


SIFSUP: Execution Platform Specifcation

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Overview

- Methodology
- Industrial roles
- Process needs
- Technical needs
- Execution Platform architecture
- Illustrative supply chain
- OSRA process updates
- Next steps

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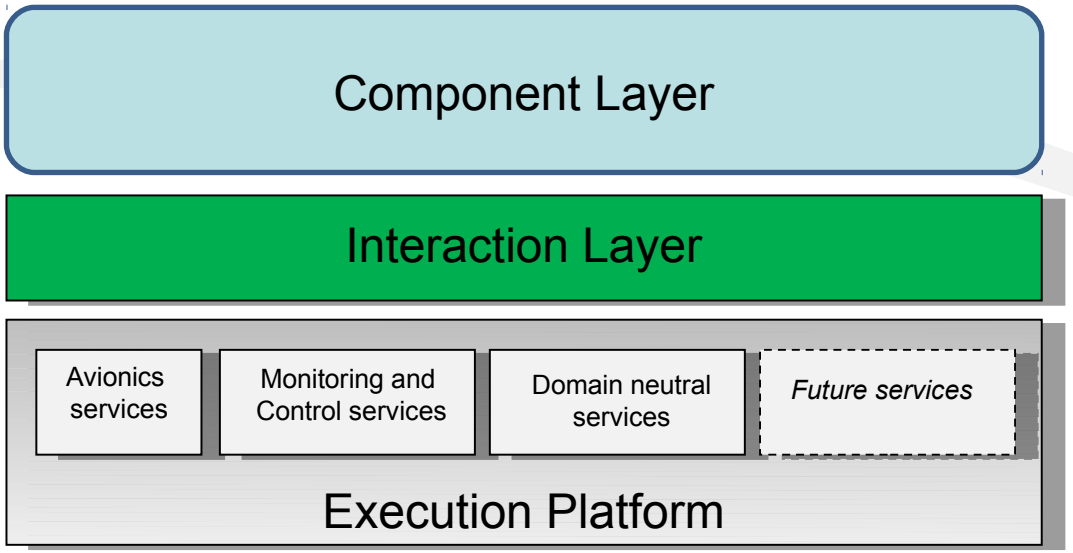
OSRA Execution Platform

- OSRA specification defines an Execution Platform
- Relatively large, monolithic Execution Platform
- Top-down definition
- “Top” interface specified
  - As service primitives



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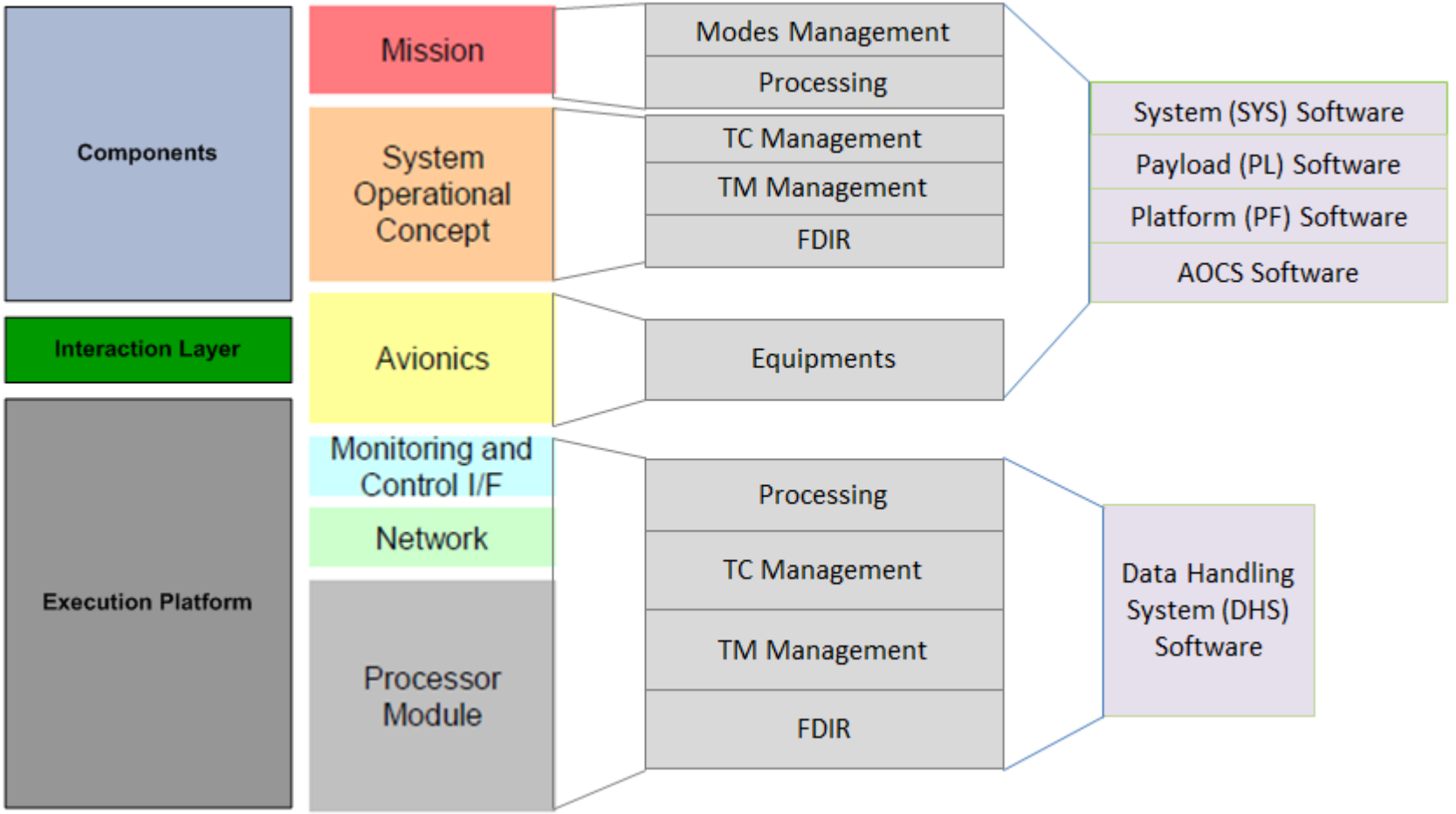
Execution Platform Scope



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Methodology

- Identify requirements on Execution Platform composition
- Determine necessary interfaces
  - Utilising existing standards where possible
- Identify impact on OSRA process

- Inputs:
  - Industrial roles from survey
  - Process needs from survey
  - Technical needs from technical activities and SIFSUP members
- Outputs:
  - Execution Platform composition and interfaces
  - Updates to OSRA process

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Industrial Roles

- Low-level platform supplier
  - Including board support package
- Operating system supplier
  - Including build toolchain support
- Hypervisor supplier
  - For time and space partitioned systems
- I/O library supplier (e.g. CCSDS SOIS)
- Monitoring and Control (M&C) library supplier (e.g. ECSS PUS)
- Onboard Control Procedure (OBCP) library supplier
- Execution Platform supplier
- Design and code generation tooling supplier
- Application software provider
- Complete onboard software supplier

Process Needs

- Identify aspects which may influence development process

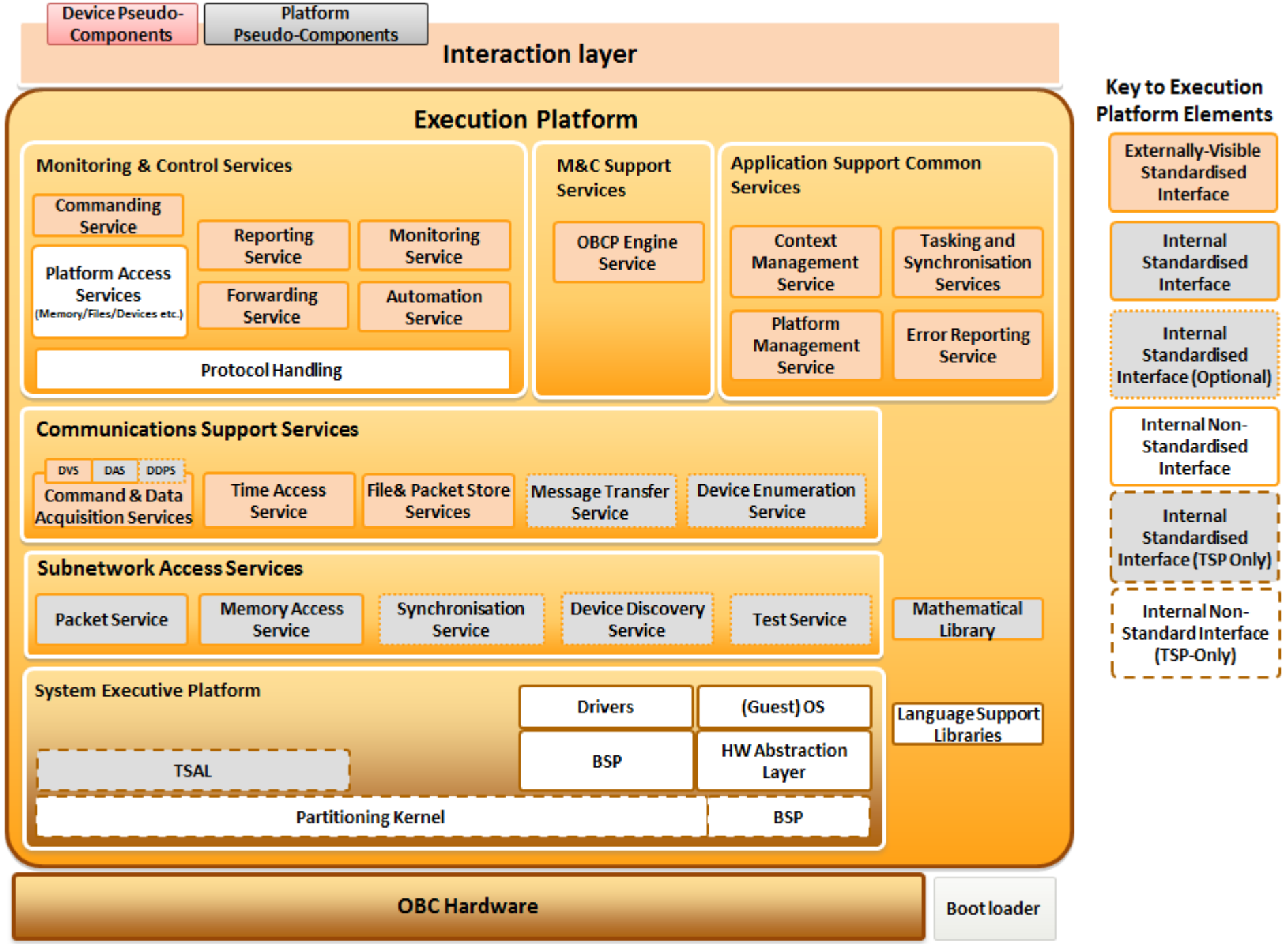
- The potential for building blocks
  - Reuse of software
- Potential for reuse of validation effort
- Independence of suppliers
  - Potential for a market
- Ease of subcontracting
- Support industrial policy
  - e.g. Geographical return

Technical Needs

- Initial focus of SAVOIR-FAIRE work was non-partitioned systems
  - Limited consideration for partitioning in COrDeT-2
  - SISTORA aimed at harmonisation
  - Some more detailed consideration in COrDeT-3
- Non-partitioned systems have relatively few needs on the composition of the Execution Platform
  - Definition of interface to Interaction Layer is sufficient
- Partitioned systems have more technical needs
  - Execution Platform in a partition needs to be tailored to meet partition needs
  - Elements of tailoring suggest suitable divisions for decomposition

Technical Needs for TSP

- Typical partition types
  - Onboard I/O partition
  - Space/ground I/O partition
  - Platform partition
  - Payload partition
  - System partition
- Useful to be able to separate
  - M&C
  - Protocol handling
  - Onboard I/O
  - Platform abstraction (platform management, context management)
  - OS abstraction (e.g. tasking and concurrency support)


Device Pseudo-Components
Platform Pseudo-Components
Interaction layer
Execution Platform
Monitoring & Control Services
Commanding Service
Reporting Service
Monitoring Service
Platform Access Services (Memory/Files/Devices etc.)
Forwarding Service
Automation Service
Protocol Handling
M&C Support Services
OBCP Engine Service
Application Support Common Services
Context Management Service
Tasking and Synchronisation Services
Platform Management Service
Error Reporting Service
Communications Support Services
DVS
DAS
DDPS
Command & Data Acquisition Services
Time Access Service
File& Packet Store Services
Message Transfer Service
Device Enumeration Service
Subnetwork Access Services
Packet Service
Memory Access Service
Synchronisation Service
Device Discovery Service
Test Service
Mathematical Library
System Executive Platform
Drivers
(Guest) OS
TSAL
BSP
HW Abstraction Layer
Partitioning Kernel
BSP
Language Support Libraries
OBC Hardware
Boot loader
Key to Execution Platform Elements
Externally-Visible Standardised Interface
Internal Standardised Interface
Internal Standardised Interface (Optional)
Internal Non-Standardised Interface
Internal Standardised Interface (TSP Only)
Internal Non-Standard Interface (TSP-Only)

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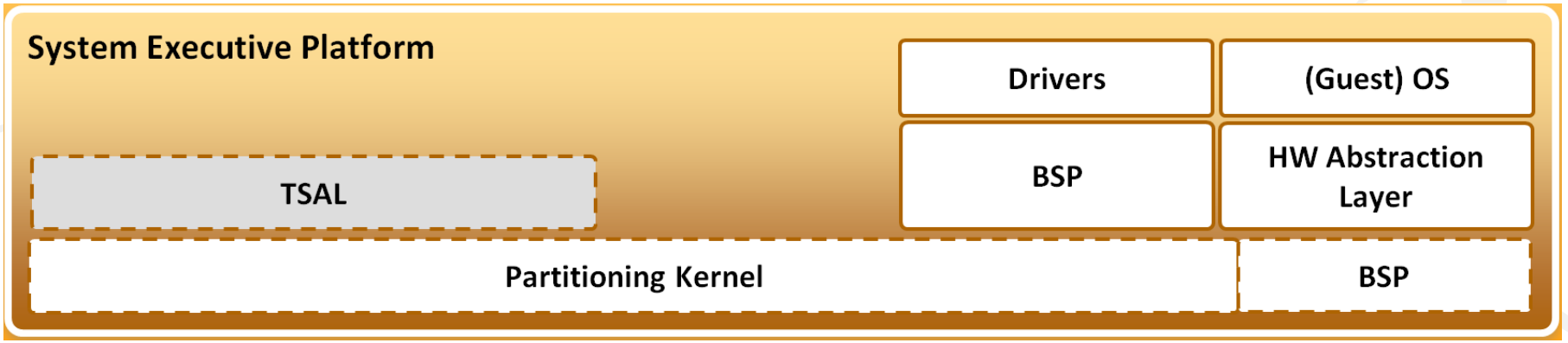
Building Blocks

- Hypervisor (TSP-only)
- OS/Guest-OS (TSP-only)
- System Executive Platform
- Low-level platform
- Avionics library
- M&C library
- OBCP engine
- Execution Platform
- Tooling

Low-Level Platform

- Several key building blocks
- Only standard interface is TSP Abstraction Layer (TSAL)
- Other interfaces may be de-facto standardised
  - e.g. API for a given OS



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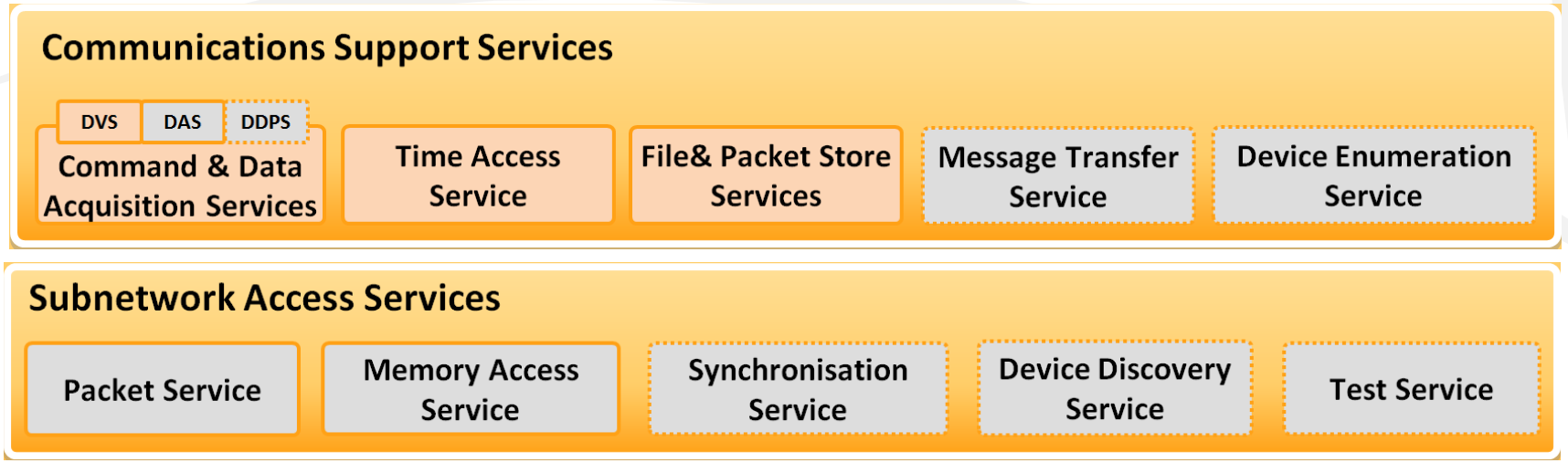
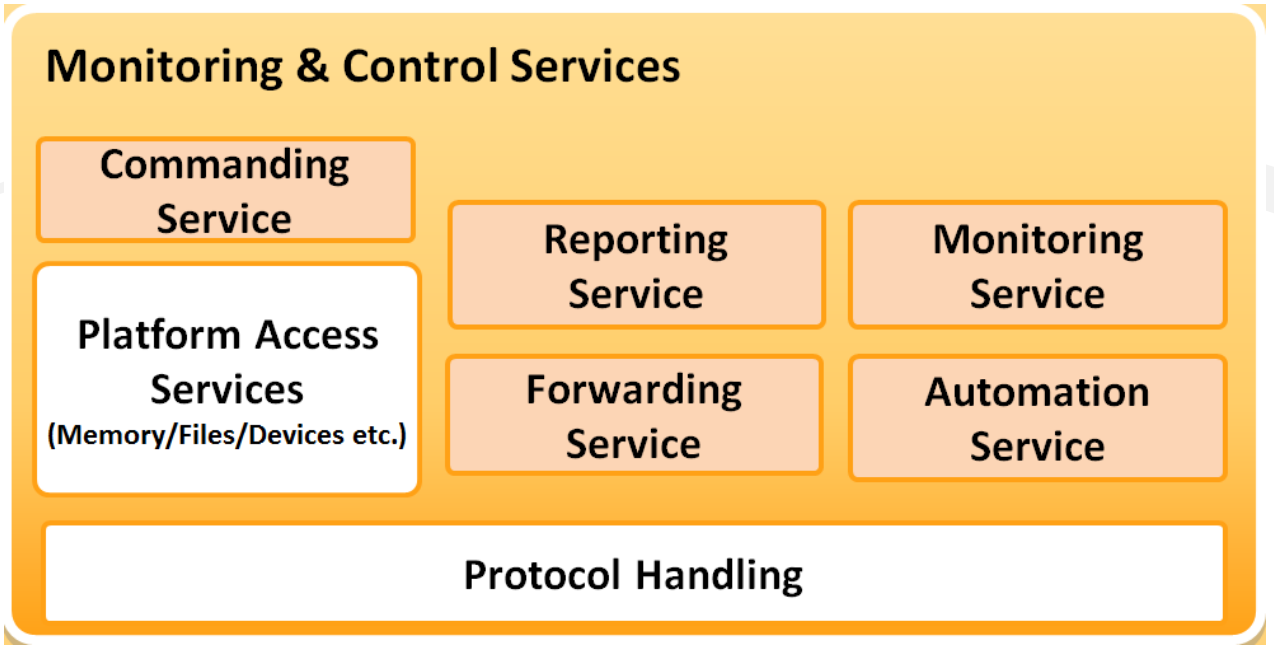
Avionics Library

- Interface standardisation based on SOIS
- Key services exposed externally to Execution Platform
  - DVS, TAS, FPSS
- Other services expected to be used internally
  - DDPS, DAS, MTS, DES
  - PS, MAS, SYS, DDS, TS
- EDS support useful (expected for OSRA support)



M&C Library

- Abstract M&C library
- Could be any M&C standard
  - Including PUS and MOS
- External interface from OSRA
- Internal interfaces currently undefined



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OBCP Engine

- Onboard Control Procedure Engine
  - Or any form of interpreter/virtual machine which provides execution control
- Engine interface conforms to ECSS-E-ST-70-01C
  - “Provided interface”
- Interface to M&C services currently undefined
  - “Required interface”

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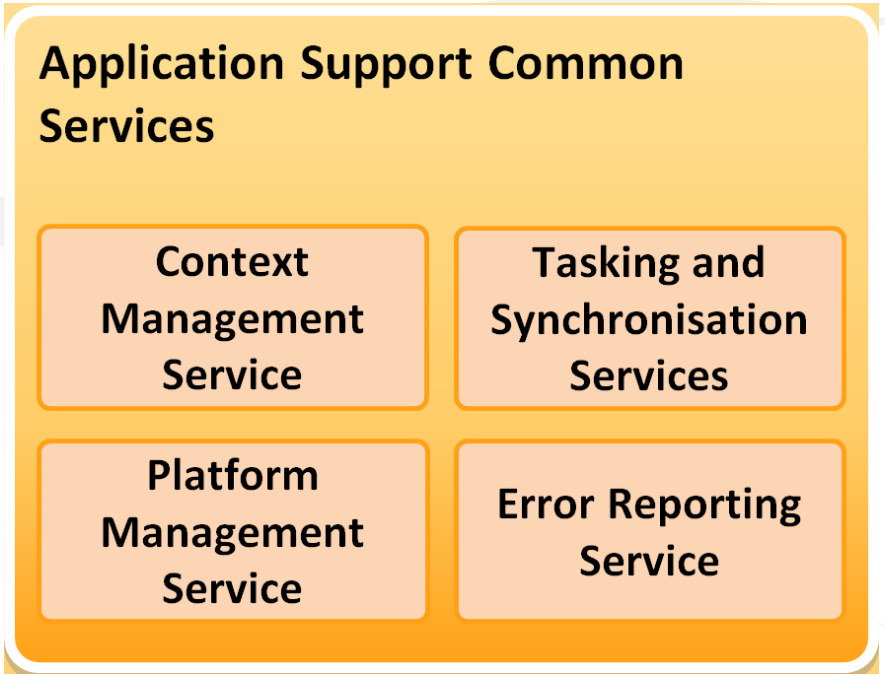
Execution Platform Services

- Tasking and concurrency services
  - i.e. OS abstraction
- Error reporting
  - Compatible with health monitoring for TSP
- Platform management
  - platform restart
  - partition management
- Context management
  - Management of context “chunks”
  - Compatible with component context



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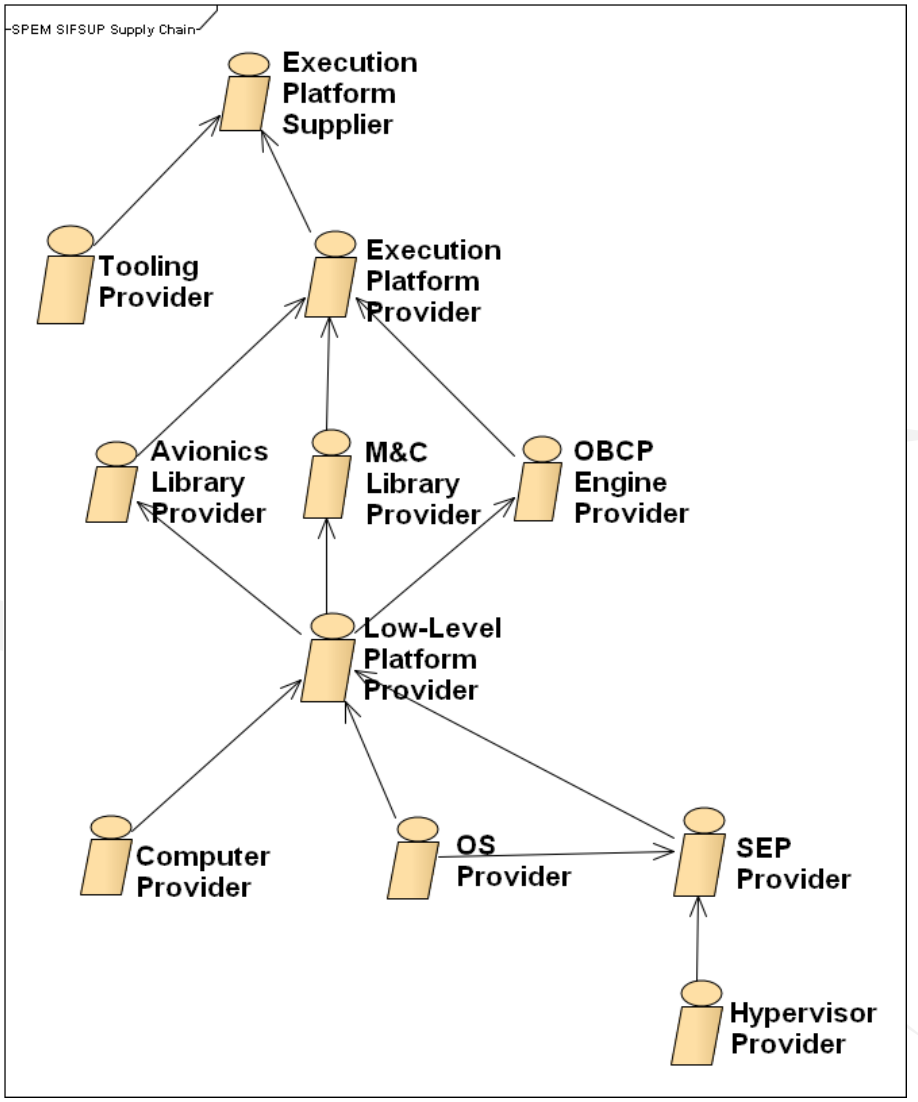
Roles and Supply Chain

- Building blocks can each be supplied
  - But do not have to be
  - Still feasible to have single provider for Execution Platform
  - Or create in house
- OSRA process can be extended to reflect possible supply chain
- Has no/little impact on development process
- Use and supply of tooling not yet fully represented



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Next Steps

- Refine interface definitions
  - Determine gaps
  - Add to roadmap
- Refine process
- Document harmonised architecture and process
- Document harmonised terminology
- Consult with SAVOIR-FAIRE/-IMA Working Groups
- Incorporate suggestions/refinements
- Merge into existing documents?
  - e.g. OSRA Specification

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