SIFSUP: Results of the Industrial Survey

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Overview

- Introduction to SIFSUP
- Aims of the Industry Survey
- Survey approach
- Summary of responses
- Response themes
- Next steps

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Objectives and Approach

- SIFSUP
  - SAVOIR-IMA and SAVOIR-FAIRE Support Activity

- Define a harmonised Onboard Software Reference Architecture (OSRA)
- Key inputs
  - SAVOIR-FAIRE OSRA (as defined by COrDeT-x activities and others)
  - SAVOIR-IMA Architecture (as defined by IMA-SP activity)
- Decompose the "Execution Platform"
  - Support technical and industrial objectives
- Create a set of harmonised documents
  - Including architecture, terminology, interfaces

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Organisation
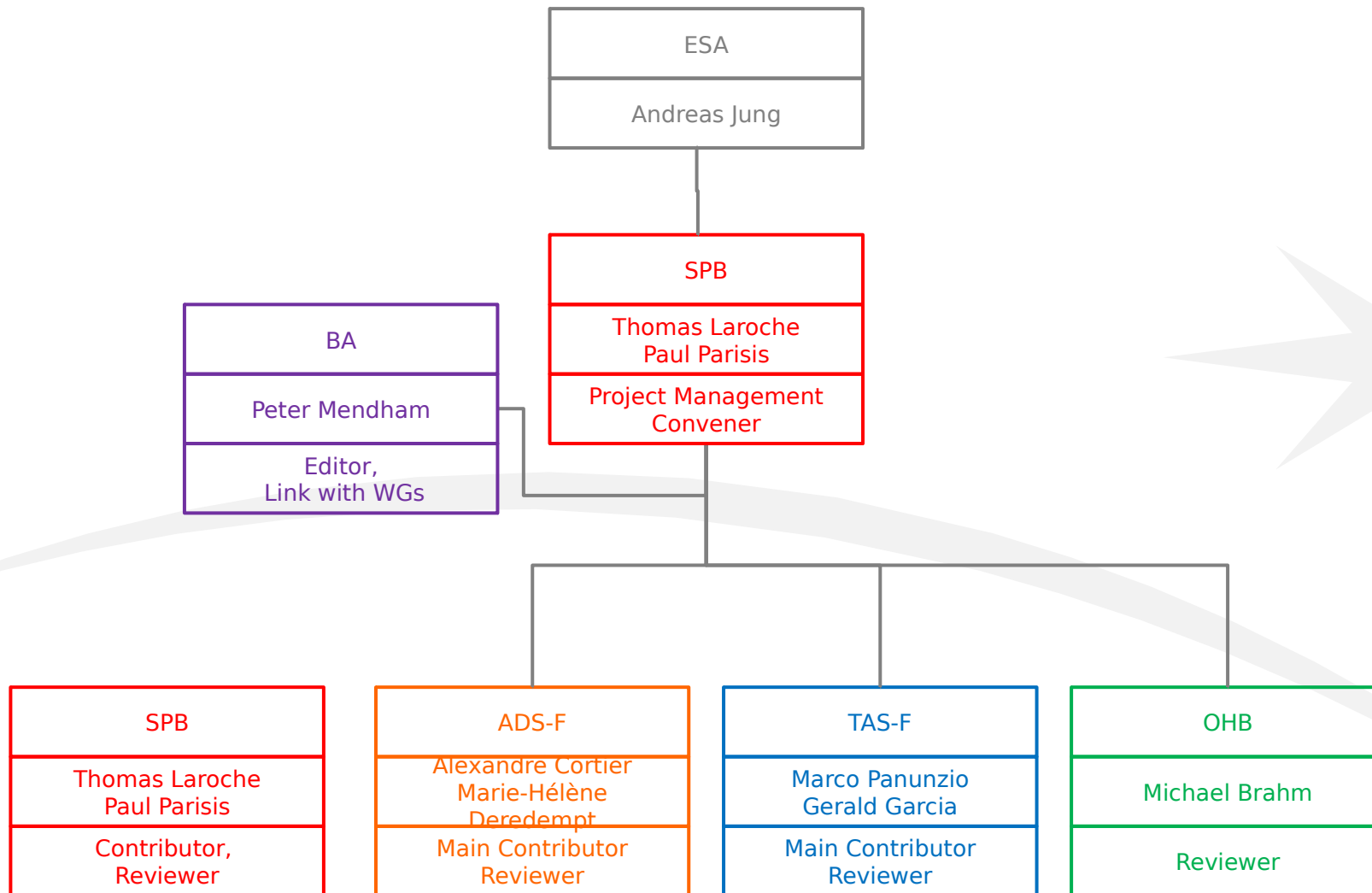
Starting Point

- The aims of SAVOIR-FAIRE and SAVOIR-IMA include
    - Lowering of development costs through reuse
    - Increase in software flexibility
    - Positioning of software later in development

- This **can only** be realised if the OSRA matches the commercial reality
    - Otherwise the OSRA will fail in practice

- This affects
    - Roles
    - Processes
    - The technical solutions in the OSRA

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Industry Survey

- Industrial survey of SAVOIR-FAIRE/-IMA members (thanks to respondents!)
  - Framed as a questionnaire
- Covered the following topics
  - Aims and objectives of the OSRA
  - Reference architecture elements
  - Tools
  - Roles and processes
  - Products and services
  - Role of SIFSUP
  - Roadmap and release
- Health Warning: Results here are **heavily summarised**
- Results varied considerably
  - Strongly in line with expectations to against expectations
  - Some key areas of dispute between respondents

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Aims of the OSRA

- Assess industry view of OSRA
  - What it is
  - What it could/should be

- Determine views of potential OSRA
  - Advantages
  - Disadvantages

- Responses – expected aims of the OSRA
  - **Harmonisation** of component-/model-based software engineering and time and space partitioning ESA activities
  - **Methodological, architectural and (partly) technological reference** for the development of on-board software in Europe
  - Define elements of software architecture in order to identify and define **interoperable building blocks**
  - Identify standard **Execution Platform services and interfaces**

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OSRA Advantages

- Responses...

- Improved consistency
  - Alignment, terminology, methodology
- Improved process
  - Reuse across missions e.g. in requirements
- Improved approach
  - Separation of concerns
- Improved organisations
  - Easier subcontracting and procurement
- Improved opportunities
  - Enabler for market dynamics

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Potential Pitfalls

- Responses…

- Initial overhead and inertia
  - Heavy initial overhead
  - Reluctance to change
  - Acceptance by industries
- Technical issues
  - Challenges of harmonisation
  - Damaging to innovation
  - Under-engineering (cannot accommodate mission complexity)
  - Over-engineering (too complex for some missions)
- Commercial Issues
  - Market for building blocks
  - Return on investment
  - Imbalanced funding schemes (e.g. use of GSTP)

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Technical Characteristics

- Determine expected/desired technical characteristics for harmonised OSRA

- Responses
  - Standard
  - Layered
  - Modular
  - Tailorable
  - Configurable
  - CBSE/MBSE/Separation of Concerns
  - *Include a rich/minimal Execution Platform*
  - *Supported by tooling/tooling to be avoided*

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Key Elements

- Identify key elements of the architecture
  - Interested in commercial/industrial concerns as well as technical

- Layers as identified by SAVOIR-FAIRE
  - Component Layer, Interaction Layer, Execution Platform
- Execution Platform more interesting…
  - Should contain M&C (e.g. PUS)
  - *Should/should not be tied to PUS*
  - SOIS-related services: *should/should not follow SOIS standards*
  - Abstraction layer
  - RTOS/Hypervisor/Executive
  - Additional services
    - e.g. cryptography/security, compression, logging, file system
  - Must accommodate a partitioned architecture with centralised services
  - Must be configurable

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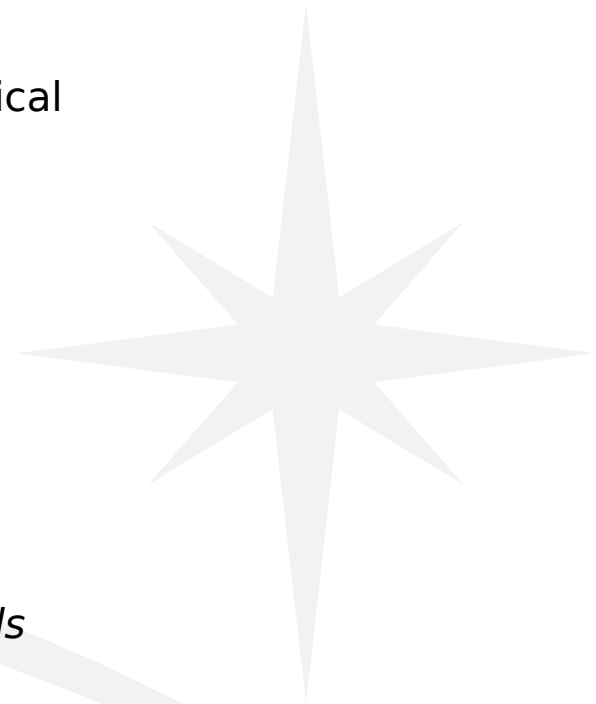
Tools

- Identify tools seen as being necessary

- Determine opinions on position of tooling to the OSRA

- Responses...
  - Wide range of tooling identified
    - Design tooling, configuration, PA support, debugging etc.
  - Availability of tools
    - *Should be commercial/in-house only/open source*
  - *Should be common or shared/should be left open*
  - *Should/should not use a domain-specific language*
  - *(Expensive) tooling should not be necessary*

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Roles

- Identify potential roles in harmonised process
  - Attempt to create harmonised process
  - Assist in standardisation and the definition of interfaces

- Responses...
  - Position of prime
    - *Should/should not always be architect/integrator*
    - *Ability to subcontract building blocks should be limited/significant*
  - *Subcontractor/supplier roles*
    - Application provider
    - Tooling provider
    - Execution Platform provider
    - Building block provider (e.g. M&C, SOIS, RTOS, Hypervisor)

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Agency Role

- Determine what role industry sees ESA playing
  - Assist in roadmap development

- Responses…
  - Standardisation (*to/not to ECSS level*)
  - Management (industry bodies and steering groups)
  - Promotion
  - *Foster a market*

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Role of SIFSUP and Roadmap

- Asked for guidance on content and direction of SIFSUP activity
  - What should SIFSUP do?
  - What should it produce?
  - What should follow SIFSUP?

- General agreement in responses
  - Work towards harmonisation
  - Standardisation (*to/not to ECSS-level*)
  - Interface definition (*service primitive level/language-specific API level*)
  - Establish governance
  - Prototyping should follow SIFSUP

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Response Themes

- Widespread agreement on aims and structures of the OSRA

- Cautious endorsement of the OSRA

- Some key areas of tension
  - Size and composition of Execution Platform
    - Large vs small
    - Monolithic vs building blocks
  - Desire for a market in building blocks
  - Role of prime contractor – potential for support of subcontracting
  - Role of tooling

- These often govern whether the respondent sees the OSRA as a threat or an opportunity

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Next Steps

- Results of industrial survey will be used to guide SIFSUP

- Expected results of activity
- Approach to harmonisation
- Decomposition of Execution Platform
- Proposed roadmap for OSRA prototyping and development

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