

RFI on PLM and MBSE interoperability and integration

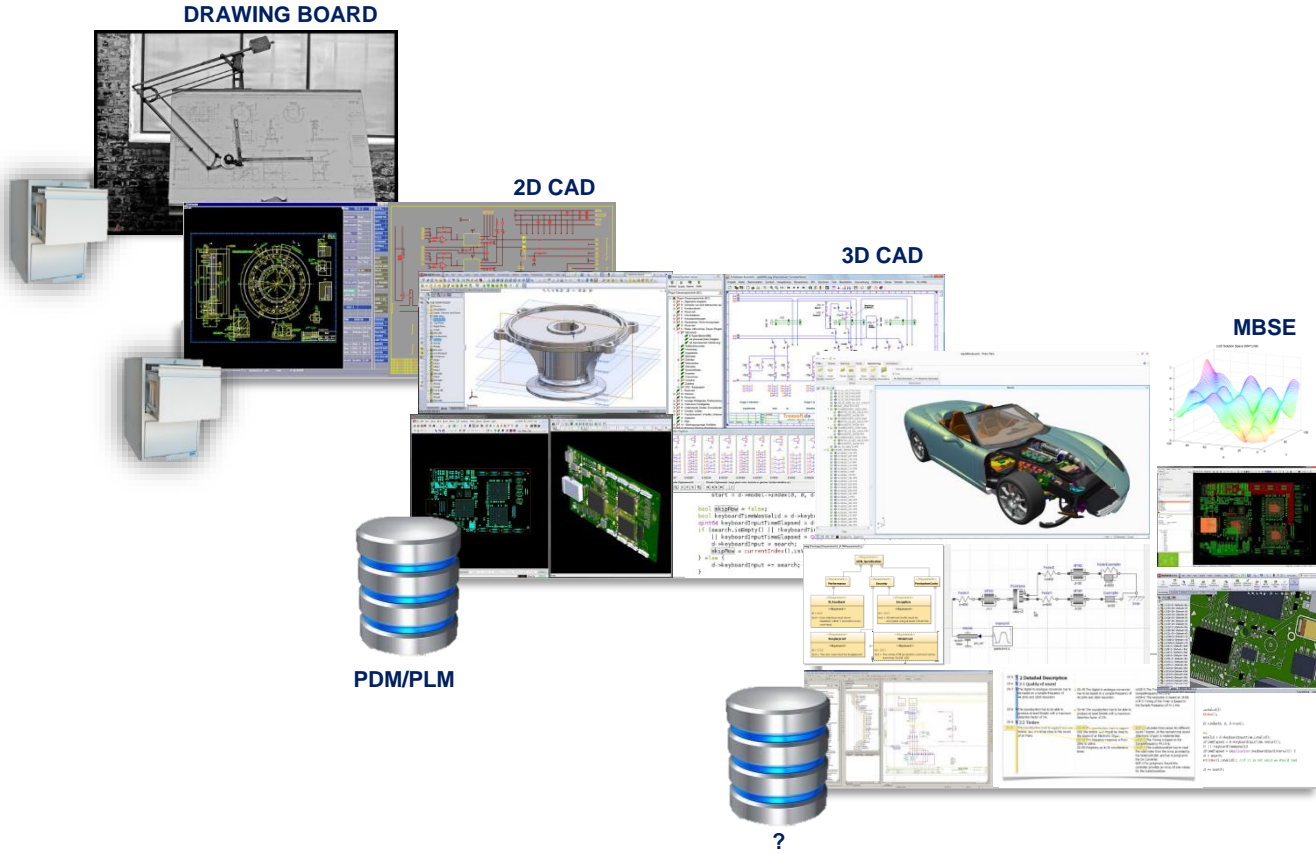
Michael Pfenning, XPLM

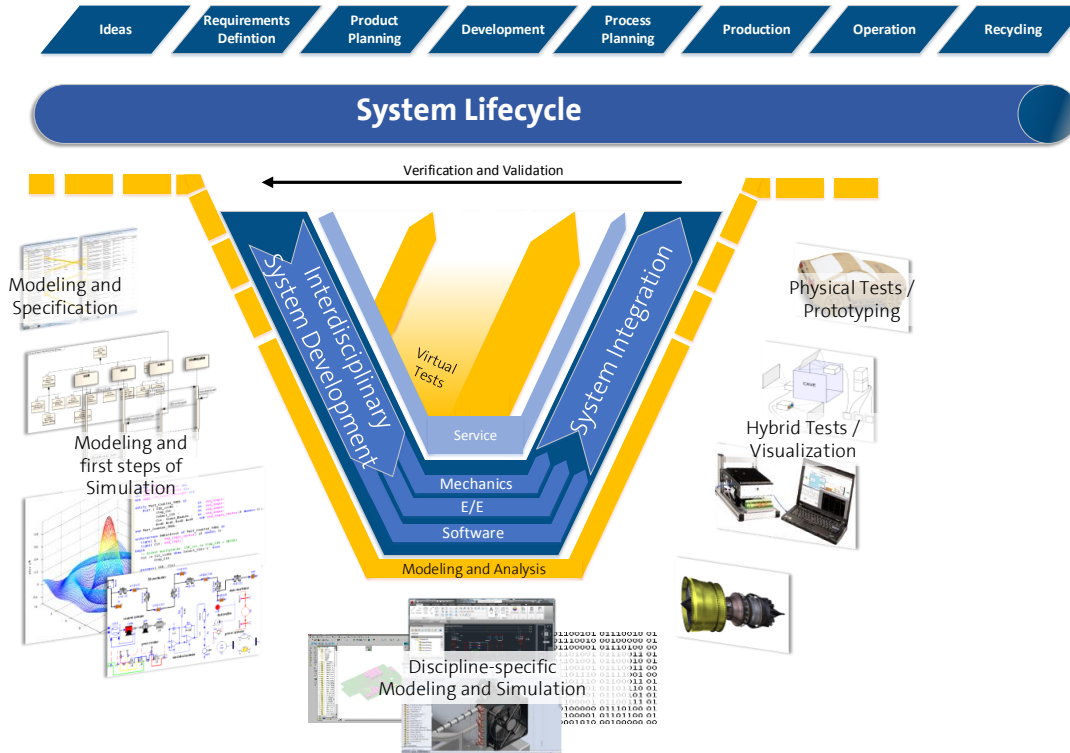
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December 10th 2015, La Jolla, CA

- › Description of the problem
- › Thoughts about Functions in SysML
- › Questions for the RFI
- › RFI Roadmap



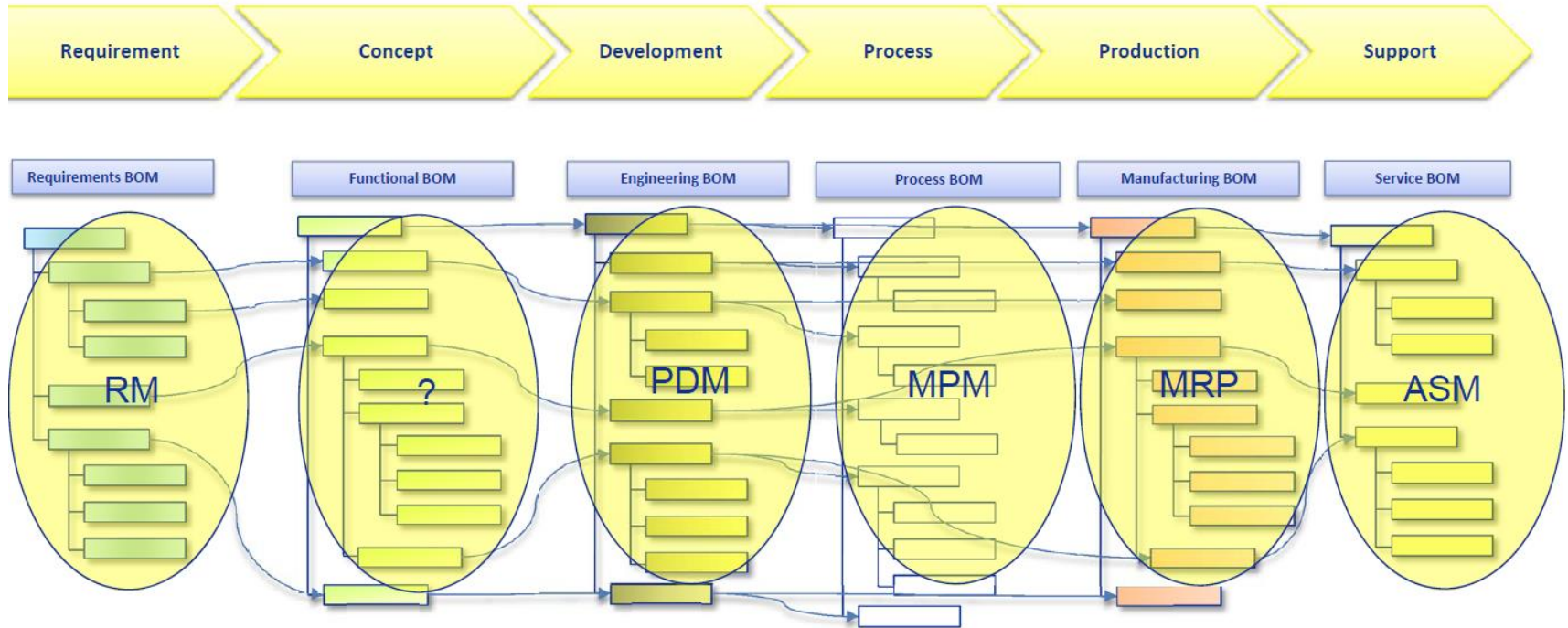


Extended V-Model (derived from (VPE) of TU Kaiserslautern)

- ▶ PLM evolved from PDM (and therefor the mechanical domain)
- ▶ PLM started to include E/E and Software to some extent. At least results are stored for configuration control.

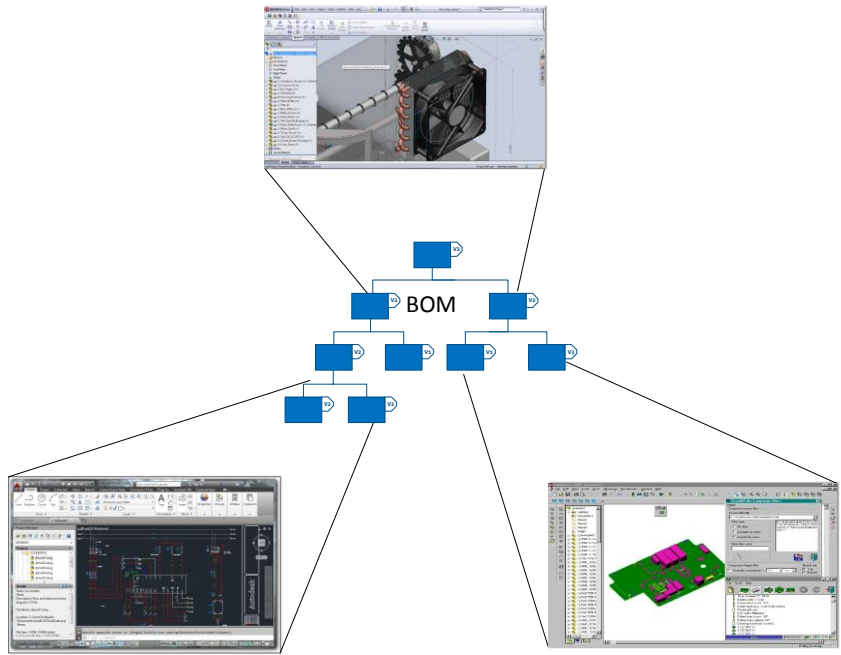
- ▶ PLM for an engineer is the database where he puts his work results in, but for the CTO it is the log of what happend in the development
 - ▶ Therefor PLM is essential for documenting decisions (product liability!)

- ▶ PLM consists of product model
 - ▶ Models from authoring systems are mainly treated as documents
 - ▶ Item structure (BoM) is setting up a „physical structure of the system“
 - ▶ The item is referencing the models necessary to define itself.
 - ▶ Properties of e.g. CAD models can be part of the PLM datamodel and synchronized with the properties in CAD (so called property update)
 - ▶ PLM is more than just document management, but not (yet) capable of (high granular) model management
 - ▶ „mechatronics BoM“ can be referencing ECAD, EDA, MCAD models.
- ▶ PLM consists of process model
 - ▶ Most important process is the change process
 - ▶ There have been change processes defined, for example in CM-II

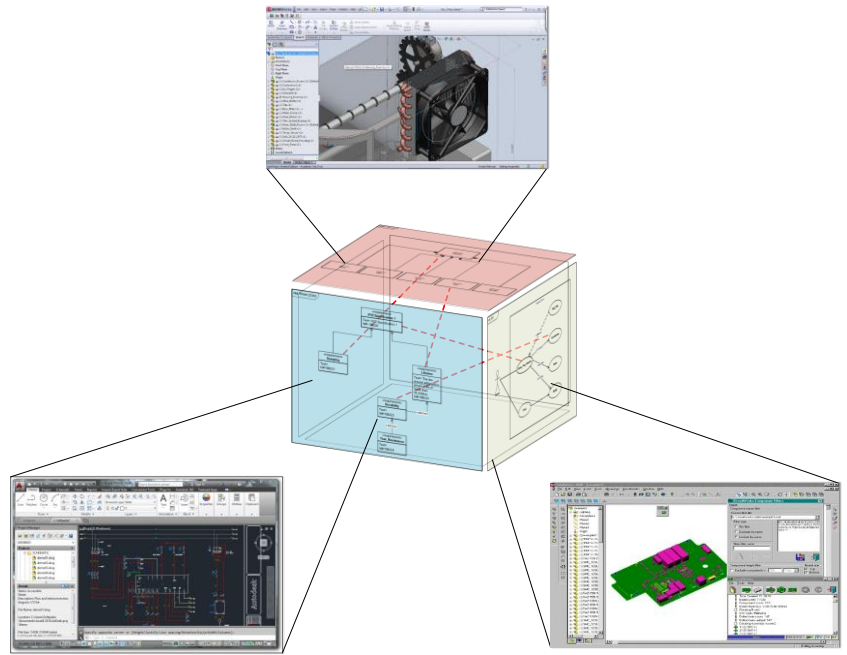


Source: Prof.Martin Eigner (VPE)

- › Some PLM-systems introduced REQM-modules
- › PLM had non-physical structures in it, but they haven't really been used so much
 - › Functional BOM / functional breakdown on a discipline-neutral level
 - › Generic product structure for certain domains („auto BoM“ in automotive)
- › The aim has been to set up vertical and horizontal traceability (V-model)
 - › Vertical: Req -> functions -> generic product structure -> BoM
 - › Horizontal: Req -> test cases / verification methods

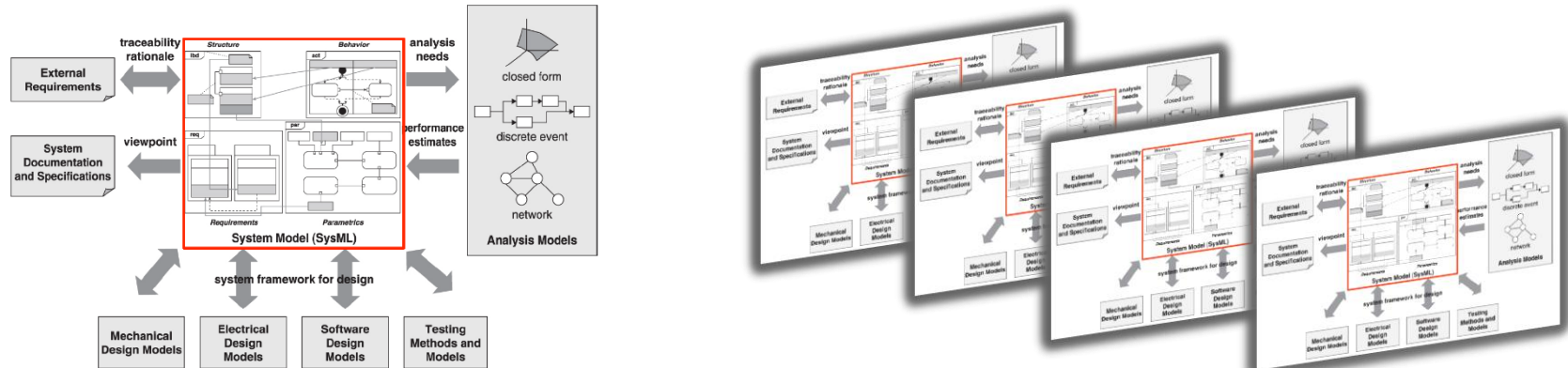


The past



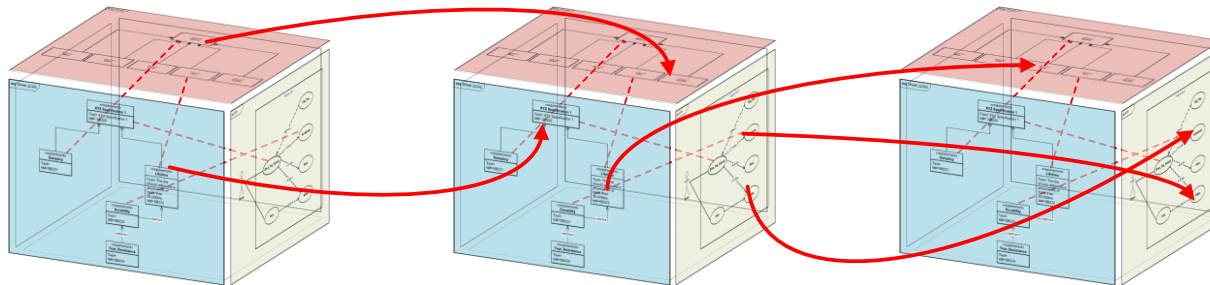
The future

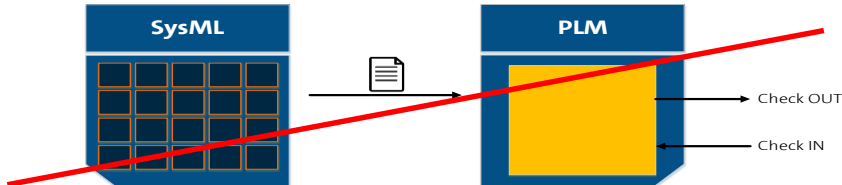
System Model as the glue over the lifecycle



Source: Sanford Friedenthal

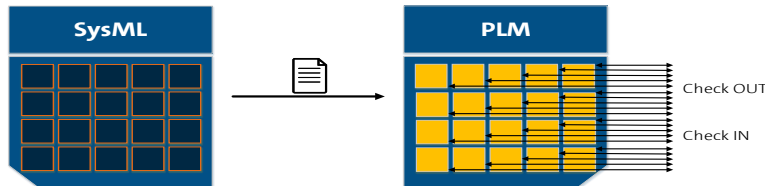
time



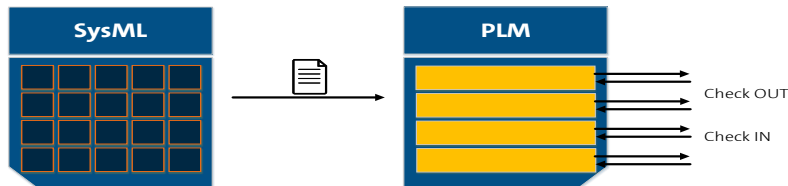


Contradicting a model-based approach

- › Save to PLM as a document
 - › No representation of any artifact from SysML in the PLM datamodel

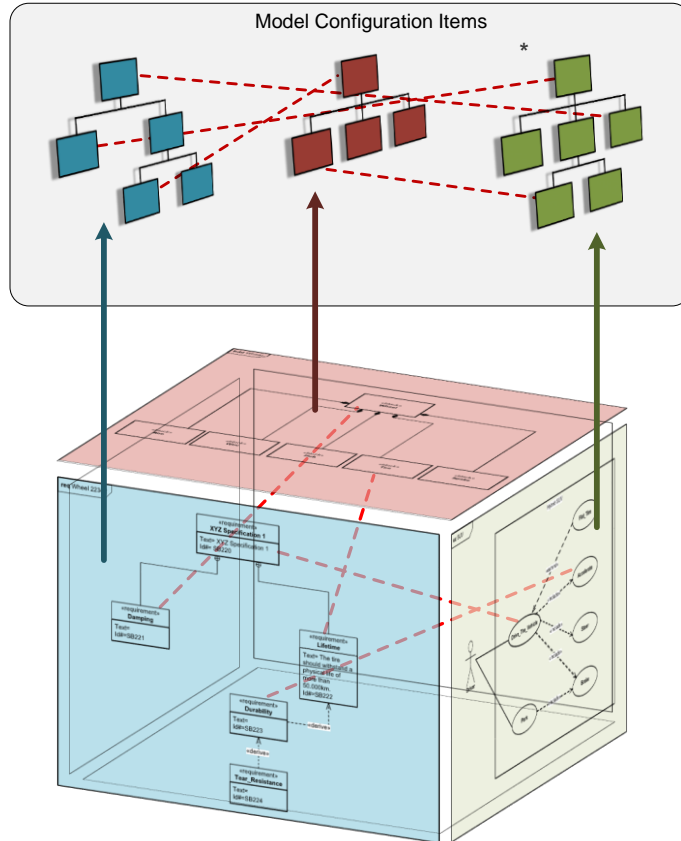


- › Save to PLM as the whole model
 - › Full representation of all artifacts from SysML in the PLM datamodel
 - › All Model Management is done within PLM



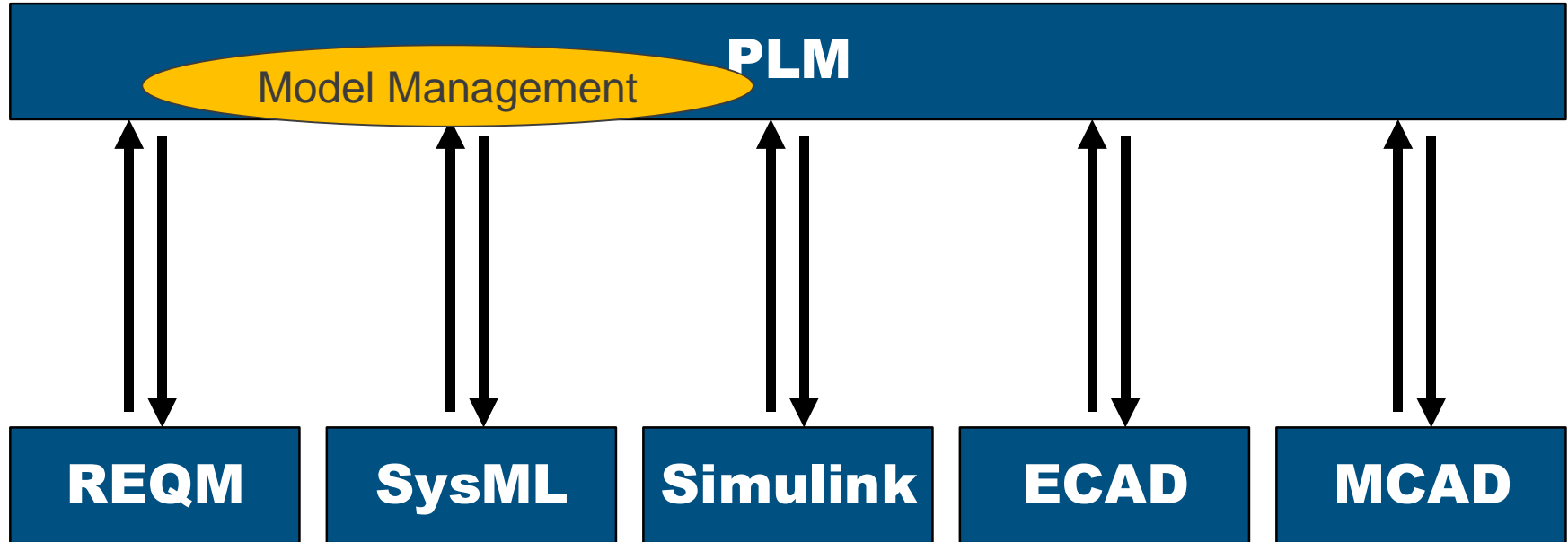
- › Save to PLM only the necessary artifacts
 - › Only the necessary artifacts for the usage in PLM as objects
 - › High granularity of Model Management is done in ALM

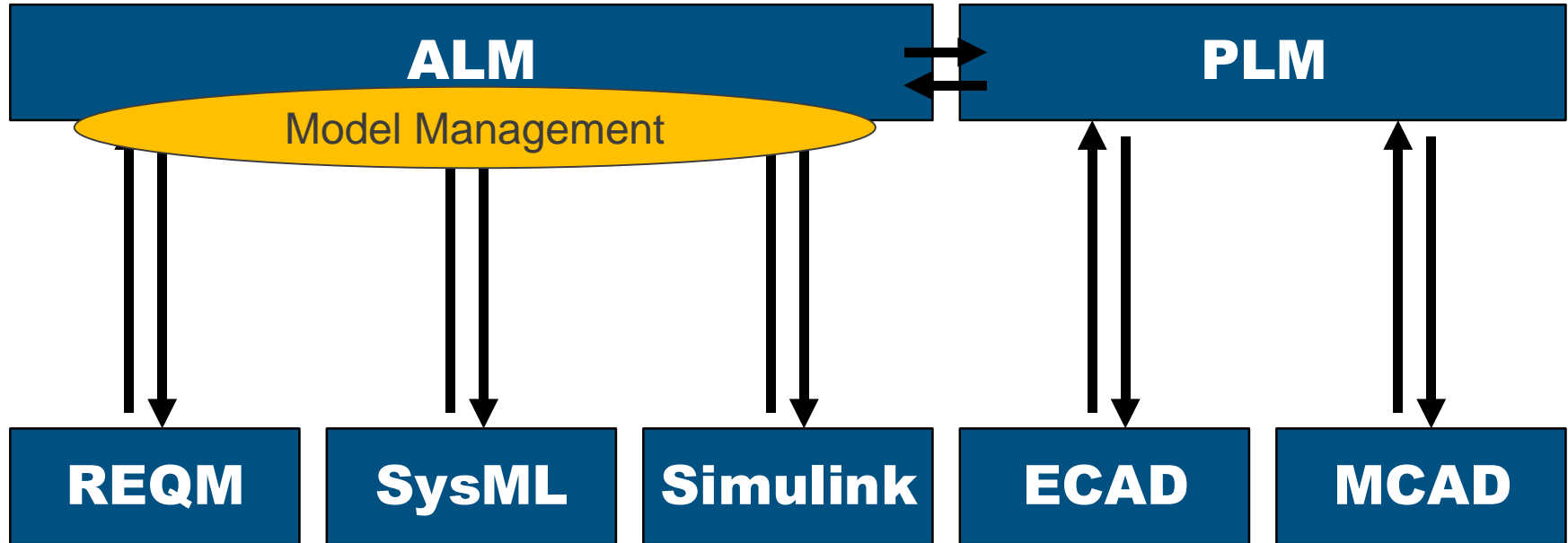
administrative
view on the
system model

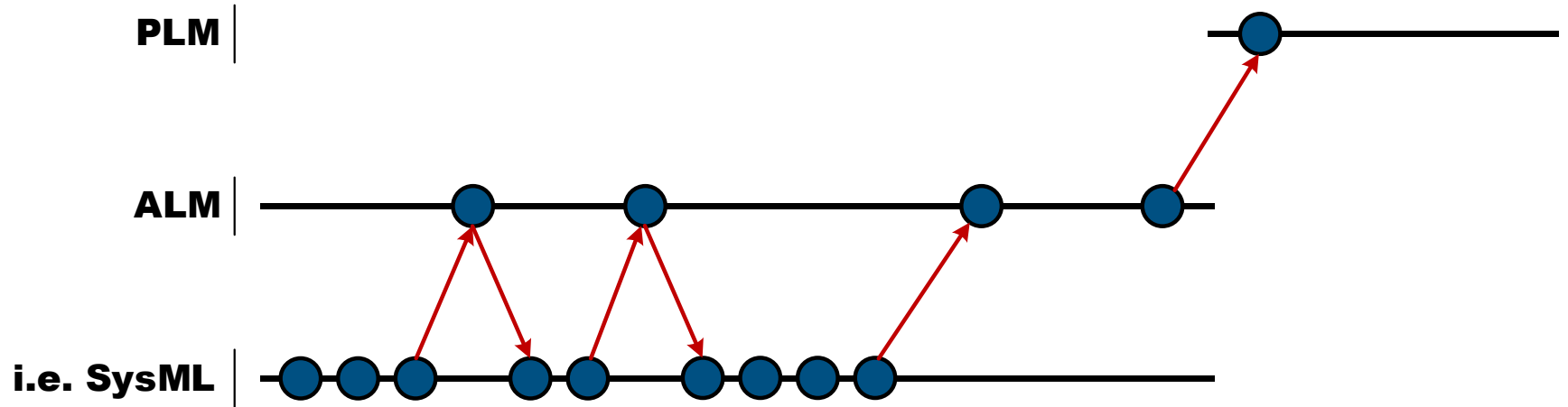


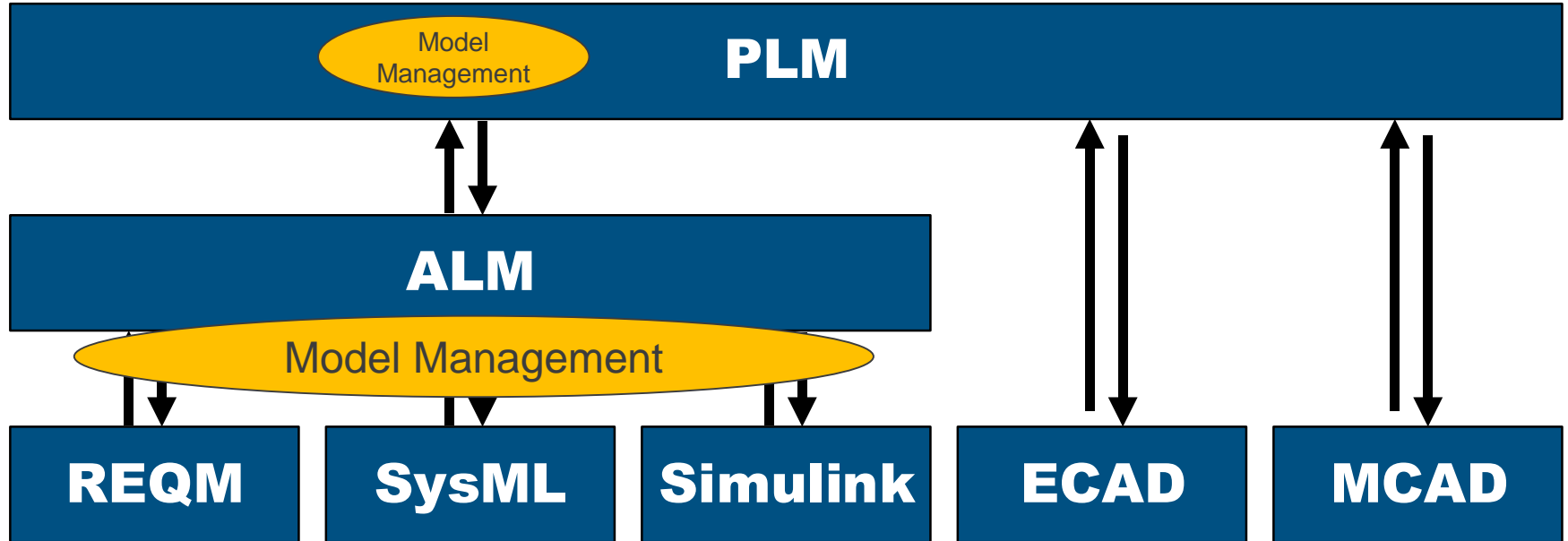
- MCI is a logical part of the model that is maintained in a controlled fashion [...]. MCIs can be defined in different granularities, from an individual fine grained Model Element, a set of model elements, to the entire model.

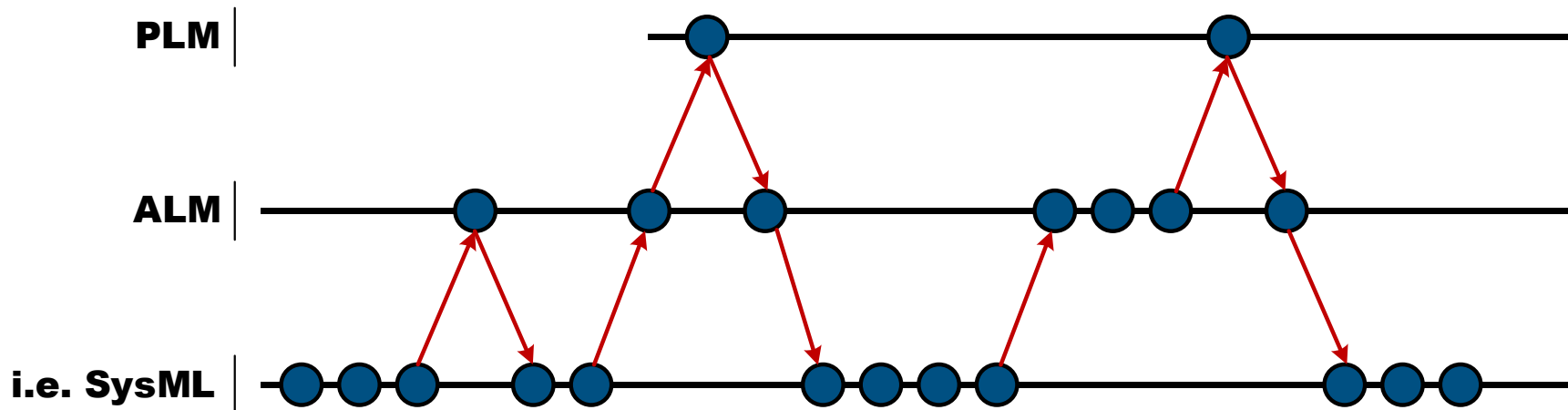
* The concept of MCIs has been introduced in the Model Lifecycle Management paper by the Model Management working group at INCOSE











Questions for RFI

1. What artefacts in MBSE and PLM have the same meaning?
2. Which information in the system model can be used in other models (MCAD, ECAD, Analysis...)?
3. What information from other models (MCAD, ECAD, Analysis,...) can be used in the system model?
4. What issues occur when trying to set up multidisciplinary engineering processes?
5. How does a MBSE change process look like today?
6. What is needed to better support reuse of (partial) system models?
7. What is needed to better support collaboration inside SE and between SE and other disciplines?
8. What benefit is provided when using the system model over the whole lifecycle?

9. Can the system model provide context information for operating the instance of a system (as-built) (digital twin...)?
10. What is the meta data associated with an MCI?
11. How important is a system model as a single point of reference over the whole lifecycle of a product?
12. Is there a need to freeze certain baselines of the system model at certain stages of the engineering process? If yes, which concepts need baselining?
13. Which constructs of the system model need versioning on which level of granularity?
14. What is the benefit of managing models as objects instead of managing the system models textual representation (XML snippets)?
15. What specific use cases do you have for the MBSE / PLM Integration?
16. How do your needs of formal change control evolve over the system's lifecycle (early program control vs. Design/engineering vs. Production vs. Operation/Maintenance vs. Disposal)?
17. The RFI should contain questions about the respondent. (role, industry, vendor/user)
18. Definitions, definitions, definitions...

- › Next draft to be sent to ManTIS/Roadmap beginning of January
- › 90% of RFI should be ready for Reston meeting
- › Issue the RFI at June Meeting (Orlando)
- › Response until October
- › Survey (Online questionnaire ?)

Thank you