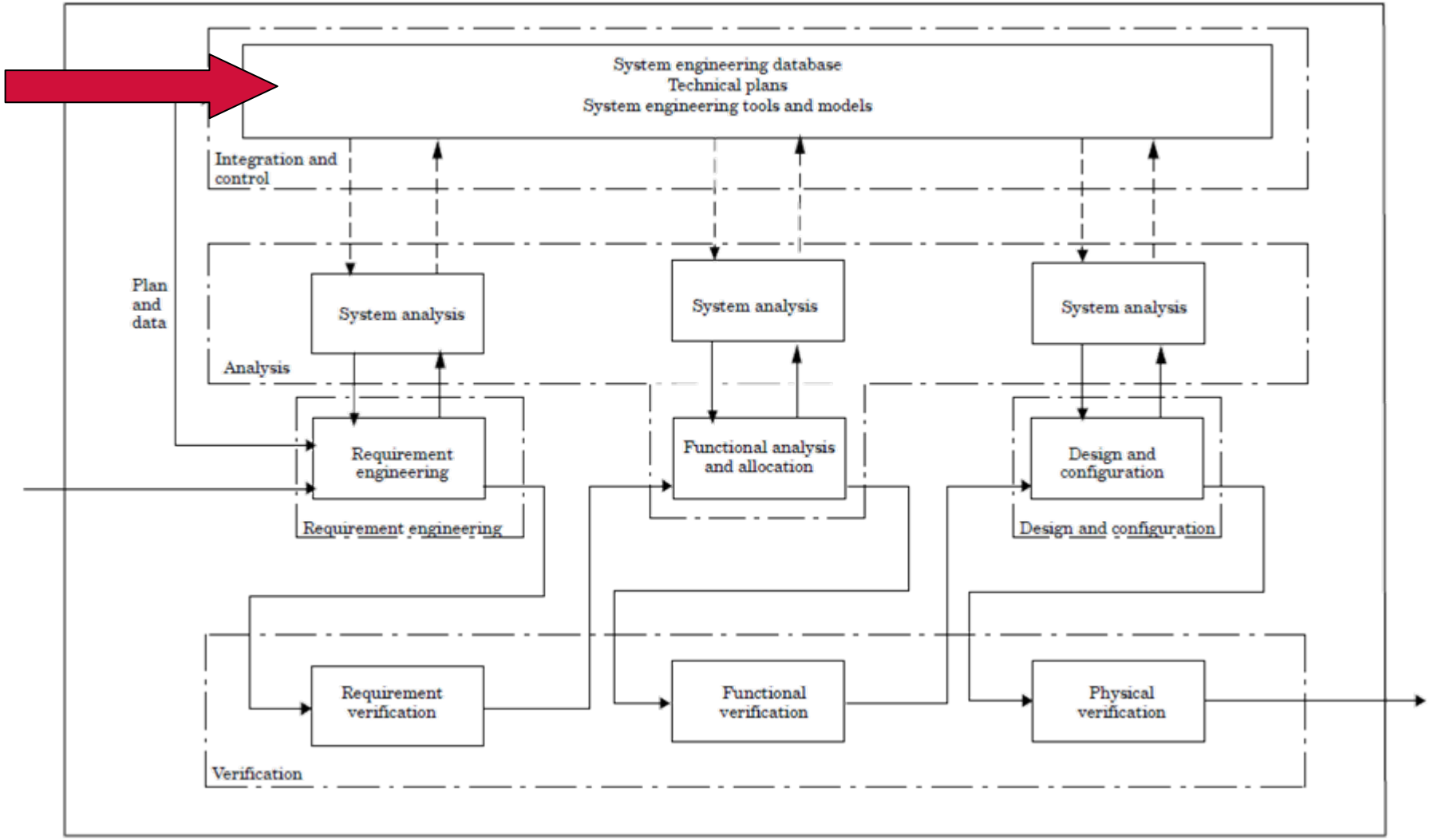
Observations of Current Trends in Verification

Joachim Fuchs
Noordwijk
2/11/2010

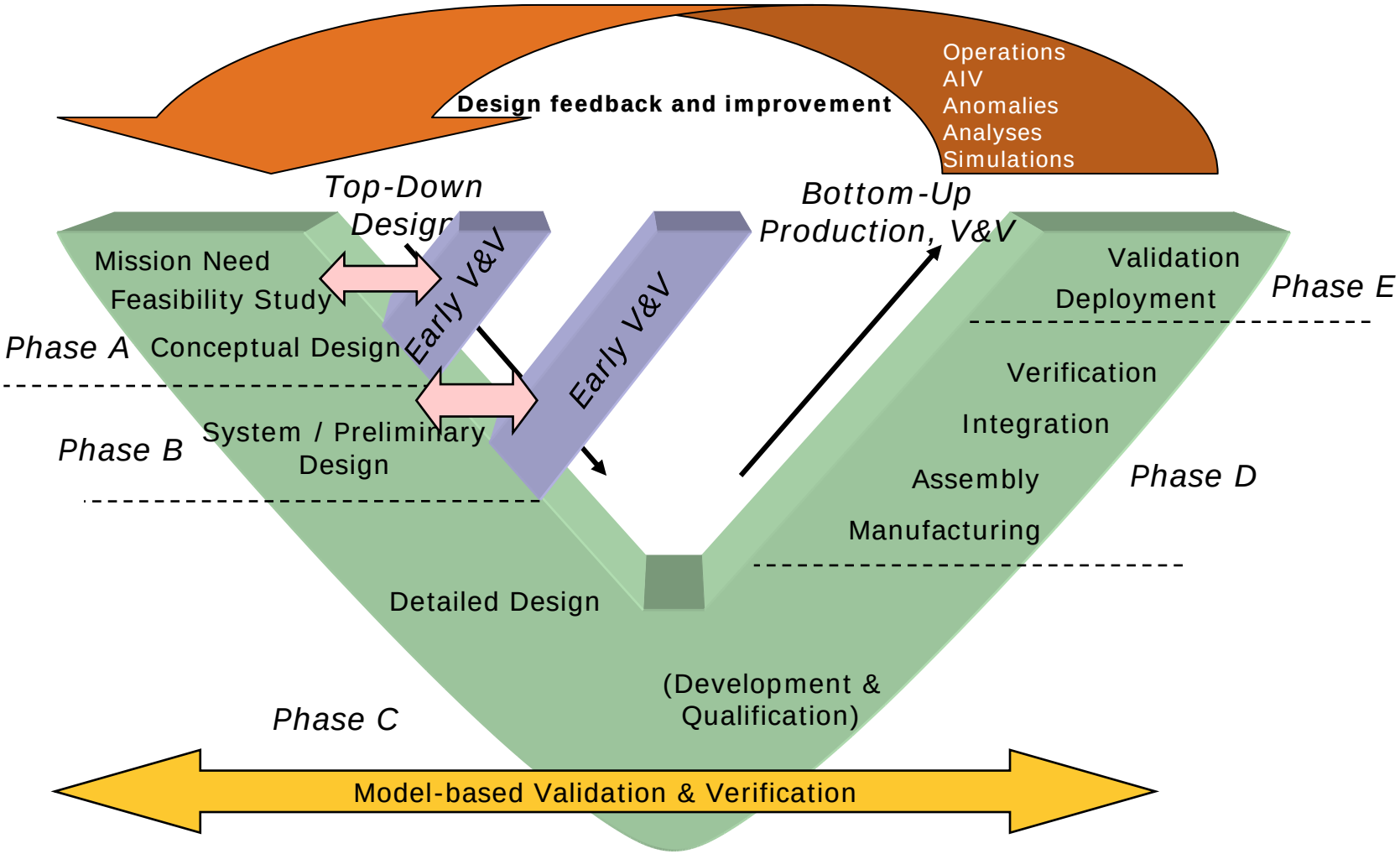
Objective: Improve the way to deliver space systems

1. Motivation
    a. Reduce cost and schedule in projects
    b. Manage increasing complexity
    c. Assure quality
    d. Strengthen competitiveness
2. Problem areas
    a. “Stovepipe” design approaches (limited cross-sectorial harmonisation)
    b. Inconsistent System Data across actors and along project life-cycle
    c. Bottlenecks in AIT / AIV
    d. Weak initial verification leading to late problem detection
    e. Difficult handover between stakeholders (ESA / industry)
3. Technology push
    a. Model-Based System Engineering
    b. Virtual Design / Testing capabilities
    c. System modelling / simulation
    d. Standardisation

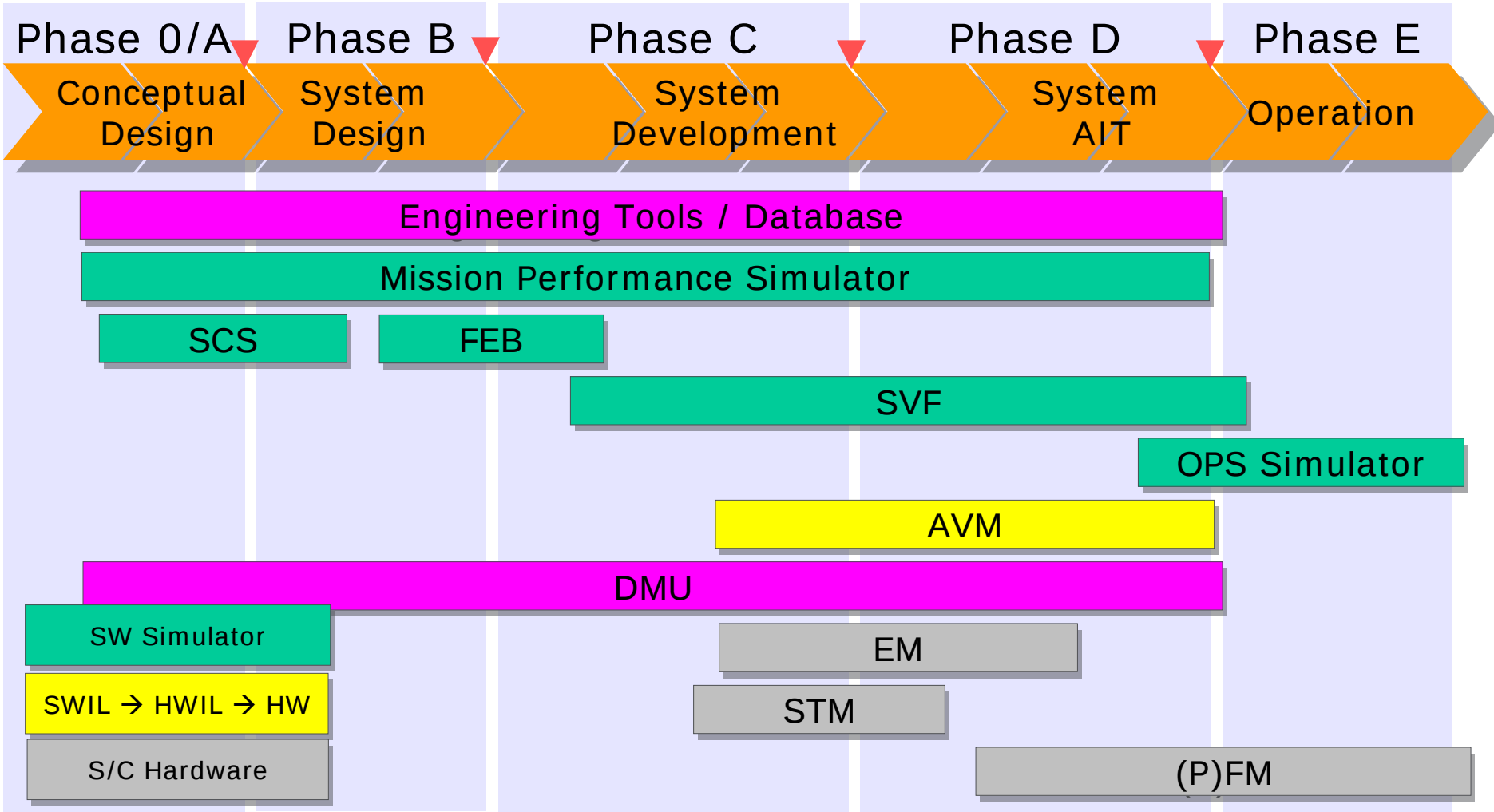
Context:
SE Function Relationship (ECSS E10)



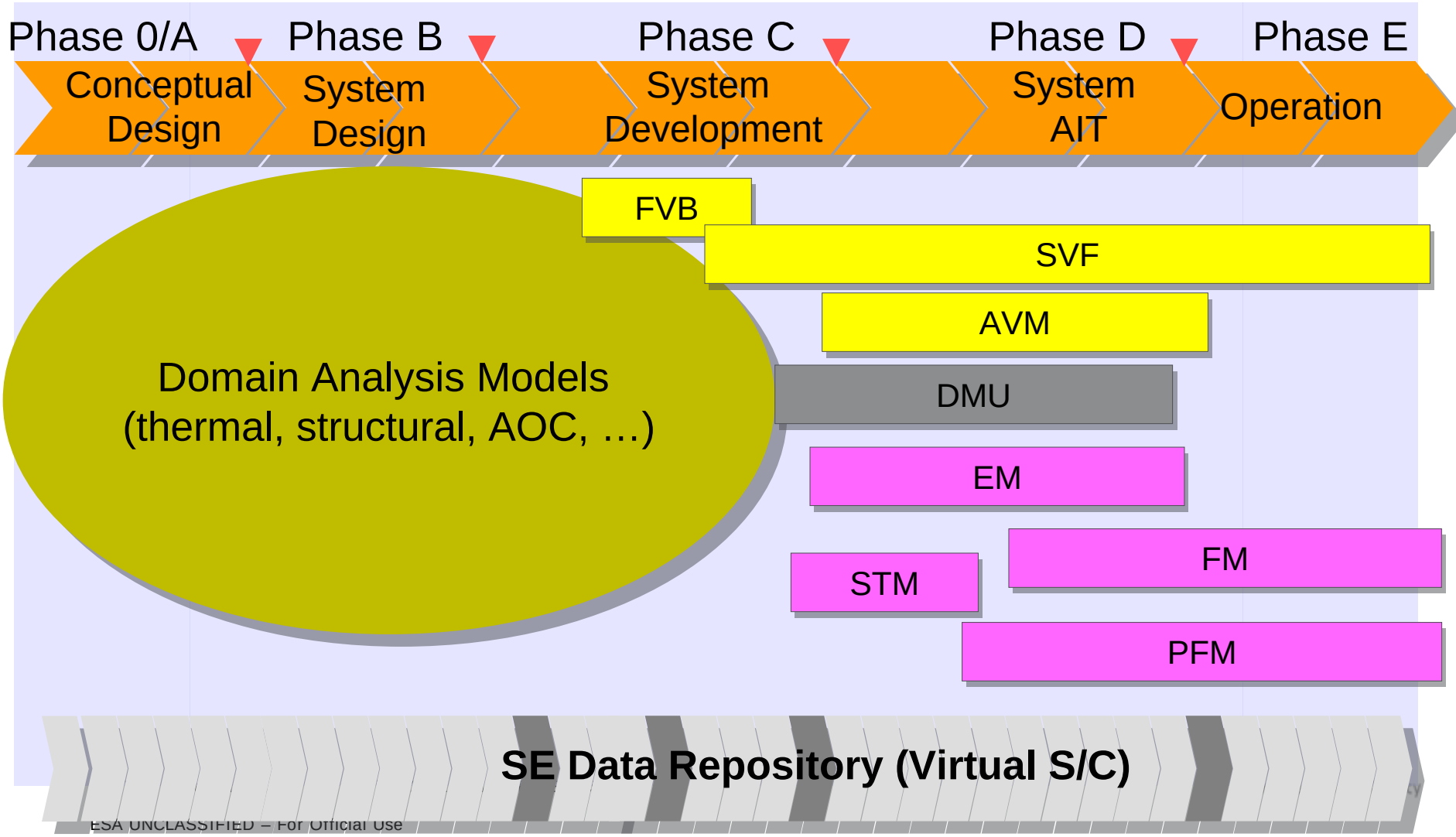
Model-Based Engineering Process (MBSE)



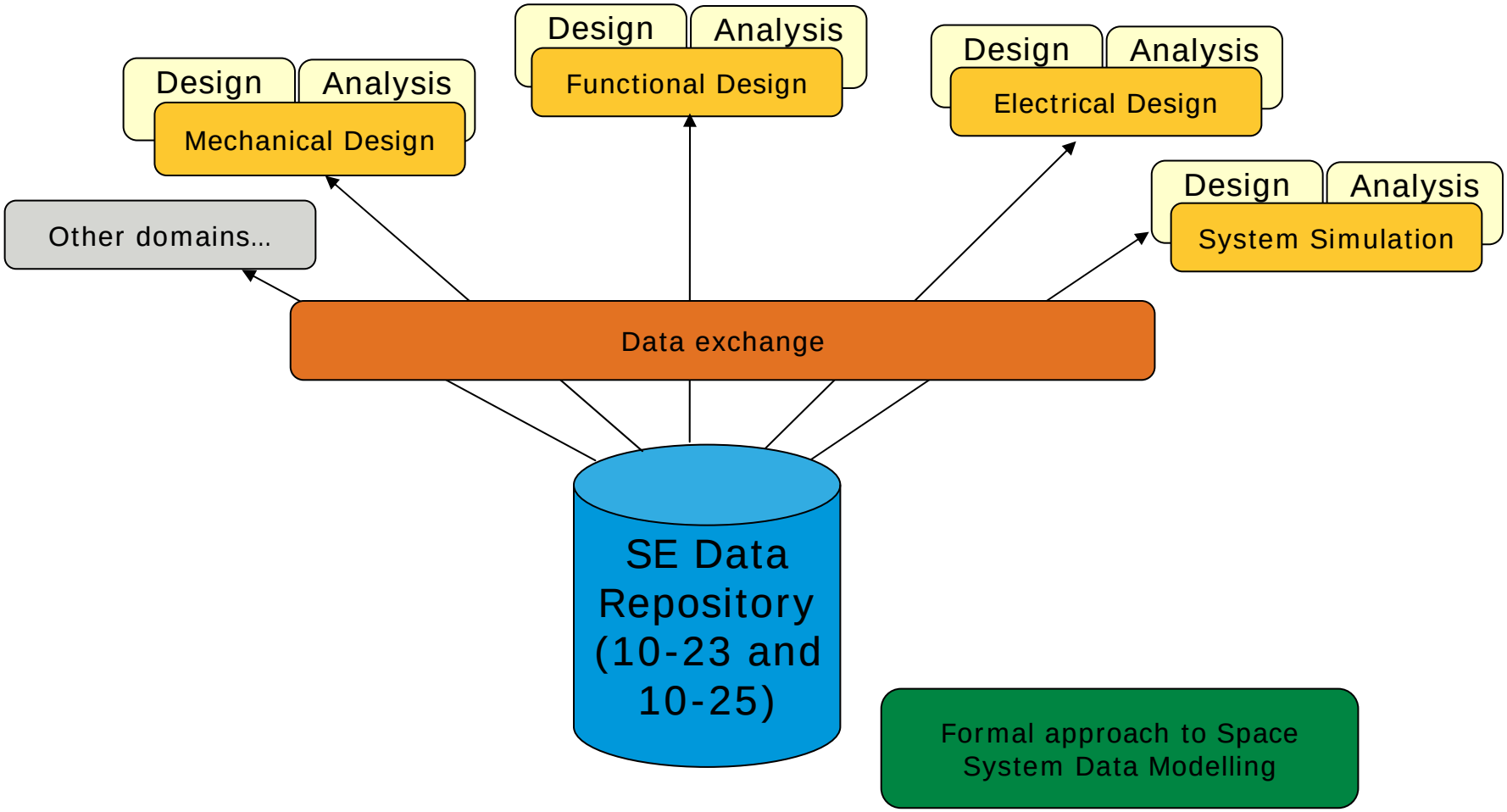
Spacecraft Models today (I)



Spacecraft Models today (II)

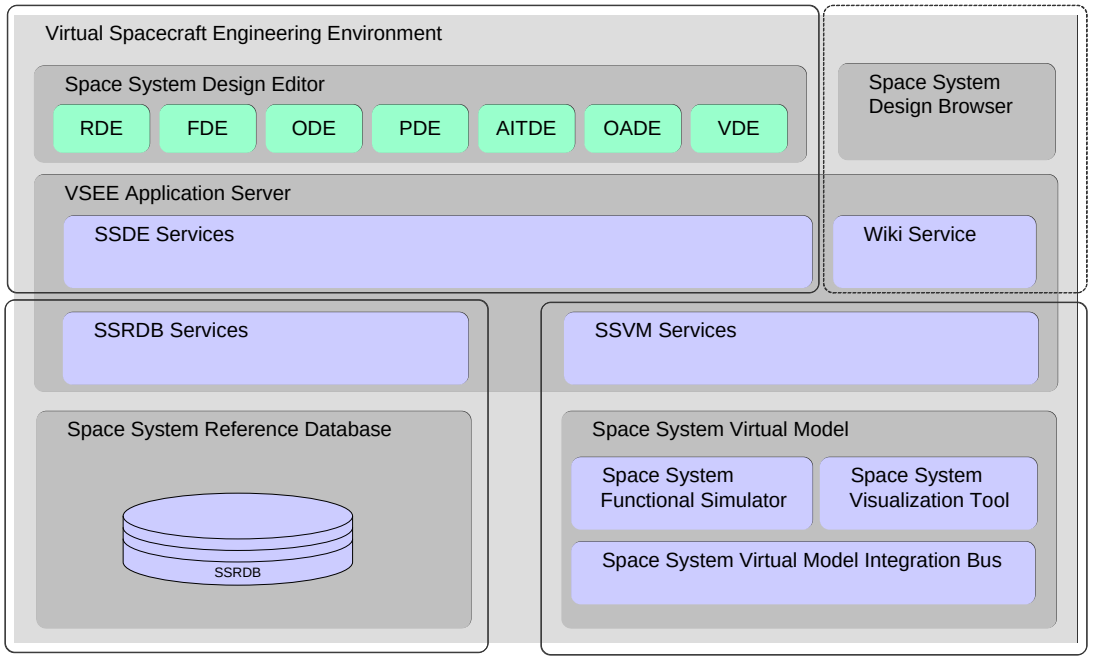


Model-based Data Exchange



Virtual Spacecraft Engineering Environment

- Prototype for
  - Engineering Database and associated services
  - System Visualisation tool (3D visualisation)
  - System-level editors for
    - Requirements
    - Topology
    - Functional design
    - Operational design
    - Operational activities
    - AIT procedures
    - Verification tables…
- In preparation link to functional simulation, using reference architecture



Questions

1. What are the benefits of early modelling and simulation?
2. How can we measure efficiency, cost effectiveness, return of investment?
3. What are the key contributions/roles of the different models along the DDV cycle?
4. What are the implications for model philosophy?
5. When should and can functional models be validated on real equipment / calibrated with test results?

6. Do we go in the right direction? What are the next steps?