

Product Based Interoperability – Approaches and Requirements

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Presented by Kurt Sandkuhl

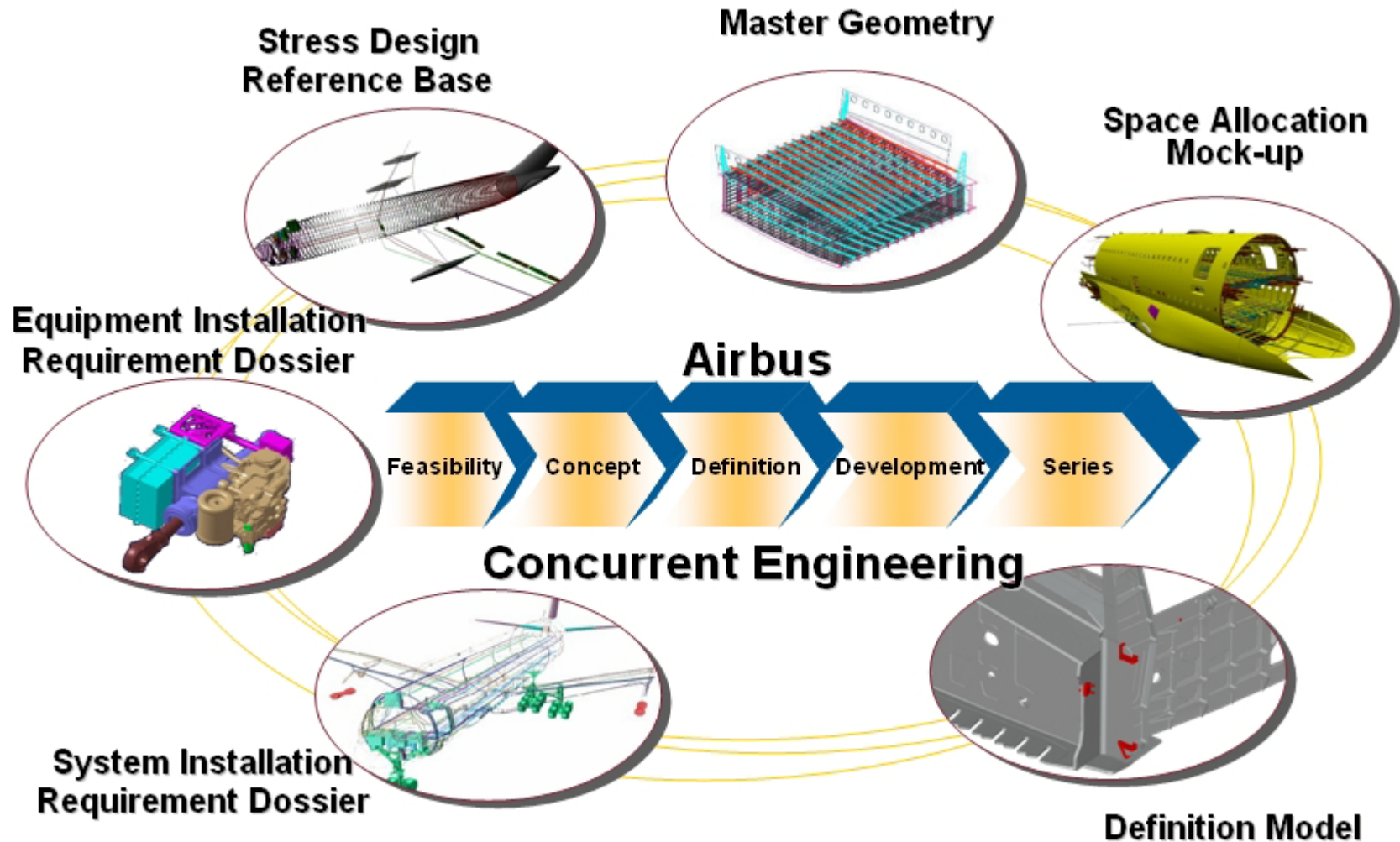
Product Based Interoperability

... is about removing barriers to

- Interdisciplinary knowledge sharing and cooperative problem solving
- Information logistics and quality management
- Data exchange between companies and targeted applications for different disciplines

Visualization of the Product

Concurrent Engineering using multidisciplinary models (source: Airbus ACE)

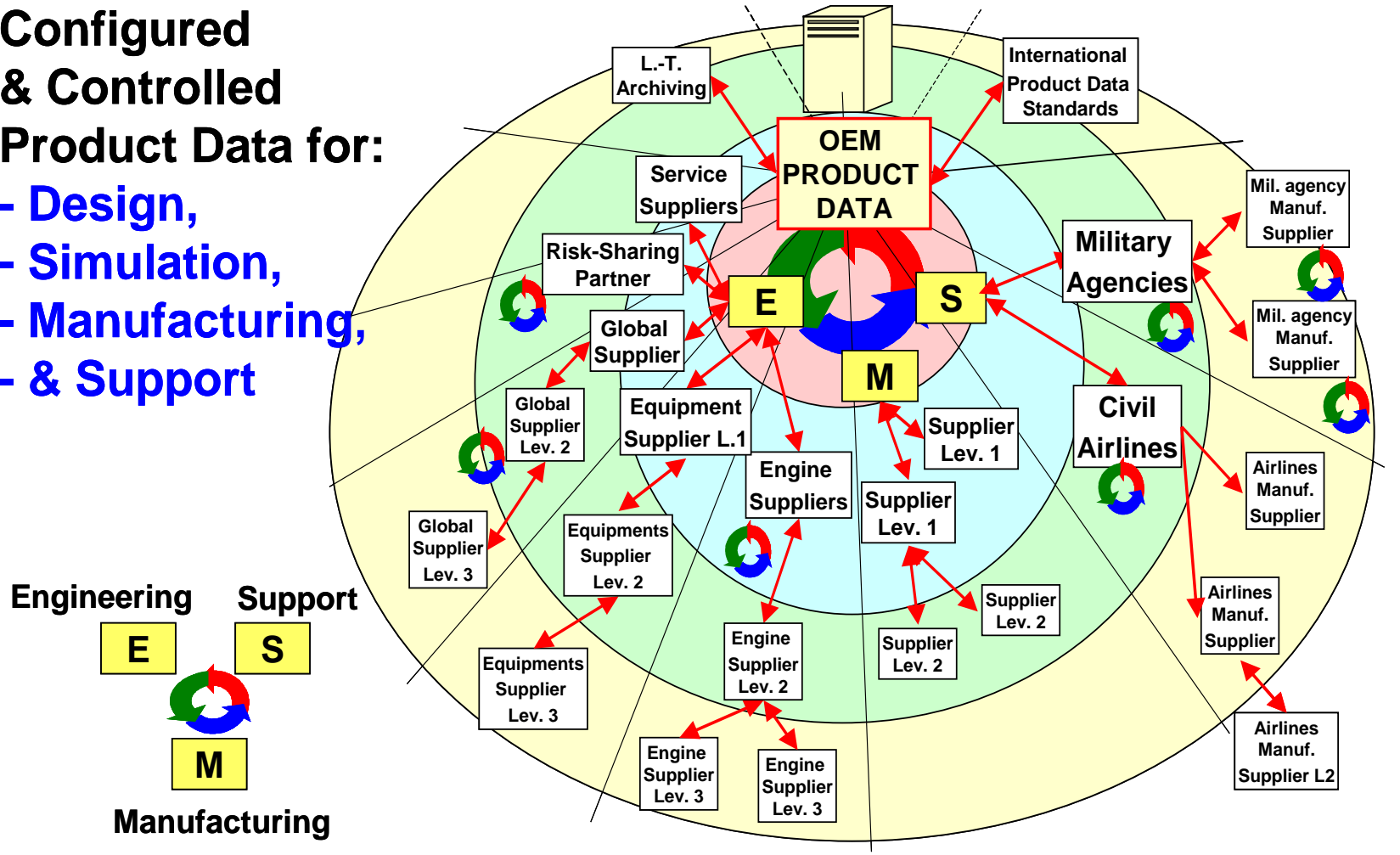


By courtesy of Nicolas Figay, EADS

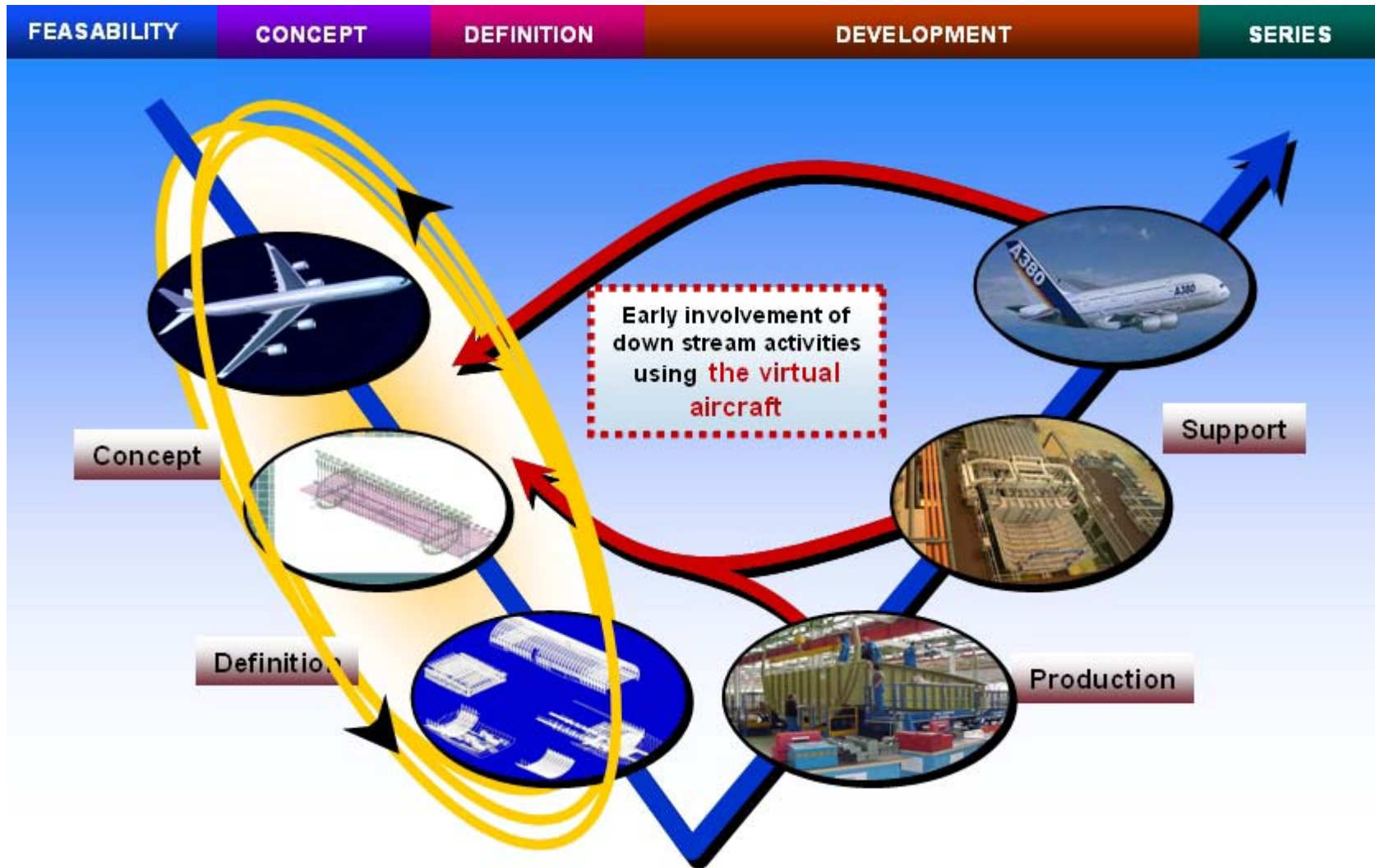
Visualization of the Enterprise - Networked organizations

Configured & Controlled Product Data for:

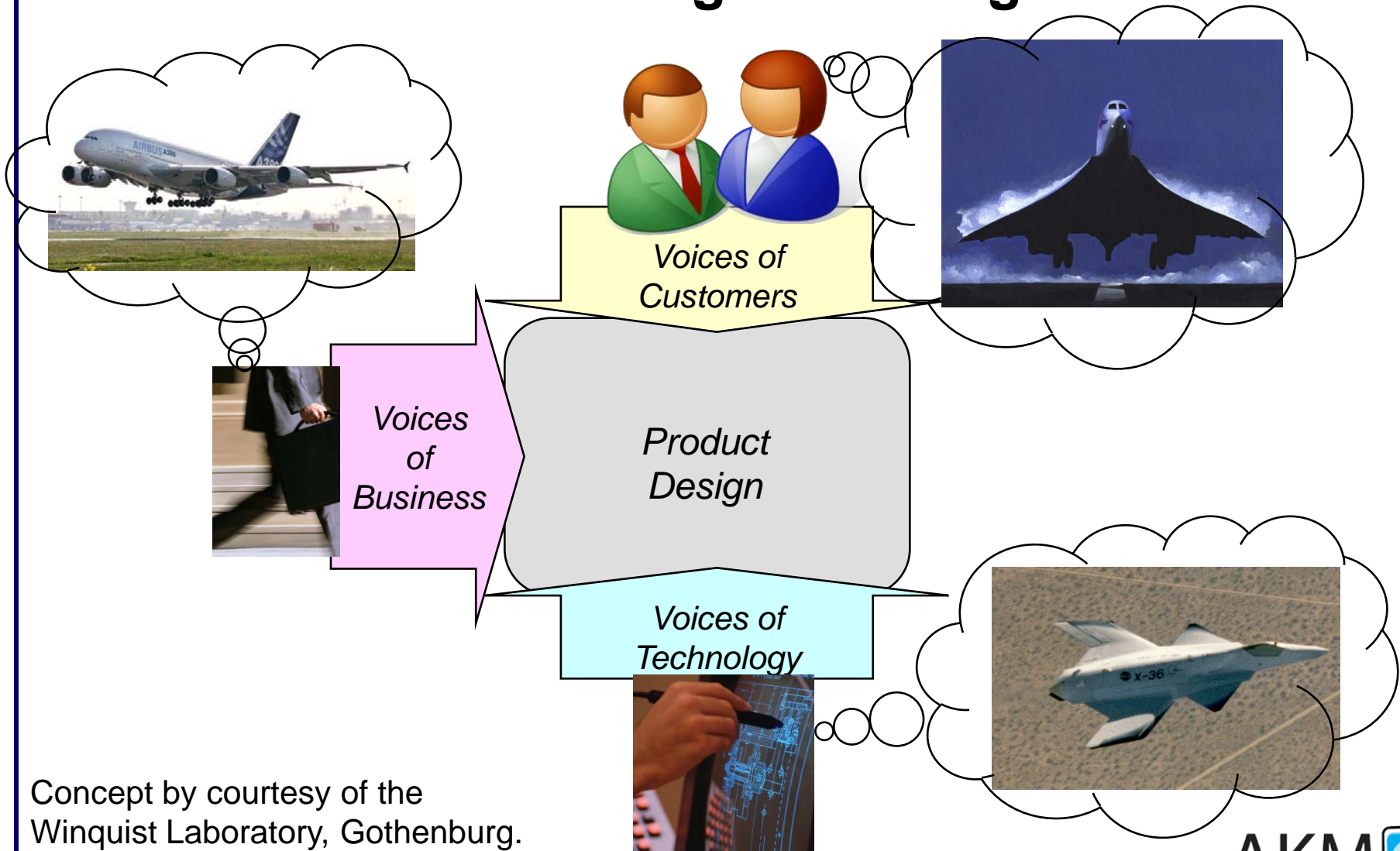
- Design,
- Simulation,
- Manufacturing,
- & Support



Virtual Aircraft for Early Involvement of Downstream Activities



Product Design Challenges

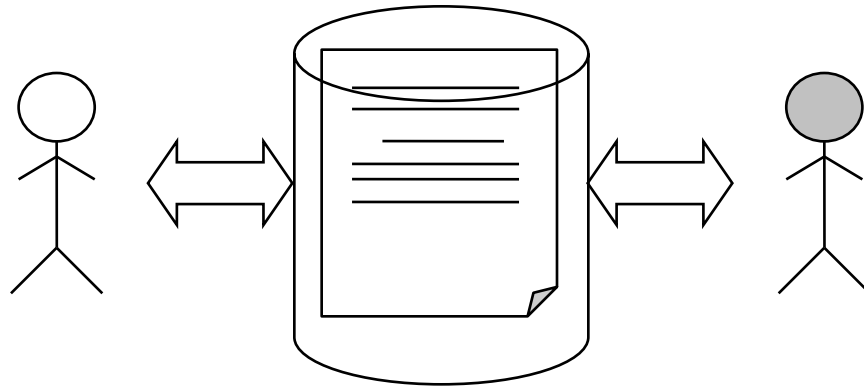


Concept by courtesy of the Winquist Laboratory, Gothenburg.

Product Based Interoperability Profiles

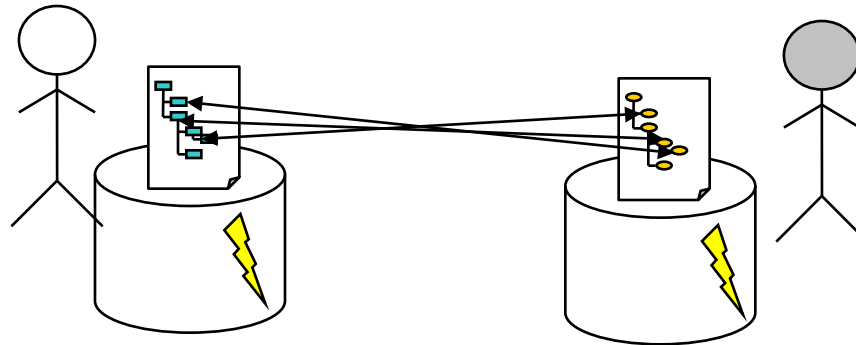
- Document management
- Data mapping (EAI)
- Reference models (Semantic web)
- Shared information repository (PDM)
- Federated knowledge repository (Pragmatic web)

Product Document Management



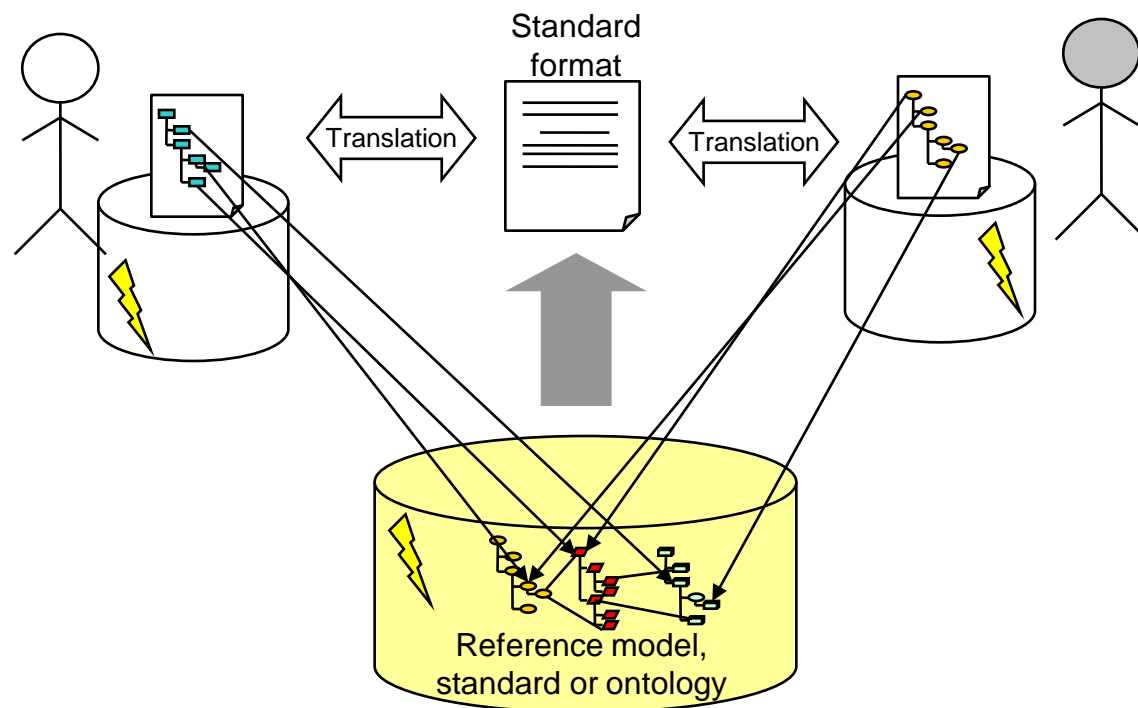
- Manual data processing
- Email exchange or document management
- Documents include text, spreadsheets, engineering drawings etc.

Product Data Mapping



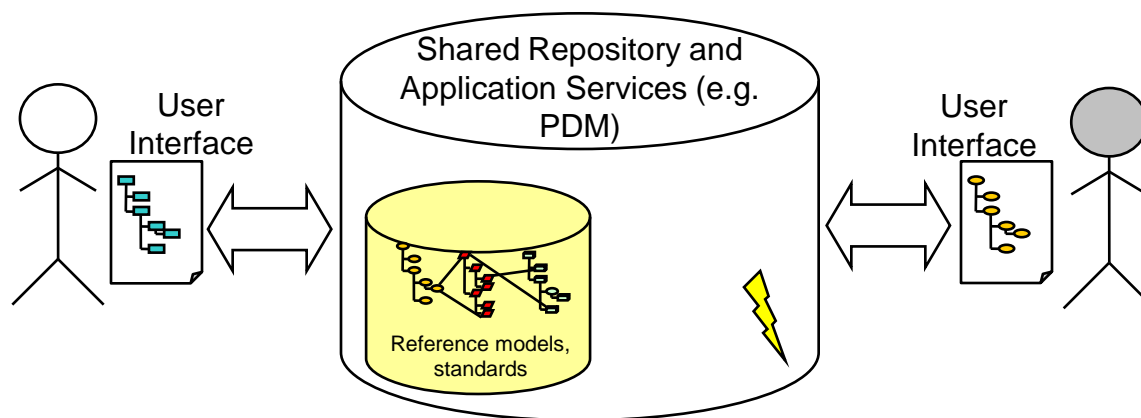
- Local applications for automated data processing
- Data to data mapping, APIs and web services
- Enterprise Application Integration (EAI)

Interoperability through Standards



- Local applications
- Mapping through global taxonomy/thesaurus
- Ontologies
 - Formal global model opens up for automated reasoning and rule based reconciliation

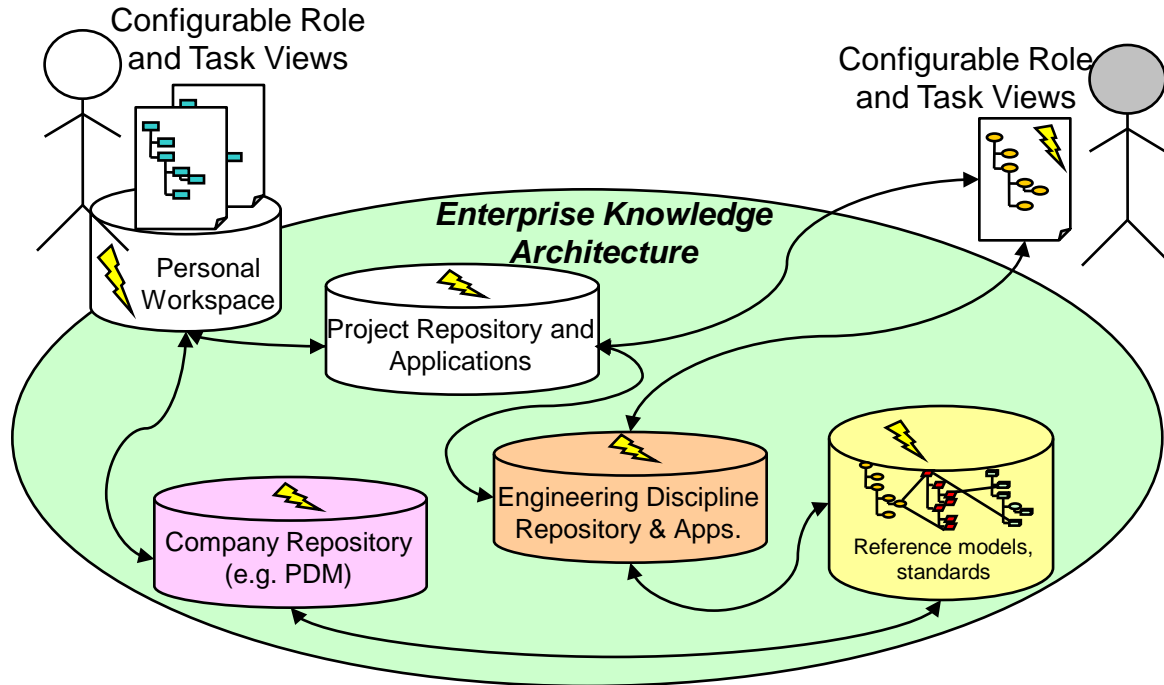
Shared Information Repository



- Integrating database with instance data and reference models
- Single global model, global execution
- Product data management (PDM)
- *"mySAP PLM: Software That Provides the Single Source of Truth for All Product-Related Information"*

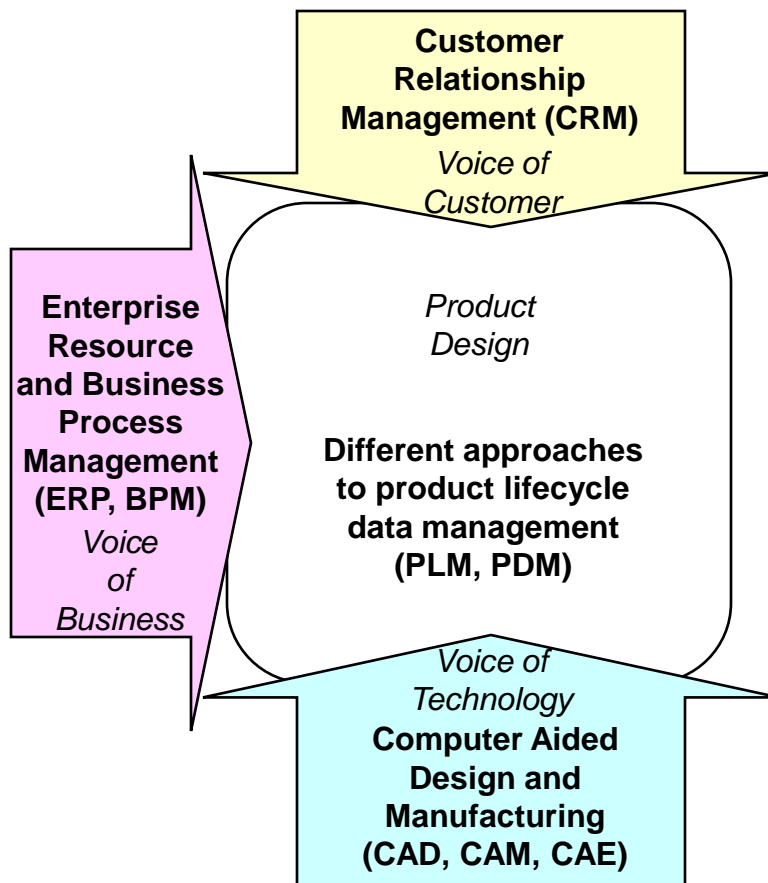
(<http://www.sap.com/solutions/business-suite/plm/index.epx>)

Federated Knowledge Repository



- Federated knowledge architecture with multiple local repositories
- Pragmatically emerging web of local views, local metamodels, local execution, local ownership
- Active knowledge models

Product Design Support – State of the Art



- Single generic perspective for all users; - no roles, views, work management and knowledge sharing support
- User managed information exchange, no active knowledge support for collecting experiences and improving work
- Sequential flows creating versioning of data and local data management problems

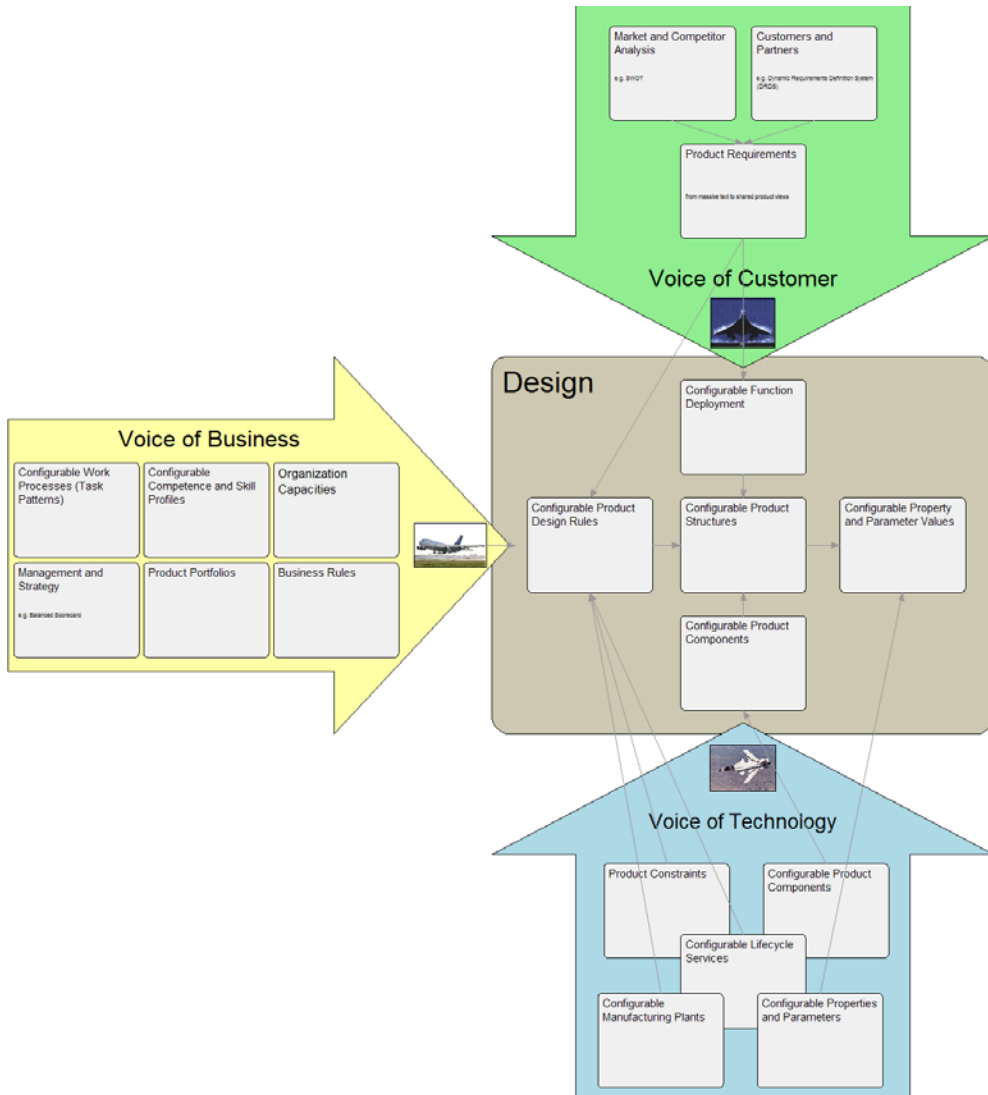
Design Principles for Federated Product Knowledge Management

- **Service-oriented** and component-based, plugging in available IT tools in a need-driven manner
- **User-controlled**, with semi-formal and interactive reasoning, because the key knowledge is the individuals' technical design skills
- **Collaborative**, because most products are too large to be designed by a chief designer, and involve too many different engineering disciplines and other business roles
- **Business-oriented**, because business resources, constraints, and requirements constitute the basic framework within which the design process takes place
- **Configurable** in every aspect, allowing dynamic design languages, processes, systems and services
 - Configurable on every level, allowing, capturing, and learning from local deviations, exceptions, and innovations
 - Extensible, allowing new organizational roles, working practices, system services, etc. to be brought into the joint design arena when needed

Design Principles for Federated Product Knowledge Management (continued)

- Based on **multiple views**
 - Allowing each person to access the rich and complex product information structure through simplified role- and task-oriented workplaces
 - Allowing heterogeneous and inconsistent views to coexist, enabling negotiation between perspectives and shared reality construction, not enforcing a global, shared model prematurely by only allowing consistent, already interoperable, views to be expressed
- **Multi-dimensional**, combining multiple type hierarchies, part structures, properties and parameter aspects, for different disciplines
- **Inter-organizational**, because design increasingly requires core competence found outside of the company, among e.g. suppliers and consultants

CPPD Overview



The CPPD methodology and the AKM family of platforms form a spiralling set of increasingly more detailed views of how to implement what using which services