SAVOIR

space avionics open interface architecture

Reusing Specification to favour product lines

On behalf of the SAVOIR Advisory Group
Jean-Loup TERRAILLON – ESTEC/TEC-S
Lead Software Systems Engineer

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Space

Avionics

Open

Interface

a**R**chitecture.

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SAVOIR: Motivation

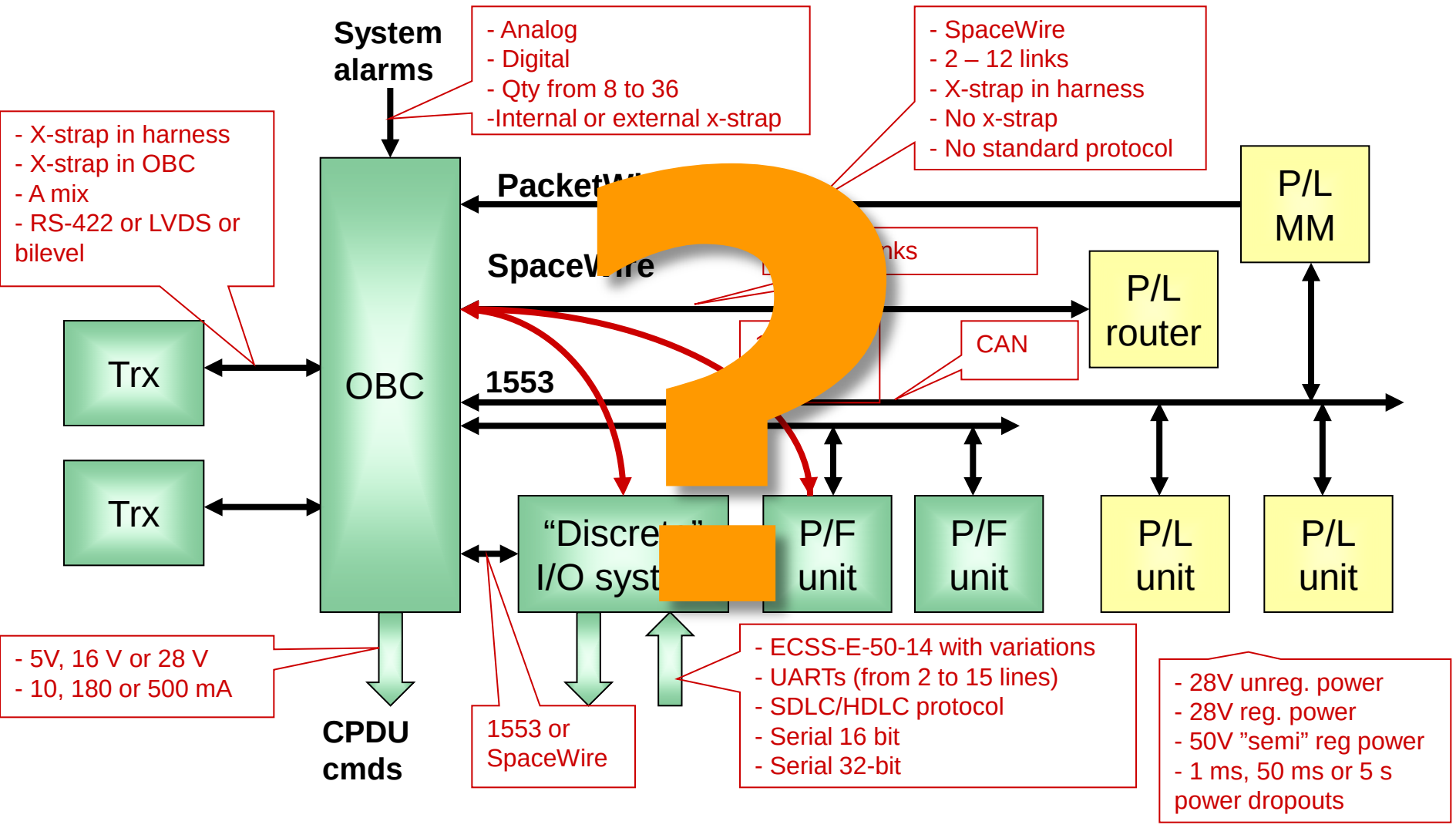
"Industry recommends to develop modular architectures fulfilling various mission needs and using a limited number of building blocks or equipments units with limited and robust standards (1553, SpaceWire…) and protocols…"

*"**Reference architectures** should be defined mainly in order to identify generic building blocks interfaces…"*

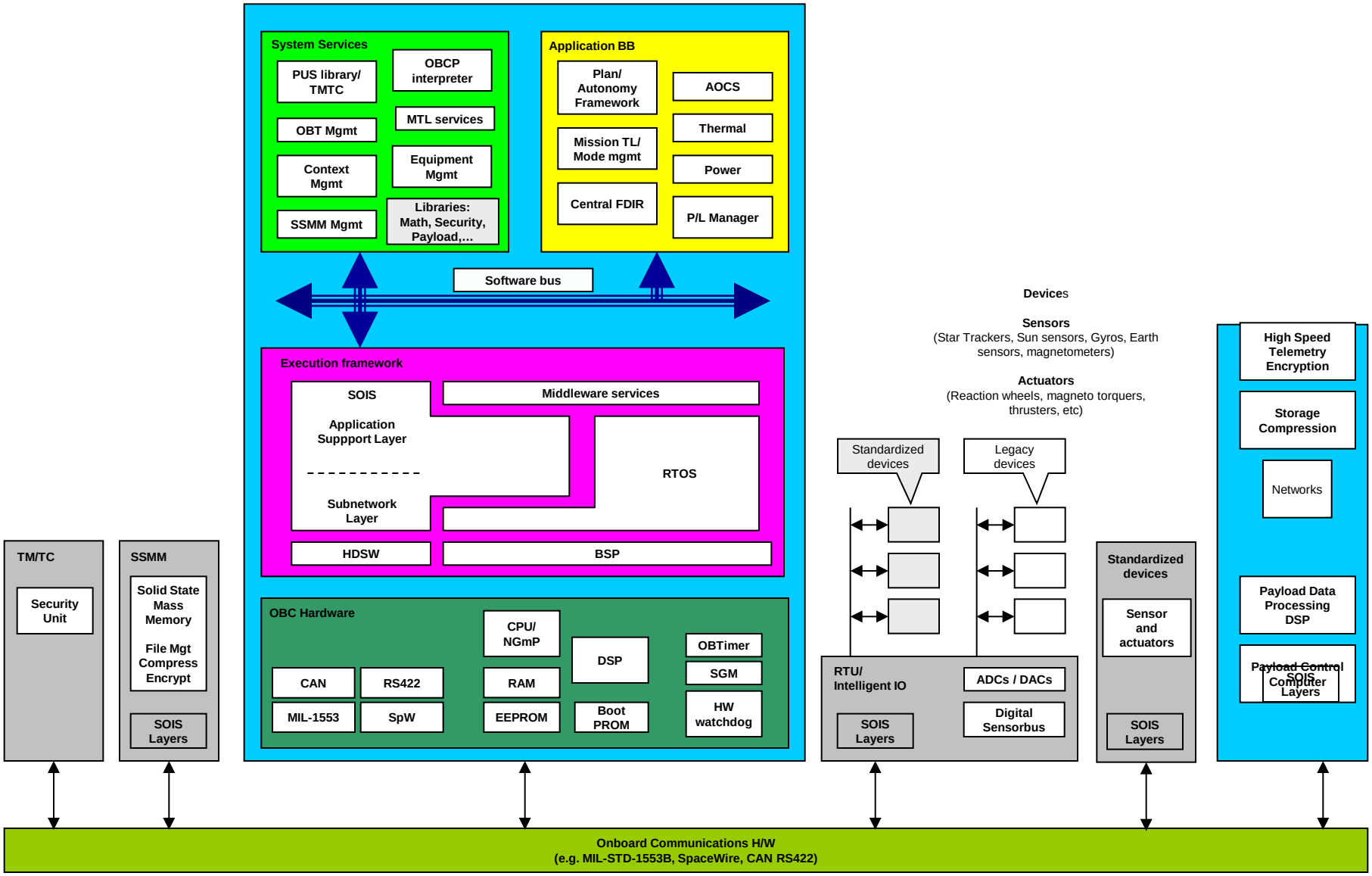
Eurospace recommendation

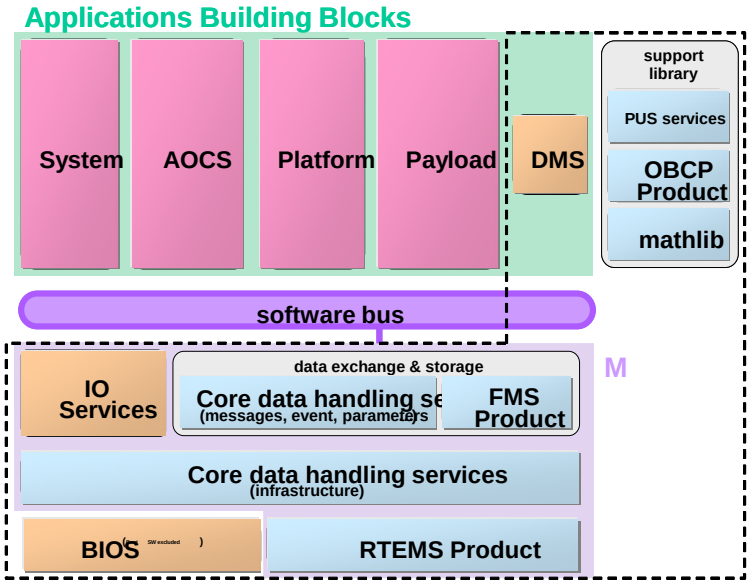
European Harmonisation on Avionics Embedded Systems,
December 2006

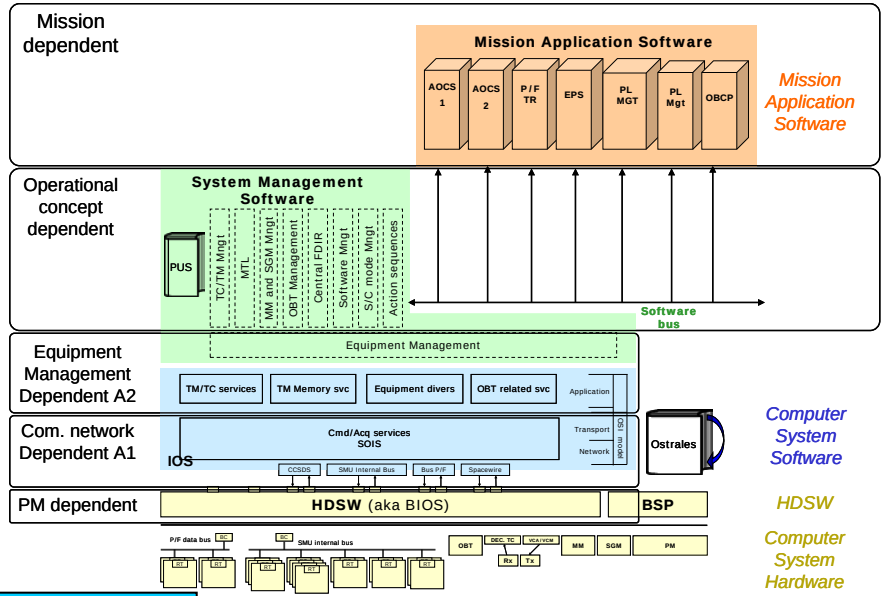
Avionics architecture Some of the variabilities



Conceptual Reference Architecture and Building Blocks



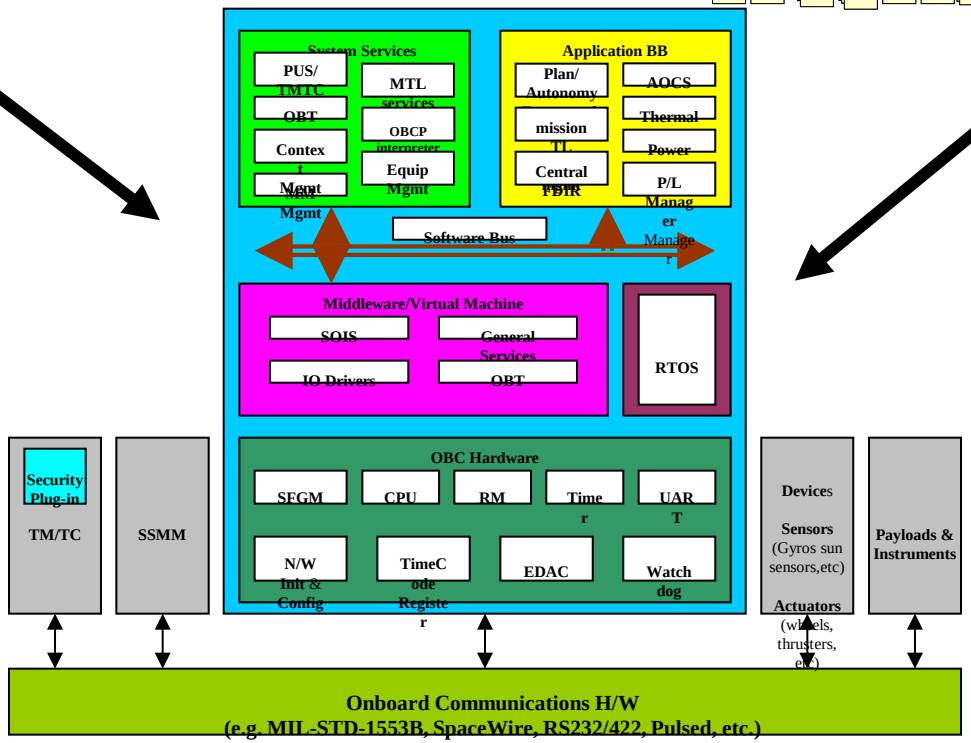




Astrium

TAS

Comms Architecture



HW Architecture

SAVOIR Advisory Group: FEDERATE

esa

DLR Deutsches Zentrum für Luft- und Raumfahrt e.V. in der Helmholtz-Gemeinschaft

cnes CENTRE NATIONAL D'ÉTUDES SPATIALES

AIRBUS DEFENCE & SPACE

ThalesAlenia Space

OHB SYSTEM

TERMA

Selex Galileo A Finmeccanica Company

Together ahead. RUAG

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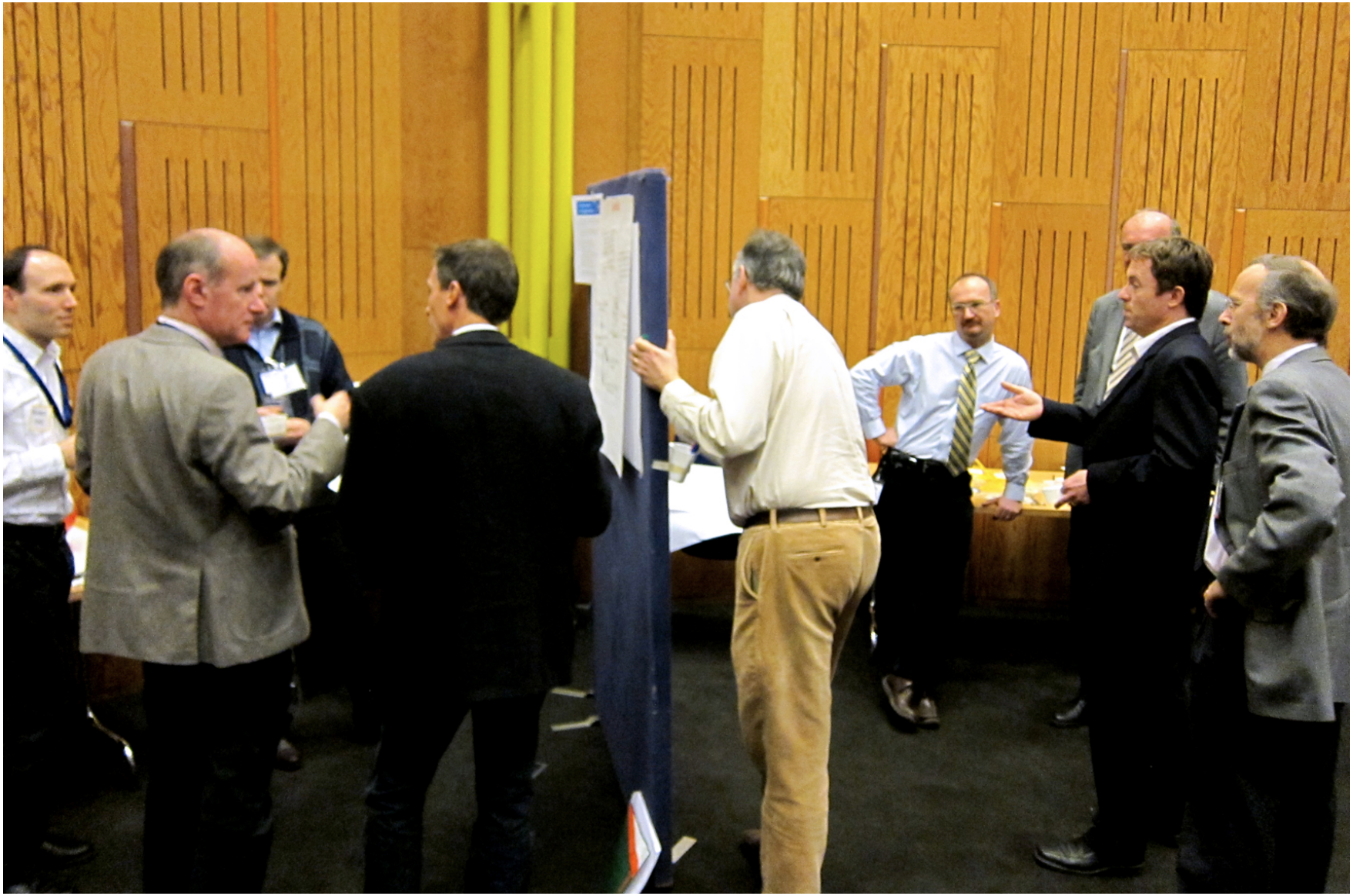
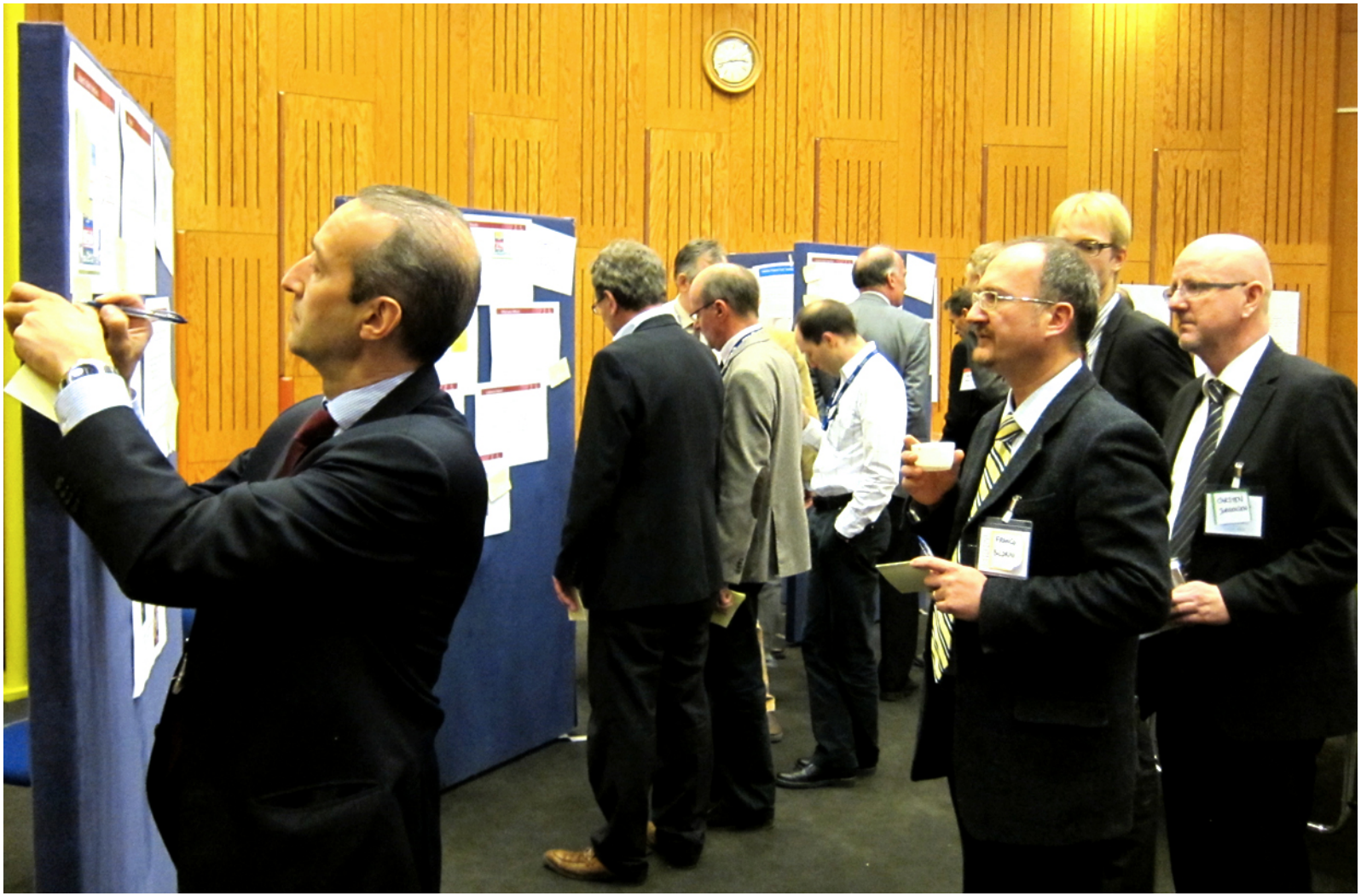
SAVOIR Round Table, ADCSS08,
ESTEC 29 October 2008



SAVOIR Round Table, ADCSS08,
ESTEC 29 October 2008

In the shoes of
an Agency Project Manager
esa
ESA PROJECT MANAGER



SAVOIR Round Table, ADCSS08,
ESTEC 29 October 2008

SAVOIR Round Table, ADCSS08,
ESTEC 29 October 2008

SAVOIR Round Table, ADCSS08,
ESTEC 29 October 2008

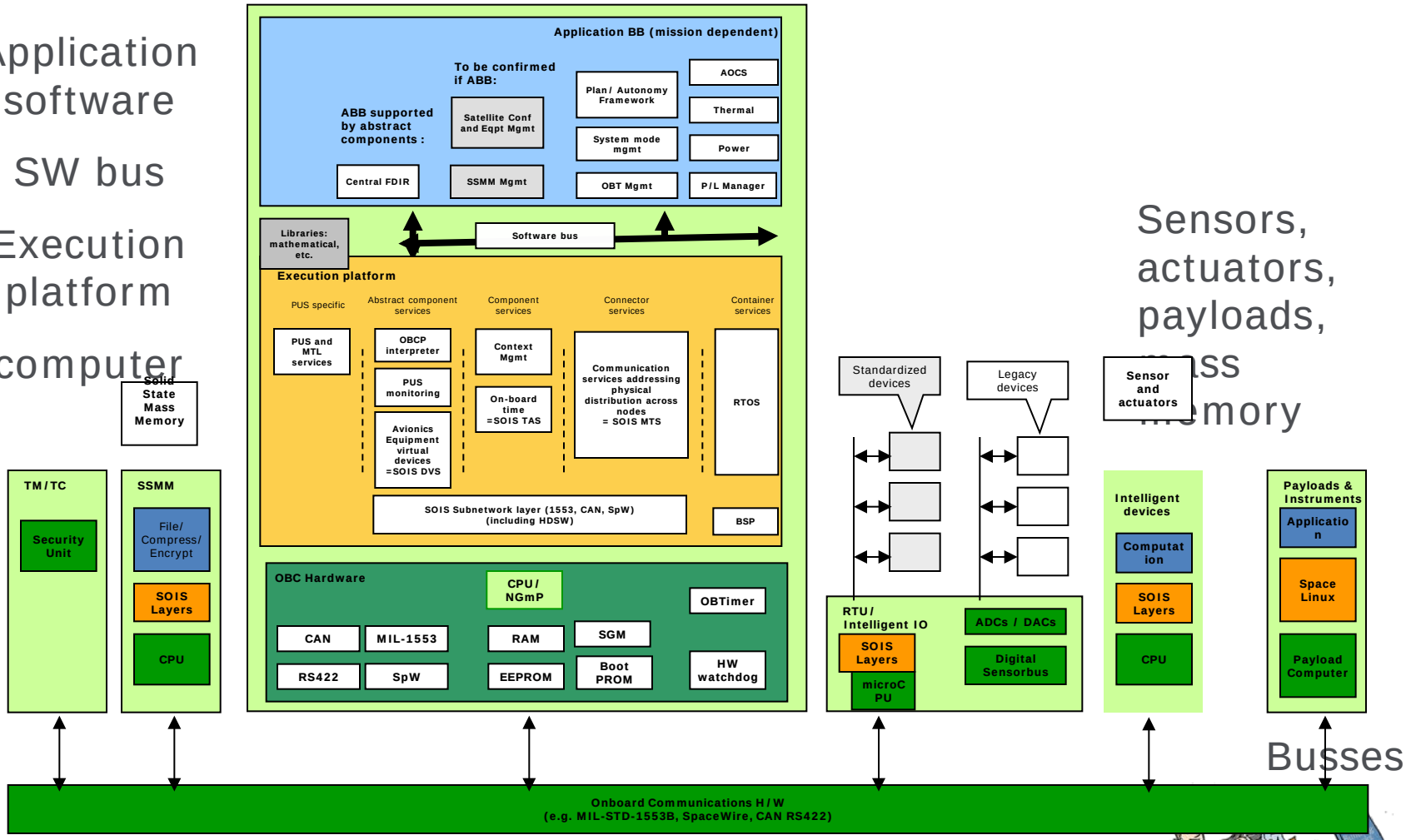
The avionics reference architecture (HW + SW)

Application software

SW bus

Execution platform

computer



Sensors, actuators, payloads, mass memory

Busses

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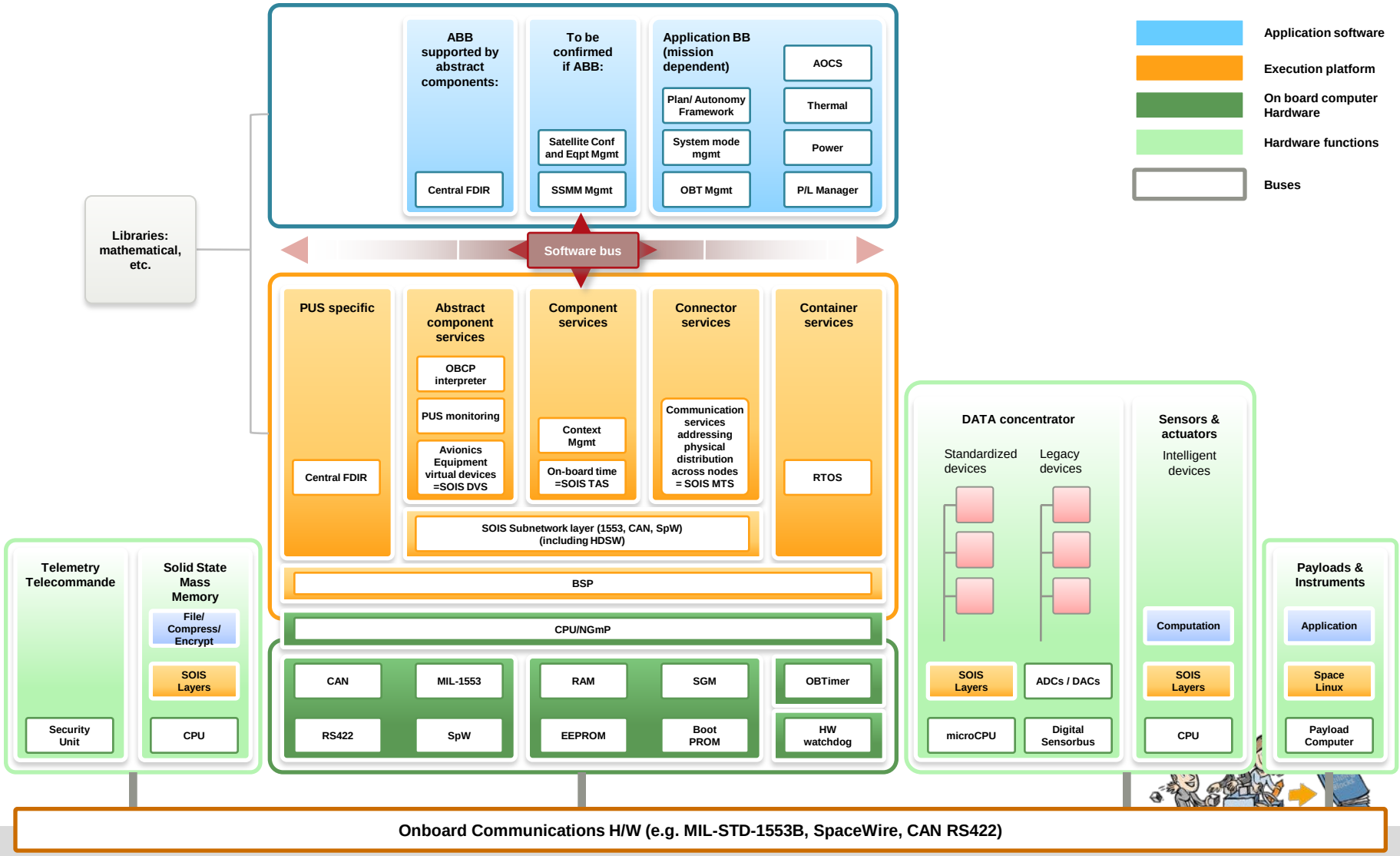
The avionics reference architecture (HW + SW)



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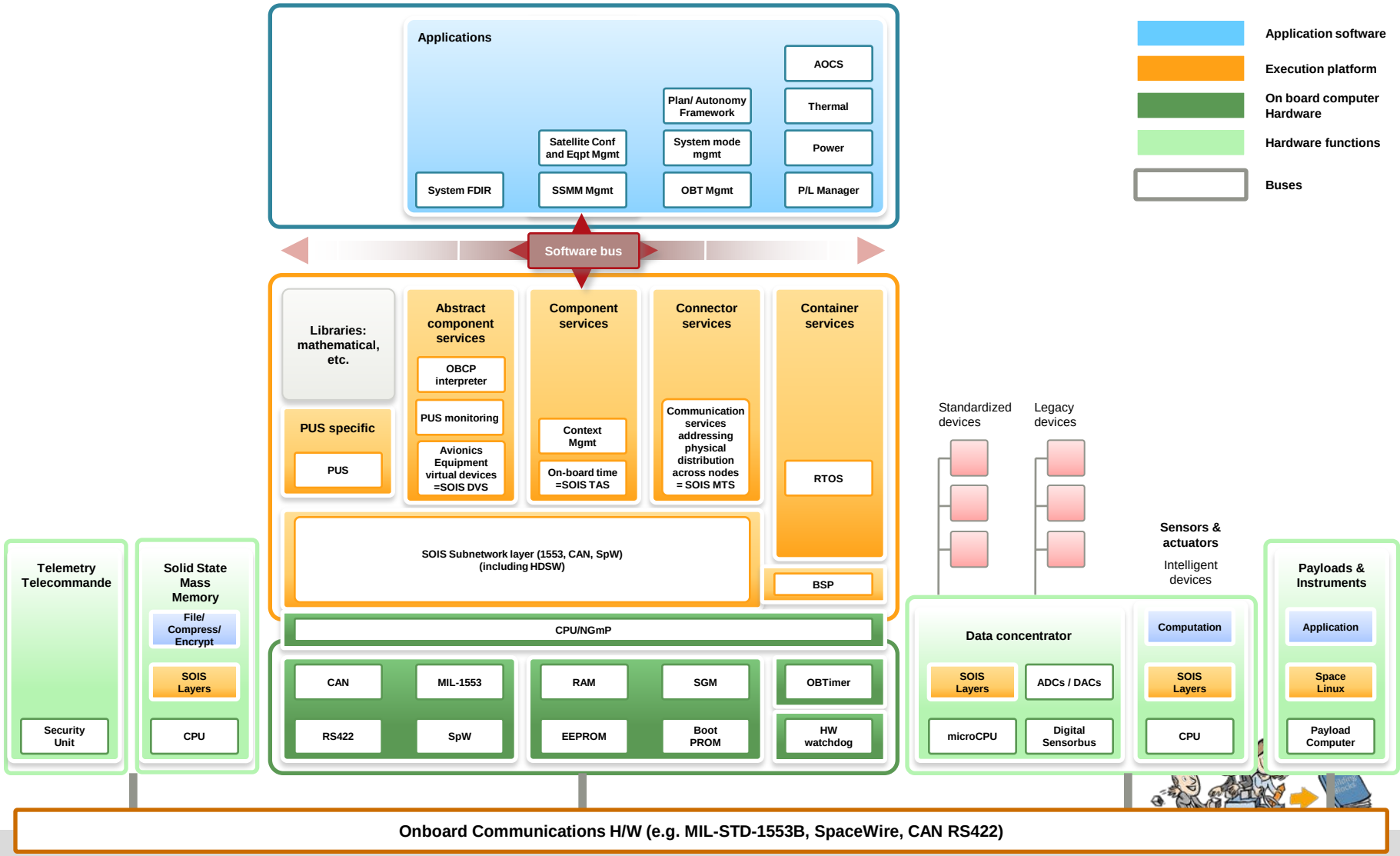

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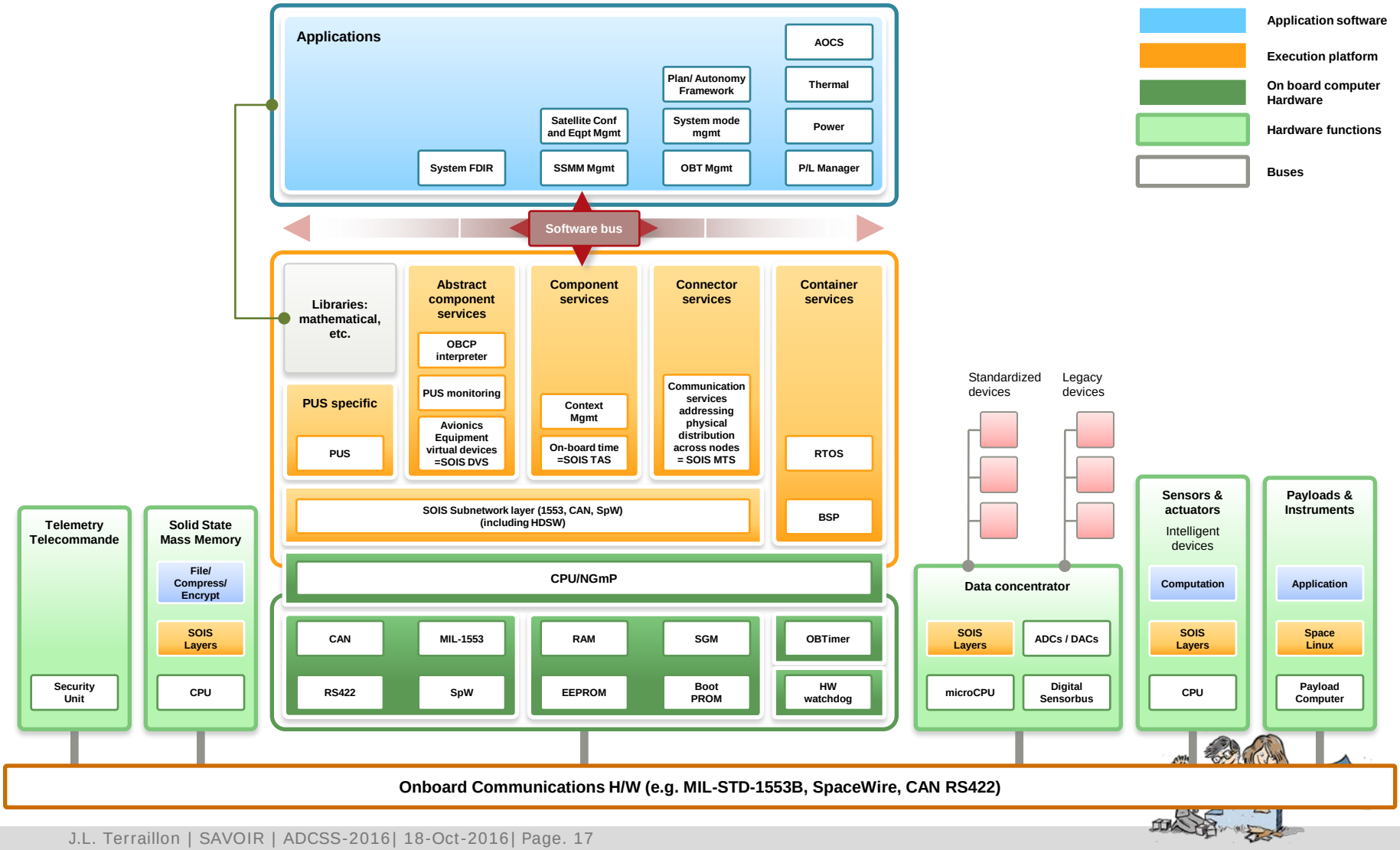

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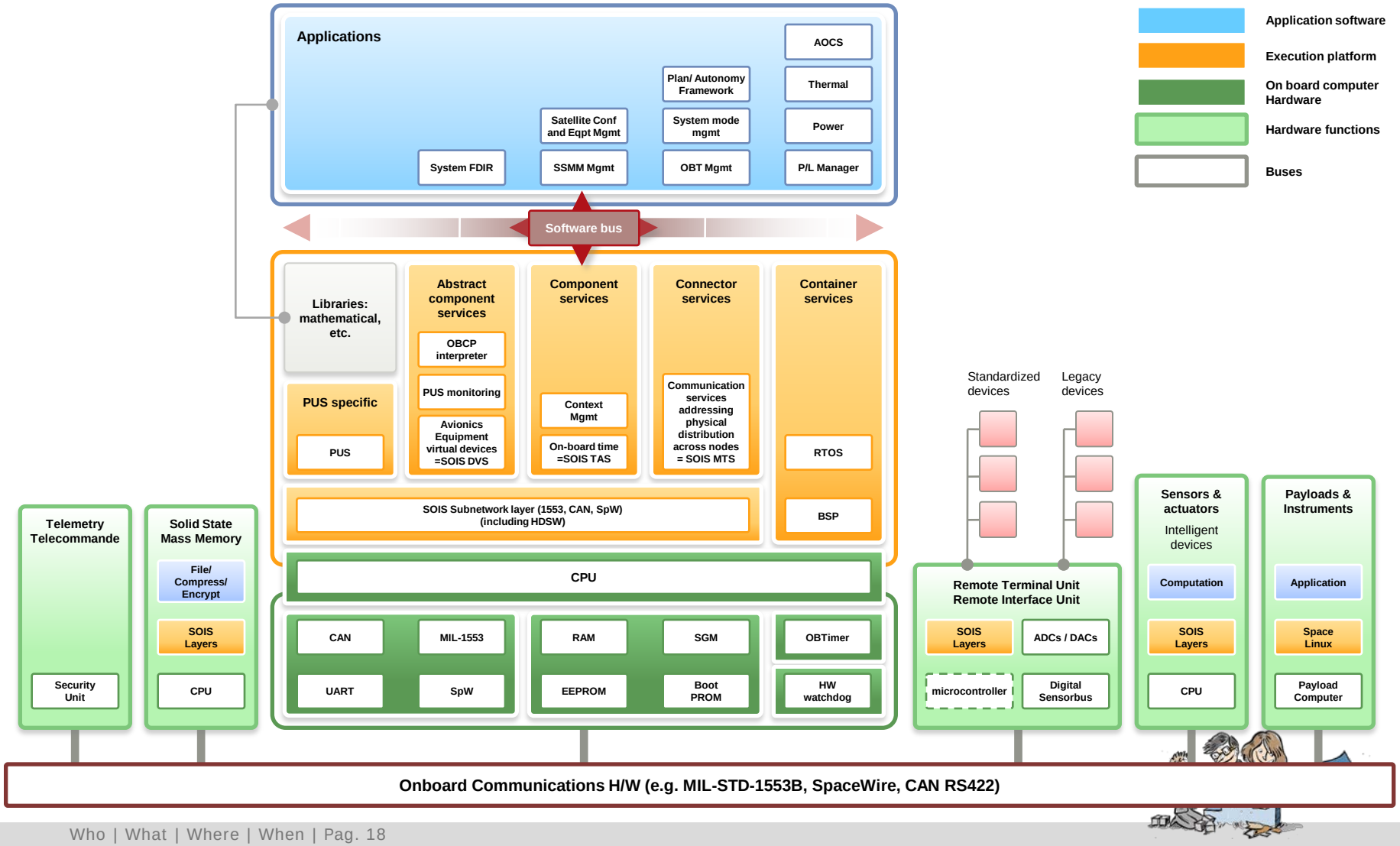

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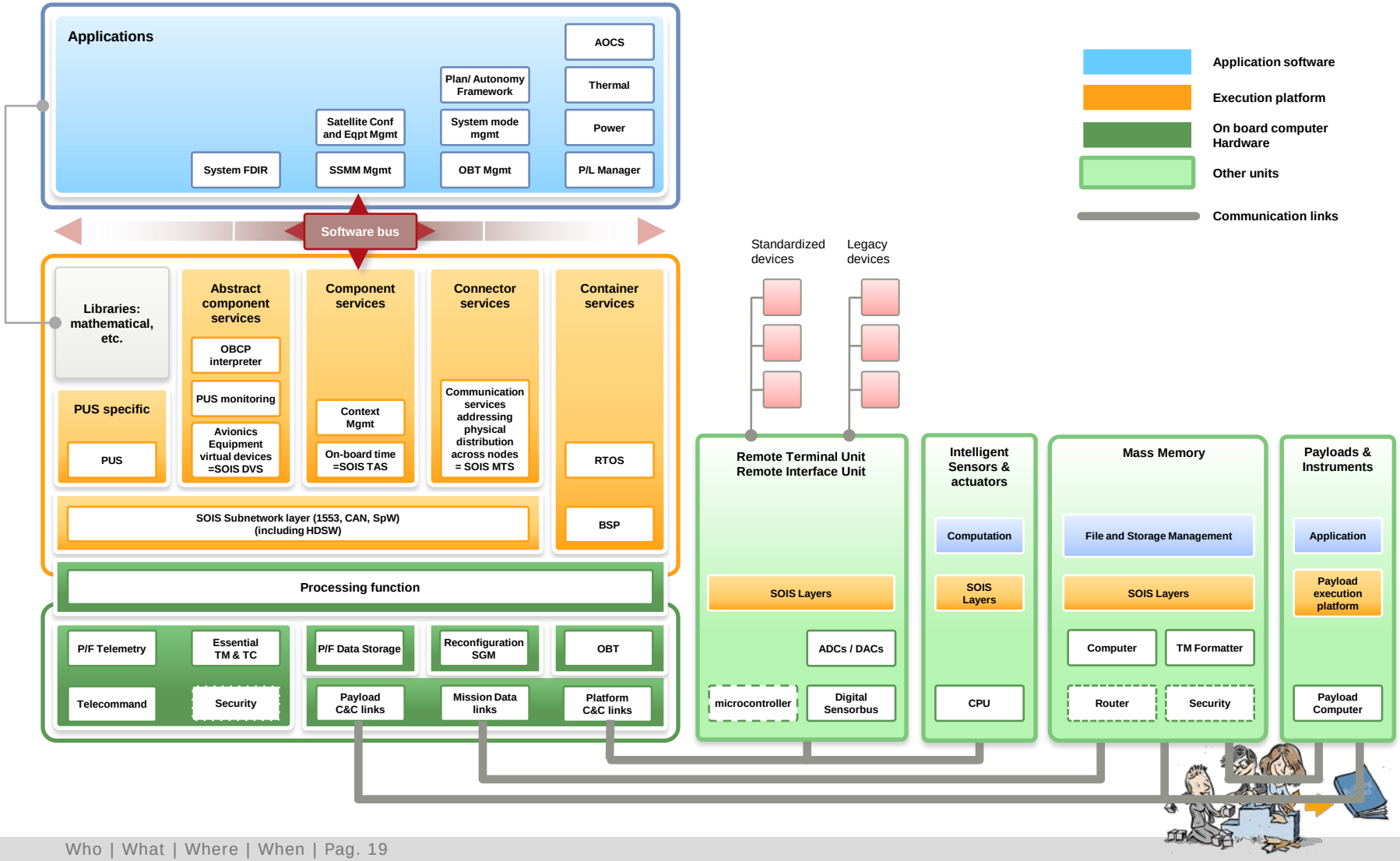

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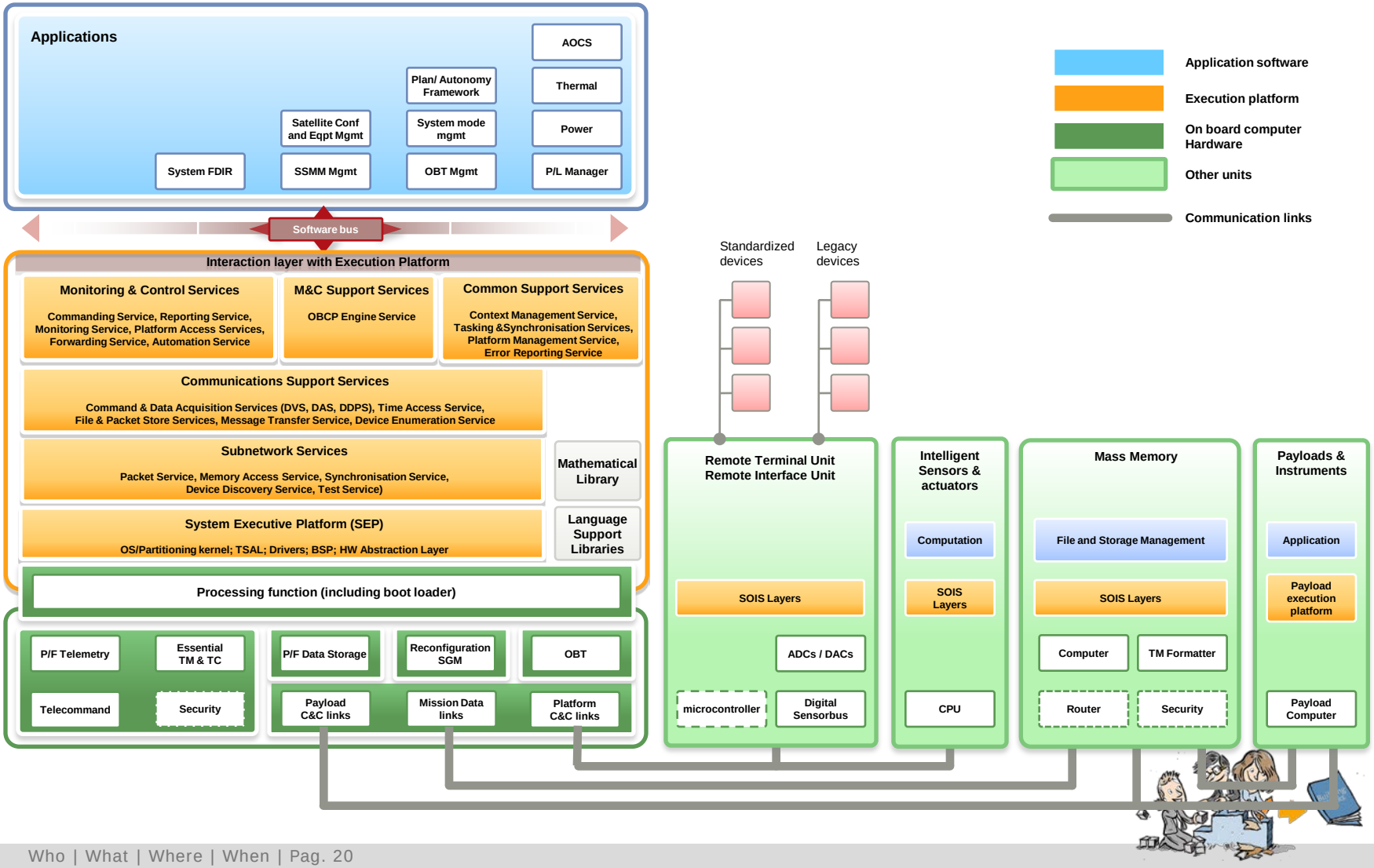

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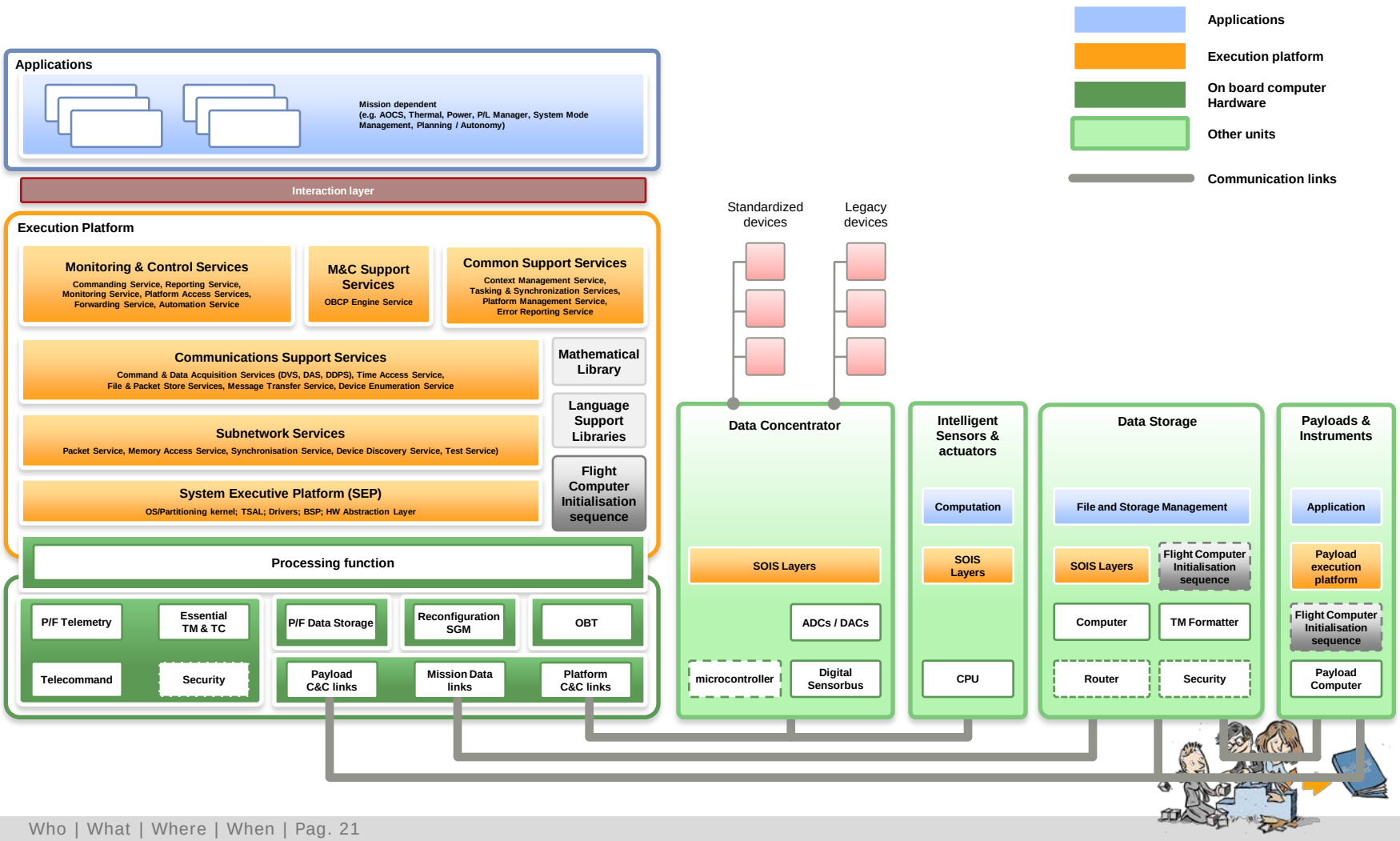

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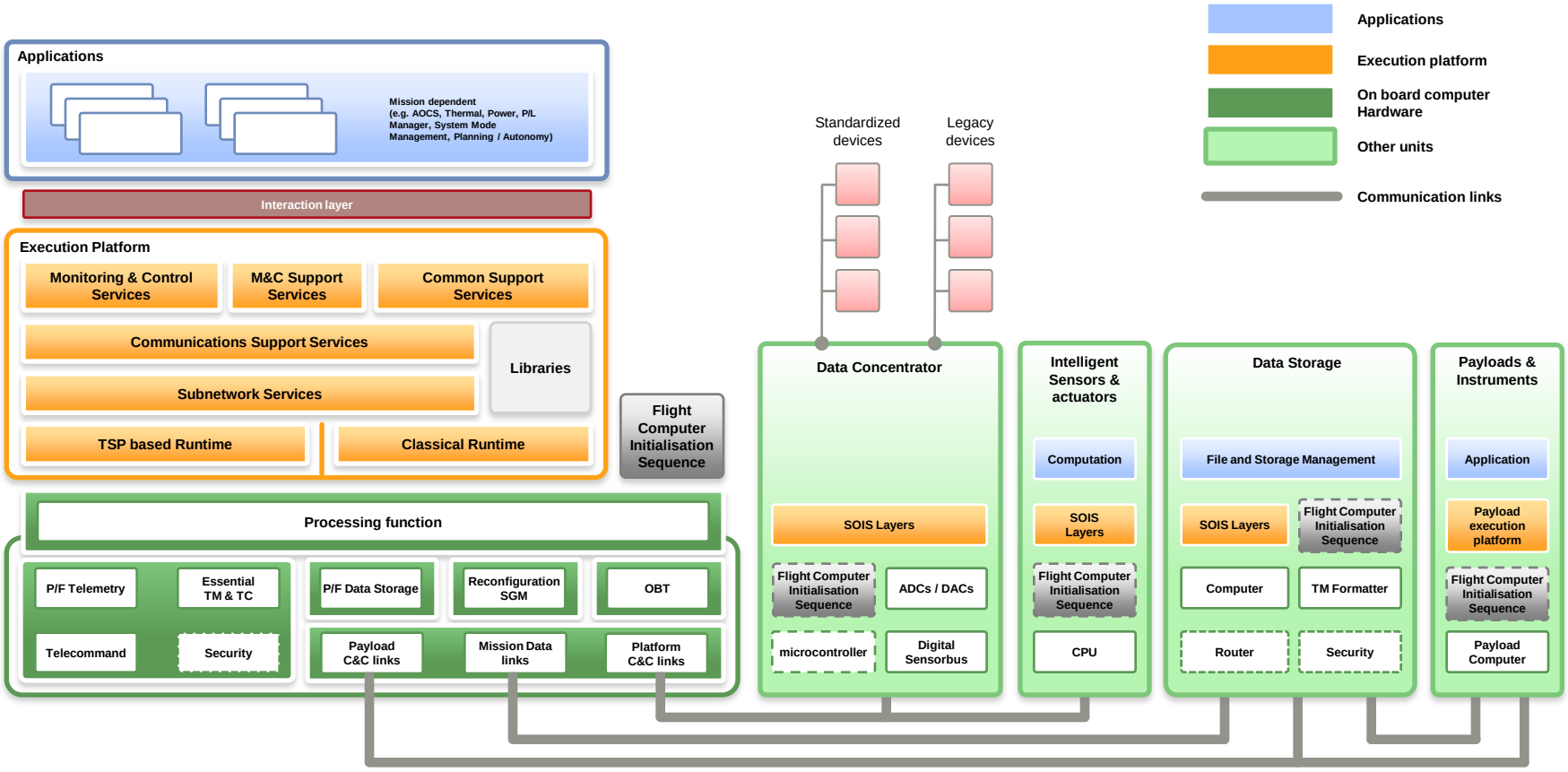

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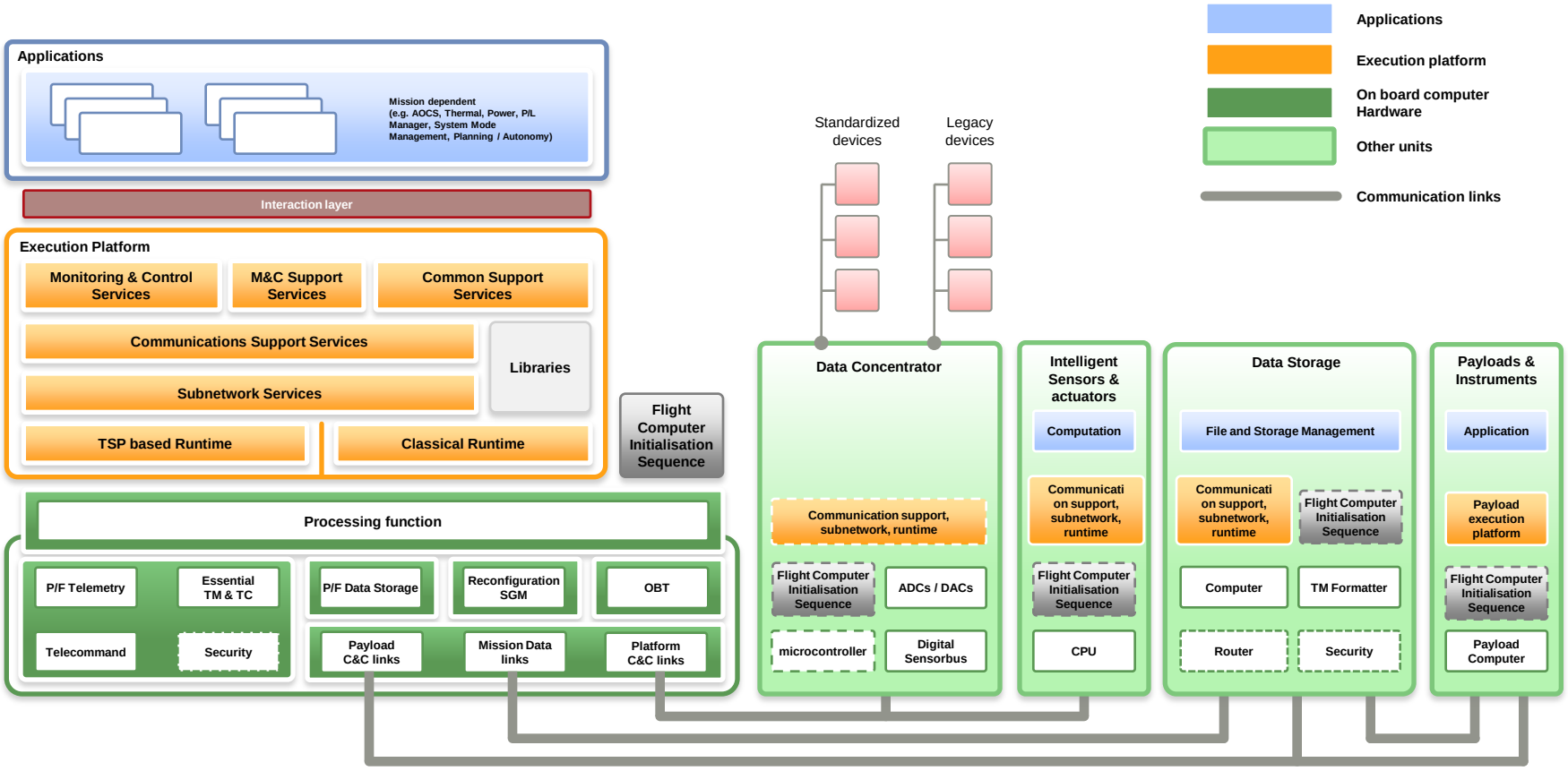

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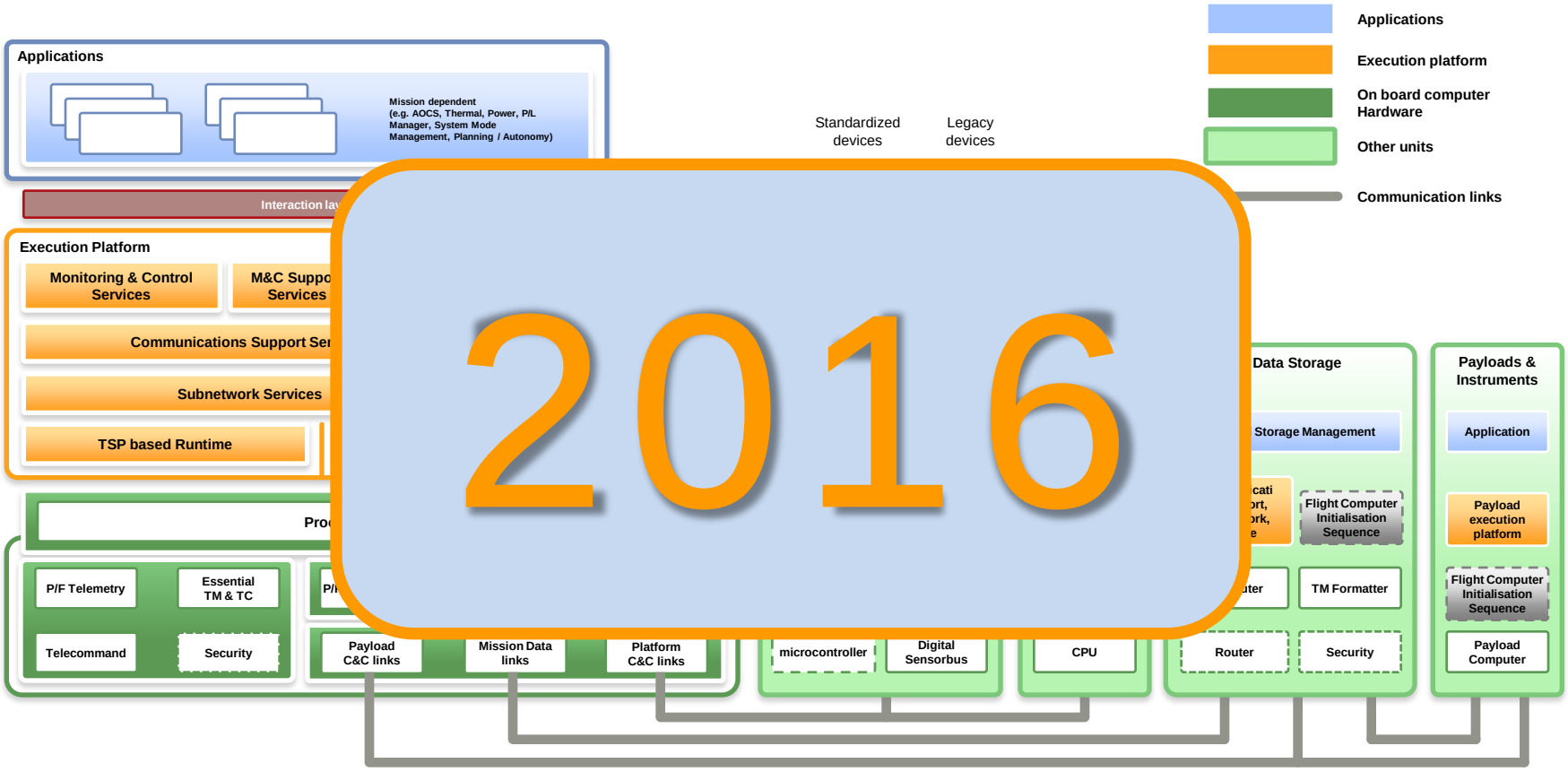

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SAVOIR Output

- **reference avionics architecture**
- **interface specifications**
- **functional specification**

Generic customer SRDs

↓

Generic System Integrator Product Spec

↓

Product Lines

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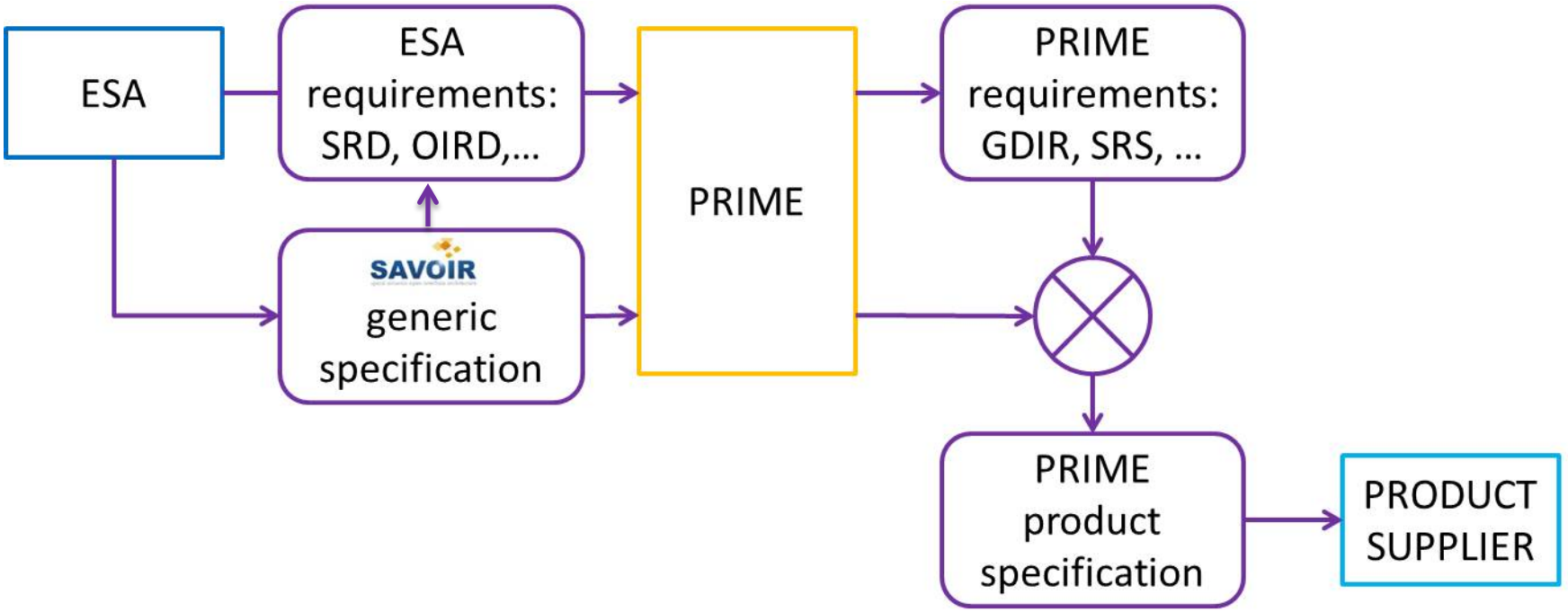
Use of SAVOIR documents



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SAVOIR Documentation (1/4)

- SAVOIR Documentation tree — SAVOIR-TN-000
- SAVOIR Functional Reference Architecture — SAVOIR-TN-001

SAVOIR ASRA
avionics system reference architecture

- SAVOIR Avionics System Reference Architecture Handbook — SAVOIR-HB-002
- SAVOIR On-Board Software Reference Architecture Training Material — SAVOIR-HB-001

SAVOIR OSRA
on-board software reference architecture

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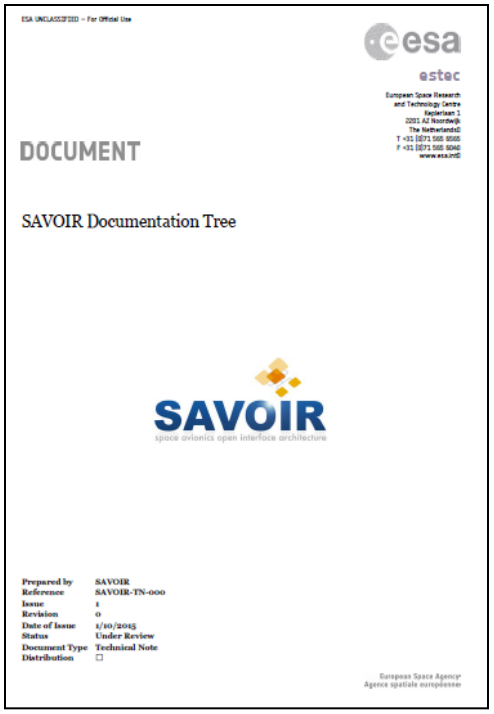
SAVOIR Documentation (2/4)

- SAVOIR Generic OBC Specification — SAVOIR-GS-001
- SAVOIR Flight Computer Initialisation Sequence Generic Specification — SAVOIR-GS-002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DOCUMENT

SAVOIR Documentation Tree

SAVOIR
space avionics open interface architecture

Prepared by	SAVOIR
Reference	SAVOIR-TN-000
Issue	1
Revision	0
Date of Issue	1/10/2015
Status	Under Review
Document Type	Technical Note
Distribution	☐

European Space Agency
Agence spatiale européenne

Working Group reports

- SAFI
- SAIF
- FAIRE
- IMA

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SAVOIR Documentation (3/4)

- SAVOIR Generic RTU Functional and Operability Specification
- SAVOIR Generic Data Storage functional, performance, (*operational)* and interface specification
- SAVOIR Space Component Model
- SAVOIR Execution Platform Functional Interface

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SAVOIR Documentation (4/4)

The list is intended to be up to date on:
http://savoir.estec.esa.int

Available documents are released on the Esa Space Software Repository
http://essr.esa.int

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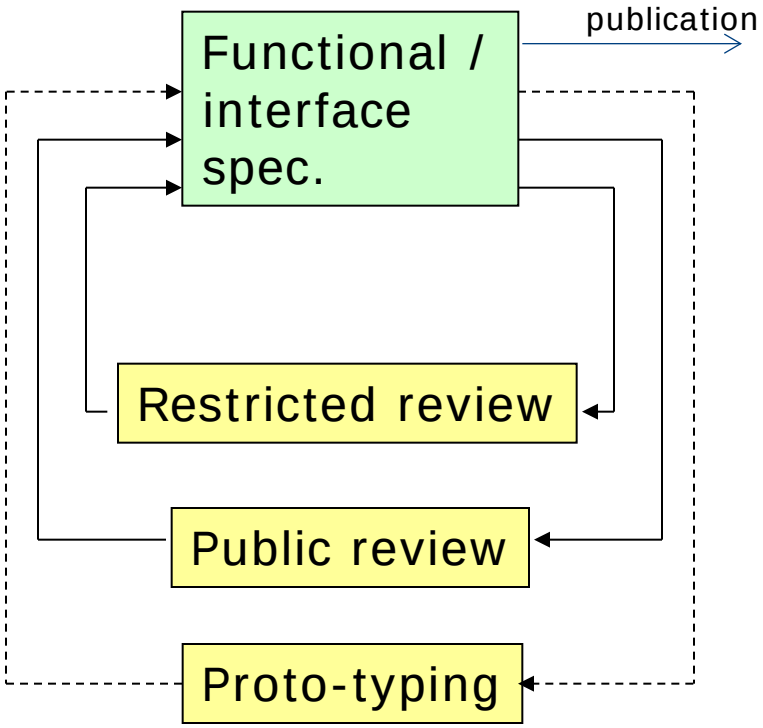
Specification production scheme.



- Obc specification ☑
- Boot software specification ☑
- Generic OIRD ☒

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SAVOIR working groups

SAVOIRFAIRE — Software reference architecture

SAVOIRIMA — Time and Space Partitioning

SAVOIRSAIF — Sensor/Actuator Electrical interface **Finalised**

SAVOIRSAFI — Sensor/Actuator Functional Interface **Finalised**

SAVOIRMASAIS — MAss Storage Access Interfaces and Services

SAVOIRUNION — Functional links

SAVOIRFDIR — Fault Detection, Isolation, Recovery **New**

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TODAY

- Produce the Data Storage FMS generic specification 10:50
- Produce the Avionics Network generic specification 11:05
- Produce the Generic OIRD 11:20
- Publish the ASRA handbook 11:40
- Start the FDIR handbook and working group 12:00
- Produce the Electronic Data Sheet roadmap:
  from the SOIS concept to the prime industrial needs,
  through the Savoir-Safi experience 12:20
- Finalize the RTU generic specification
  and go for Public review 12:40

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SAVOIR-NEXT

Next year

- Finalize the software documents (OSRA: generic specification of an “execution platform” , component model approach), and go for Public review

- Tailored application, from platform to payload, of the
  (i) OBC spec to ICU and
  (ii) OSRA architecture to OSRA-P

  ➔ payload reference architecture?

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Conclusion (1/2)

Key Performance Indicators:

- Request to have Savoir transferred in CCSDS
- Assiduity to the SAG meetings
- High audience in dissemination events such as ADCSS
- Increasing maturity of Savoir documents
- ECSS and CCSDS are influenced by SAVOIR

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Conclusion (2/2)

<u>Deployment in projects</u>

- Applicability as “Normative Documents”, something between requiring “Applicable Document” and only informative “Reference Document”.
- Unformal application in Euclid
- More formal application in ESA instrument FLEX, and PLATO

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Conclusion (2/2)

Challenge

Harmonizing the way the Esa ITT are done up to the lowest procurements

➔ generic SRD

“**life style**”

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Contact

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http://savoir.estec.esa.int

http://essr.esa.int

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- Jacques Busseuil – ThalesAleniaSpace
- Bernard Bruenjes- OHB
- Carsten Jørgensen – Terma
- Torbjörn Hult – RUAG
- Franco Boldrini – Selex Galileo

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