RangeDB, the product to meet the challenges of nowadays System Database

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24th March 2015

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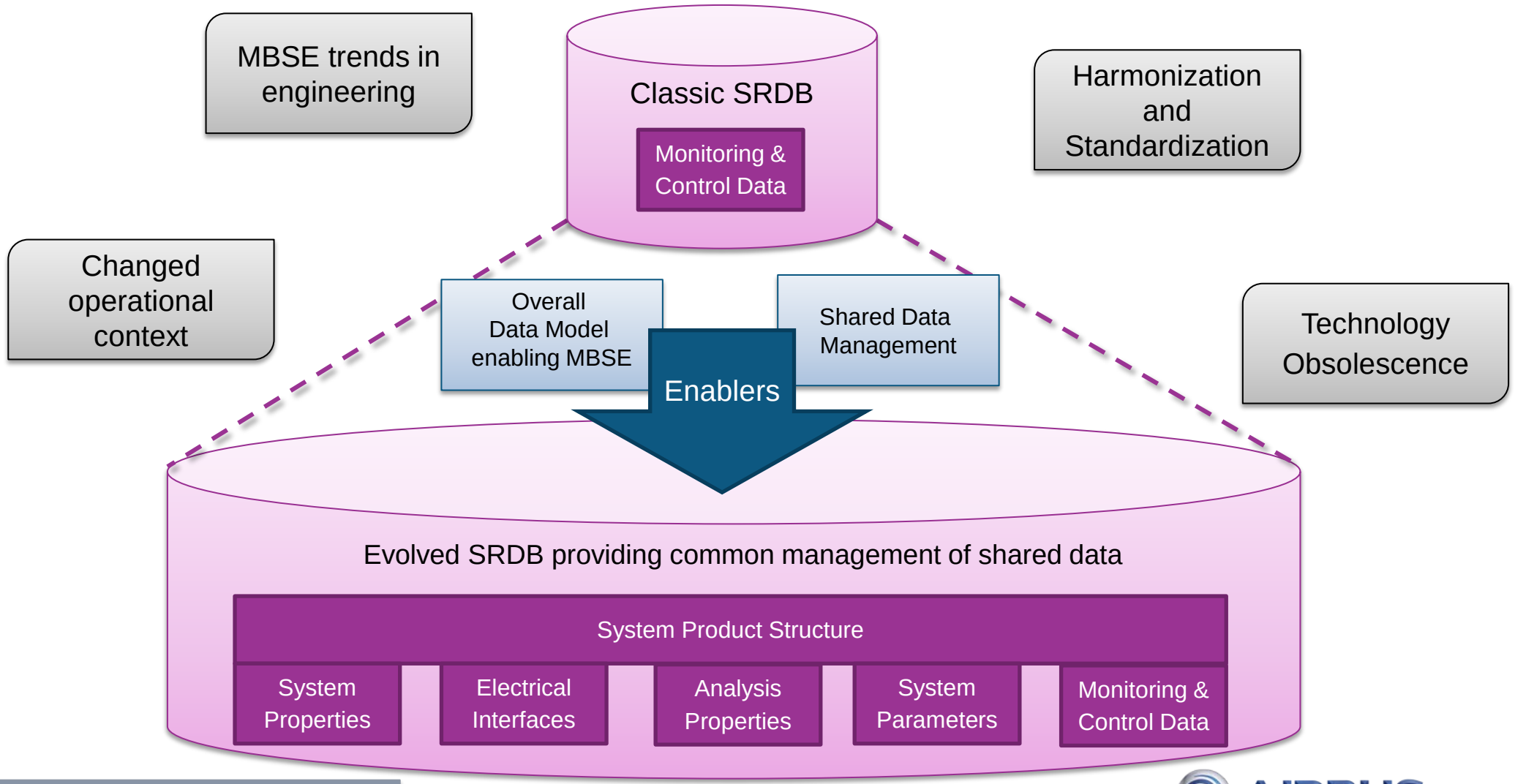
The development of RangeDB, the product to meet the challenges of nowadays System Database is completed



Changed Context and expectation for a new Spacecraft Reference Database

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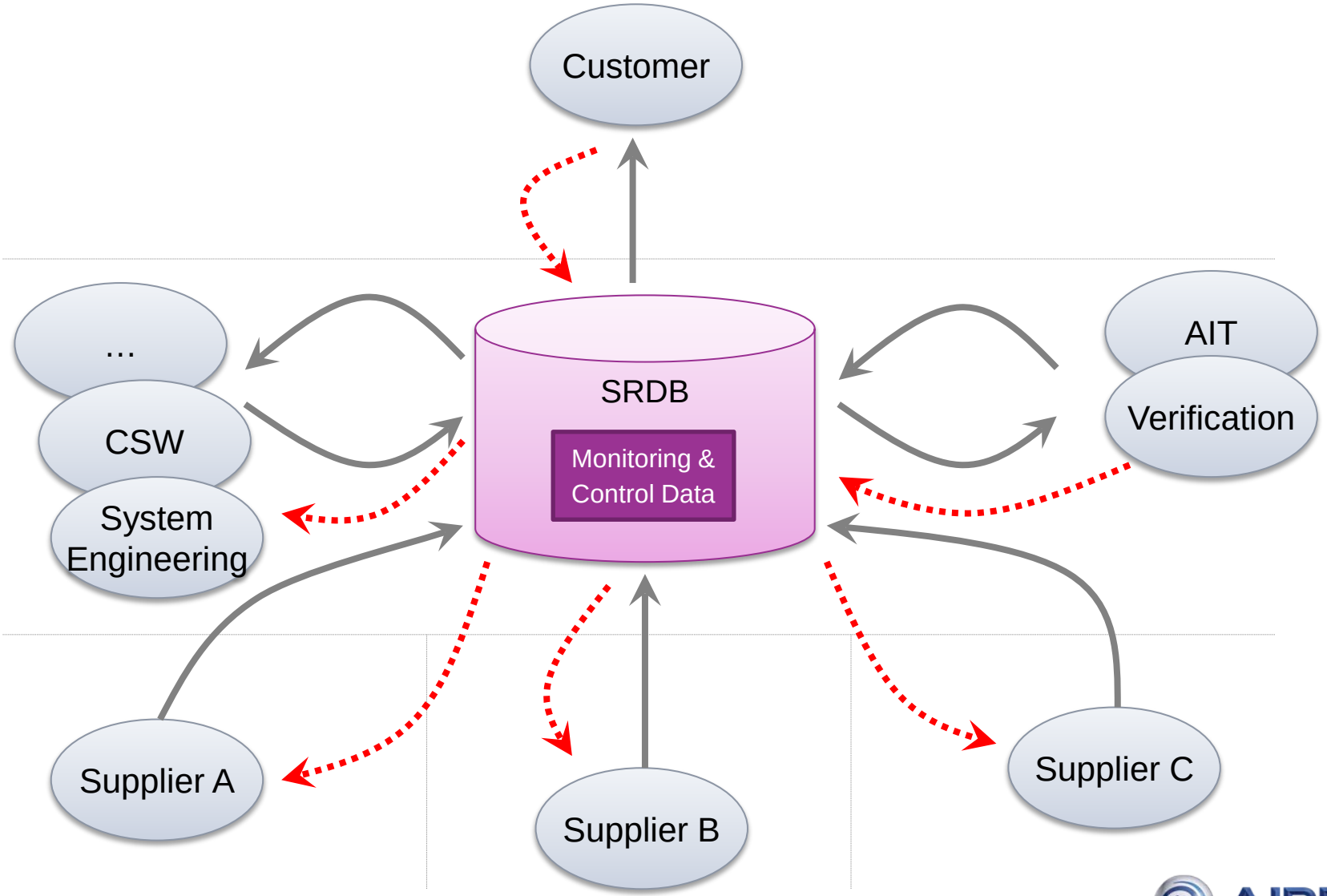
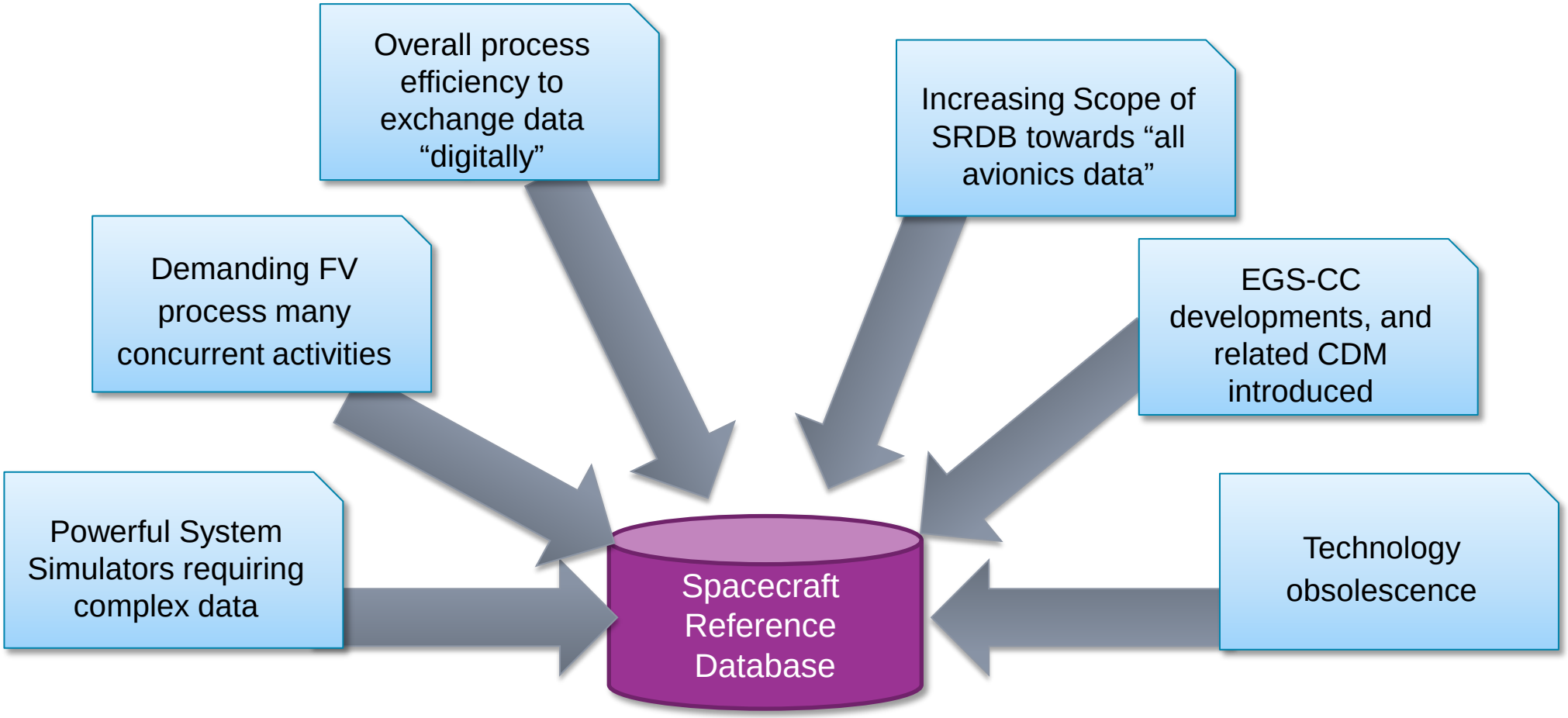
A classic SRDB is an information hub, right in the centre of a heavy-weight concurrent engineering process in late phases



The operational context of a SRDB changed significantly over the past decade – and lead to the decision for a new development



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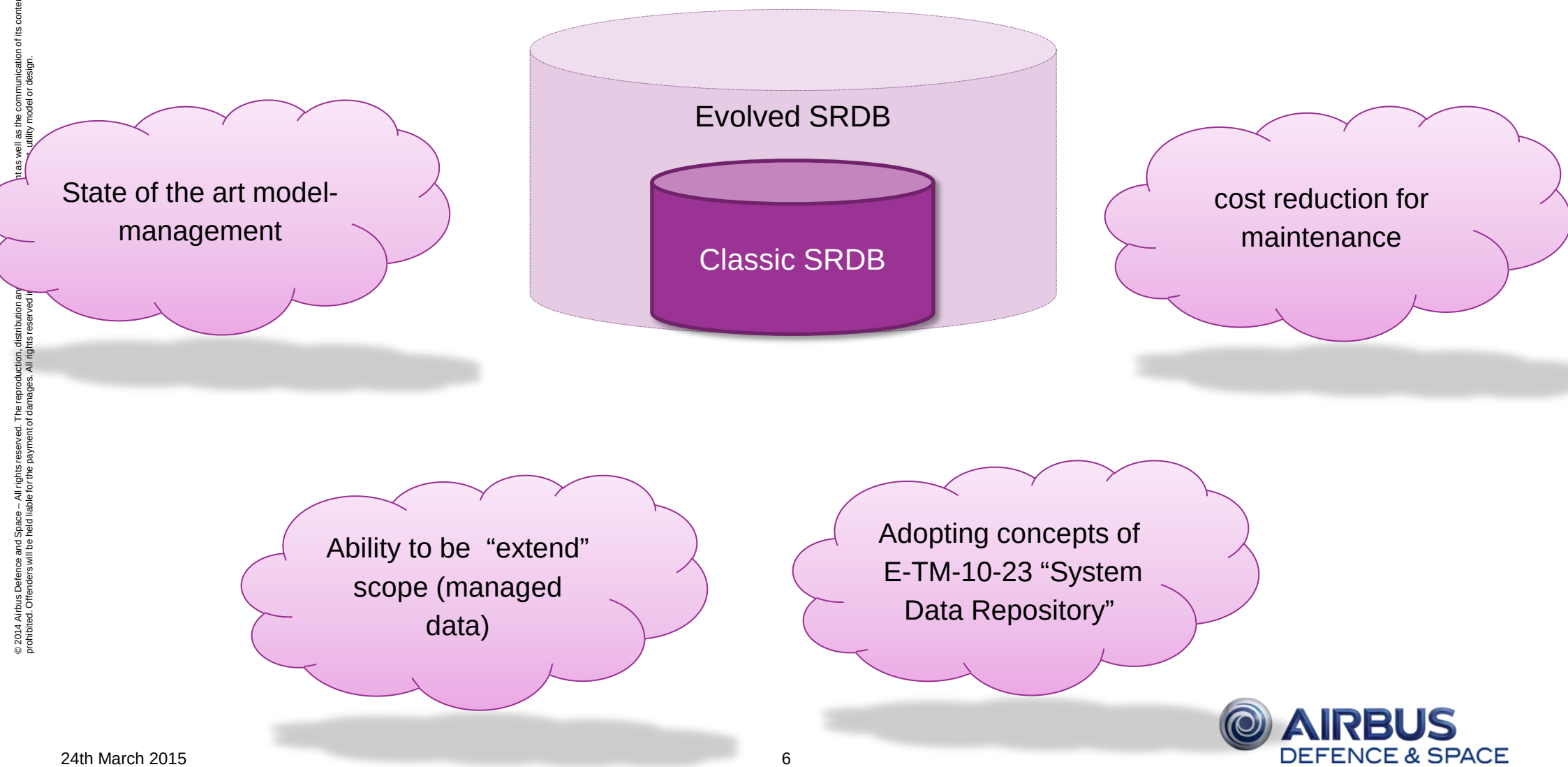
Associated with the decision for a new development where demanding technical and non technical expectations



ECSS-E-TM-10-23 “Space System Data Repository” was started to facilitate transition to MBSE with the following objectives

Cost reduction for DB

Timely arrival of DB

Improve Quality of Data

Improve Tool Integration

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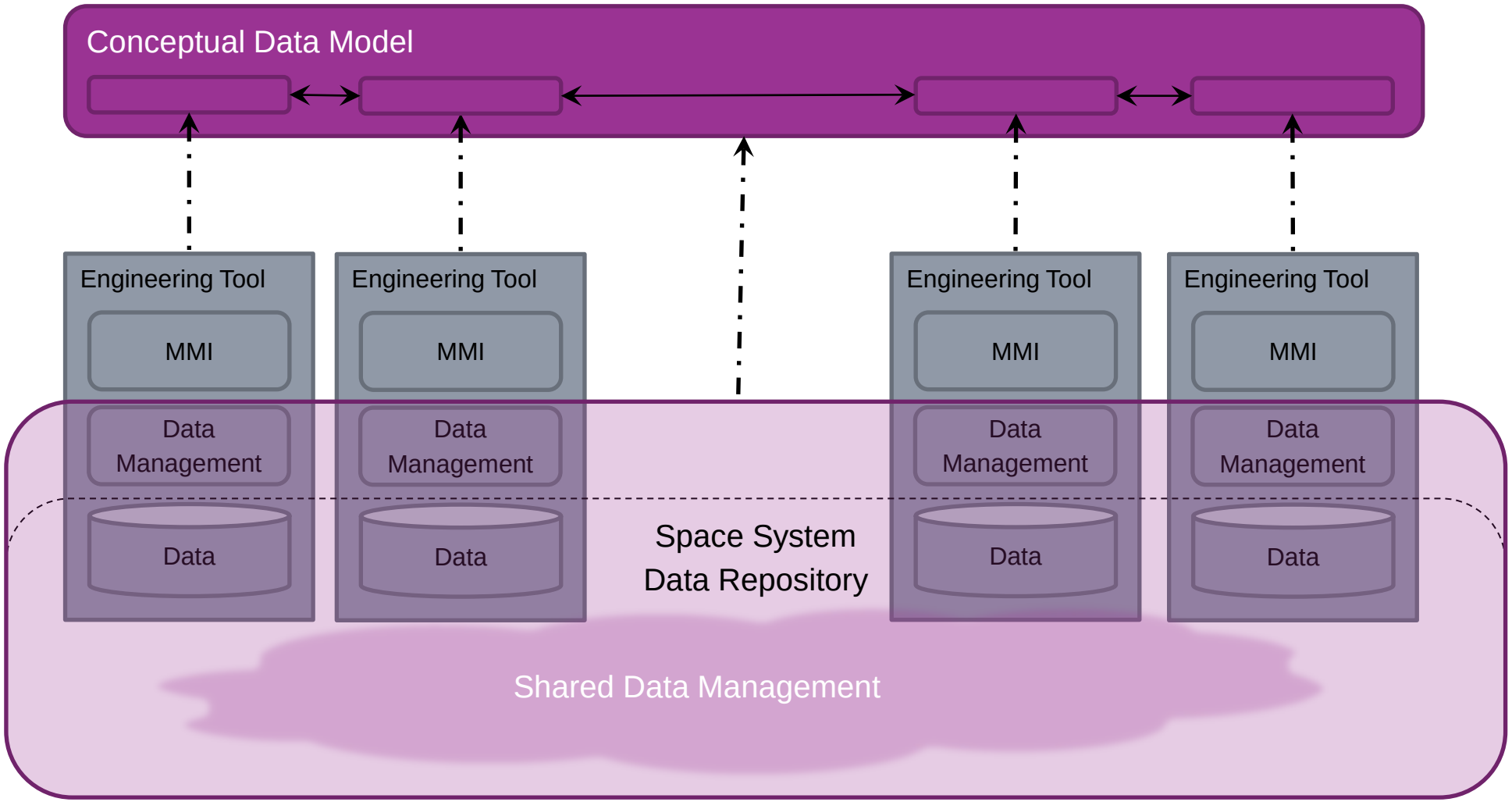
ECSS-E-10-23 introduces the following main concepts enabling the required interoperability for a improved consistency of data …



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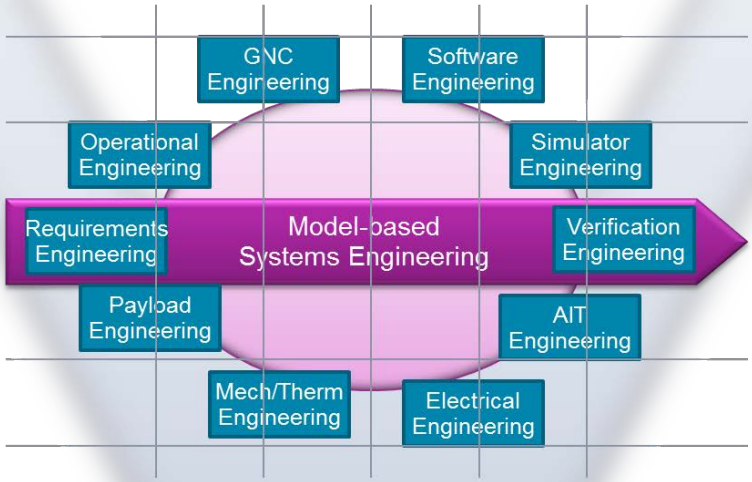
…. But also facility the incremental transition into an integrated environment, across life-cycle, disciplines and supply chain

Managing the Federation of DB



"user friendly" way of data editing

Definition of the managed data derived from process

System simulation along the life-cycle

Model management technologies

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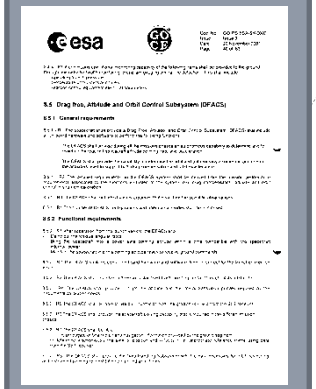
ESA TRP “Virtual Spacecraft Design” to demonstrate an solution for an integrated data management realizing ideas of E-TM-10-23

Requirements



Operational Modes

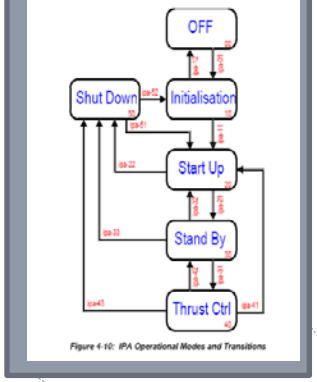
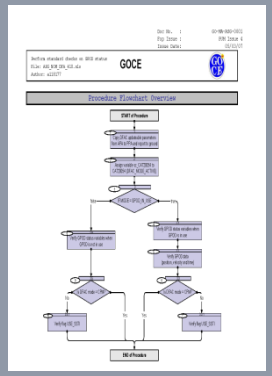


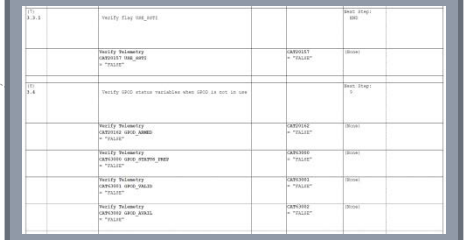
Figure 4-10: IPA Operational Modes and Transitions

Operational Proc



Configuration

Integration Procedure



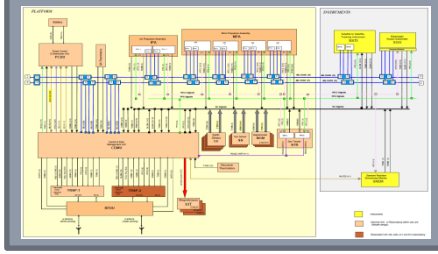
Verification Matrix

7.1.1 Platform SM Verification Matrix

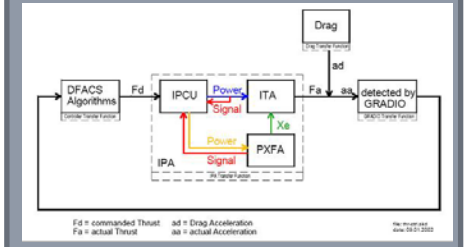
The following table summarises the key requirements and verification method versus the SM configuration:

Requirement Category	Equipment- Level	Platform- Level	Spacecraft- Level
Function	-	-	-
Performance	-	-	-
Leakage	-	-	-
Alignment	-	T	T
Thermo Elastic Stability	-	A	T
Interfaces	T, I	T, I	-
Physical Properties (mass, CoG)	T [1]	-	T
Quasi Static Load	-	-	T
Vibration	-	-	T
Acoustic	-	-	T
Separation Shock	-	-	T
Thermal Verification (TV/TB Test)	-	-	-
EMC- R & C	-	-	-
ESD	-	-	-
Magn. Moment	-	-	-
Radiation environment	-	-	-
Oxygen	-	-	-

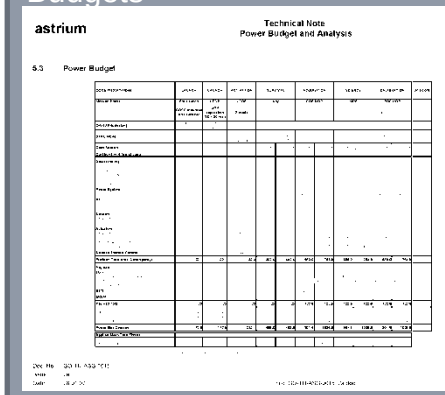
Electrical Interfaces

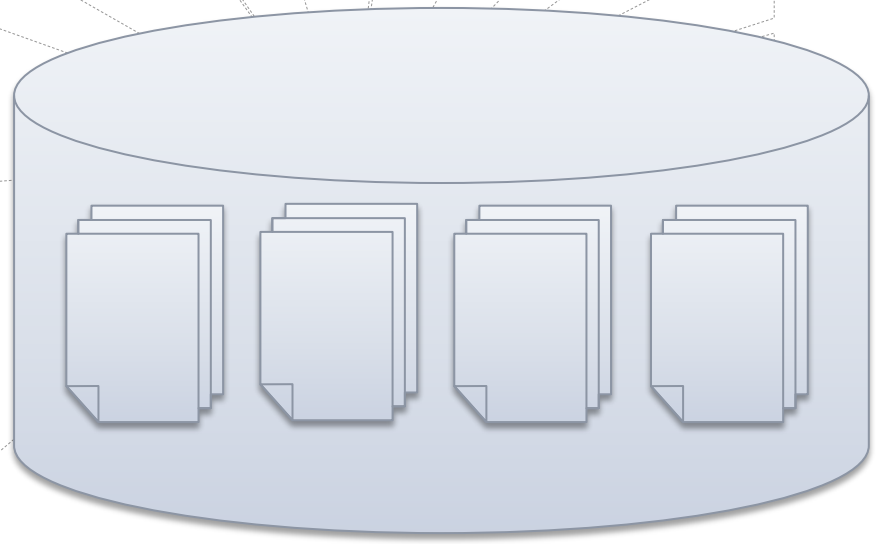


Functional Architecture



Budgets





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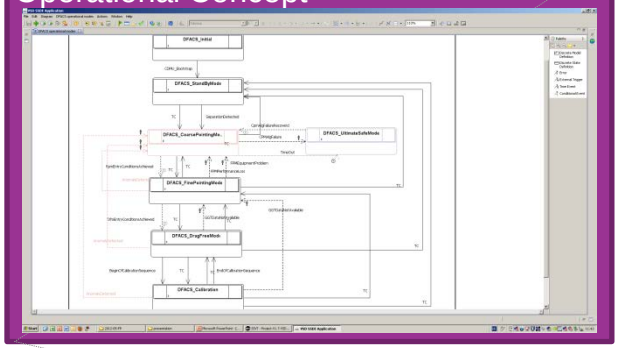
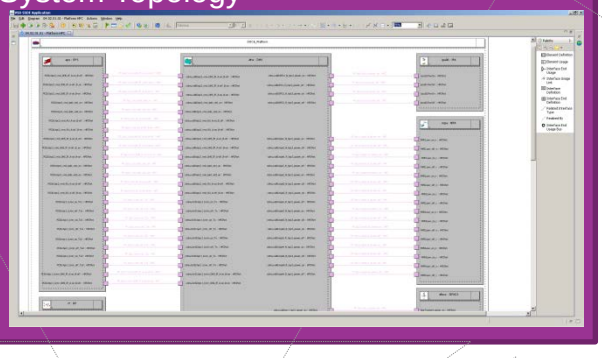
Re-hosting of the views of a “document-based” system model into a database providing an integrated DB management approach

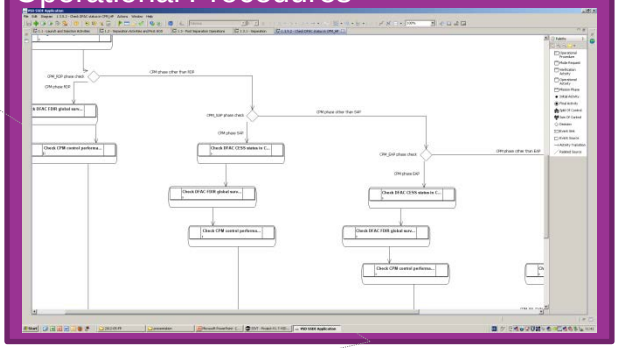
Operational Concept



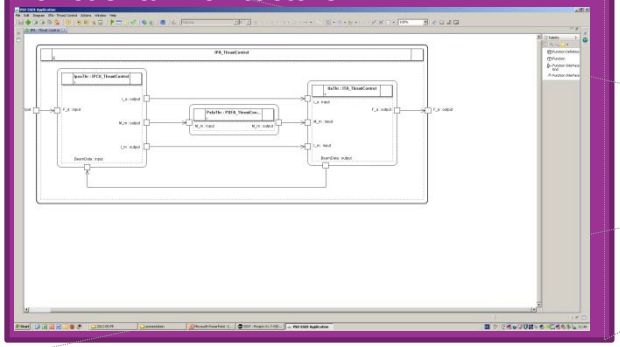
System Topology



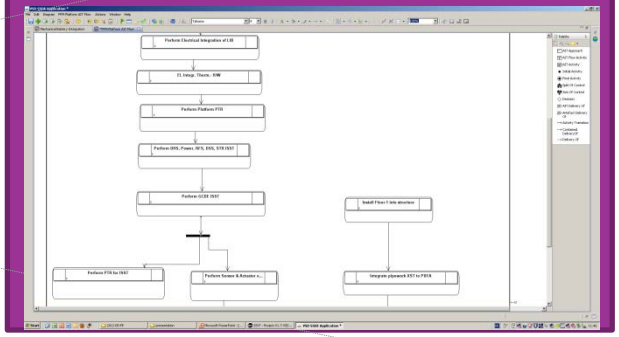
Operational Procedures



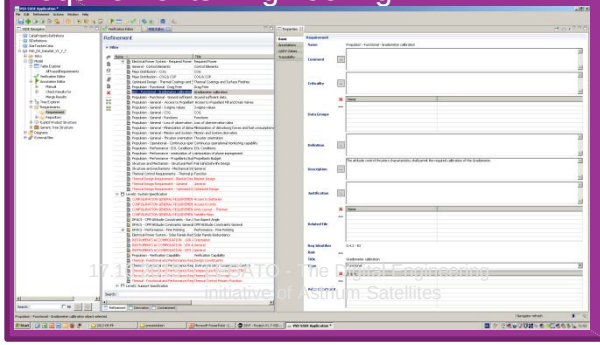
Functional Architecture



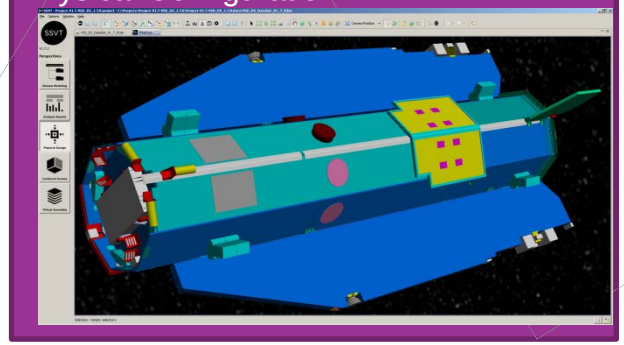
AIT Flow and Integration Procedures



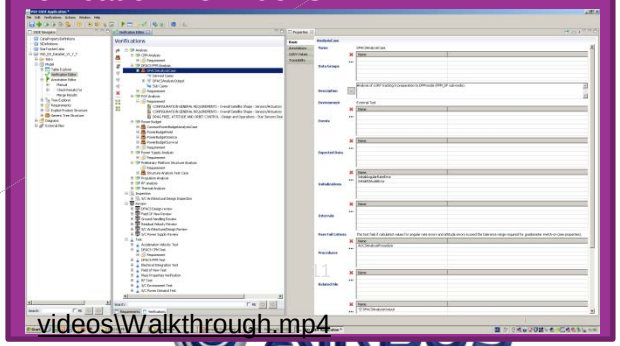
Requirements Engineering



Physical Configuration



Verfication Definitions



videos\Walkthrough.mp4

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Technological success factors of the developed RangeDB

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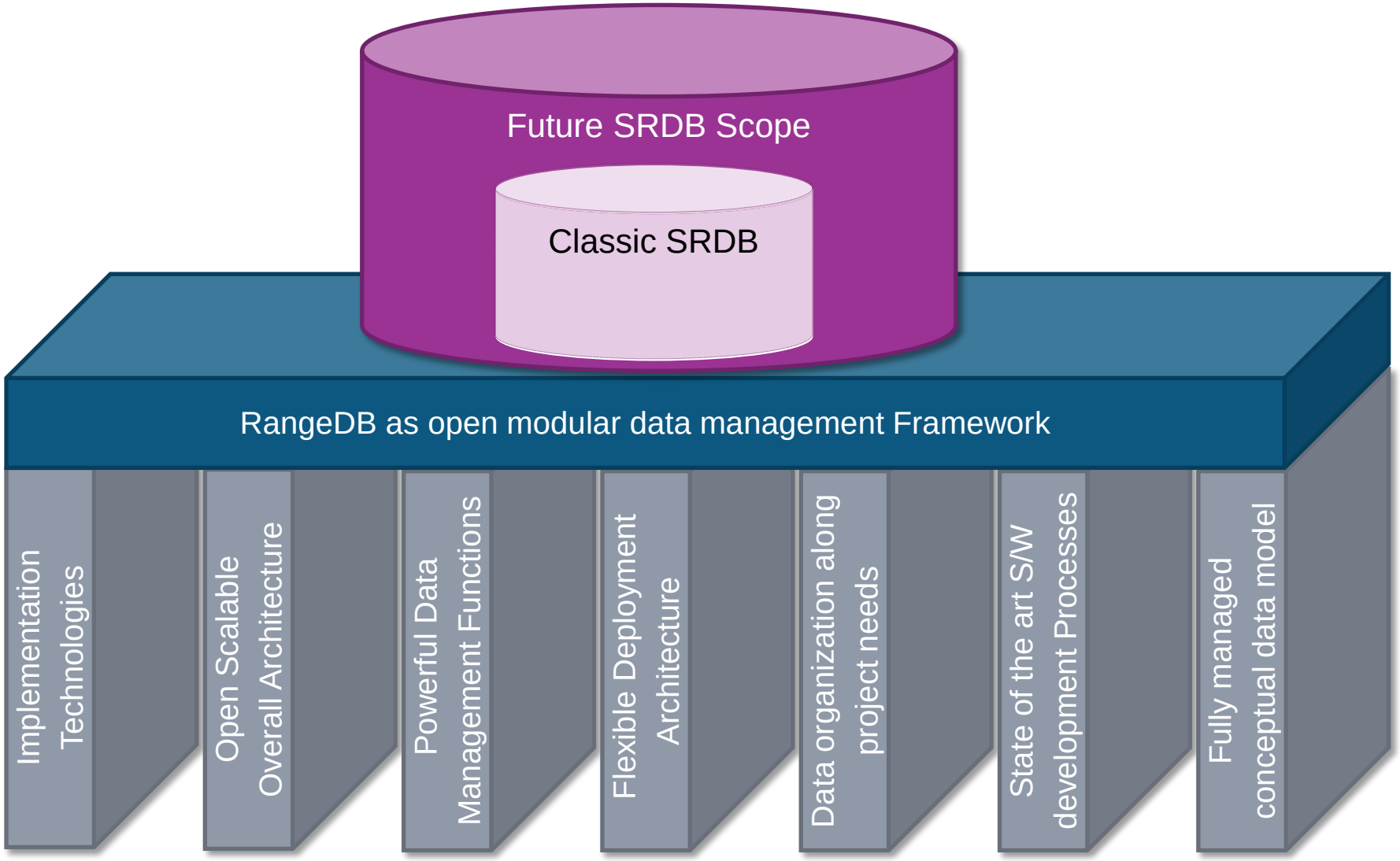
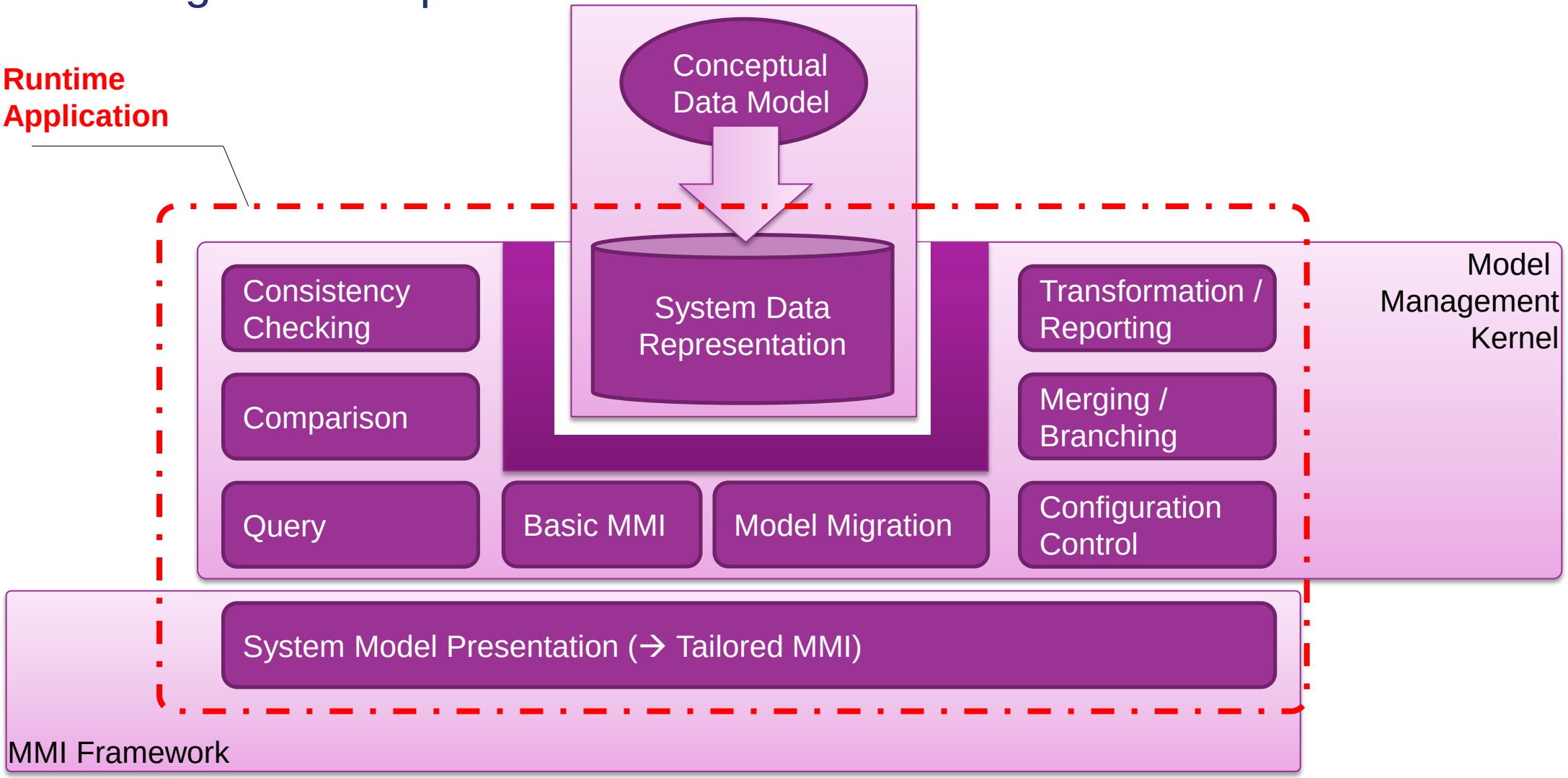
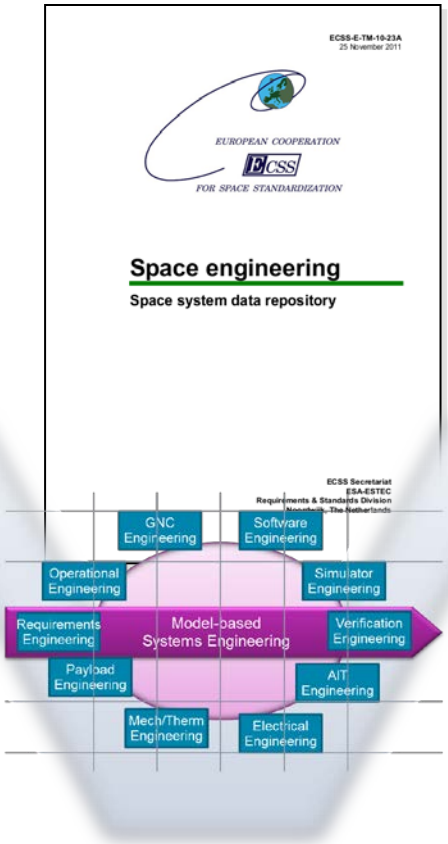
RangeDB is relying on the following technical pillars in order to answer the needs of an SRDB today – and tomorrow



Three related frameworks form the core of the S/W architecture - following the EMF provided means



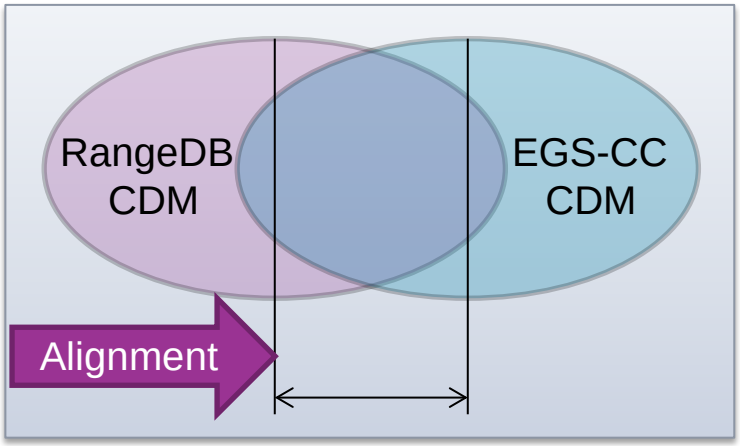
For the conceptual data model various constraints had to be considered



Consideration of Internal Process Needs

RangeDB Conceptual Data Model

Implementation / Validation Feedback



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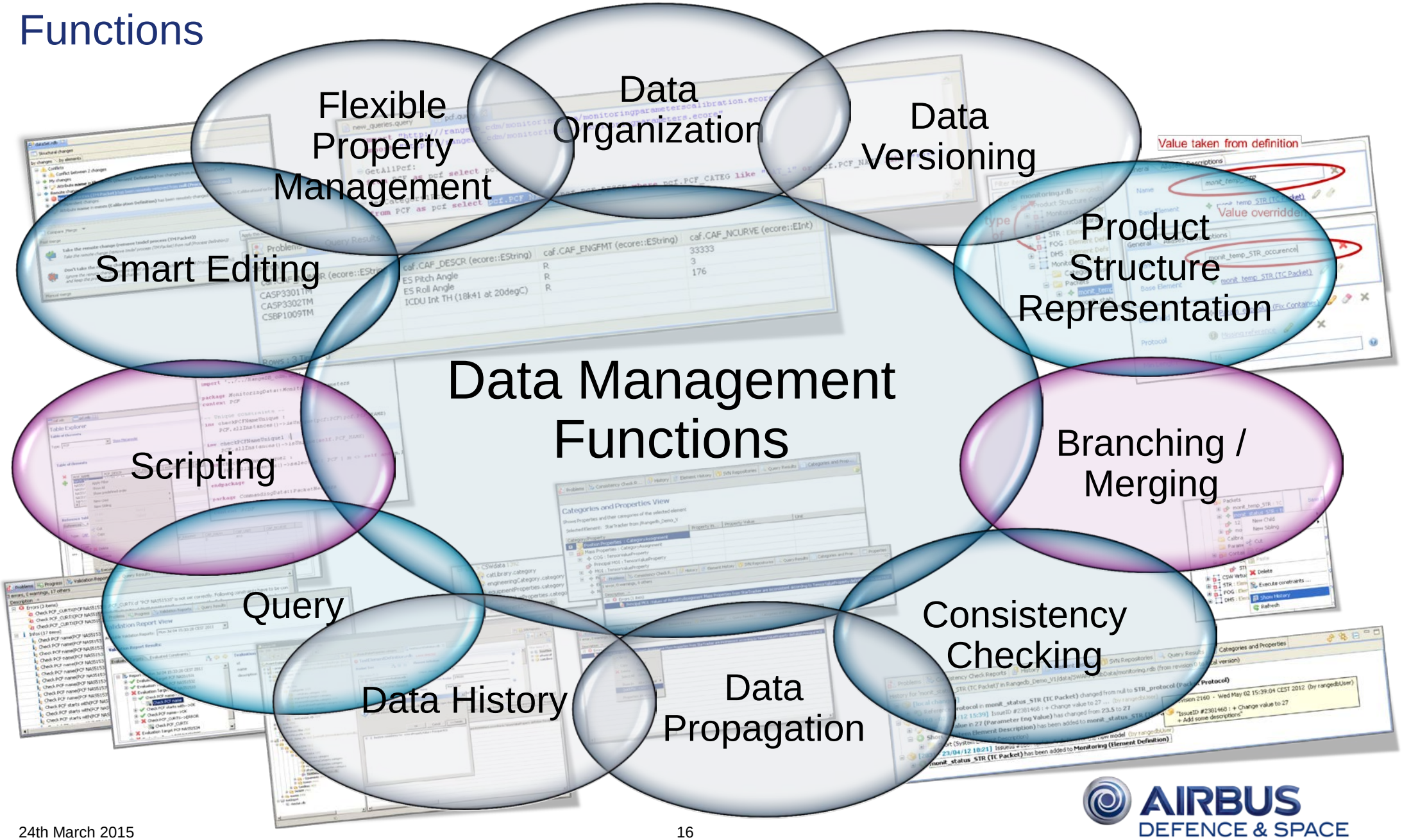
RangeDB provides powerful, flexible and reliable Data management Functions



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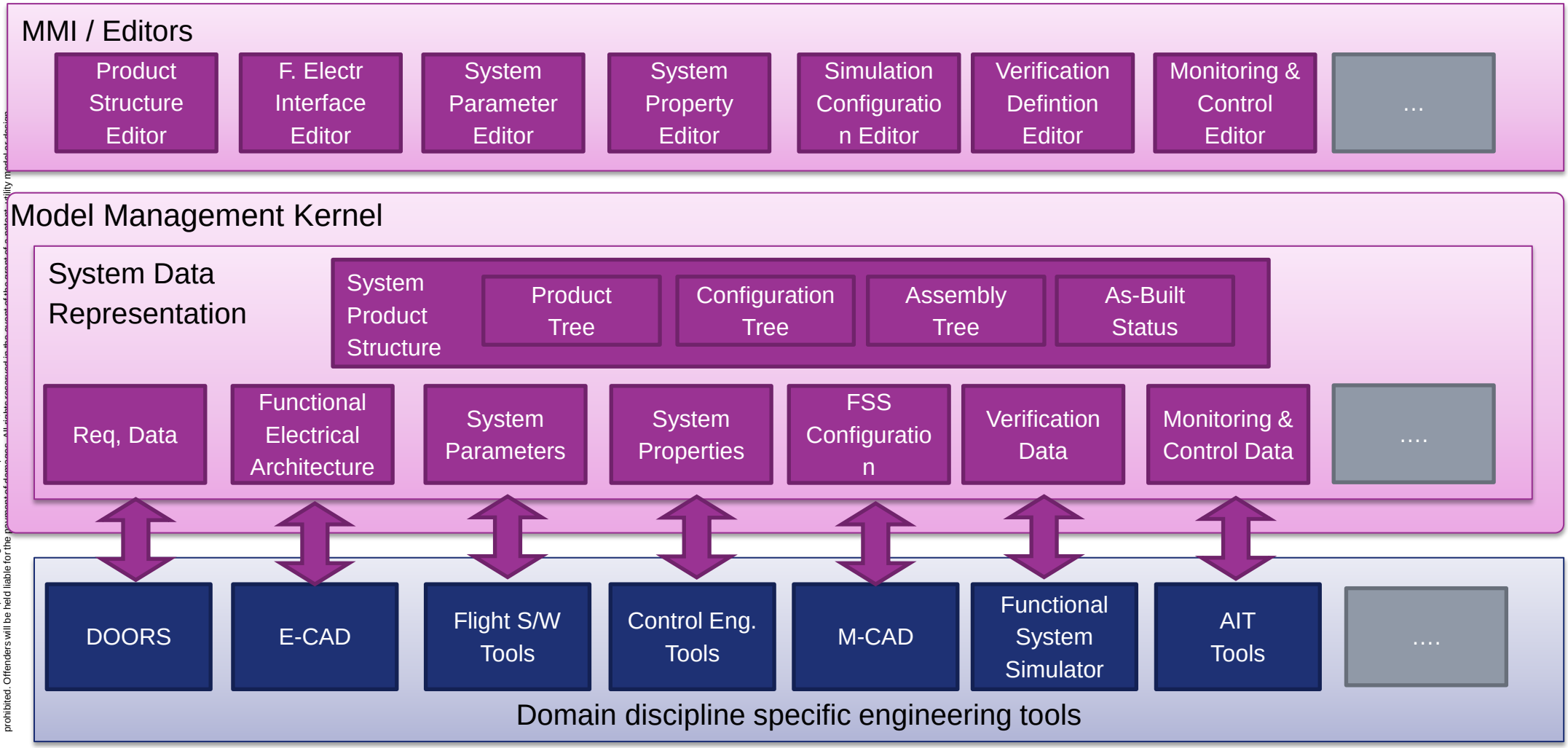
The architecture allows a modular extension in terms of managed data, related editors and interfaces – based on a generic kernel



Product Data Management System

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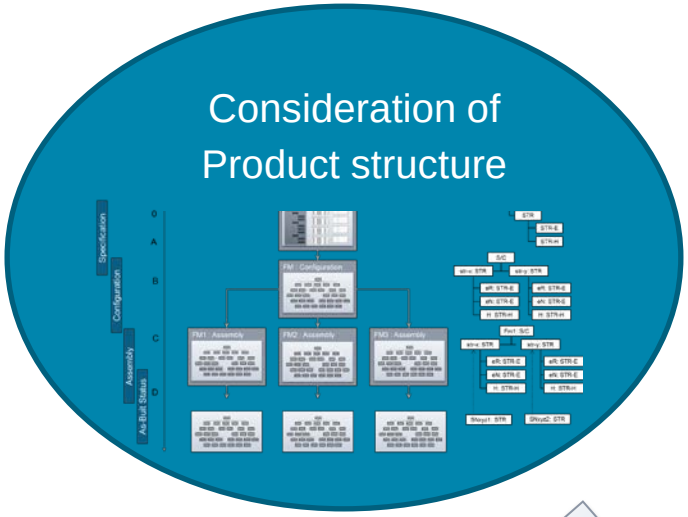
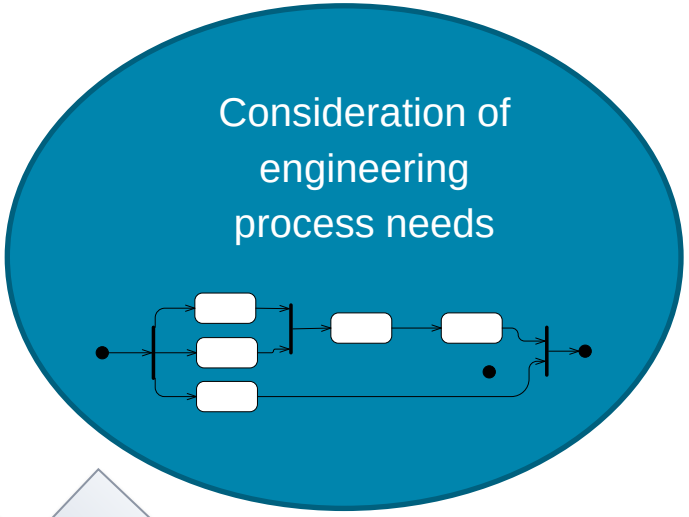
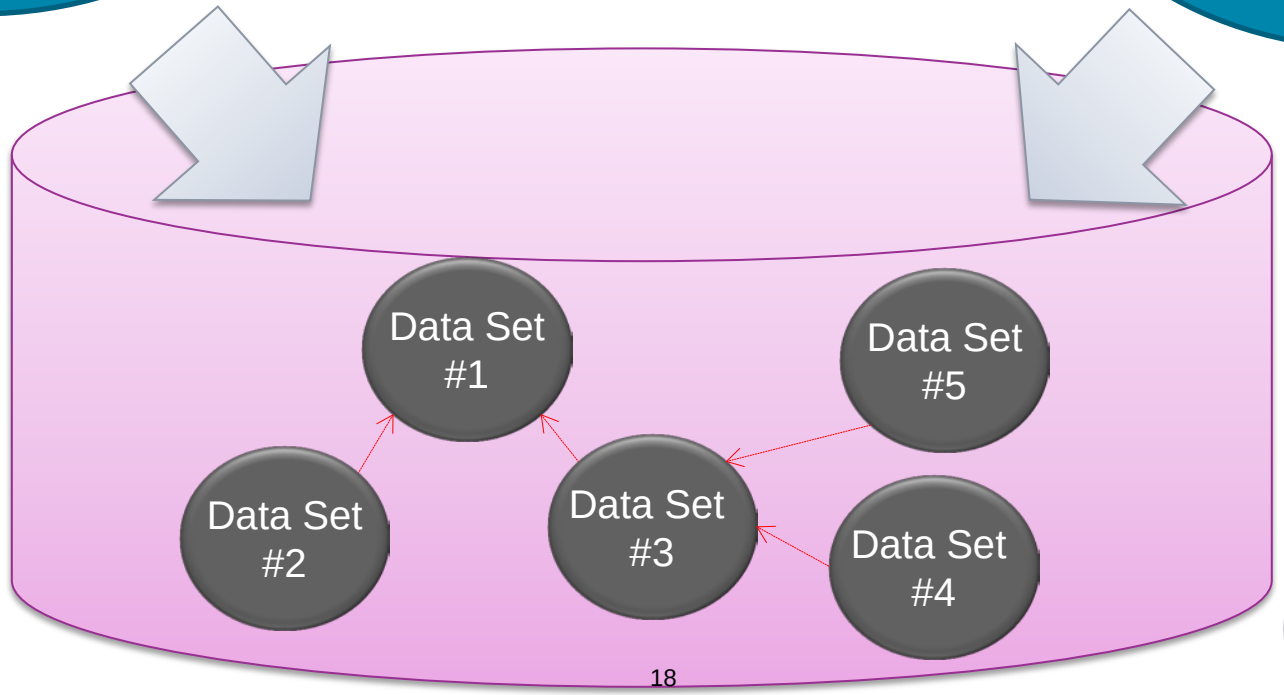
RangeDB allows the organization of data – in configuration items – according to the actual product structure and process needs







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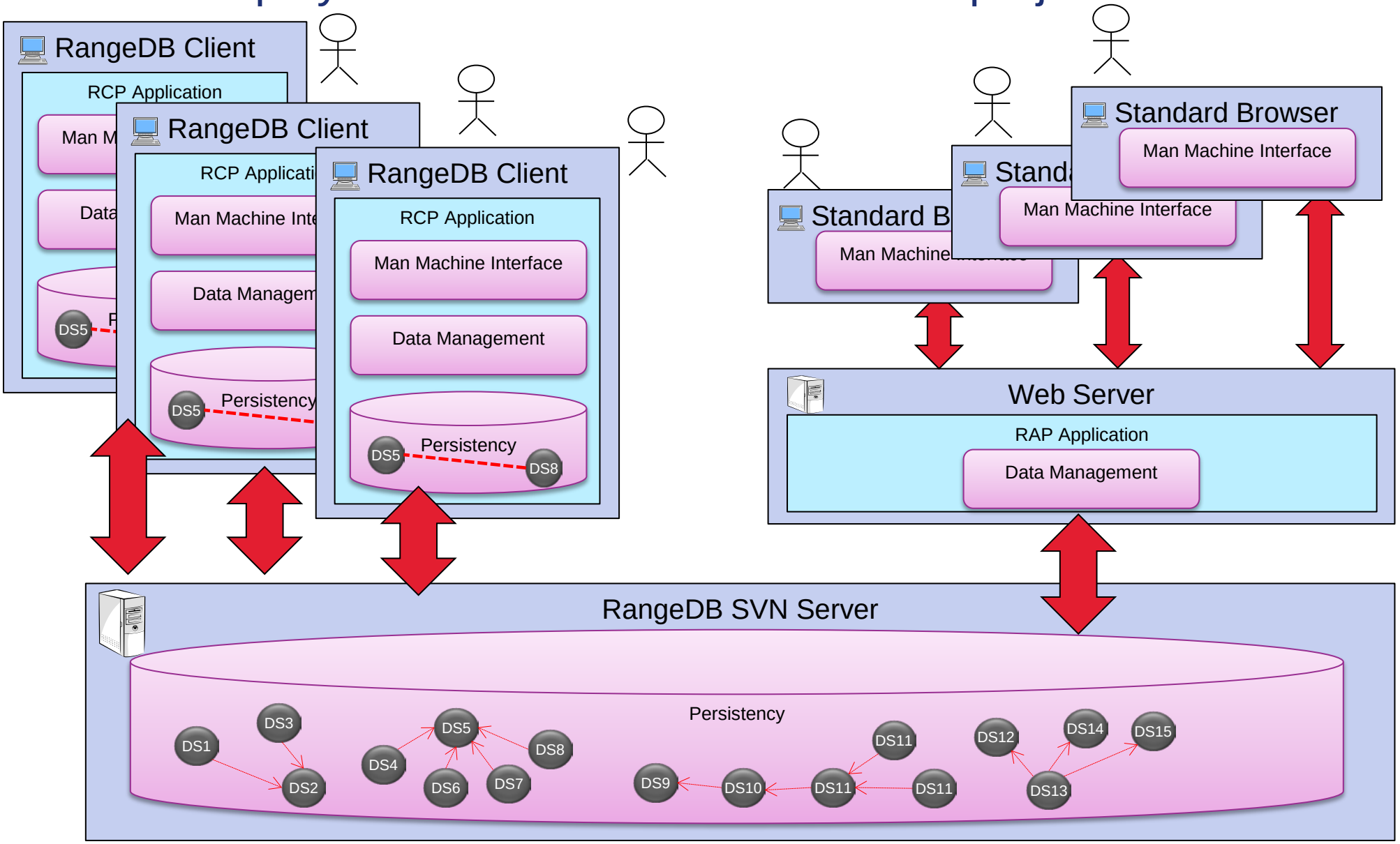
A flexible deployment architecture is offered to projects



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RangeDB development is completed, deployment of RangeDB is ongoing

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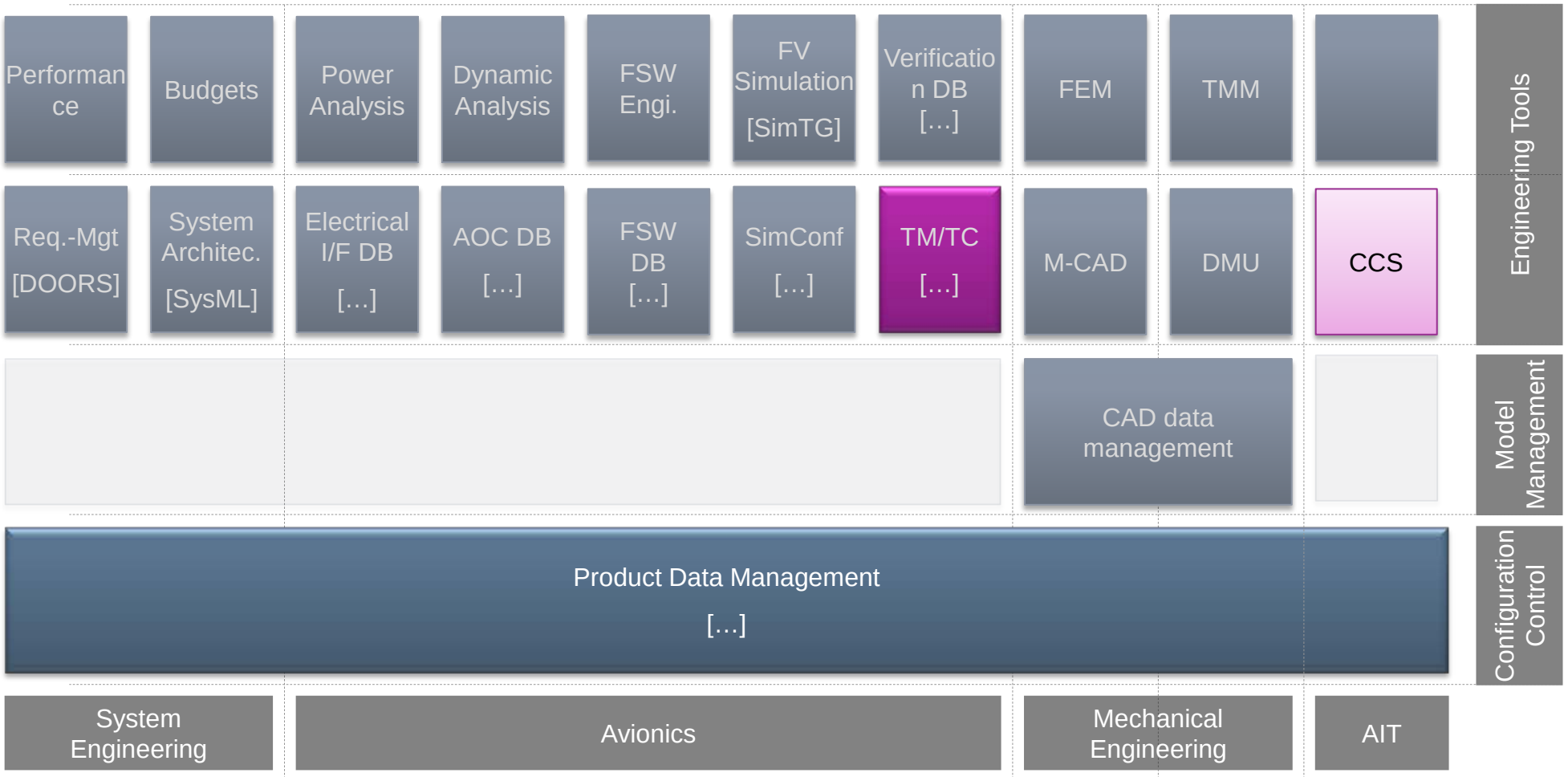
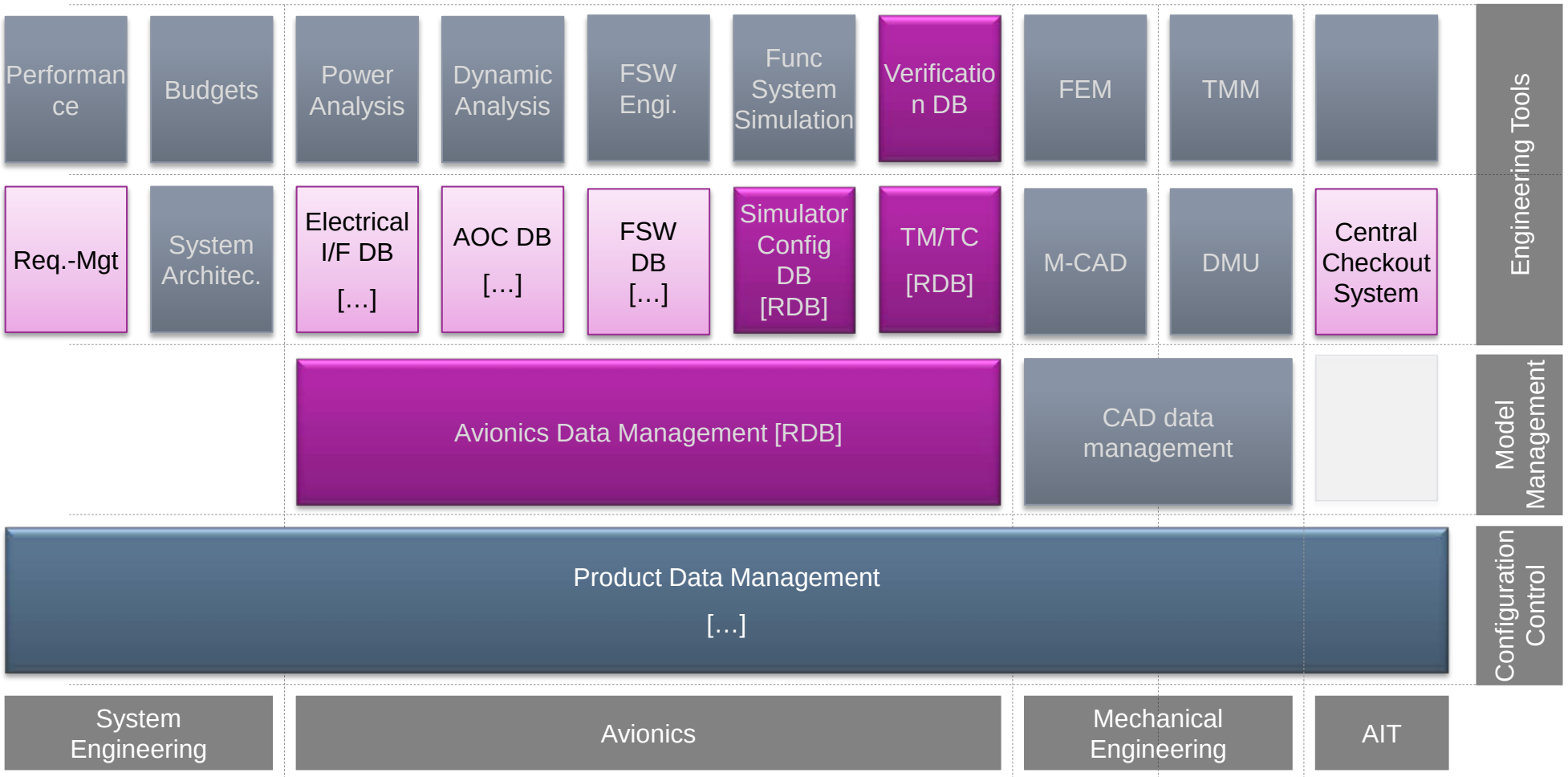
The overall engineering tool infrastructure, sets the context of an SRDB



RangeDB implementing the evolved scope of an SRDB today, provides the backbone for integration of avionics data



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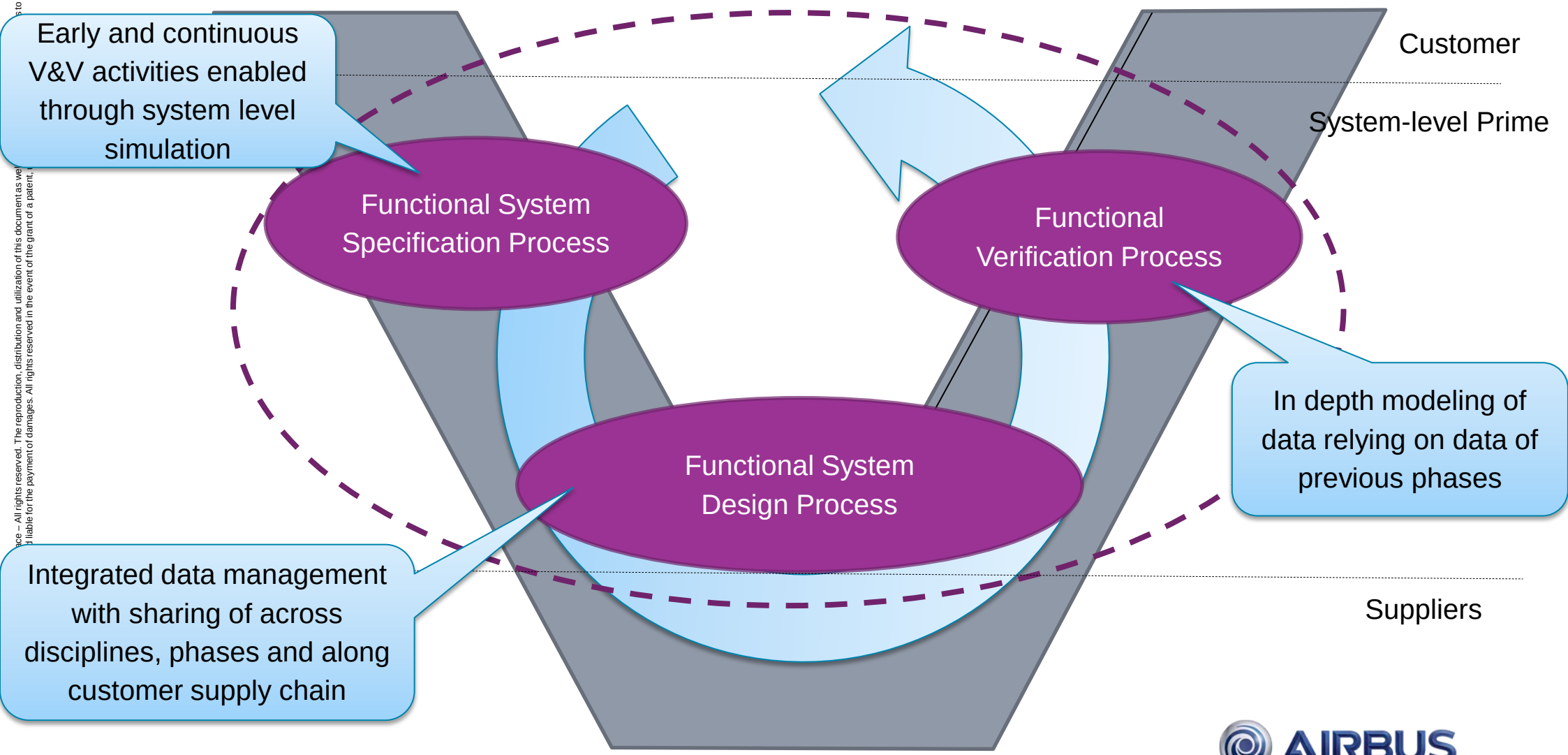
Manage the transition towards MBSE for the scope of avionics, along the complete life-cycle from specification through verification



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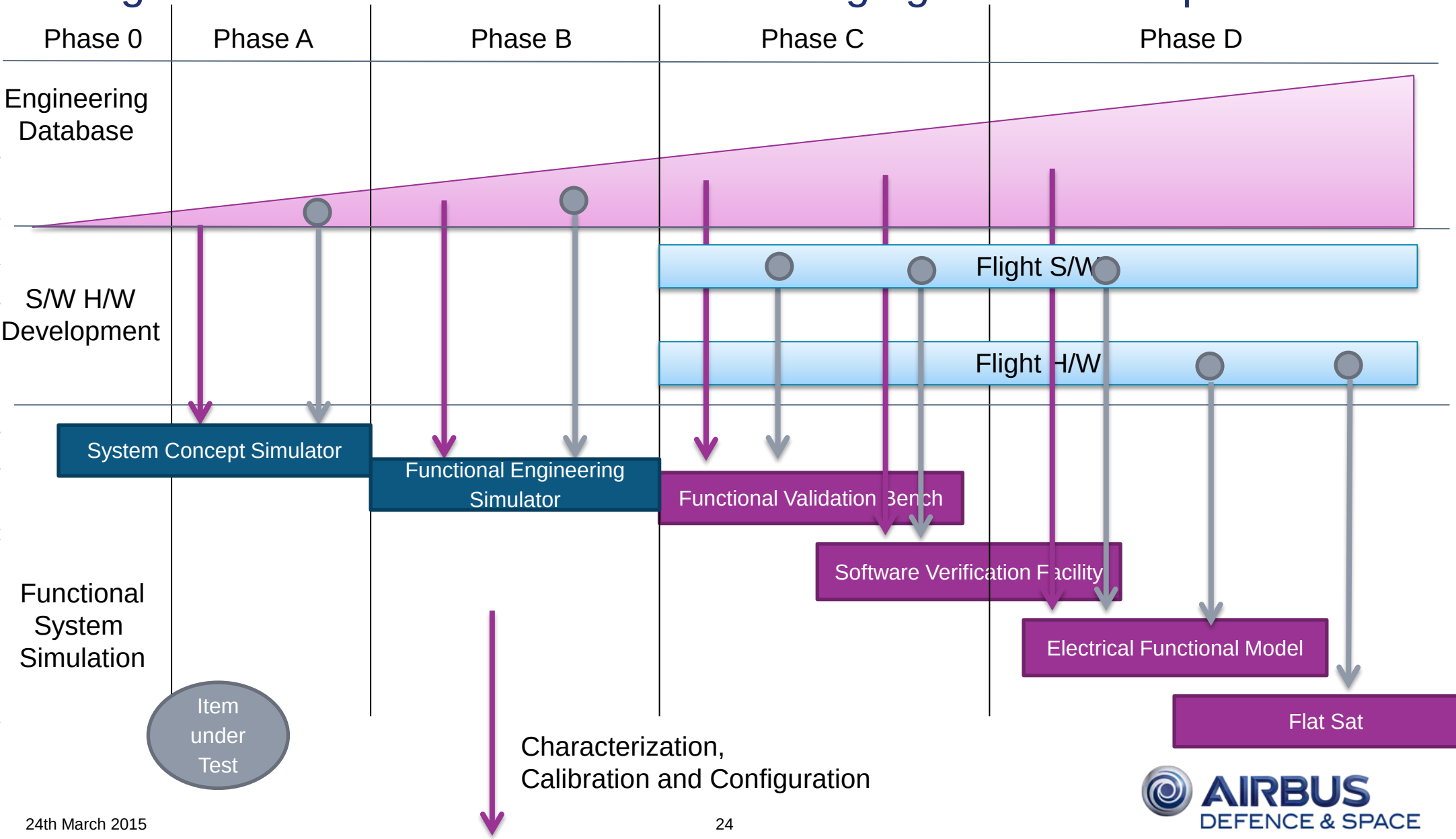
Leveraging the early use of an SRDB, to care for consistent configuration of simulation – enable emerging use case in phase B



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With the RangeDB product developed Airbus DS has the means to answer the needs of a SRDB today and tomorrow

- Airbus DS decided in 01/2011 to develop a new product for engineering data management to replace current solutions used to configure SRDB applications, called RangeDB

- The main requirements / constraints for the new solution were
  - Technical: Flexible, module, “state of the art” data management framework
  - Economic: Provide basis for a cost efficient maintenance and evolution of the product
  - Process: Facilitate transition to MBSE, close alignment with EGS-CC
  - Usability: Key driver for the development was the close involvement of the end users

- The development for the initially requested scope was finished after 3 years of development, followed by a 1y validation period in 12 / 12014

- Deployment of RangeDB is ongoing for different applications, Launcher, S/C platform, S/C payload on different sites across Europe

- Further developments have been requested in order to progress in the overall consistency of data

- With RangeDB Airbus DS is prepared for the future to manage the transition to MBSE / Digital Engineering / Industry 4.0 !

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