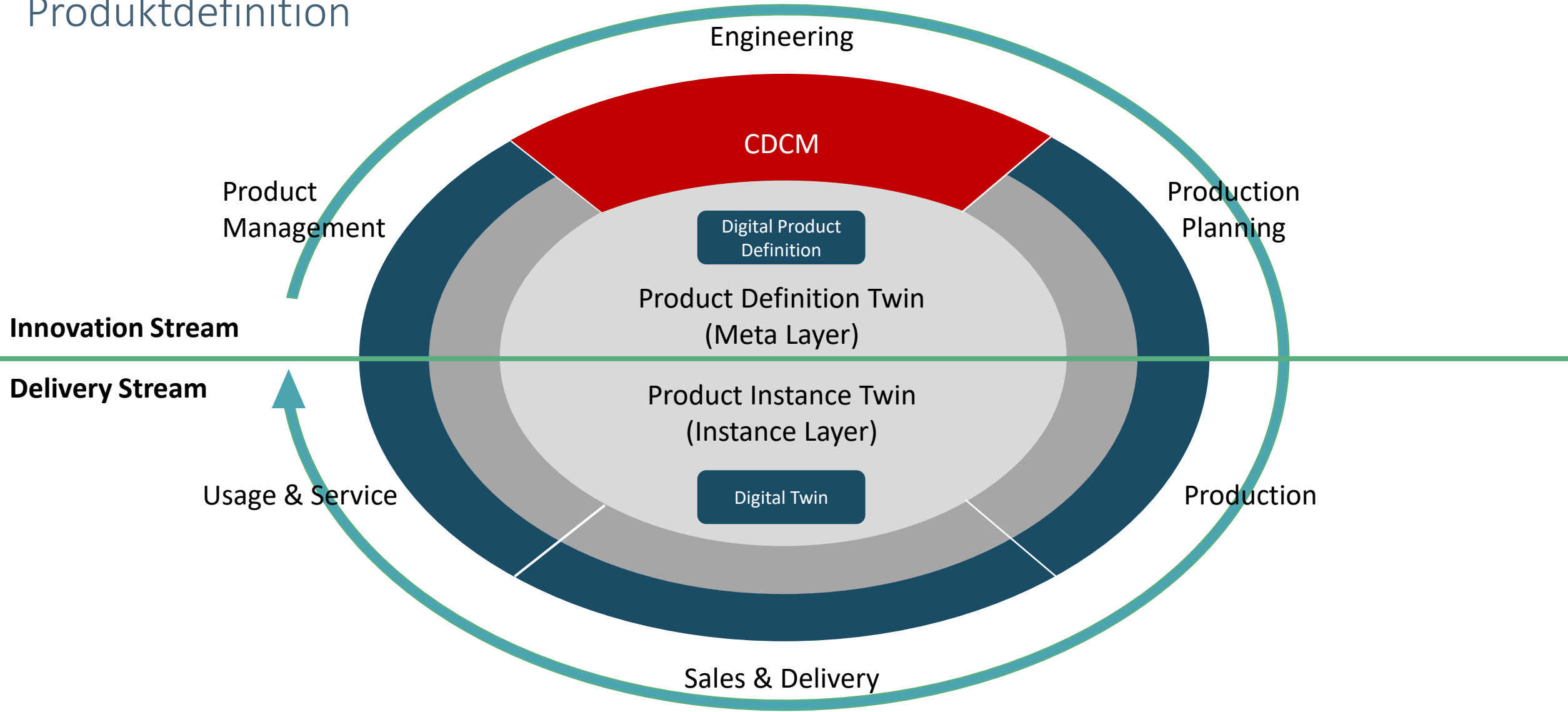


# Cross Domain Configuration Management «CDCM»

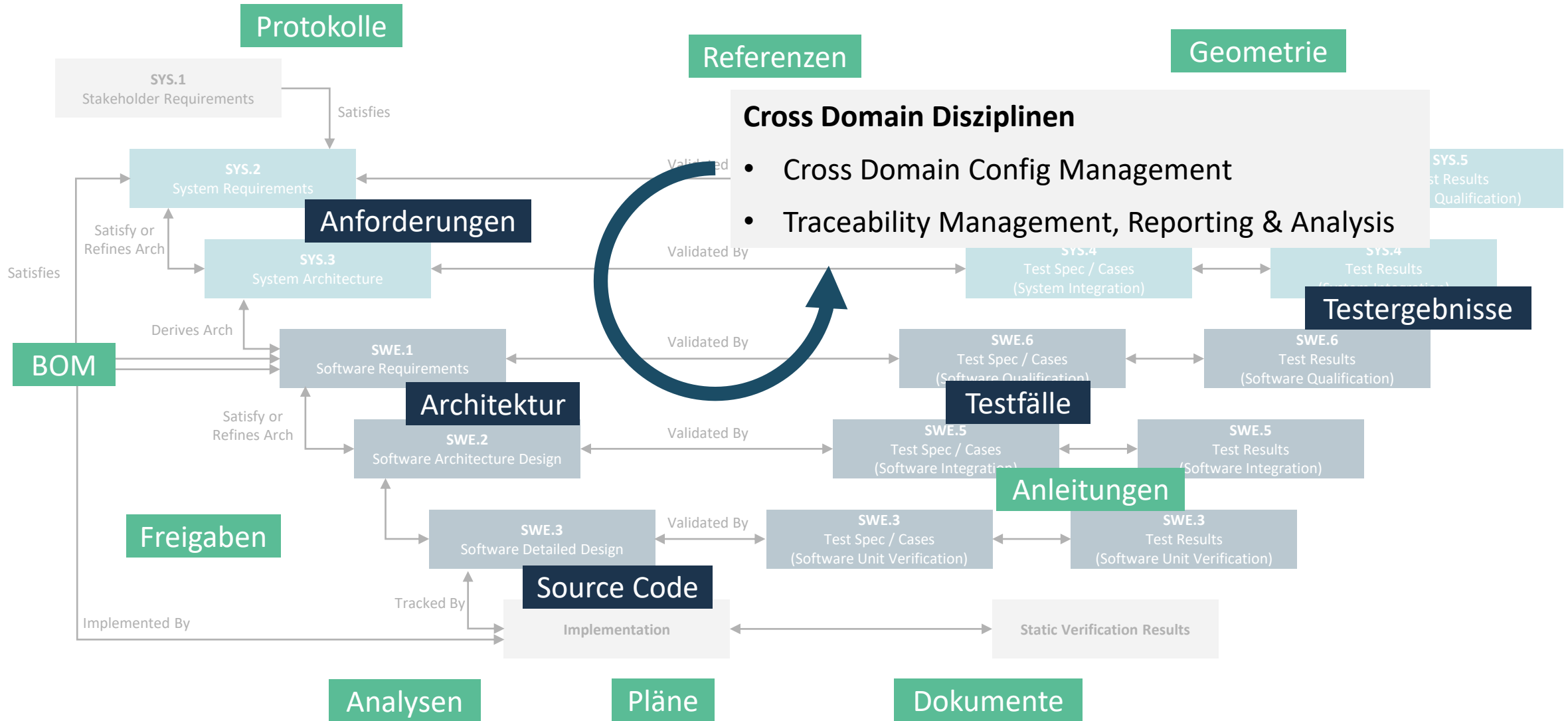
Domänenübergreifendes Informationsmanagement  
zur Entwicklung komplexer cyberphysischer Produkte



# CDCM integriert eine Vielzahl von Domänenmodellen zu einer digitalen Produktdefinition

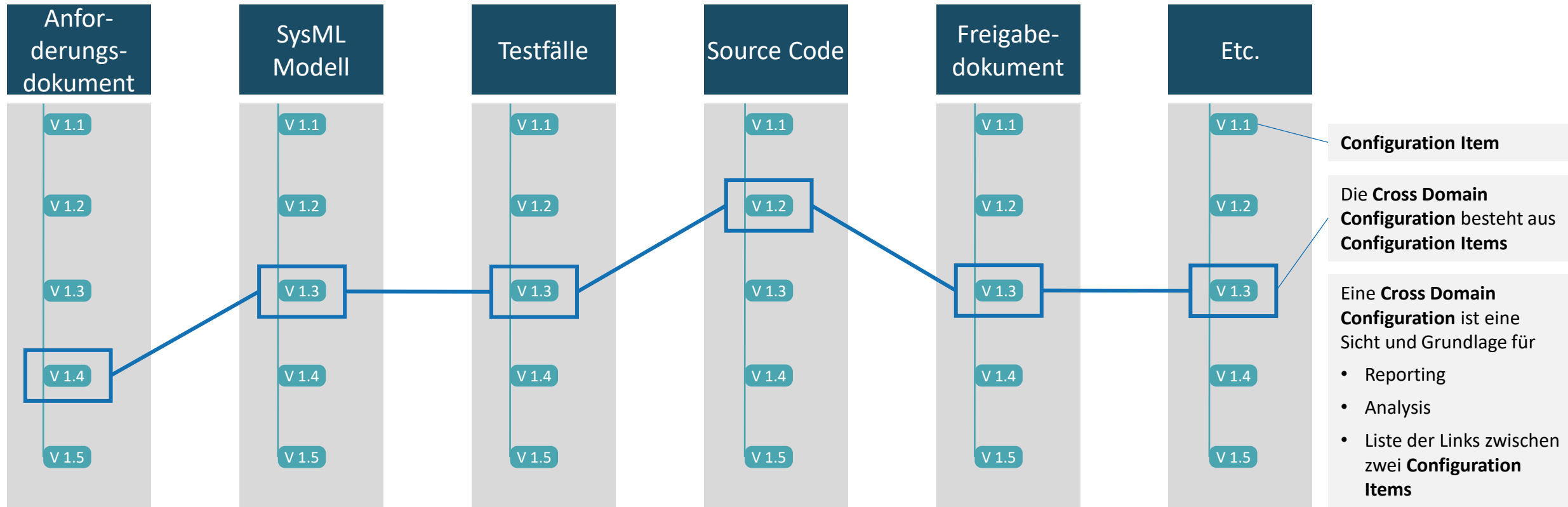


# Die Kontrolle des "V" erfordert holistische Ansätze, um Silos zu überwinden



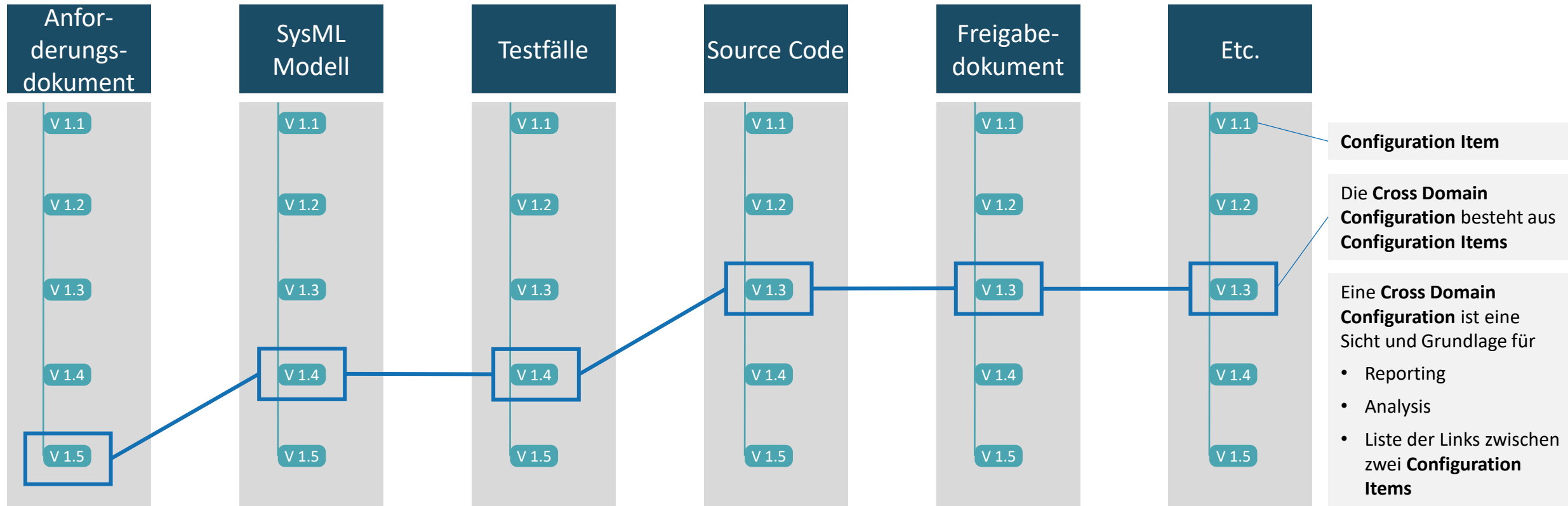
# Versionierte Engineering Informationen sind über viele Werkzeuge und Domänen verteilt

Alle Autorenwerkzeuge erzeugen versionierte Inhalte

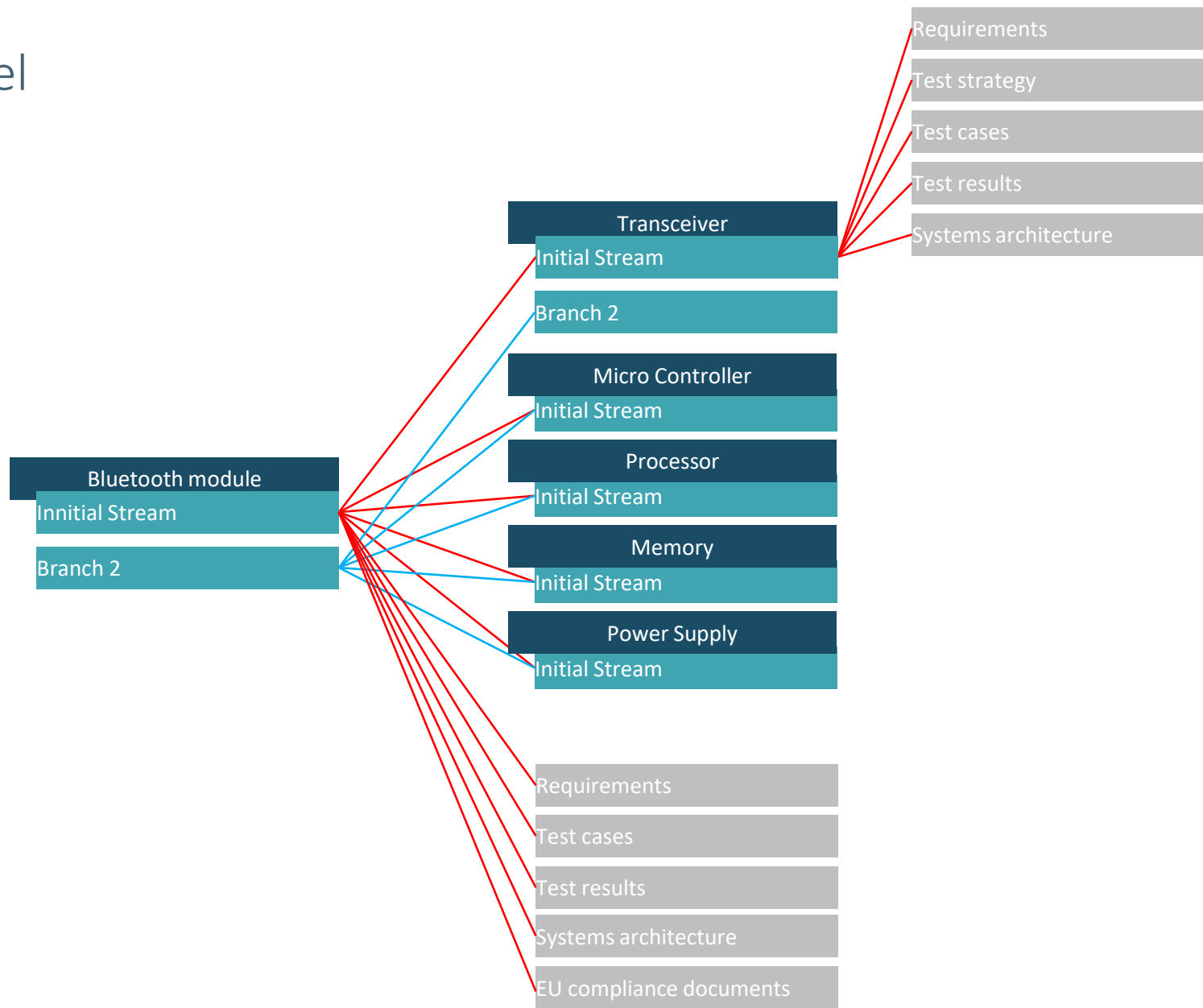


# Versionierte Engineering Informationen sind über viele Werkzeuge und Domänen verteilt

Alle Autorenwerkzeuge erzeugen versionierte Inhalte



# Ein Beispiel



- Product
- Configuration
- Configuration Item

aka: external work product

# Cross Domain Configurations bieten enorme Benefits

## Ziel 1: Management der CDC

- Hierarchisierung von Produkten
- Forcierung von Wiederverwendung
- Sicherstellung von Konsistenz
- Effizienzsteigerung im Baselineing, QM- und Freigabeprozess

## Ziel 2: Nutzen der CDC als Kontext

- Cross Domain Analysen, z.B. Impactanalysen
- Traceability Management
- Compliance, z.B. ISO 26262
- Modernes Productline-Engineering

Aufbau einer vollständigen domänen-übergreifenden,  
toolunabhängigen Produktdefinition

Grundlage für modernes  
Productline engineering  
→ Versionen / Varianten

Forcierung der  
Wiederverwendung  
von Engineering Assets

Erste digitale Definition  
des Produkts im  
Produktlebenszyklus

Mit welchem Tool wird Cross Domain Configuration Management bei Euch gemacht?

Machen wir gar nicht

Machen wir irgendwie manuell oder  
mit Excel

Wir haben ein eigenes Tool dafür  
entwickelt

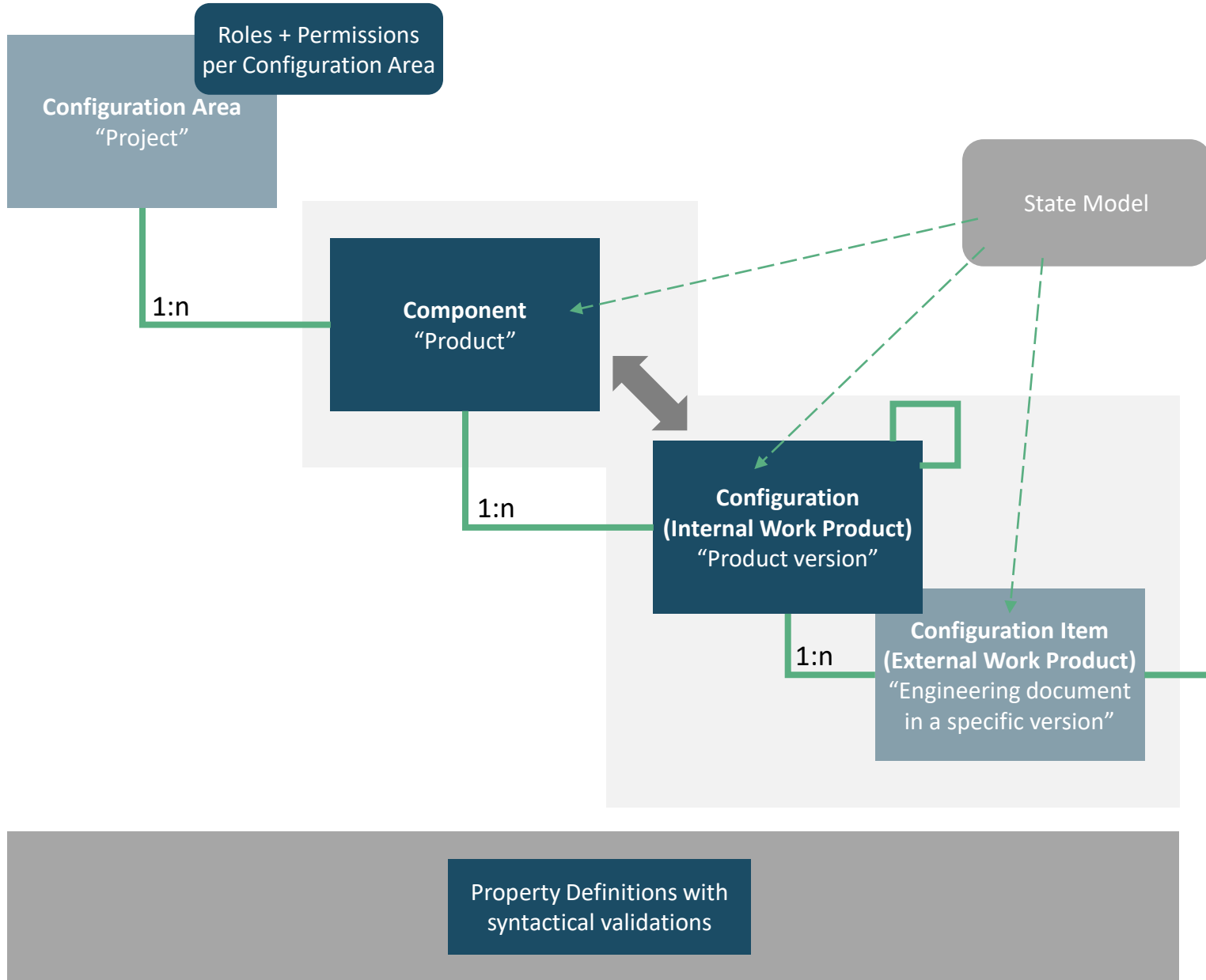
Wir nutzen Standardsoftware, z.B. IBM  
Jazz / GCM



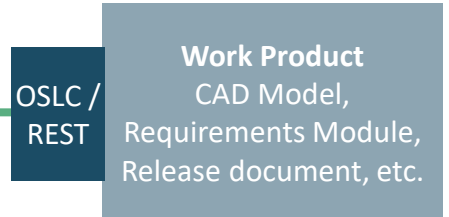
# Entwicklung eines CDCM Tools bei Bosch

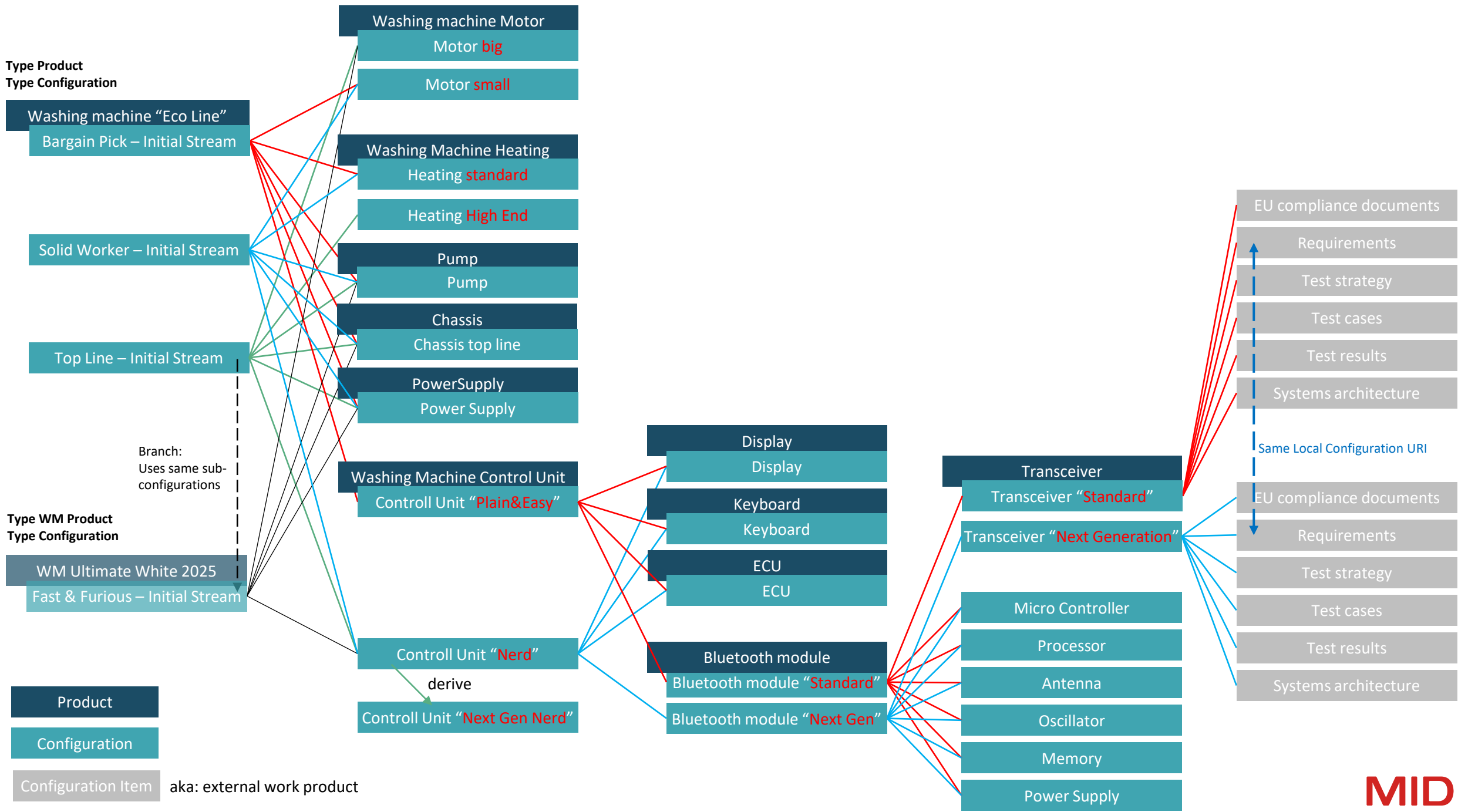


# Core Data Model

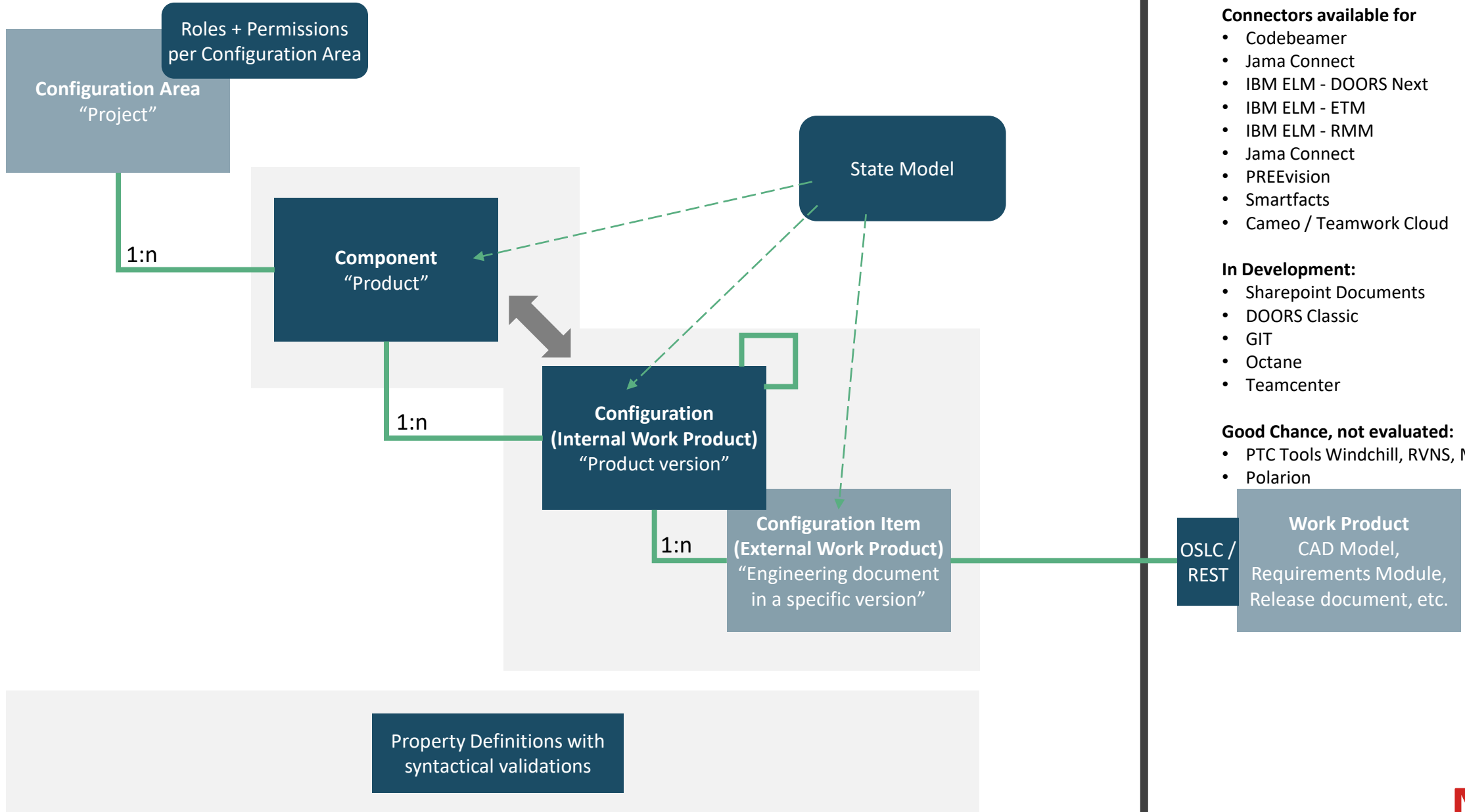


# Authoring Tools





# CDCM - Core Data Model



## Authoring Tools

### Connectors available for

- Codebeamer
- Jama Connect
- IBM ELM - DOORS Next
- IBM ELM - ETM
- IBM ELM - RMM
- Jama Connect
- PREvision
- Smartfacts
- Cameo / Teamwork Cloud

### In Development:

- Sharepoint Documents
- DOORS Classic
- GIT
- Octane
- Teamcenter

### Good Chance, not evaluated:

- PTC Tools Windchill, RVNS, Modeler
- Polarion

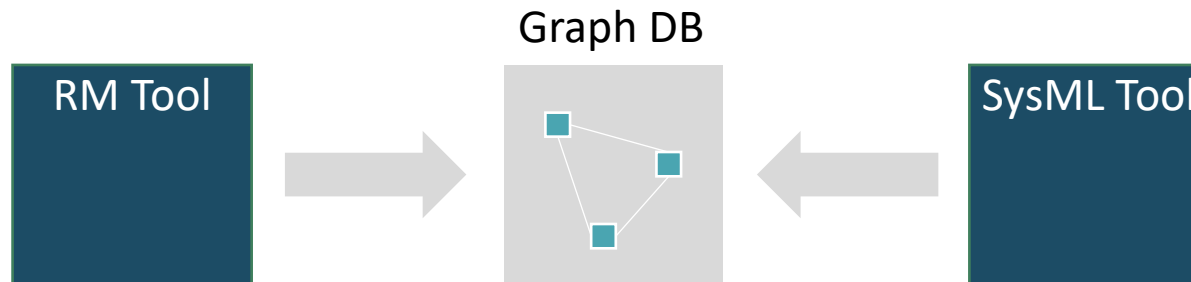
# OSLC: Referencing Content - Instead of Synchronizing it

**Synchronize** one silo into the other and leverage tool internal link mechanisms



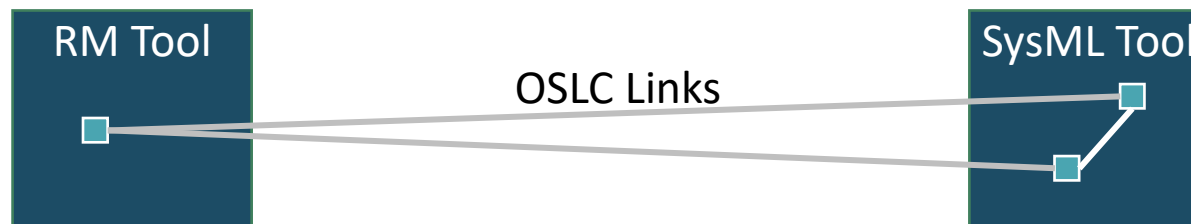
- Too little flexibility e.g. for variant management
- Security Issues
- Works only for two models

**Synchronize** models and links into one data source and manage them there



- Bad behavior in model branch and merge

Store the links in the models and **reference** to the other side

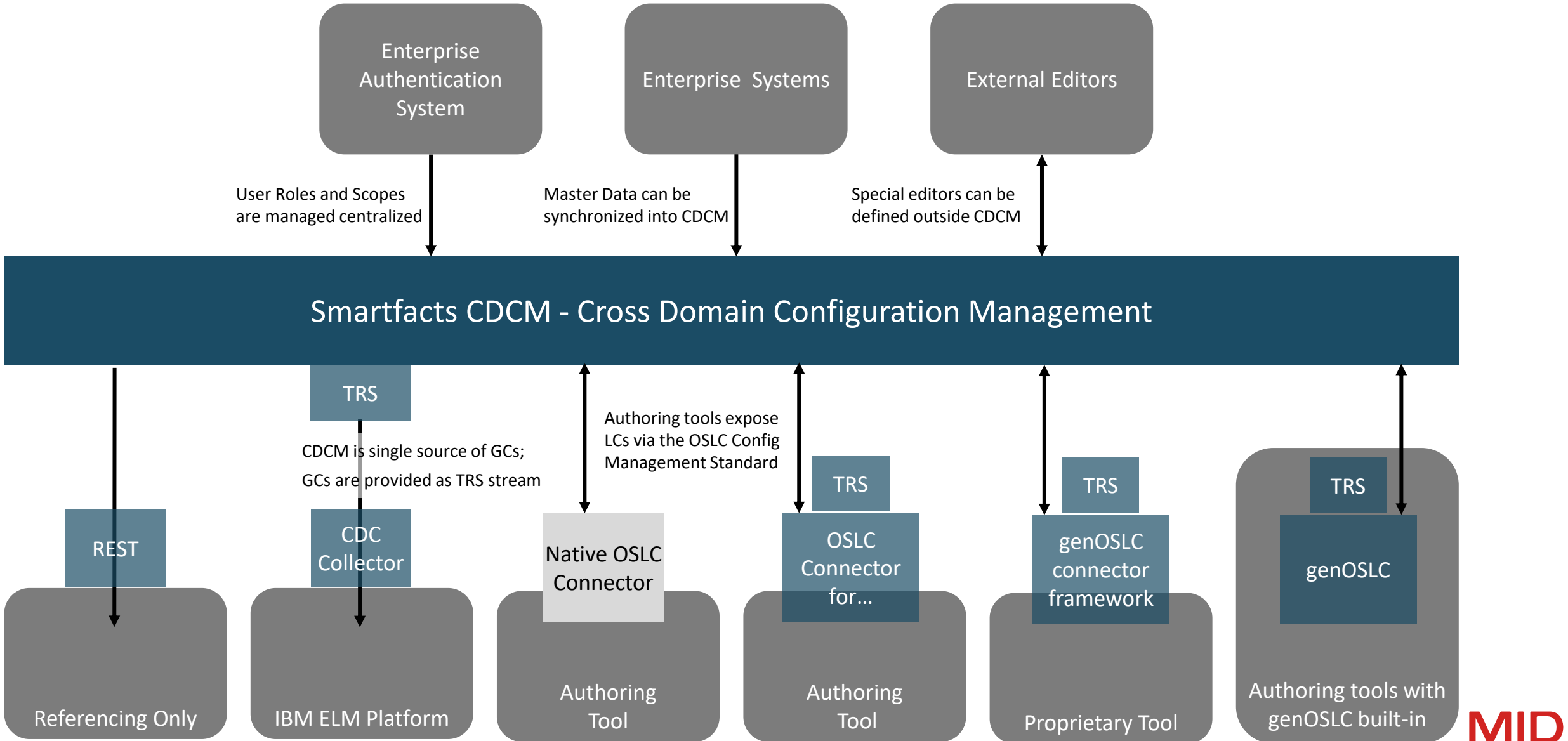


- Flexible
- Scalable
- Secure

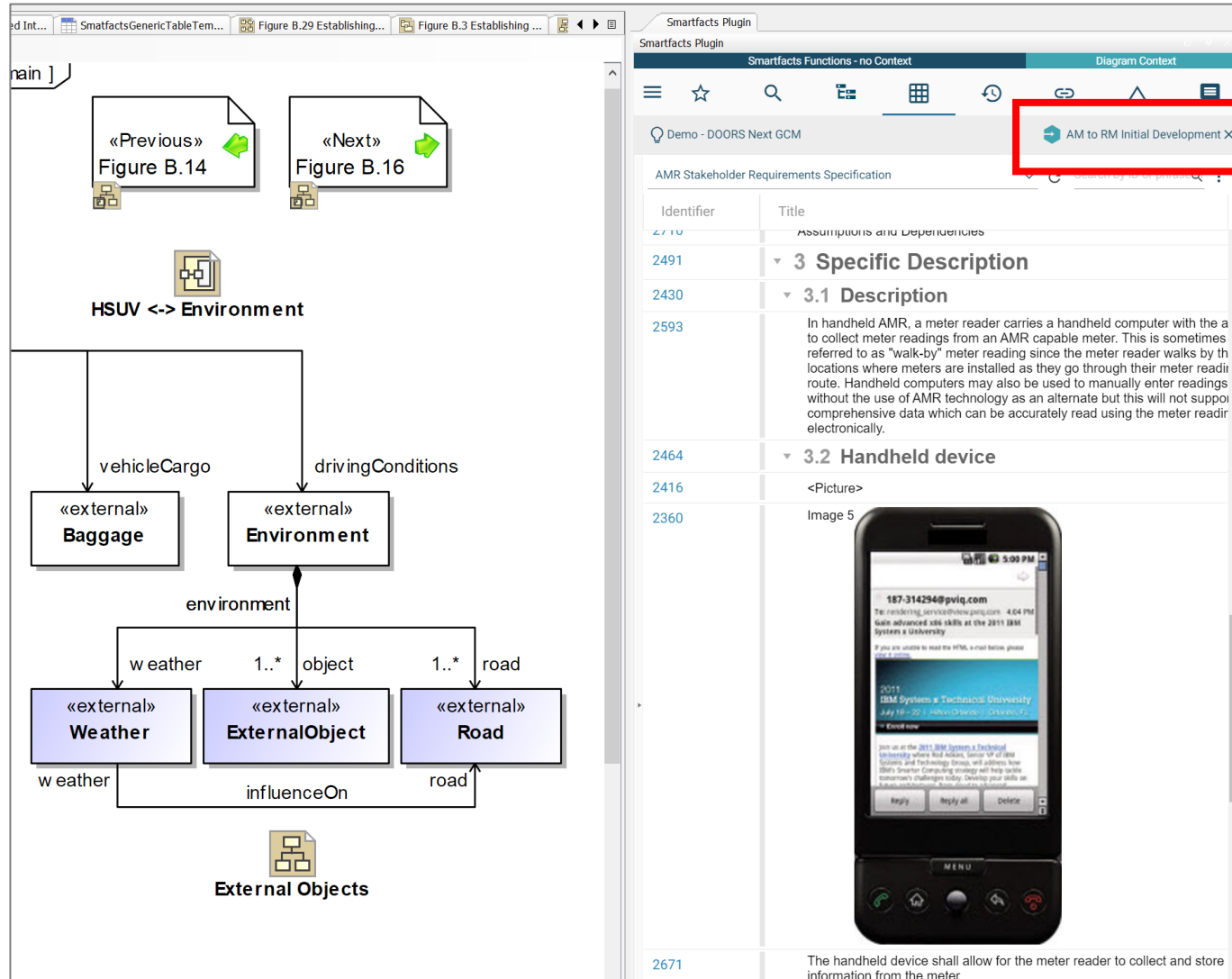
# Was ist eigentlich der OSLC Standard?

- OSLC = Open Services for Lifecycle Collaboration
- Standard zur Verbesserung der Tool Interoperabilität
- Seit 2013 Mitglied in der Open Standard Organization OASIS
- Wichtige Bestandteile:
  - OSLC Core
  - OSLC Configuration Management
  - OSLC TRS (Tracked Resource Set)
  - Weitere in Arbeit...
- Primäre Nutzung: Sicherstellung der Traceability zwischen Artefakten unterschiedlicher Werkzeuge

# Schritt I: Anbindung einer großen Anzahl von Autorenwerkzeugen



# Beispiel: Integration mit Cameo Systems Modeler



**Tool-übergreifender Kontext** definiert, in welcher Cross-Domain Configuration gearbeitet wird





# Beispiel: Integration mit Source Code in Eclipse

The image shows the Eclipse IDE interface with a C++ source code editor on the left and the Smartfacts modeling tool on the right. A red box highlights the 'AMR Basis Initial Developm...' entry in the Smartfacts Functions list, and another red box highlights the same entry in a detailed view pane on the right.

```
251/// @return the larger one of both values
252template <class T>
253T GetMax(T valueOne, T valueTwo)
254{
255
256 return (valueOne > valueTwo ? valueOne : valueTwo);
257}
258
259/// @brief Template class to test the template functionality of Doxygen
260/// @tparam T should be an integer type
261template <class T>
262class SwTempl
263{
264 //@@ImplementsRequirement{DNG/BI_KAMuPBS_Ee2Uh-mNXLVybw/?label=Leashed Pets}
265 //@@ImplementsRequirement{DNG/BI_KANVQBS_Ee2Uh-mNXLVybw/?label=Stray Animals}
266 //@@ImplementsRequirement{DNG/BI_KANVQHS_Ee2Uh-mNXLVybw/?label=Temperature Operational Limit of the device}
267 //@@ImplementsRequirement{DNG/BI_KANVQHS_Ee2Uh-mNXLVybw/?label=Temperature Operational Limit of the device}
268 T values[2];
269public:
270
271 /// @brief Constructor of template class.
272 /// @param first Value one will be stored in array.
273 /// @param second Value two will be stored in array.
274 //@@ImplementsRequirement{DNG/BI_KAMuNBS_Ee2Uh-mNXLVybw/?label=Pinch Areas}
275 SwTempl(T first, T second)
276 {
277 //@@ImplementsRequirement{DNG/BI_YDIMFvBOEeuUpcMcn_AbPA/?label=meter irregularities;}
278 values[0] = first; values[1] = second;
279 }
280
281 /// @brief Return the min value of the values added in the constructor.
282 /// @return Lower one of the both values.
283 T SwTempl_GetMin()
284 {
285 //@@ImplementsRequirement{DNG/BI_YDIMFvBOEeuUpcMcn_AbPA/?label=damage equipment (such as broken seals);}
286 //@@ImplementsRequirement{DNG/BI_YDIMFvBOEeuUpcMcn_AbPA/?label=impediments to meter access, including dogs;}
287 return (values[0] < values[1] ? values[0] : values[1]);
288 }
289
290protected:
291 /// @brief Return the max value of values added in the constructor.
292 /// @return Higher one of the both values.
293 T SwTempl_GetMax()
294 {
295 //@@ImplementsRequirement{DNG/BI_YDIL8_BOEeuUpcMcn_AbPA/?label=The systems shall meet the following objectives;}
296 //@@ImplementsRequirement{DNG/BI_YDIL9PBOEeuUpcMcn_AbPA/?label=Meter reading in the most cost effective manner possible}
297 //@@ImplementsRequirement{DNG/BI_YDIL9fBOEeuUpcMcn_AbPA/?label=A system goal of 100% accurate, 100% reliable, 100% of the time}
298 //@@ImplementsRequirement{DNG/BI_YDIL9vBOEeuUpcMcn_AbPA/?label=Ability to perform advanced data analysis of incremental meter readings}
299 //@@ImplementsRequirement{DNG/BI_YDIL9_BOEeuUpcMcn_AbPA/?label=Maximization of existing investments in meter reading technology}
300 //@@ImplementsRequirement{DNG/BI_YDIL-PBOEeuUpcMcn_AbPA/?label=Support conservation monitoring and enforcement}
301 //@@ImplementsRequirement{DNG/BI_YDIL-fBOEeuUpcMcn_AbPA/?label=Provide accurate meter readings}
302 return (values[0] > values[1] ? values[0] : values[1]);
303 }
304};
305#endif // CPP_SWCOMP_SRC CPP_H_
```

The Smartfacts Functions list on the right contains the following items:

- Leashed Pets
- Stray Animals
- Temperature Operational Limit of the device
- Temperature Operational Limit of the device
- Pinch Areas
- meter irregularities;
- damage equipment (such as broken seals);
- impediments to meter access, including dogs;
- The systems shall meet the following objectives:
- Meter reading in the most cost effective manner possible
- A system goal of 100% accurate, 100% reliable, 100% of the time
- Ability to perform advanced data analysis of incremental meter readings
- Maximization of existing investments in meter reading technology
- Support conservation monitoring and enforcement
- Provide accurate meter readings

The detailed view pane on the right shows the 'Global Configuration Definition' for 'Source Code Integration - V2', including the following items:

- Source Code Integration - V2
- <https://github.com/MID-Eclipse/traceabilityBrowser>, main
- AMR 2 Requirements Initial Stream

# Schritt II: Link Intelligence Platform

## Smartfacts CDCM Cross Domain Configuration Management

05/2024

Smartfacts  
Link Intelligence

07/2024

Versioned  
Artifact  
Store

Link  
Index

Native OSLC  
Connector

TRS

OSLC  
Connector  
for...

Authoring  
Tool

TRS

genOSLC  
connector  
framework

Authoring  
Tool

Proprietary Tool

Smartfacts  
Plugin +  
Publisher

Graphical  
model-based  
authoring tools

TRS

genOSLC

Authoring tools  
with genOSLC  
built-in

# Version 1 nach 12 Monaten

## Highly Configurable

- Data Model
  - Properties based on primitive data types with syntactical validation
  - Records = multi value properties
  - Master Data = externally synchronized
  - Calculated Fields
- User Interface
  - UI areas can be customized via a forms builder
  - Fields can be masked
  - Master data selectors
- Behavior
  - Guards allow multi-field validations
- Data
  - Master Data can be maintained via REST

## Integration Mechanisms

- Public REST layer providing 40+ endpoints
- Externally defined editors can be integrated
- Webhooks support integration with external systems, e.g. leveraging an event bus
- OSLC TRS provides a TRS stream of Components and Configurations
- OSLC Config Management is used to integrate authoring tools (OAuth1.0a / OAuth2)
- Integration with OIDC enterprise authentication providers

## Rich Functionality

- Definition of hierarchical Components, Configurations
- Templates for creating new Components with pre-defined configuration items
- Branching, Baselineing, Partial Baselineing
- Search, where-Used, analysis can be stored
- Tagging of Components and Configurations
- Compare functionality
- Configuration Clash / Skew
- Audit Trail / Derivation History
- Favorites / Recents
- Internal and external Delegated UIs for Components and Configurations
- Configuration picker Integration via OSLC
- CDCM exposes a CDC picker for authoring tools to pick a global context

## Smartfacts CDCM - Cross Domain Configuration Management

## Modern Deployment

- Containerized web application
- Automated deployment via helm charts on Kubernetes or OpenShift
- Update from online container repository
- Database can be MongoDB onPrem or Atlas in the cloud
- Made for large scale operations: 10.000+ users

## Large Variety of Tool Integrations

- IBM ELM applications DNG, ETM, RMM
- Sharepoint Documents
- MagicDraw / Cameo / Teamwork Cloud
- GIT
- Codebeamer
- PREEvision
- Octane
- DOORS Classic

## Basis for Advanced Analytics

- Traceability management
- Link Validity
- Odata Interface to analytics database

# Mehr gerne am Stand von MID

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Ed Gentry, [e.gentry@mid.de](mailto:e.gentry@mid.de)

