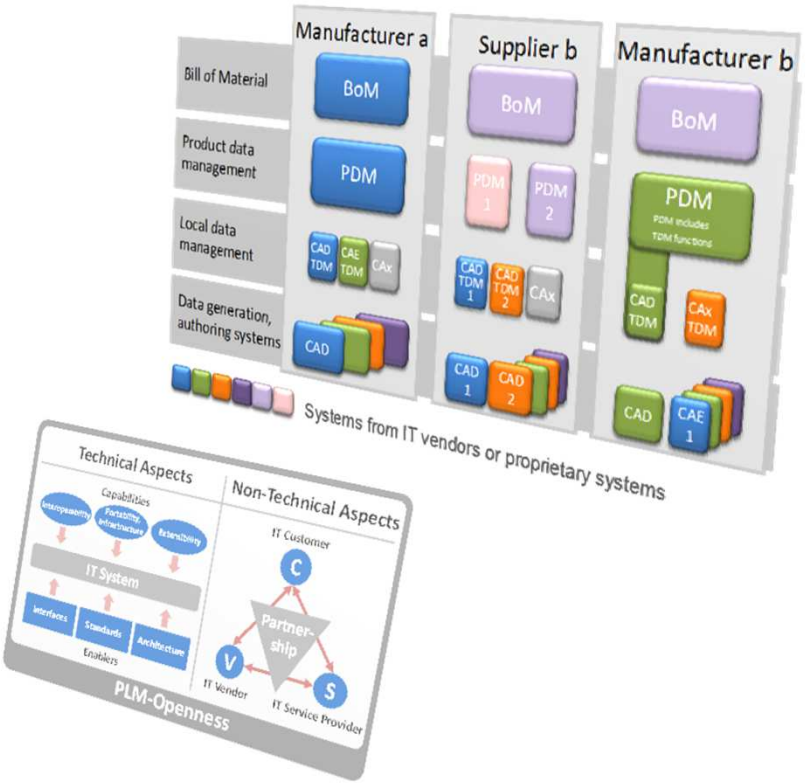
- Provision of appropriate IT Interfaces
- Application of Standards
- Customizable IT Architectures & Platforms



Openness: Bridging Technology and Business by cpo

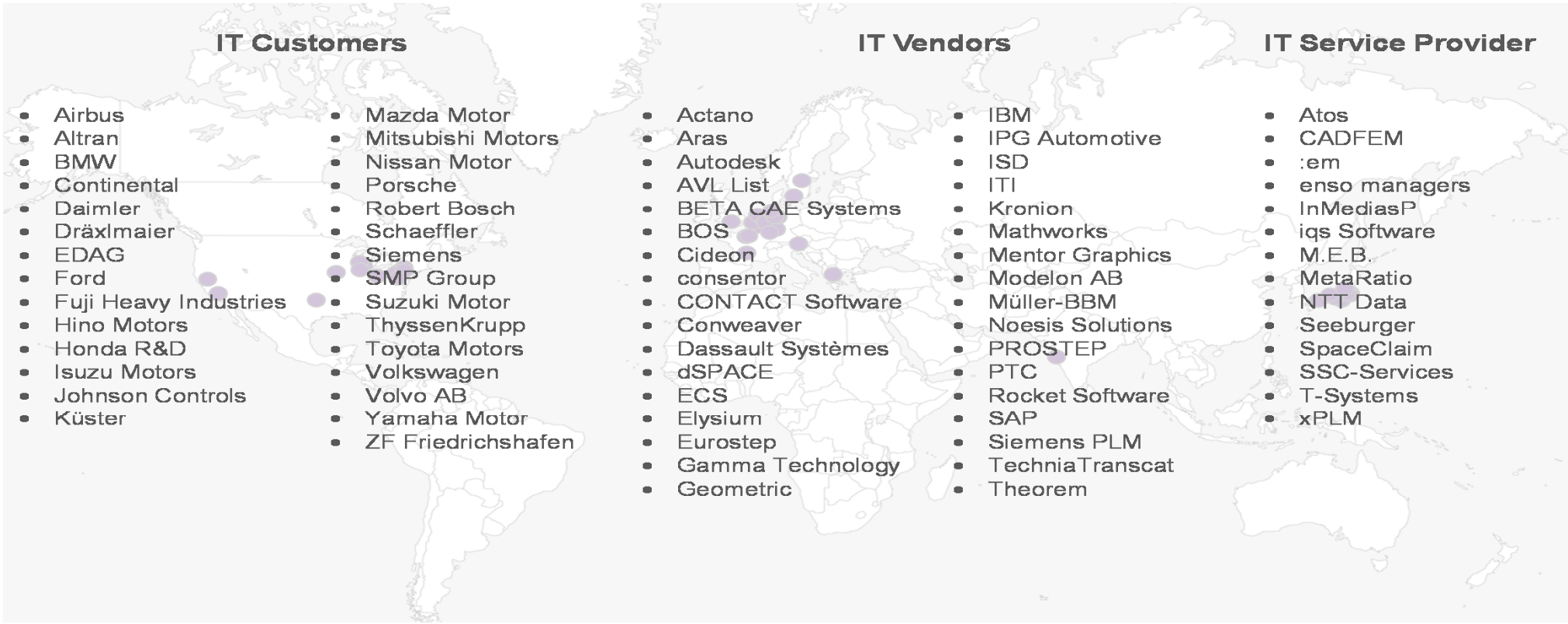
CODE of PLM OPENNESS

- CPO is a **Standard Criteria Catalogue** for
  - Interoperability, Infrastructure, Extensibility, Interfaces, Standards, Architecture, Partnership
- CPO provides **Transparency** in the market for Openness of Software by impartial, non-discriminating Criteria graduated in Shall, Should, May
- Voluntary **Self-Commitment**
  - IT Vendors document fulfillment of CPO Criteria in public statements
- Cost **Benefits for Industry & IT**
- **Open for Everybody**: www.prostep.org/en/cpo.html



77 Committed CPO-Partners – Cross-Country, Cross-Branch

Every Company is invited to join - details at www.prostep.org/en/cpo.html



IT Customers

- Airbus
- Altran
- BMW
- Continental
- Daimler
- Dräxlmaier
- EDAG
- Ford
- Fuji Heavy Industries
- Hino Motors
- Honda R&D
- Isuzu Motors
- Johnson Controls
- Küster
- Mazda Motor
- Mitsubishi Motors
- Nissan Motor
- Porsche
- Robert Bosch
- Schaeffler
- Siemens
- SMP Group
- Suzuki Motor
- ThyssenKrupp
- Toyota Motors
- Volkswagen
- Volvo AB
- Yamaha Motor
- ZF Friedrichshafen

IT Vendors

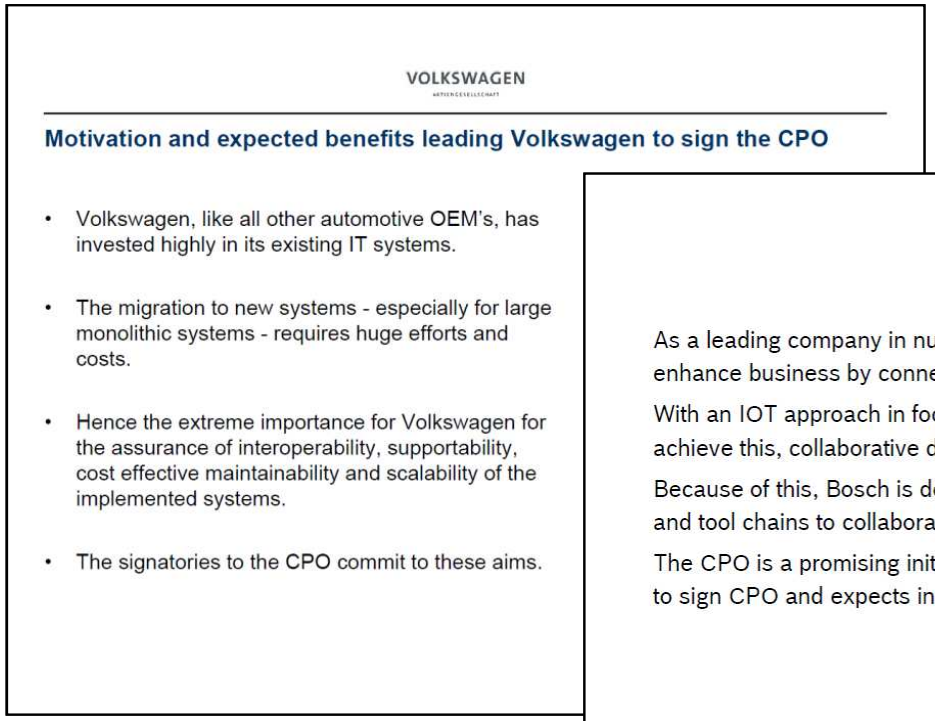
- Actano
- Aras
- Autodesk
- AVL List
- BETA CAE Systems
- BOS
- Cideon
- consentor
- CONTACT Software
- Conweaver
- Dassault Systèmes
- dSPACE
- ECS
- Elysium
- Eurostep
- Gamma Technology
- Geometric
- IBM
- IPG Automotive
- ISD
- ITI
- Kronion
- Mathworks
- Mentor Graphics
- Modelon AB
- Müller-BBM
- Noesis Solutions
- PROSTEP
- PTC
- Rocket Software
- SAP
- Siemens PLM
- TechniaTranscat
- Theorem

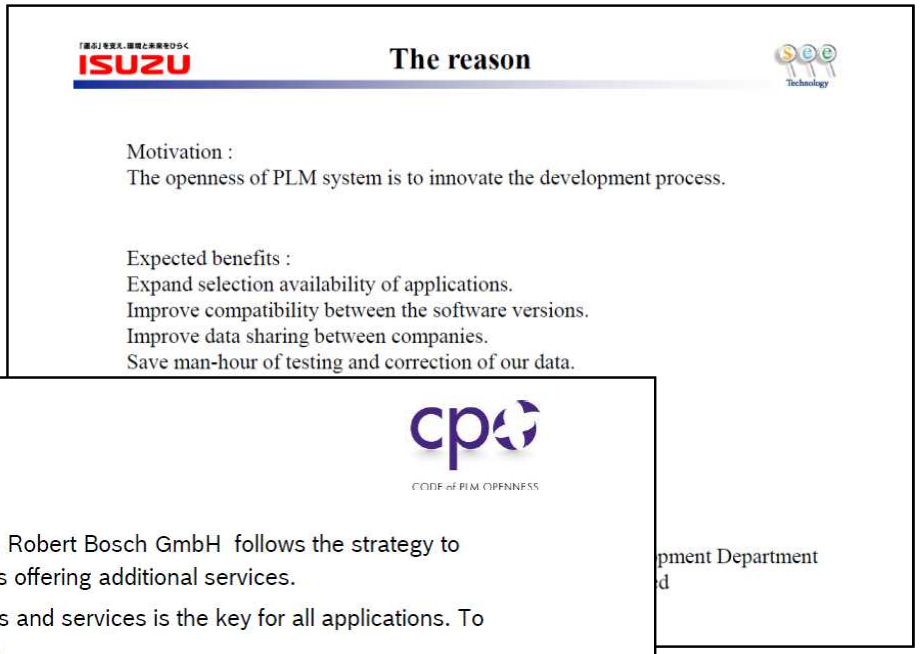
IT Service Provider

- Atos
- CADFEM
- :em
- enso managers
- InMediasP
- iqs Software
- M.E.B.
- MetaRatio
- NTT Data
- Seeburger
- SpaceClaim
- SSC-Services
- T-Systems
- xPLM

Voices from Industry

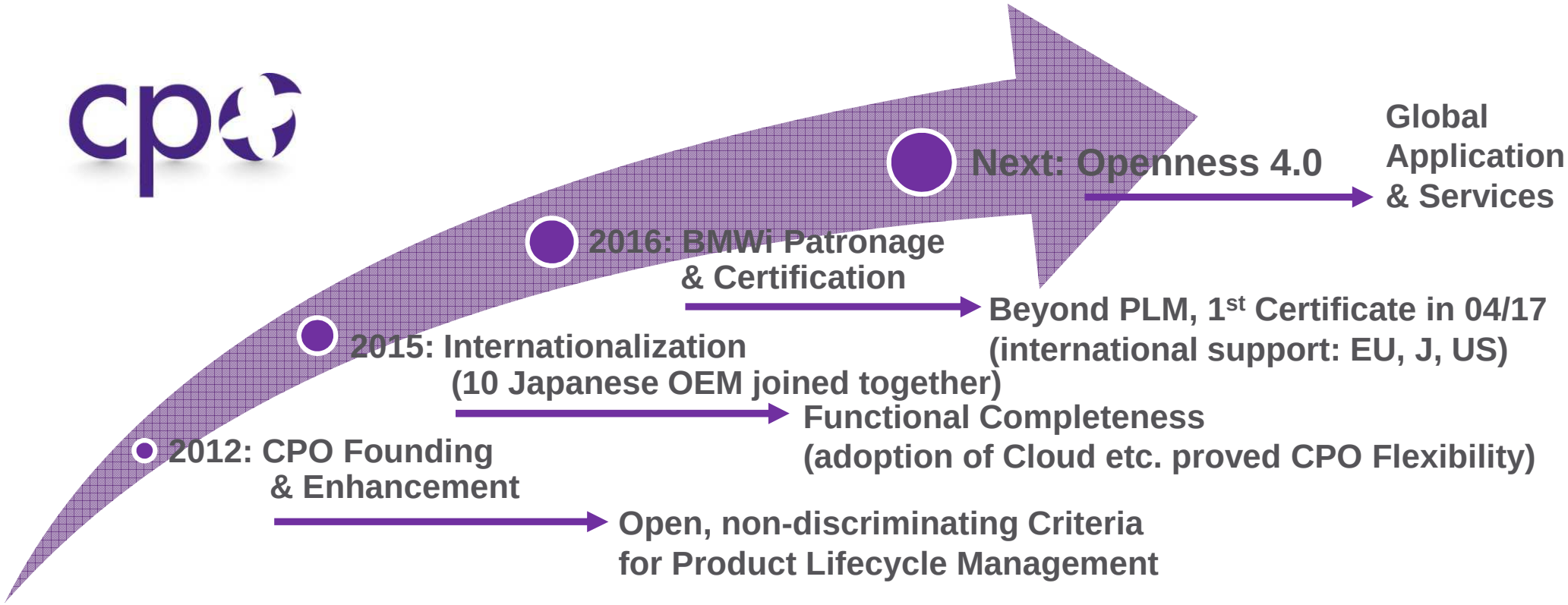
Examples





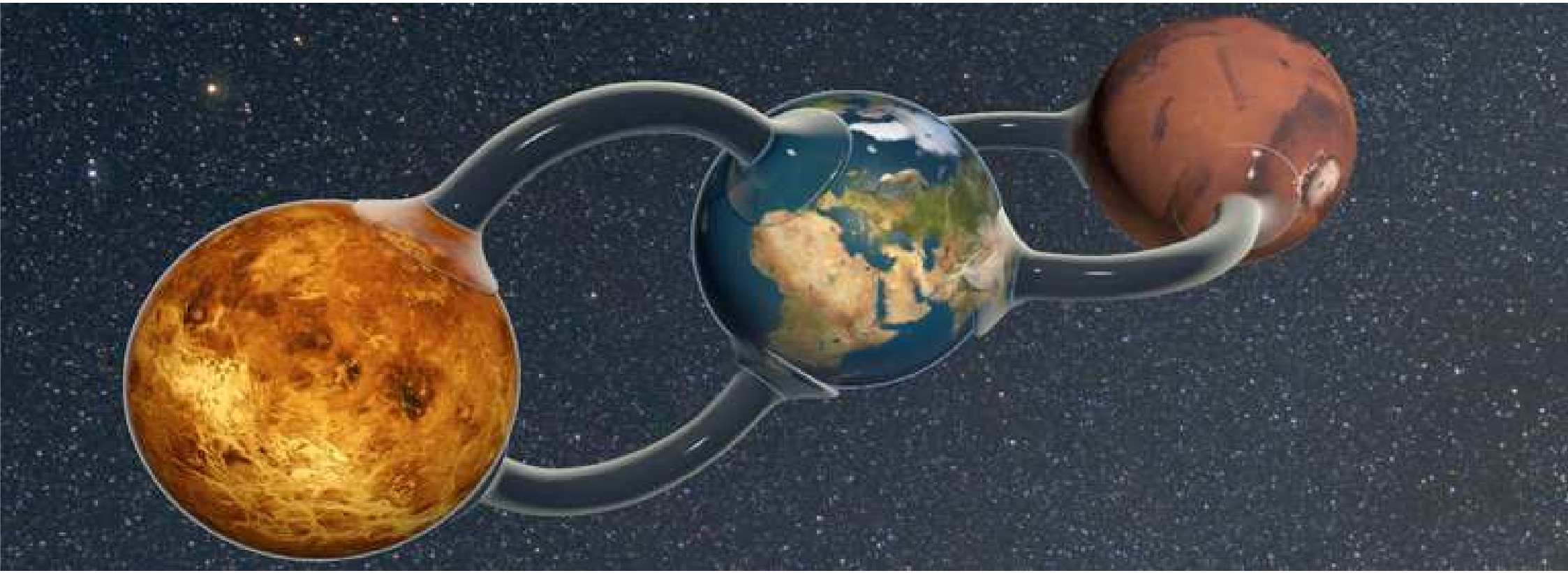
Roadmap toward Openness 4.0

Past – Today - Tomorrow



“Do or do not. There is no try.”

Yoda, Star Wars



Backup:
About ProSTEP iViP

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22 December 2016

ProSTEP iViP Association: Neutral & Non-Profit

A Strong Community since 1993

- Leading Worldwide-acting Neutral & Non-Profit Network of 180 Members from Industry, IT and Research
  - Driven & Funded by its Members
- Digital Transformer in Product Creation & Production
  - Defining Standards & Interfaces for Digital Processes
  - Safeguarding industrial Benefits & Interoperability
- Expert in IT-Standards & Industrial Implementation

Providing Results of Industrial Relevance

Fast and Flexible

Defining Standards & Industrialization for Digital Transformation:

- e.g. ISO 10303, ISO 14306, LOTAR, OMG ReqIF
- Dozens of ProSTEP iViP, VDA, VDMA Recommendations
- Tons of White Papers and Recommended Practices

Together with Partners:

ProSTEP iViP Products & Services

Digital Transformation: Standardization & Networking

Project Groups in Technical Program

- Actual 23 active groups
- Over 50 workshops p.a.
- 1.2 m € overall budget. Funding: 40 % industry, 20% other bodies (VDA etc.), 40% ProSTEP iViP

Following a Common Method

- One mature method for all projects
  - Assuring quality, efficient and reliable
- From use case to standard, and interoperable IT
- From requirements to industrial application

Publication

- White Papers & Studies, Benchmarks
- Recommendations & Standards
- Guidelines for Users and Vendors

Events

- **ProSTEP iViP Symposium**
  - Presentations, Workshops, Exhibition
  - Over 650 international participants
- **Aerospace / Automotive Summit**
  - Cross-branch Leadership & Strategy Event
- **Topic-specific conferences**
  - Each up to 200 international participants
- **Webinars**
  - 10 topic-specific webinars p.a.
  - ca. 20 international participants per event

ProSTEP iViP Organization and Focus for 2016 / 2017

Focus: User-driven Application Groups

- 3D Measurement Data Management
- ALM-PLM Interoperability
- **Code of PLM Openness**
- Digital Manufacturing
- Enterprise Rights Management
- JT Workflow Forum
- PDM for Vehicle Electric Systems
- Project Schedule Management
- ReqIF Workflow Forum
- Smart Systems Engineering
- Standardization Strategy Board
- Synced Factory Twins

Software Interoperability & Test Beds

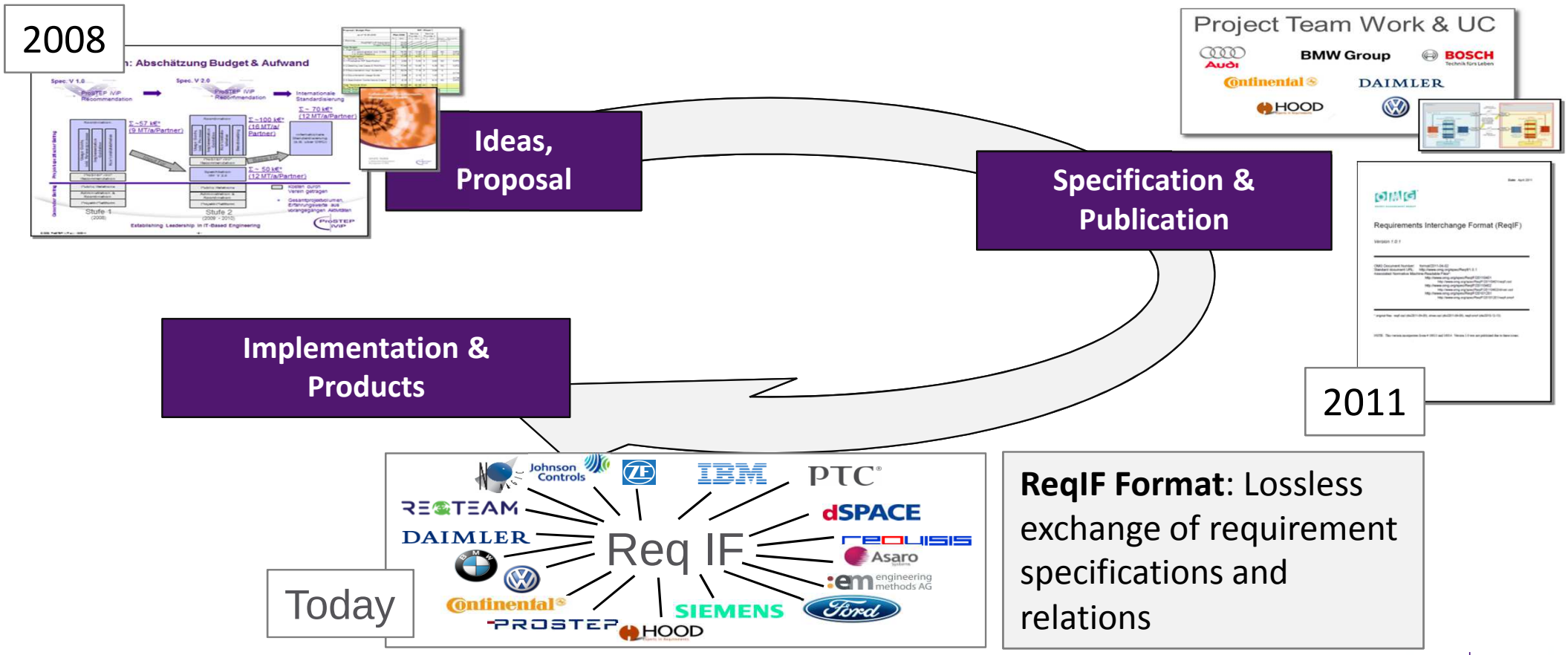
- CAx IF
- ECAD IF
- ECAD/MCAD IF
- JT IF
- PDM IF
- Req IF
- STEP Benchmark
- JT Benchmark

International Standardization

- STEP AP 242
- Long-term Archiving & Retrieval
- JT

Efficiently Reaching Aims in Time & Budget

Example of a ProSTEP iViP Project: OMG ReqIF Standard in 3 years – Today in Production



ReqIF Format: Lossless exchange of requirement specifications and relations

Save the Date:

20th ProSTEP iViP Symposium

"Digitalization of Products & Production"

- 17/18 May 2017
  in Essen, Germany
  (Colosseum Essen)
- Kindly supported by
  - thyssenkrupp
  - CONTACT Software
- Conference Program
  - 5 Keynotes
  - 40 Presentation & Workshops
- 35 Exhibiting Companies
- 650 Participants

Backup:
ProSTEP iViP Publications

Achievements by ProSTEP iViP - in cooperation with

Standards:

ISO
- **ISO 10303 (Part 28, AP 212, AP214, AP242), ISO 14306 (JT)**

OMG
- **PLM Services, Requirements Interchange Format (ReqIF)**

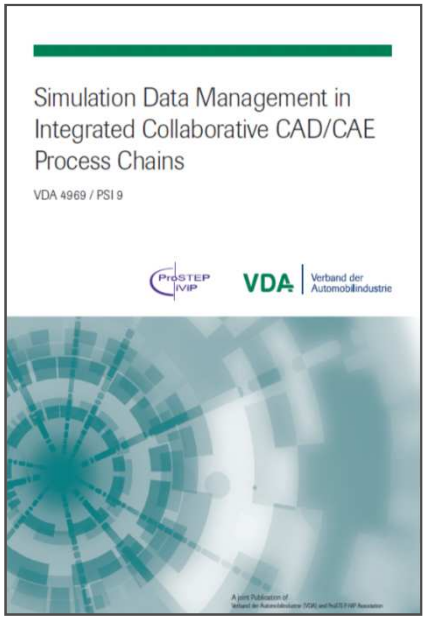
ASD-STAN
- **EN 9300 (Long-term Archiving and Retrieval, several parts)**

Recommendations:

SASIG
- **Engineering Change Management (ECM)**

VDA
- **VDA 4953-2 - Drawing-free Product Documentation**
- **VDA 4956 - PDM Data Exchange, several parts**
- **VDA 4958 - Long-term Archiving (LTA), several parts**
- **VDA 4959 – Project Schedule Management (PSM)**
- **VDA 4961 - Simultaneous Engineering (SE) Check List**
- **VDA 4964 - Harness Description List (KBL) ⇐ implementation support by ECAD-IF**
- **VDA 4965 - Engineering Change Management (ECM), several parts**
- **VDA 4966 - Collaborative Product Visualization (CPV)**
- **VDA 4967 - Simulation Data Management (SimPDM)**
- **VDA 4968 - Vehicle Electric Container (VEC) ⇐ implementation support by ECAD-IF**
- **VDA 4969 - Simulation Data Management in Integrated Collaborative CAD/CAE Process Chains**
- **VDA 5600 - Automatic Data Exchange of Product- and Metadata between OEM and Supplier PLM Systems**

VDMA
- **VDMA 66421 - Reference process for seamless production planning**



ProSTEP iViP Recommendations

PSI 1 – Collaborative Project Management (CPM)
- **PSI 1-1: CPM Reference Model**
- **PSI 1-2: CPM Data Exchange Model**

PSI 2 – Collaborative Product Visualization (CPV)

PSI 3 – Engineering Change Management (ECM), cp. SASIG ECM
- **PSI 3-2: Engineering Change Order (ECO)**

PSI 4 – Integration of Simulation and Computation in a PDM Environment

PSI 5 – ECAD/MCAD-Collaboration

PSI 6 – Requirements Interchange Format (RIF), cf. OMG ReqIF

PSI 7 – Enterprise Rights Management (ERM)

PSI 8 – Digital Manufacturing (DM)

PSI 9 – Simulation Data Management in Integrated Collaborative CAD/CAE Process Chains (C3I)

PSI 10 – Project Schedule Management (PSM)

PSI 11 – Smart Systems Engineering (SmartSE)

PSI 12 – Manufacturing Change Management (MCM)

PSI 13 – OEM-OEM and OEM-Joint Venture Collaboration

PSI 14 – JT Industrial Application Package (JTIAP)

PSI 15 – Enterprise Rights Management (ERM)

How To’s (Samples)

White Paper:
- Applying JT
- ECAD/MCAD Collaboration
- Enterprise Rights Management
- PDM Integration Strategies
- Production Planning
- Project Schedule Management
- Requirements Management
- Smart Systems Engineering
- SOA4PLM
- Vehicle Electrics
- … and many more

Guidelines:
- Business Case Analysis
- ECM Implementation
- IT Security Realization
- JT-based Data Exchange
- ReqIF Implementation
- STEP-based Data Exchange
- … an many more

Application Configuration:
- JT & STEP

Screen-Casts:
- JT Show Cases

List of Closed Projects (Samples)

- Assembly Data Exchange
- Business Value Analysis
- CAM Objects
- Collaborative Product Visualization
- Collaborative Project Management
- Digital Plant
- Engineering Change Management
- Integration of CAE and PDM
- ISO JT
- JT Benchmark 1 – 6
- OMG PLM Services
- OMG Requirements Interchange Format
- Secure Product Creation Processes
- STEP AP 212
- STEP AP 214 V1, V2, V3
- STEP AP 242
- STEP Benchmark 1 – 7

Thank you!

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