

Middleware and Dependability

Analysis of Needs & Strategy

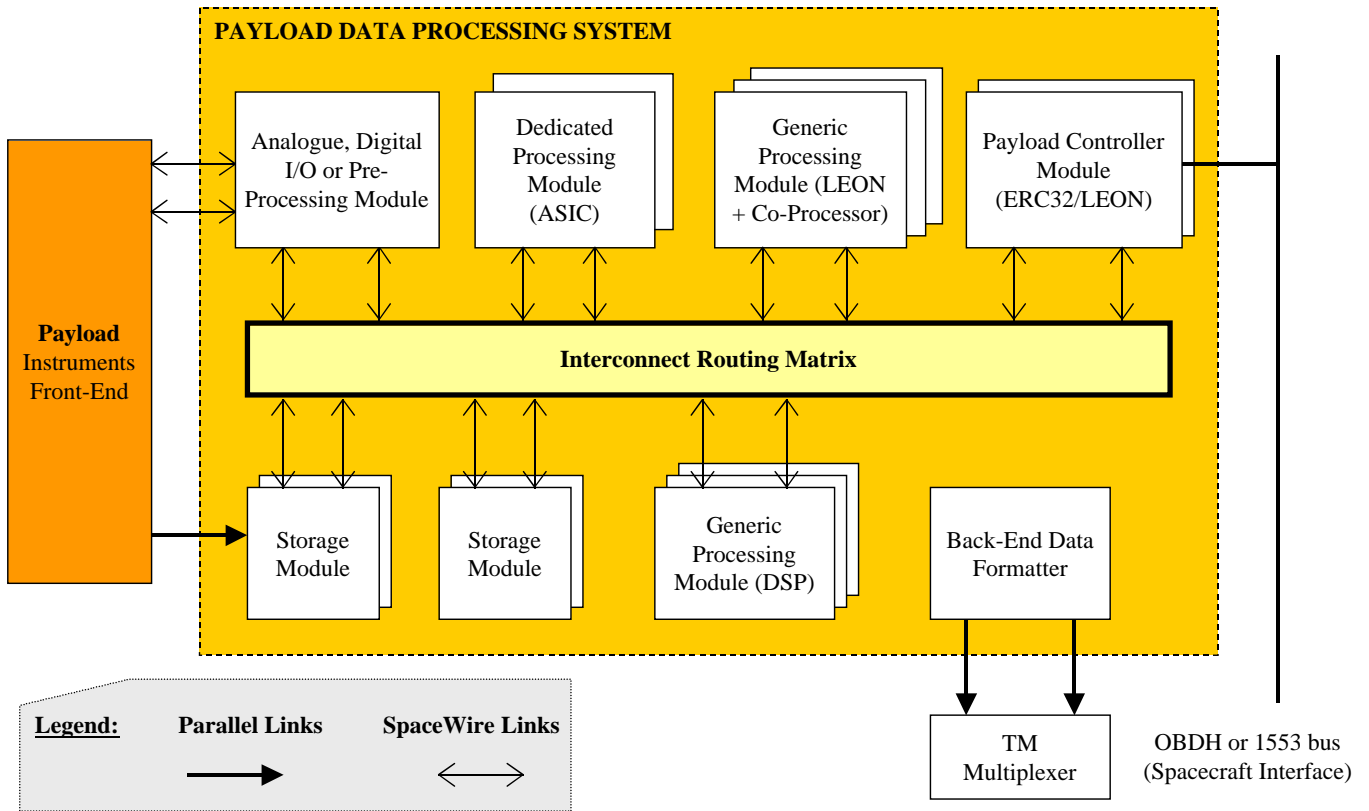
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Software Engineering and Standardisation section

RIS Working Meeting on *“Intergiciel et Sûreté de Fonctionnement”*
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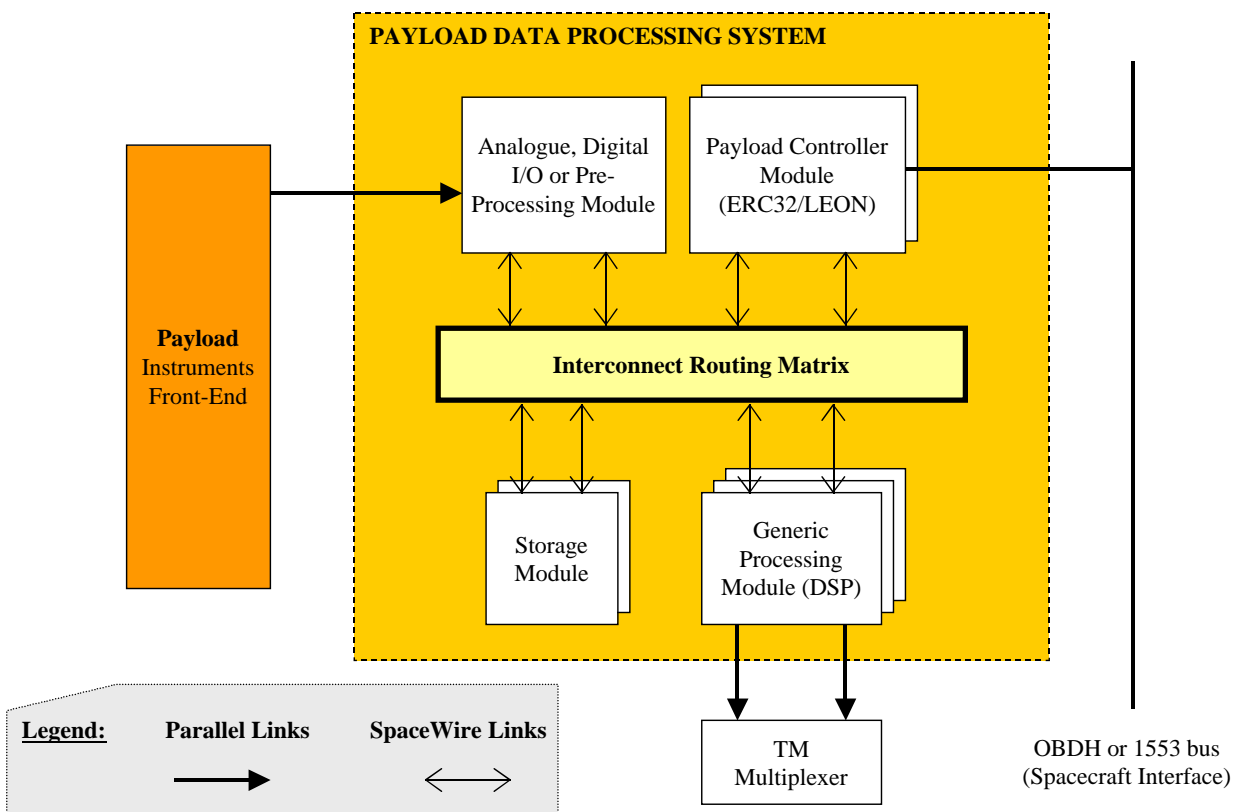
Outline

- **Analysis of needs**
- **Global engineering approach**
- **ESA R&D strategy (harmonisation dossier)**

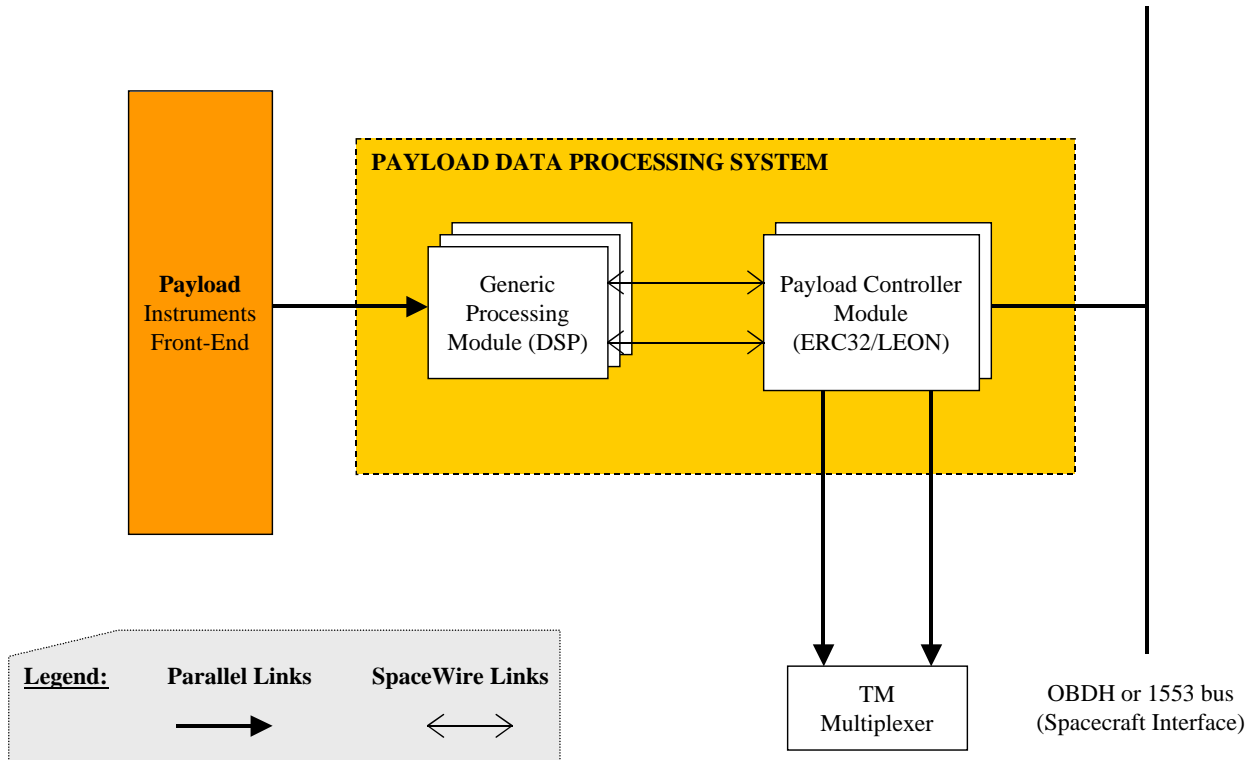
Spacecraft Architecture



Mini Spacecraft Architecture



Micro Spacecraft Architecture



Requirements & Needs

Requirements:

1. **To reuse** and port SW applications on various computing platforms (cooperation payload – platform)
2. **To ensure determinism in** integrating heterogeneous complex SW applications
3. **To isolate SW** applications for safety (FDIR)
4. **To reduce the cost and schedule** of mission customization and integration
5. **To anticipate** the transfer and to take advantage of new technologies in the space domain



Needs:

1. The different software components embedded in many on-board computers will have **to cooperate and communicate harmoniously**
2. **Dynamic migration** of software functions amongst computers, to implement performance and fault-tolerance requirements

Analysis of Needs

- **Middleware layer (A3M, RT-CORBA?) supporting:**
 1. Dynamic migration of software functions
 2. Space/ground communications
 3. Fault-tolerance requirements

- **Methods and tools:**
 1. To express the architecture (Avionics Architecture Description Language?) and properties of a software system
 2. To manage the composition of building blocks
 3. To enhance fast prototyping
 4. To prove properties
 5. To address schedulability analysis
 6. To ensure verification & validation

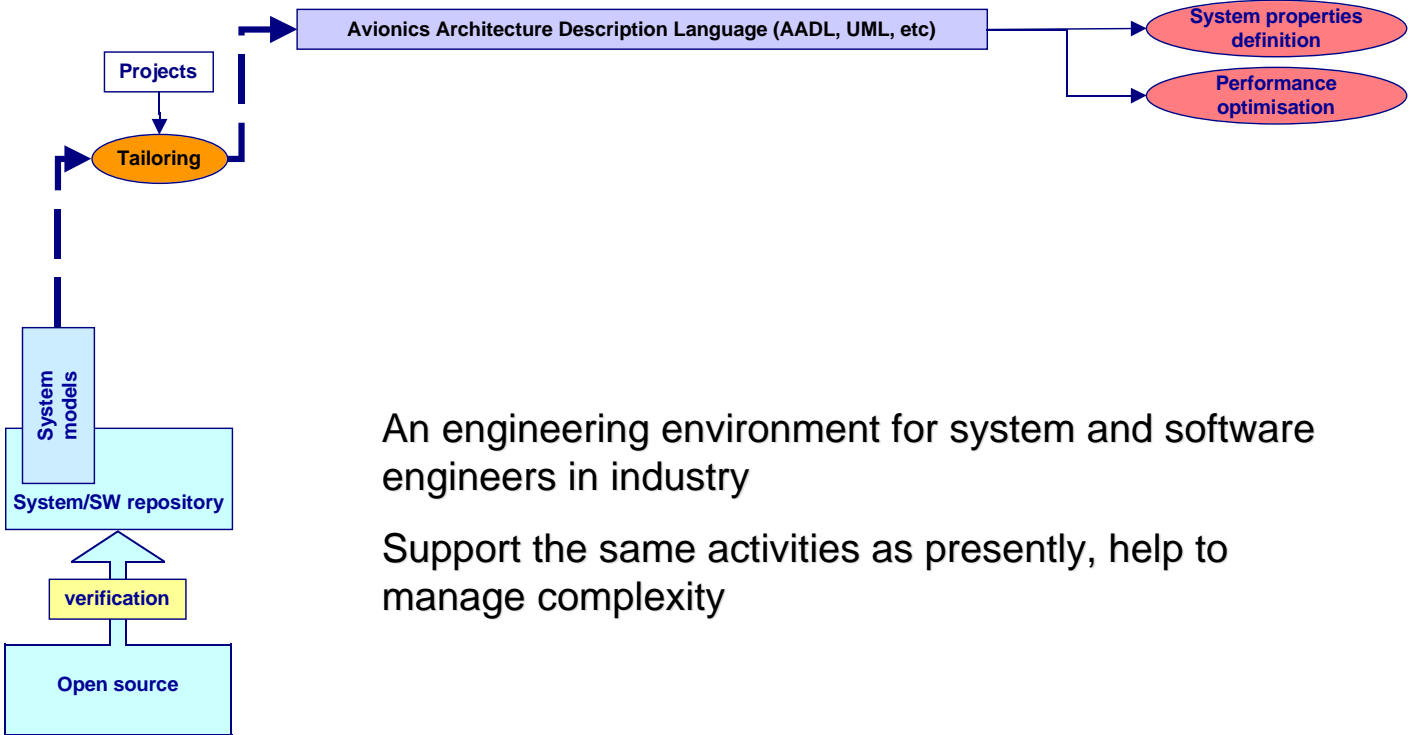
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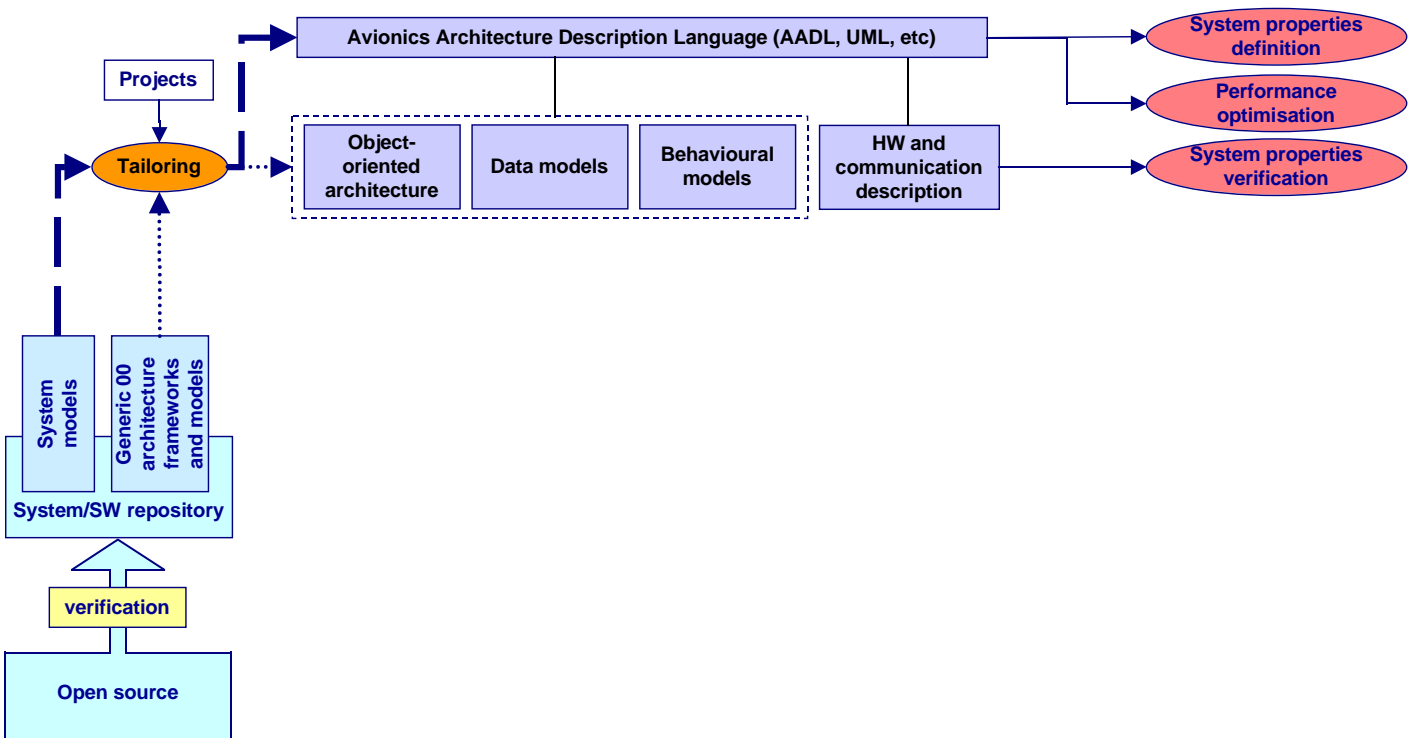
Global Engineering Approach 1) System-Software Co-Engineering



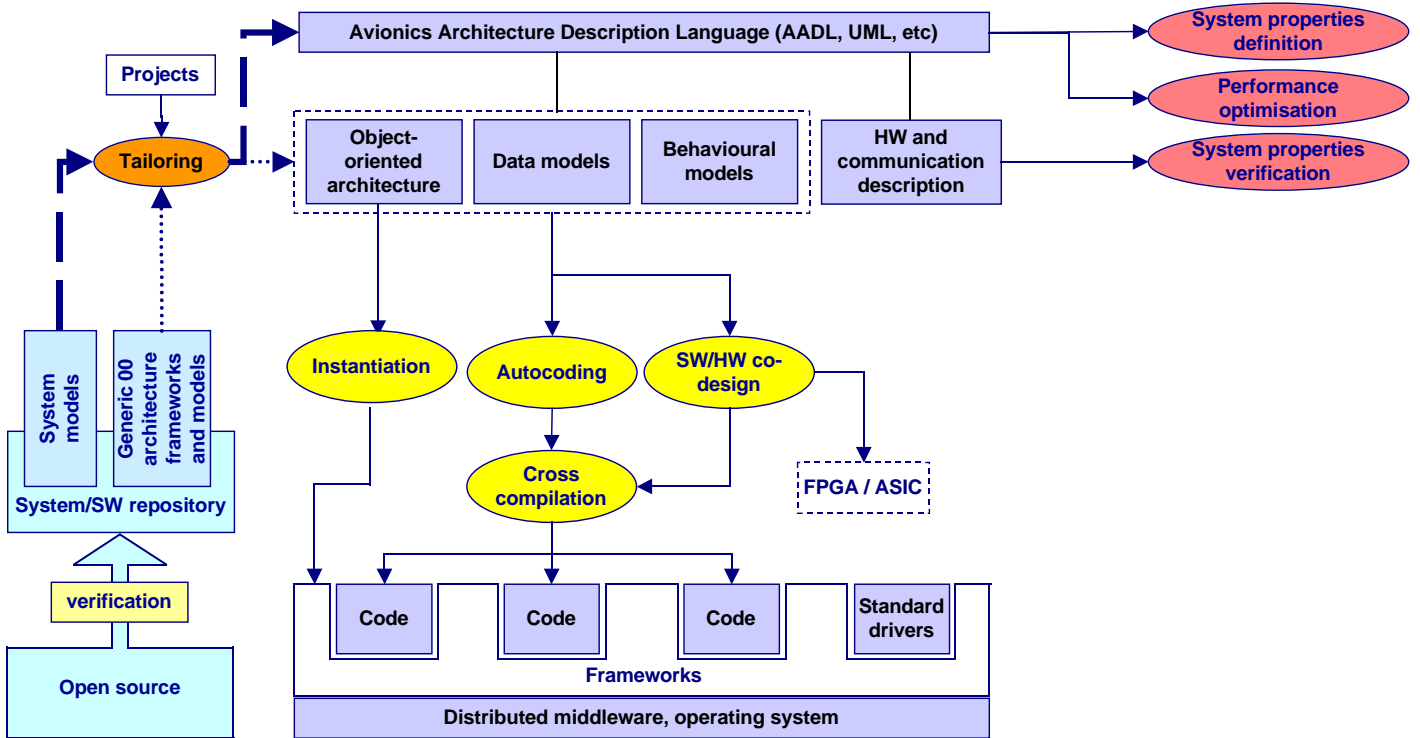
An engineering environment for system and software engineers in industry

Support the same activities as presently, help to manage complexity

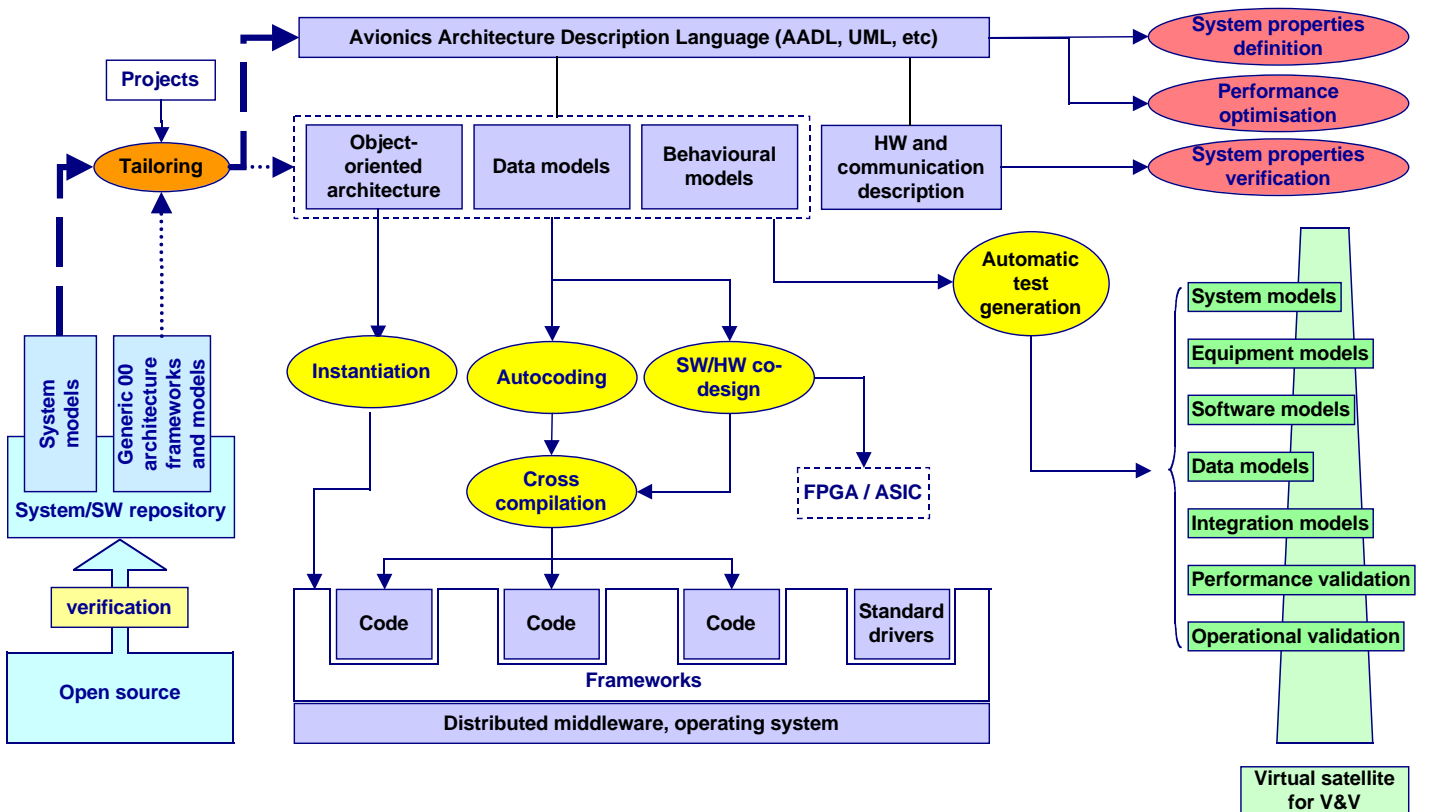
Global Engineering Approach 2) Requirement Engineering



Global Engineering Approach 3) Software Development



Global Engineering Approach 4) Verification & Validation

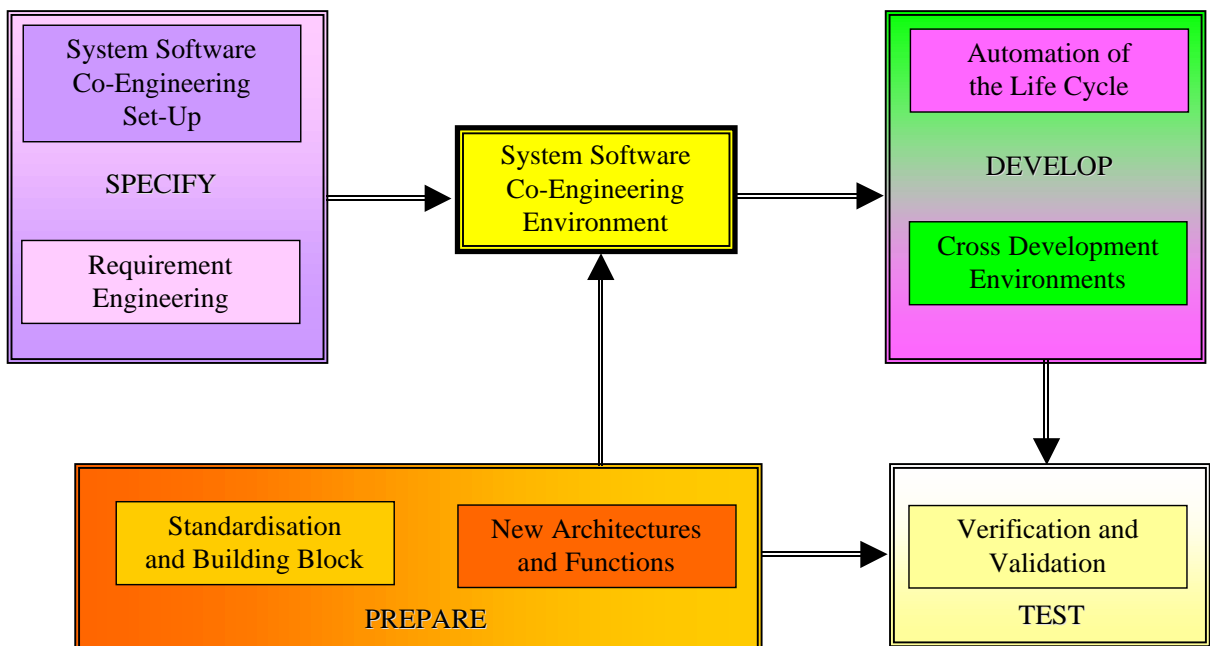


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Outline of the Activities (1/2)



Outline of the Activities (2/2)

