

# Panel 5: Where are we today?

(SWAT analysis)

**S** TRENGTH

**S**

Fits to  
individual  
Needs (Company  
& Organis.)

Stability (Bugs)

SMB 2  
between "organisations"

Virtue of  
Engineering & Validation  
for Control SW

---

Model Developers  
Can be trained on  
SMB 2, independent  
of Project/  
Infrastructure

**O**PPORTUNITIES

Engage  
Universities &  
Academia.

Extend  
Exchange  
(Carl's Data,  
Tool chain, etc.)

Sharing  
Maintenance  
=> additional  
Budget for New  
features

Learn from  
(each) other  
(other Organisations)  
even outside Space

COUPLING  
MBSE  
and DIGITALIZATION  
(3/5 YEARS TIME  
FRAME)

FMI  
New standards?



# WEAKNESSES

Model exchange still challenging (even with SMP2)

Closed to Space Industry only

5

Current infrastructure are not full SMP2 compliant  
=> exchange of models remain complex

Missing "SMP Compliance Suite" (outcome of SMP2 not available for use)

→ VALIDATION NOT ADDRESSED BY SMP2.

→ MODELS NOT FULL PLUG AND PLAY IN ≠ INFRA.

Sharing of documents

Sharing of OBSW source code to debug ops. Sims.

TO MODEL TRUE SYSTEMS-OF-SYSTEMS, THE SPACE DOMAIN MUST SIGNIFICANTLY EXPAND ITS AWARENESS OF DEVELOPMENTS IN OTHER DOMAINS (NUCLEAR, CIVIL AVIATION ETC).  
THE SPACE DOMAIN SHOULD ACTIVELY SOLICIT KNOWLEDGE TRANSFER FROM THESE OTHER DOMAINS (NOT WAITING FOR IT TO HAPPEN BY CHANCE)

Shared simulation environment  
(→ Co-Simulation)

distributed simulation

NOT OPEN TO OTHER INDUSTRY

DIFFICULT LICENCING

Missing opportunity to improve overall technology

- How far is each company rationalised for their FES, SuF, ToHS, ... simulators

Address model intellectual property  
(will become blocking point in the future)

# THREATS

Level of Investment  
Legacy for companies

=> Functional Mock-Up Trust Centre

Digitalisation leading to "steep" / "logn"  
Cheaper  
Higher <sup>units</sup> model Modularity to build more System models

Model classification  
How to choose between 10 models of same equipment?  
Need for Model Identity Card? (Automotive)

Un-even starting position



## Strength

- Fits to individual (company + organisation) need
- Stability (bugs)
- SMP2 between "organizations"
- Virtualisation of engineering & validation for control software

## Opportunities

- Model developers can be trained on SMP2, independent of project/infrastructure
- Engage Universities & Academia
- Extend exchange (config **dal**, tool chain)
- Sharing maintenance -> additional budget for new releases
- Lessons from (**ead**) other (organisations) even outside space
- Coupling MBSE and digitalization (3/5 years' time frame)
- FMI new standard?

## Weaknesses

- Model exchange still challenging (even with SMP2)
- Closed to space industry only
- Current infrastructure are not full SMP2 compliant -> exchange of model remain complex
- Missing SMP compliance suite (outcome of SMP2 not available for use)
- Validation not addressed by SMP2, models not full plug-and-play in INFRA
- Sharing of documents, sharing of OBSW source code to debug OPS Sims
- Shared simulation environment (-> Co-simulation)
- Distributed simulation
- Not open to other industry, difficult licensing, missing opportunity to improve overall technology
- To model true systems-of-systems the space domain must significantly expand its awareness of developments in other domains (nuclear, civil aviation etc.)
- Space domain should actively solicit knowledge transfer from these other domains (not waiting for it to happen by chance)
- How far is each company rationalized for their FES, SVF TMS simulators?
- Address model intellectual property (will become blocking point in the future)

## Threads

- Level of investment, legacy for companies
- -> functional Mock-up trust center
- Digitalisation leading to "ste"/Mages" cheapes, higher model modularity to build more system model
- Model classification:
  - how to choose between 10 models of same equipment?
  - Need for model identity card (automotive)?
- Un-even starting position