

SAVOIR is growing!

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



# Reusing Specification to favour product lines



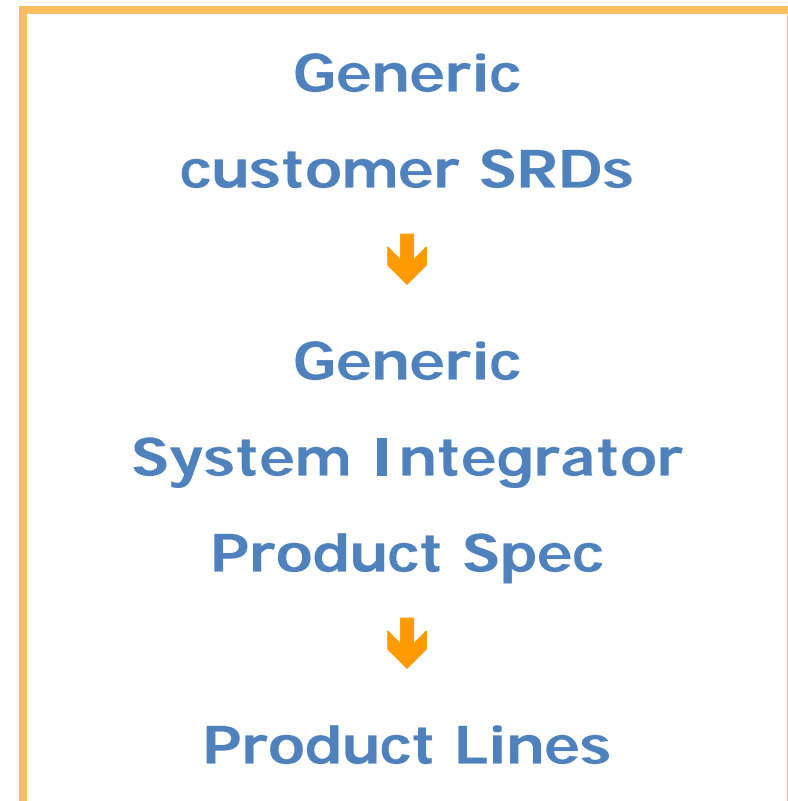
*Space*

*AVionics*

*Open*

*Interface*

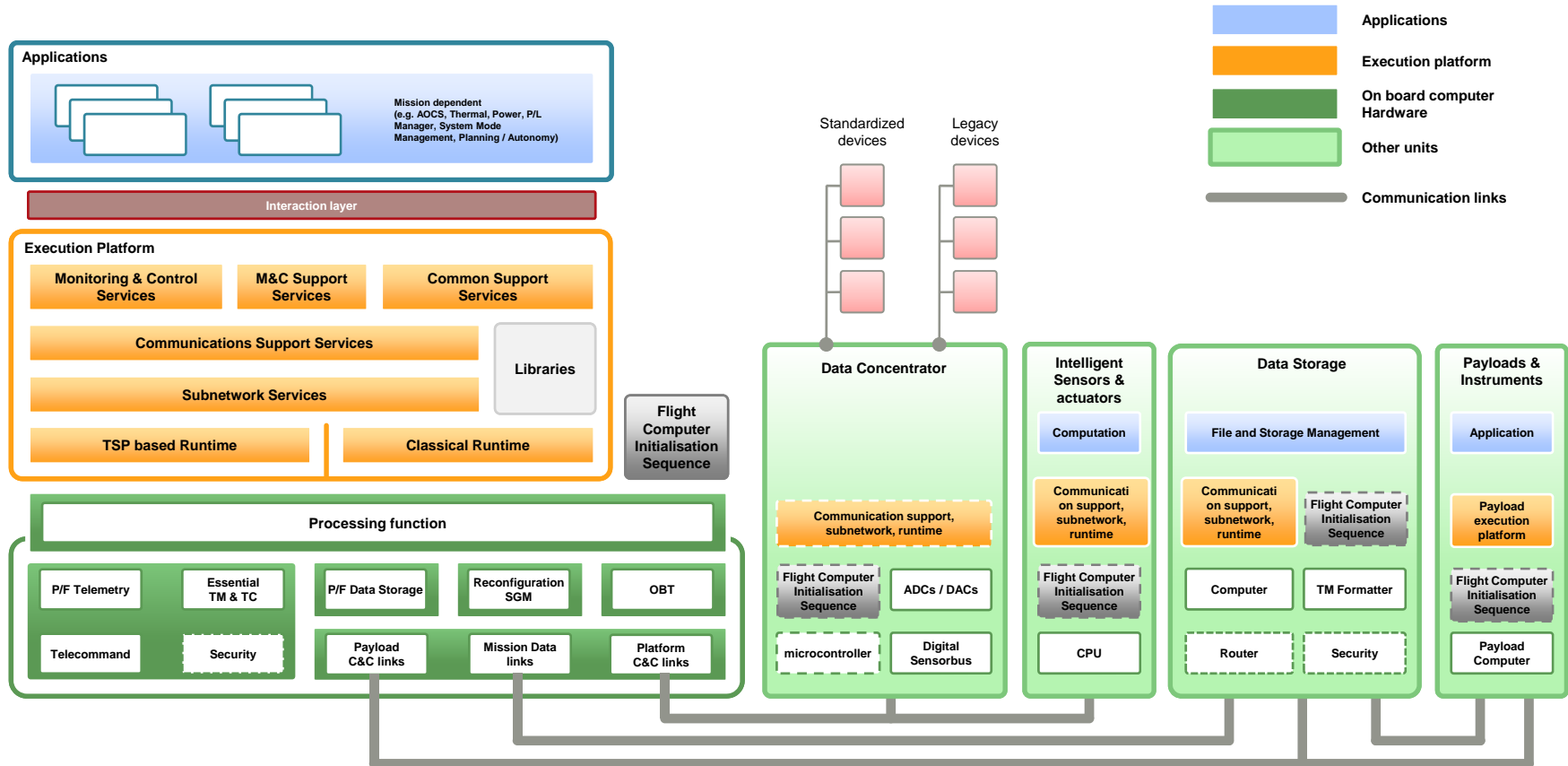
*aRchitecture.*



# SAVOIR Advisory Group: FEDERATE



# The avionics reference architecture (HW + SW)



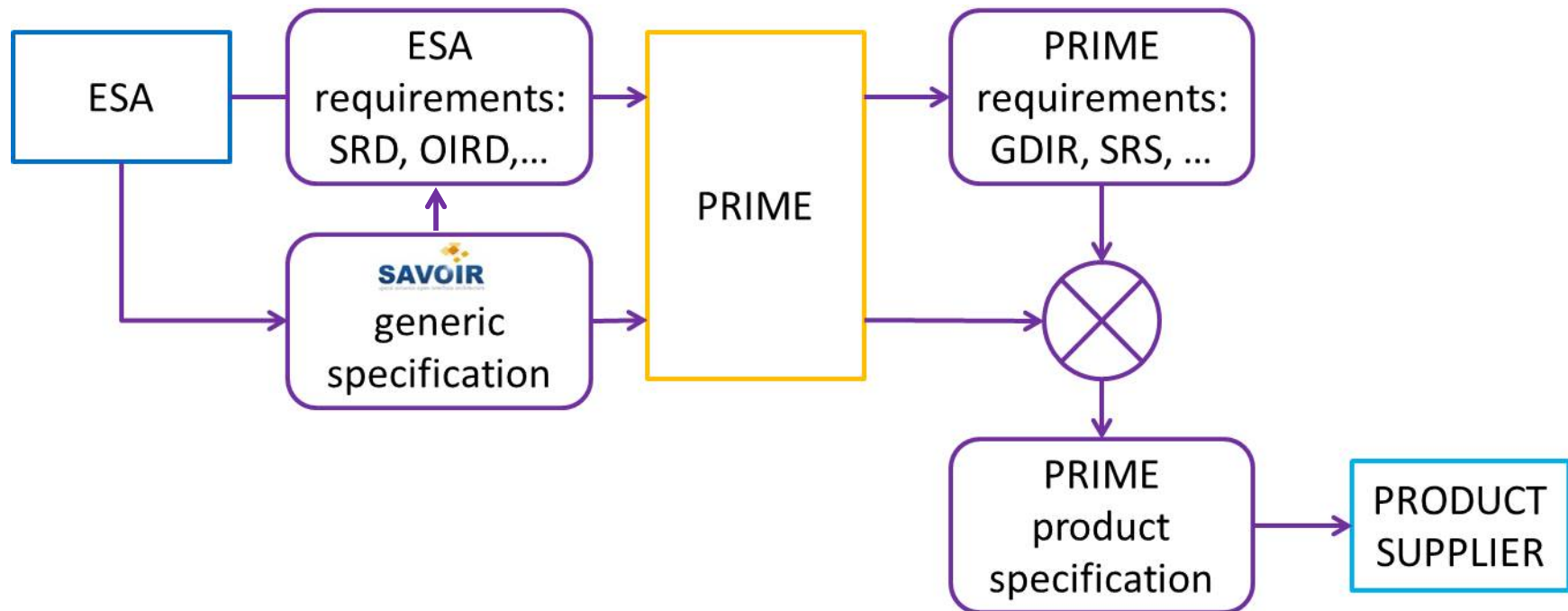
# SAVOIR Output



- **reference avionics architecture**
- **interface specifications**
  - **generally ECSS CCSDS**
- **functional specification**
  - **customer SRD**
  - **product specification**



# Use of SAVOIR documents





## Deployment in projects

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



# SAVOIR Documentation (1/4)



- SAVOIR-TN-000 SAVOIR Documentation tree
- SAVOIR-TN-001 SAVOIR Functional Reference Architecture
- SAVOIR-HB-002 SAVOIR Avionics System Reference Architecture Handbook
- *SAVOIR-TN-002 <drafting>* *SAVOIR On-Board Software Reference Architecture*
- SAVOIR-HB-001 SAVOIR On-Board Software Reference Architecture Training Material





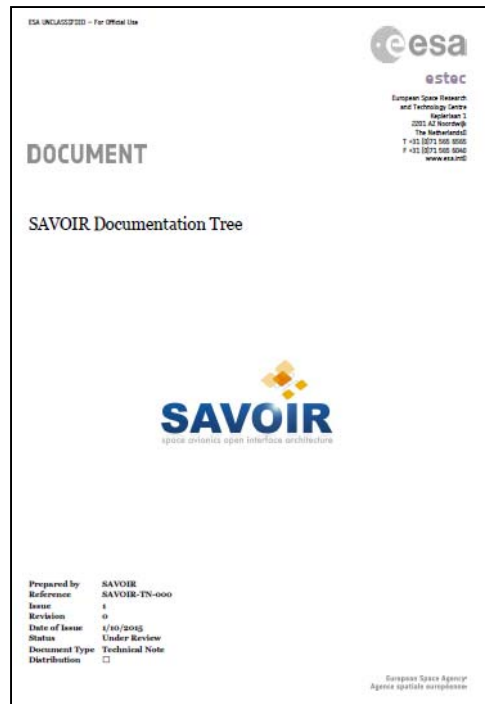
## SAVOIR Documentation (2/4)



- SAVOIR-**GS**-001 SAVOIR Generic OBC Specification
- SAVOIR-**GS**-002 SAVOIR Flight Computer Initialisation Sequence Generic Specification
- SAVOIR-**GS**-003 SAVOIR Generic RTU Functional and Operability Specification  
<review>
- SAVOIR-**GS**-004 SAVOIR Generic Data Storage functional, performance, (operational) and interface specification  
<drafting>
- SAVOIR-**GS**-005 SAVOIR Execution Platform Functional Specification  
<drafting>



# SAVOIR Documentation (3/4)



## Working Group reports

- SAFI
- SAIF
- FAIRE
- IMA



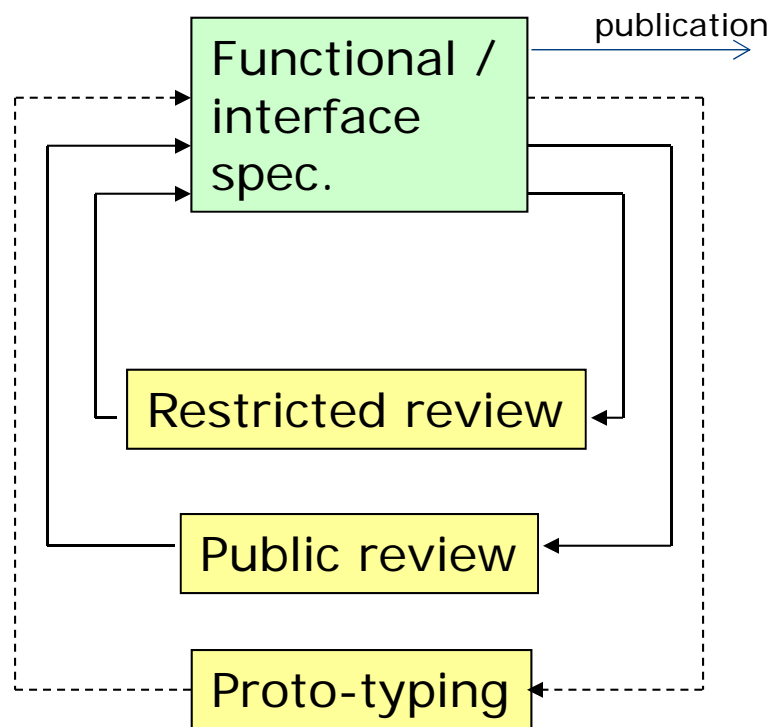


The list is intended to be up to date on:  
<http://savoir.estec.esa.int>

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



# Specification production scheme.



- Obc specification
- Boot software specification
- RTU specification
- Generic OIRD





## working groups



Software reference architecture



Time and Space Partitioning **Finalised**



Sensor/Actuator Electrical interface **Finalised**



Sensor/Actuator Functional Interface **Finalised**



MAss Storage Access Interfaces and Services



Functional links



Fault Detection, Isolation, Recovery



Automatic code generation **New**



# Competence Domain Avionics



## Avionics systems

architecture, o/b communication, o/b autonomy, fdir, operability, o/b security, o/b gnss receiver, development process, verification, validation

**TT&C E2E systems**  
space communication architecture, payload data modulator, transponder, TT&C o/b RF and antenna  
*(optical communication o/b)*

## CD03

## Data systems

data processing, data management, payload/platform computers, data storage, on-board network, microelectronics  
(hw-sw codesign)

**Control systems**  
aocs & pointing, gnc, enabling technologies, control techniques, sensors, RF and optical metrology

## Software systems

flight software, software quality, dependability



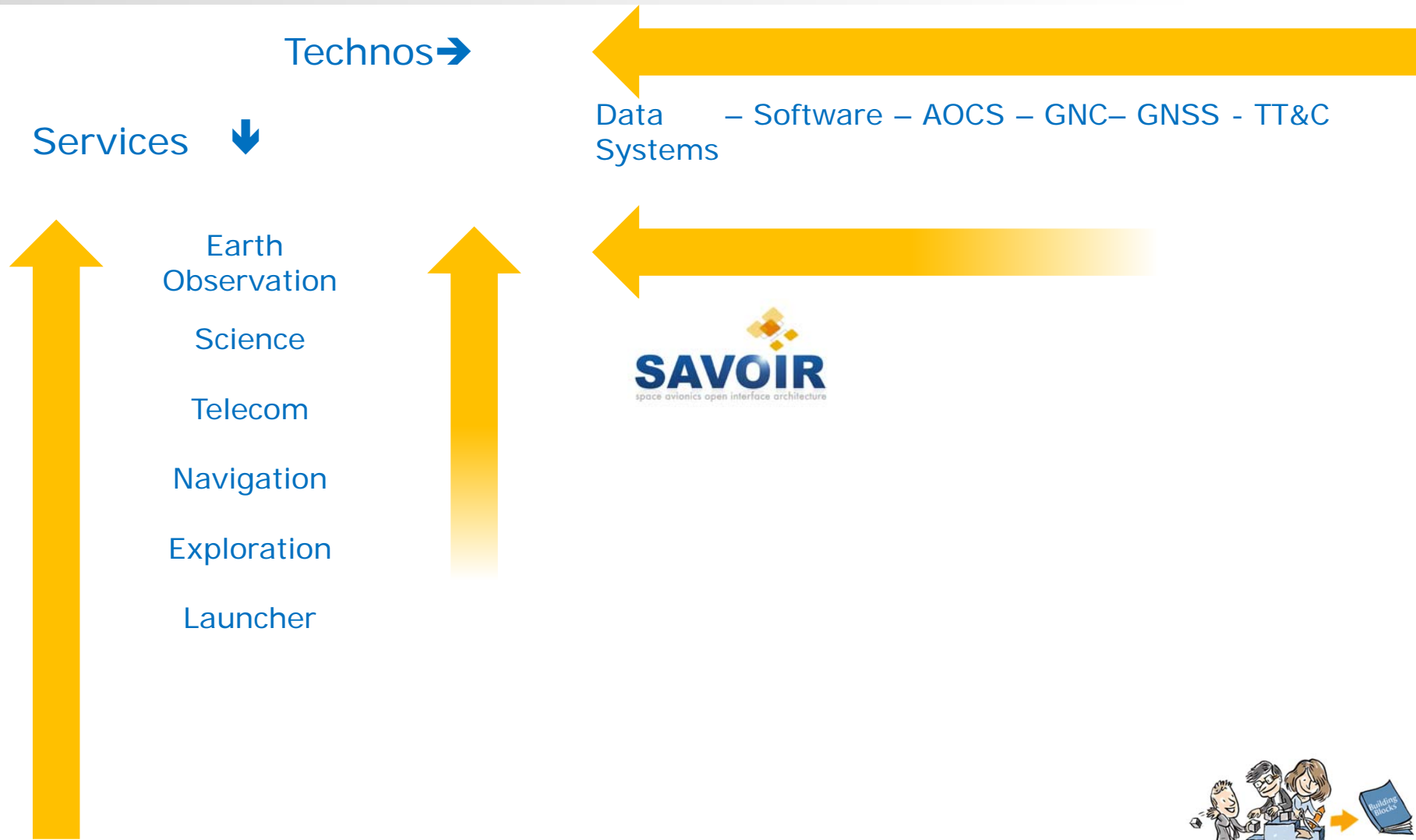
# Avionics and Harmonisation



Avionics Embedded Systems dossier: roadmap listing Avionics level cross-sectorial activities and sectorial activities with a cross-sectorial scope			On-board Radio Navigation Receivers dossier
Data Systems sectorial activities with an Avionics level scope <u>defined</u> in AES dossier	Control Systems sectorial activities with an Avionics level scope <u>defined</u> in AES dossier	On-Board Software sectorial activities with an Avionics level scope <u>defined</u> in AES dossier	TT&C (E2E) sectorial activities with an Avionics level scope <u>defined</u> in AES dossier
<p><i>Data Systems</i></p> <p><b>On-board Computers and Data Systems dossier</b></p> <p><b>Payload Data Processing Dossier</b></p> <p><b>Microelectronics Dossier</b></p> <p><b>Maybe only 1 dossier</b></p>	<p><i>Control Systems</i></p> <p><b>AOCS Sensors and Actuators dossiers</b></p> <p>Others tbc maybe not harmonized (control &amp; estimation techniques)</p> <p><b>RF &amp; Optical metrology</b></p>	<p><i>Software Systems</i></p> <p><b>On-board Software dossier</b></p>	<p><i>TT&amp;C E2E</i></p> <p><b>TT&amp;C transponders &amp; payload data transmitters</b></p> <p><b>A more complete TT&amp;C dossier with system aspects and pointers to antenna</b></p>

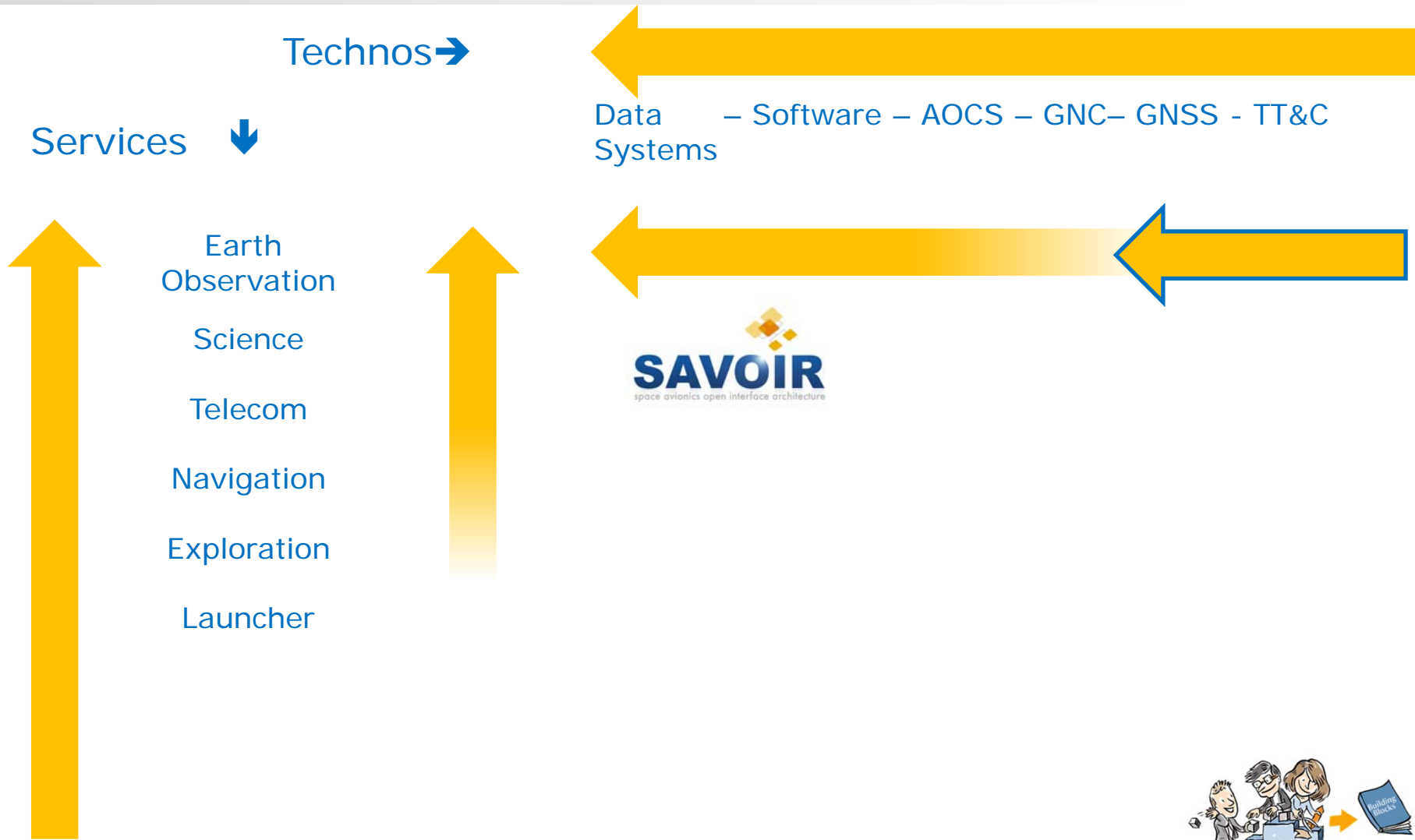


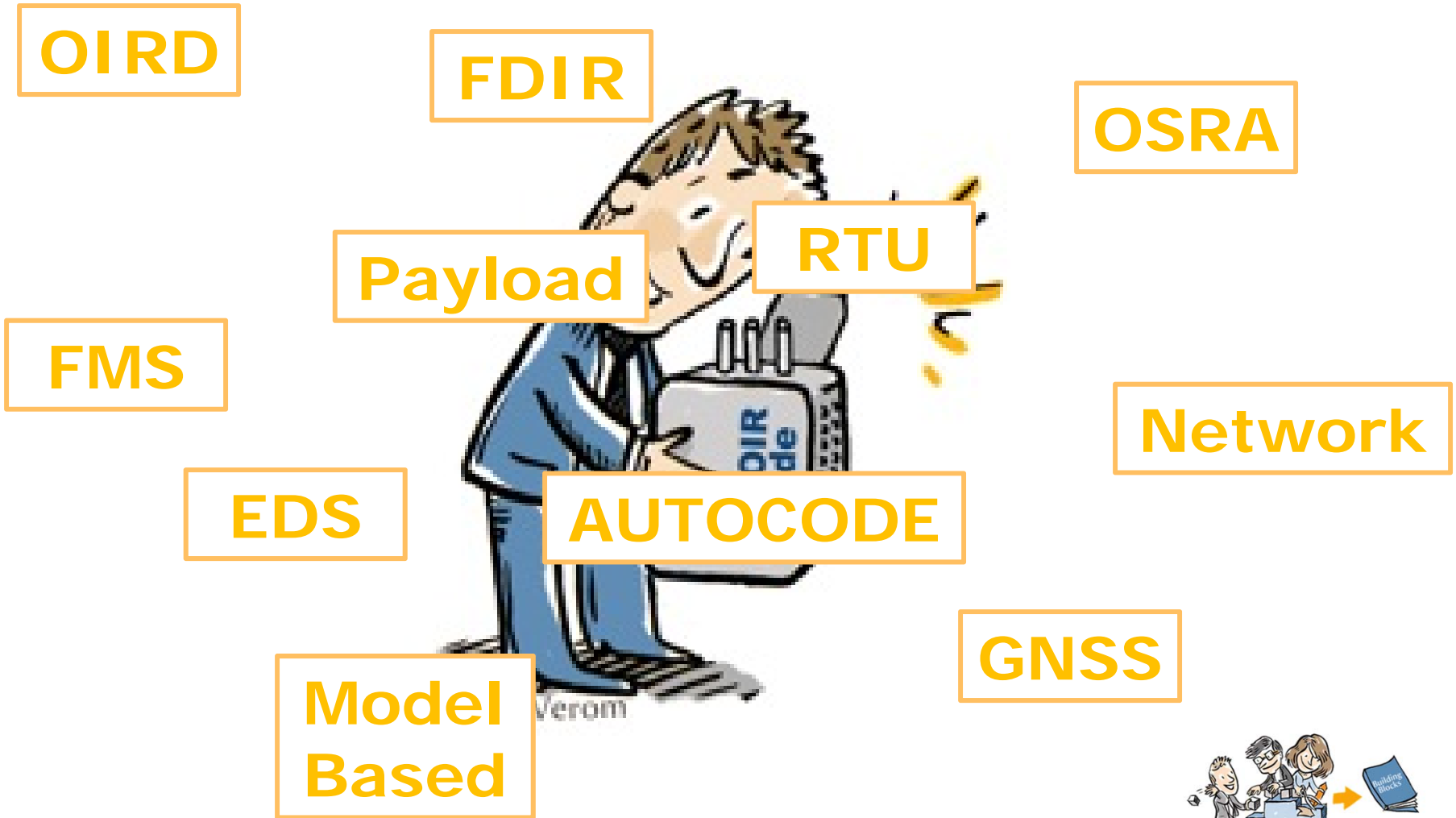
# CD03 vs SAVOIR perimeter





# CD03 vs SAVOIR perimeter





# SAVOIR-NEXT



- 09:45 FDIR working group
- 10:30 MASAIS working group
- 10:50 UNION working group
- 11:00 Use of UNION spec for SPACEFIBRE
- 11:40 FAIRE working group
- 11:55 AUTOCODE working group
- 12:10 Electronic Data Sheet
- 12:30 RTU generic specification
- 14:00 Generic GNSS function
- 14:30 Operability
- 14:45 Model based avionics



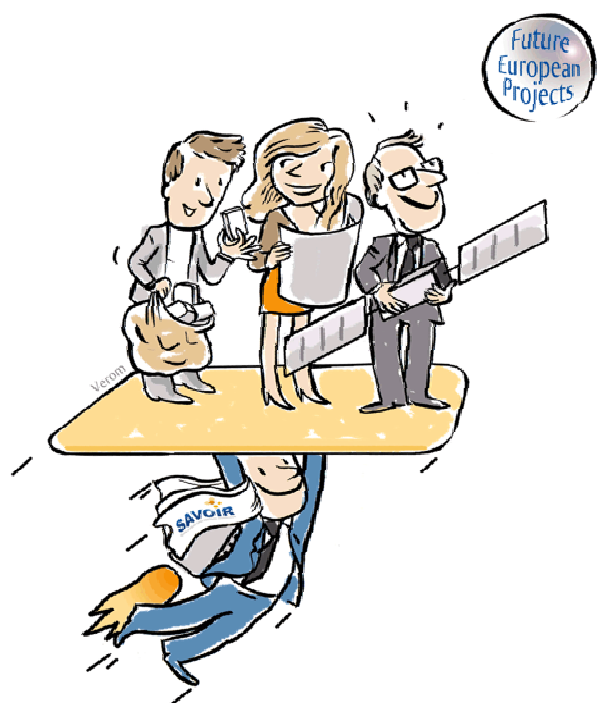
# Contact



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<http://essr.esa.int>



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- Nadine Ladiette – CNES
- Frank Dannemann – DLR
- Rémi Roques – AirbusDefence&Space
- Jacques Busseuil – ThalesAleniaSpace
- Bernard Bruenjes- OHB
- Carsten Jørgensen – Terma
- Torbjörn Hult – RUAG
- Franco Boldrini – Selex Galileo

