



In partnership with

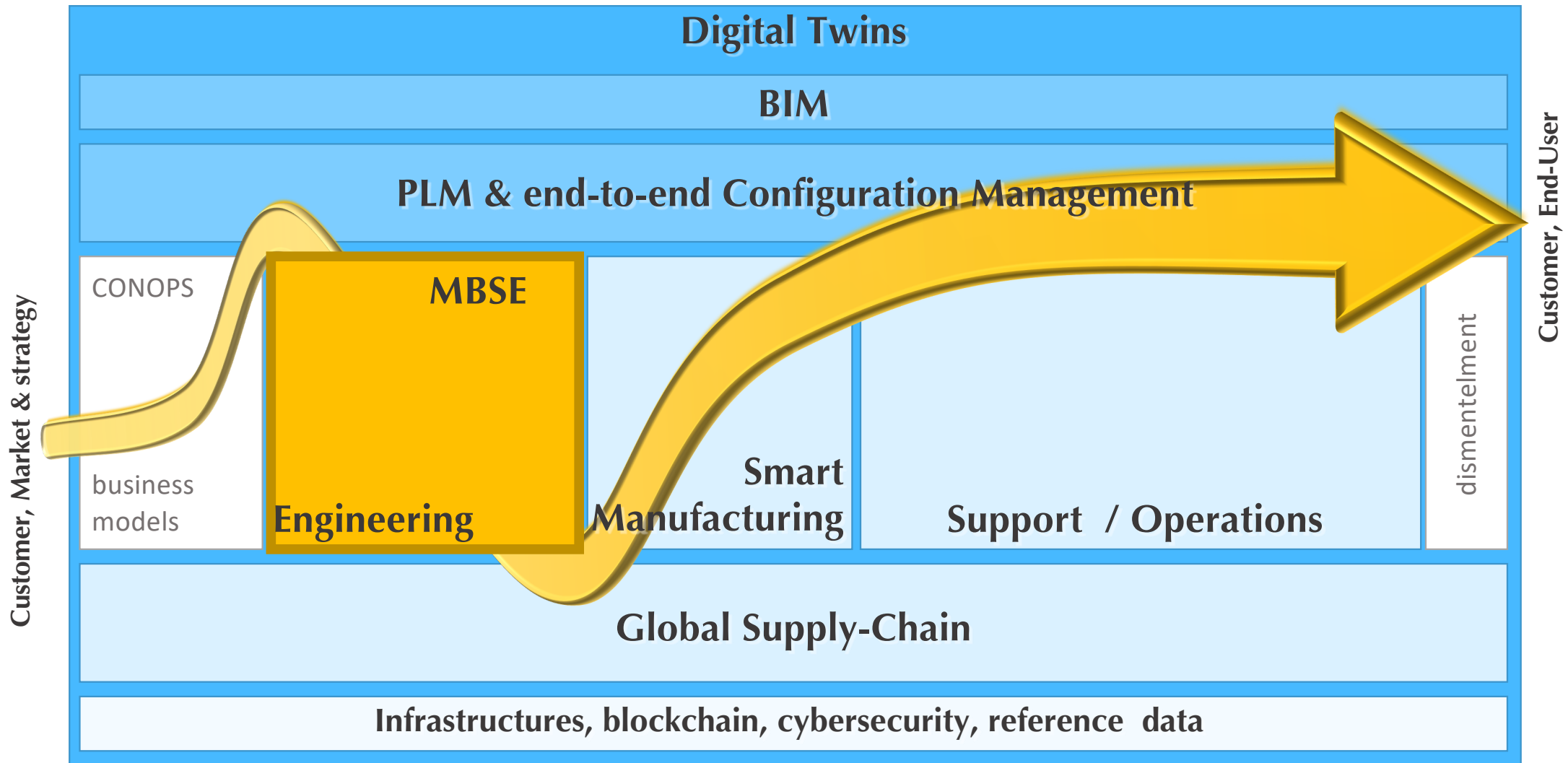


AFNeT Standards Days

MBSE – introduction

by Jean-Luc Garnier (AFIS, Thales)

<http://standardsdays.afnet.fr> - AFNeT Standards Days 2020 : 6 & 7 October 2020



An interdisciplinary approach and means to enable the realization of successful systems.

It focuses on defining **customer needs** and **required functionality** early in the development cycle, documenting requirements, and then proceeding with design synthesis and system validation while considering the complete problem: **operations, cost and schedule, performance, training and support, test, manufacturing, and disposal.**

SE considers both the **business and the technical needs** of all customers with the goal of providing a **quality product** that meets the **user needs**

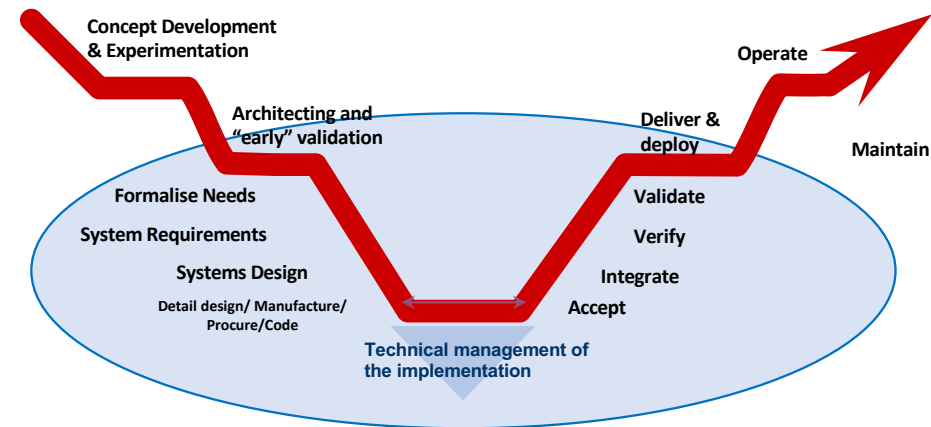
(INCOSE SE Handbook v4)

**Systems Engineering processes are now defined in
*ISO/IEC/IEEE 15288:2015 System life cycle processes***

The update of this reference should start in 2021 in order to align with the current practices.

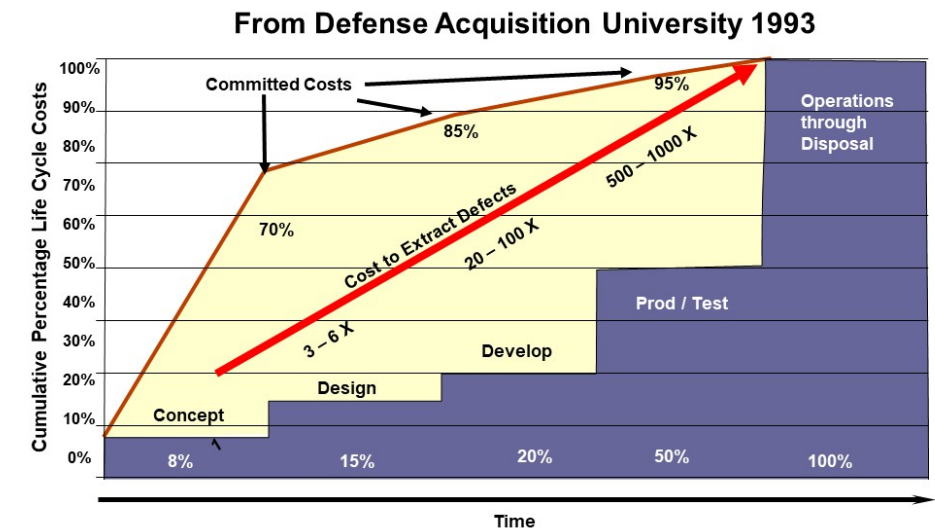
Systems Engineering has been documents based for years

- With one file per document
- With one document as input/output per engineering step



Consequence of this approach:

- A complete serialization of the activities
- Problems discovered lately



Why moving to Model-Based Systems Engineering

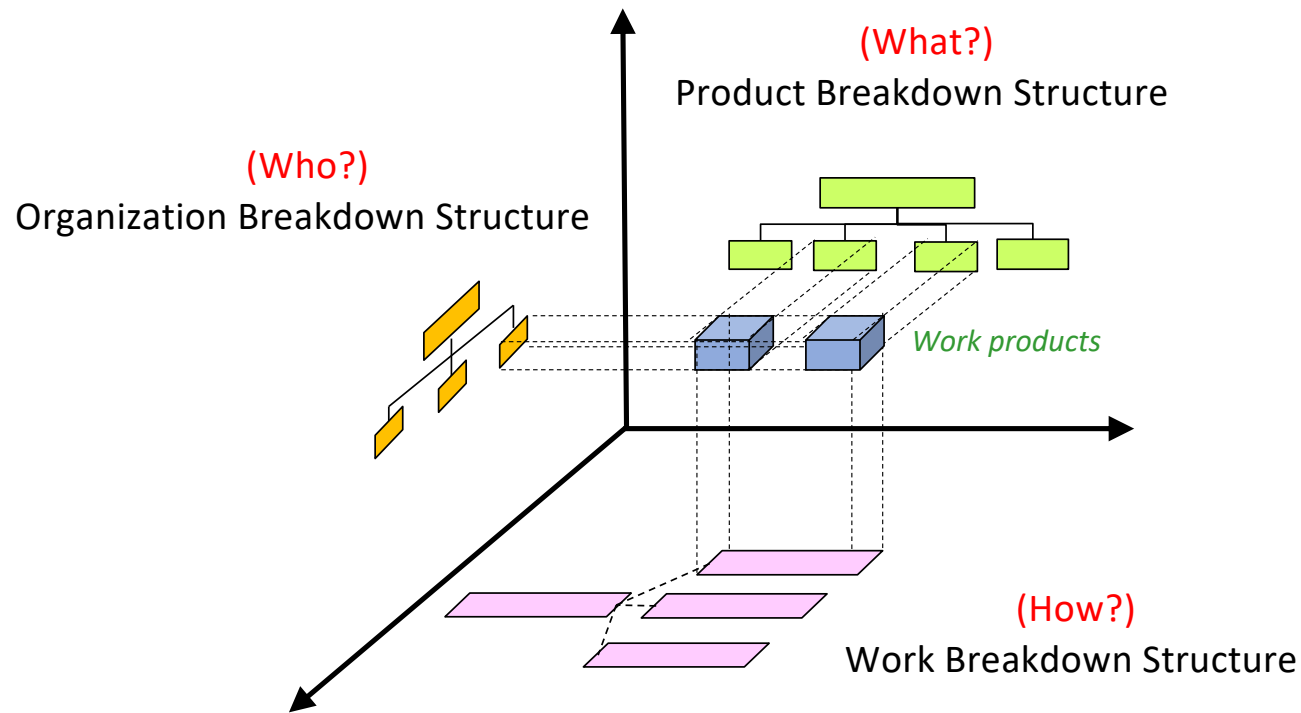


Each SE process is significantly coupled with many others.

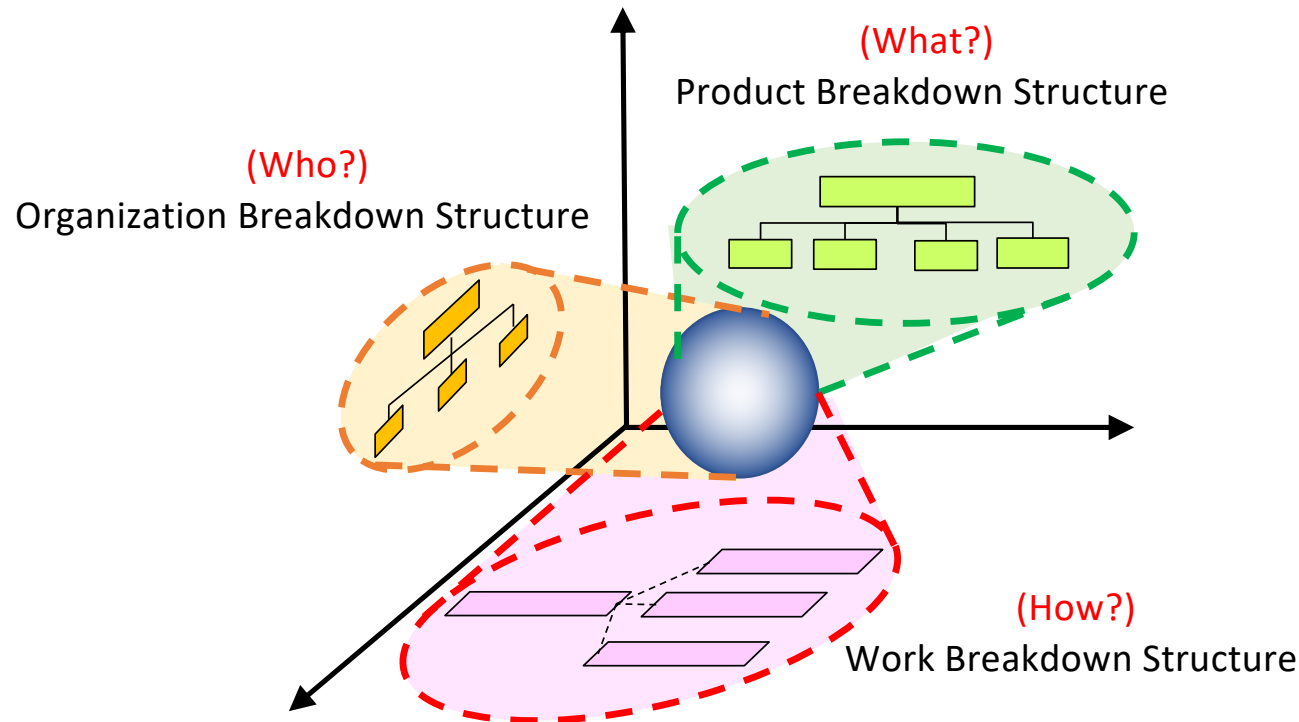
Concurrent Engineering and data continuity are key

EXTERNAL	FAA Policy Integrated Master Sched Corporate Strategy and Goals FAA Enterprise Architecture	Constraints FAA Mgmt. Decisions Govt & Int'l Regulations & Statutes Legacy System Needs Standards Technology	FAA Mgmt. Decisions Legacy System	Constraints Legacy System Market Research Standards Technology	Market Research Technology Constraints Integrated Master Schedule	FAA Policy Standards Interface Change Request	FAA Policy Standards	Technology Constraints	FAA Policy Constraints Technology Concerns/Issues Integrated Master Schedule Corporate Strategy and Goals	FAA Policy Change Requests Facility Definition	Need Standards	Technology Test & Assessment Articles System	Constraints Environ. Forces Govt. & Int'l Regulations & Statutes FAA Policy Technology Concerns/Issues Integrated Master Schedule System	SE comments SE Training Feedback Technique & Program Products Process Assessment requests Other FAA Processes Standards FAA SE competency needs	
SEMP WBS SE Input ISAP Supporting Technical Plans Audit Results NAS Enterprise Architecture	INTEGRATED TECHNICAL PLANNING	NAS Enterprise Architecture SEMP WBS	SEMP	NAS Enterprise Architecture SEMP WBS	Constraints SEMP WBS	NAS Enterprise Architecture SEMP	NAS Enterprise Architecture SEMP	SEMP	Concerns/Issues SEMP	NAS Enterprise Architecture SEMP WBS Audit Results	NAS Enterprise Architecture SEMP	NAS Enterprise Architecture SEMP	NAS Enterprise Architecture SEMP WBS		
Requirements RVCD SOW	Planning Criteria Requirements	REQUIREMENTS MANAGEMENT	Requirements	Requirements RVCD	Constraints Requirements	Requirements	Requirements RVCD	Requirements Tools/Analysis Requirements	Requirements Concerns/Issues	Requirements Change Request	Requirements	Requirements VRTM	Requirements		
Concepts Functional Architecture	Concepts Planning Criteria	Concepts Functional Architecture OSED	FUNCTIONAL ANALYSIS	Functional Architecture OSED	Constraints Functional Architecture OSED	Concepts Functional Architecture OSED	Concepts Functional Architecture OSED	Tools/Analysis Requirements	Concerns/Issues	Functional Architecture	Concepts Functional Architecture OSED	Functional Architecture	OSED		
Physical Architecture	Planning Criteria Physical Architecture	Constraints Physical Architecture Product Definition	Physical Architecture	SYNTHESIS	Physical Architecture Design Constraints Description of Alternatives	Operational Prototype Results Physical Architecture	Description of Alternatives Physical Architecture	Tools/Analysis Requirements	Concerns/Issues	Change Requests Product Definition	Physical Architecture Operational Prototype Results	Physical Architecture	Constraints Physical Architecture Operational Prototype Results		
Trade Study Reports	Planning Criteria	Trade Study Reports	Trade Study Reports	Trade Study Reports	TRADE STUDIES	Trade Study Reports		Tools/Analysis Requirements	Concerns/Issues				Trade Study Reports		
Interface Control Documents IRD	Planning Criteria	Interface Control Documents IRD	Interface Control Documents	IRD Interface Control Documents	Constraints	INTERFACE MANAGEMENT	Interface Control Documents		Concerns/Issues	Change Requests IRD Interface Control Documents	IRD	Interface Control Documents			
SCAP DARS	Planning Criteria	DARS Constraints	DARS	DARS	DARS Constraints		SPECIALTY ENGINEERING	DARS Tools/Analysis Requirements	Concerns/Issues	DARS	DARS	Verification Criteria DARS	DARS		
Credible Analysis Results	Analysis Criteria Planning Criteria	Analysis Criteria Constraints	Analysis Criteria	Analysis Criteria	Analysis Criteria Constraints			Analysis Criteria	INTEGRITY OF ANALYSES	Concerns/Issues Analysis Criteria	Credible Analysis Results	Tools & Reference Models	Analysis Criteria	Analysis Criteria	
Prog. Risk Register Prog. Risk Summary Risk Mitigation Plan Summary Risk Status Risk Mitigation Plans Constraints	Planning Criteria	Risk Mitigation Plans Constraints	Constraints	Risk Mitigation Plans Constraints	Constraints			Constraints	Tools/Analysis Requirements	RISK MANAGEMENT		Constraints	Constraints	Risk Mitigation Plans	
Baselines Baseline Changes CSA Report	Planning Criteria	Baselines Baseline Changes CSA Report		CSA Report Baselines Baseline Changes			CSA Report Baselines Baseline Changes	Baselines Baseline Changes	Baselines Baseline Changes	Concerns/Issues	CONFIGURATION MANAGEMENT		Baselines Baseline Changes CSA Report	Baselines Baseline Changes CSA Report	
	Planning Criteria	Validation Reports	Requirements	Requirements	Constraints		Validation Reports	Tools/Analysis Requirements Validated Tools & Reference Models	Concerns/Issues	Configuration Documentation Validated Tools & Reference Models	VALIDATION	Validation Reports			
	Planning Criteria	RVCD VRTM			Constraints			Tools/Analysis Requirements	Concerns/Issues	Configuration Documentation		VERIFICATION			
Commissioned System System Disposal Real Property Assets Current NAS Inventory Lifecycle Cost Estimate	Planning Criteria	Constraints		Lifecycle Cost Estimate Constraints	Lifecycle Cost Estimate Constraints			Tools/Analysis Requirements	Concerns/Issues Constraints	Change Requests Change Release Notices Configuration Documentation CSA Updates			LIFE CYCLE ENGINEERING		
SE Processes SE Best-Practices Documentation (SEM) SEBOK SE Training Curriculum Skill &/or Competency Requirements	SE Processes SE Best-Practices Documentation (SEM) SEBOK	SE Processes SE Best-Practices Documentation (SEM) SEBOK	SE Processes SE Best-Practices Documentation (SEM) SEBOK	SE Processes SE Best-Practices Documentation (SEM) SEBOK	SE Processes SE Best-Practices Documentation (SEM) SEBOK	SE Processes SE Best-Practices Documentation (SEM) SEBOK	SE Processes SE Best-Practices Documentation (SEM) SEBOK	SE Processes SE Best-Practices Documentation (SEM) SEBOK	SE Processes SE Best-Practices Documentation (SEM) SEBOK	SE Processes SE Best-Practices Documentation (SEM) SEBOK	SE Processes SE Best-Practices Documentation (SEM) SEBOK	SE Processes SE Best-Practices Documentation (SEM) SEBOK	SE Processes SE Best-Practices Documentation (SEM) SEBOK	SE Processes SE Best-Practices Documentation (SEM) SEBOK	MANTAIN SE PROCESS

Source: AFIS (French Chapter of INCOSE)



Why moving to Model-Based Systems Engineering



A model is an abstract representation of an entity or collection of entities that provides the ability to portray, understand or predict the properties or characteristics of the entity or collection under conditions or situations of interest [ISO/IEC/IEEE 42020, clause 3]

A model can cover one or more entities with respect to a viewpoint reflecting a set of concerns. [Adapted from ISO/IEC/IEEE 42010]

This session	
Standards for Systems Life Cycle Processes	Philippe Boeri Naval Group
Consideration of S.E. Standards in the ATLAS Program	Yves Baudier AFNeT
Technical presentations	
Standard for MBSE (ISO/IEC 24641)	Eric Gauthier (Thales) Lalitha Abhaya (Airbus)
Systems Engineering in a Prime Management Office; Integration of Multi-Systems Analysis	Eric Thomas (Dassault Aviation)
Collaborative Model-Based Early activities (Architecting: ISO/IEC/IEEE 420x0 series)	Jean-Luc Garnier AFIS

Questions
&
Answers



6th and 7th October

<http://standardsdays.afnet.fr>