Introduction to Systems Engineering

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- **Discover 6 standard technical processes that guide system engineers in defining their system/product**
  - Business/mission analysis, stakeholder needs and requirements definition, system requirements definition, architecture definition, design definition, system analysis

- **Understand how models can help supporting activities of those processes through sample case**
  - Illustrate results of activities
 - Illustrate modeling
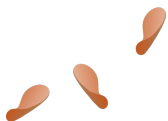
- All projects in concept or development stage concerning:
  - Industrial systems (including safety critical avionic systems)
  - Tools/products to support development of industrial systems
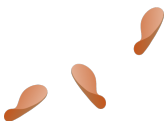
Target people
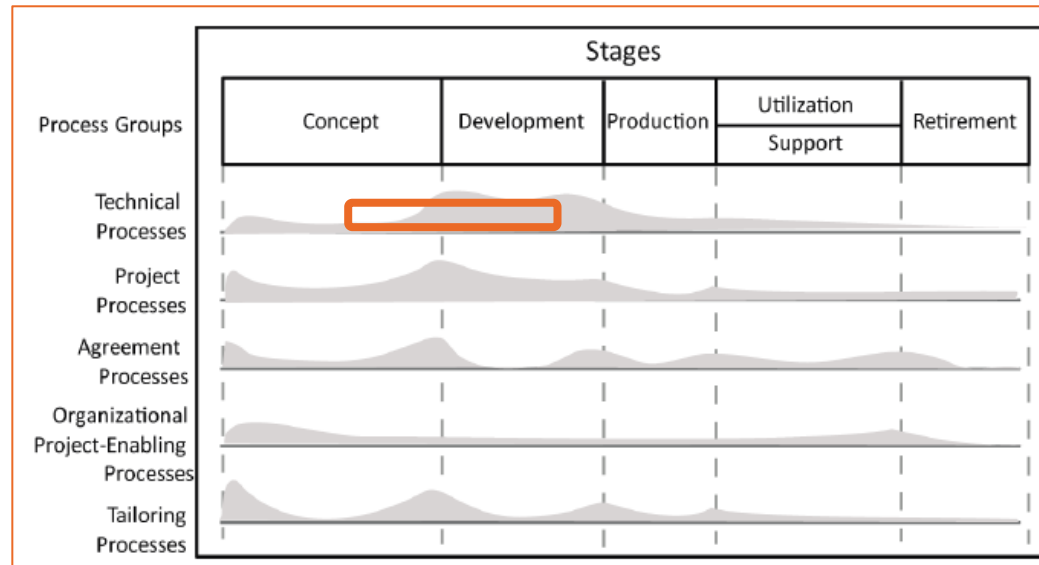
- **"System" teams**
  - Functional experts
  - System architects
  - Project manager/leader

- **Supporting specialists/experts**
  - Safety, Security
  - HW expert
  - SW architect
  - Quality team
  - V&V team
  - Thermal expert
  - …

- **1- Mission analysis (1h)**
  - Mission scope, problem or opportunity – business goals, solution space, first candidate solutions
  - SysML modeling: Sequence diagram, requirement diagram

- **2 – Stakeholder needs and requirements definition (4h)**
  - Operational context, first identification of system functions, traceability to business/mission goals,
  - SysML modeling : Block diagram, state machine, Use cases, sequence, Requirements with traceability.

- **3.1 System requirements definition (2h)**
  - Definition of system functions and of their interfaces, allocation of performance, non functional requirements, traceability to stakeholder requirements
  - SysML modeling: Requirements and traceability links
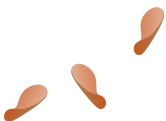
- ## 3.2. System Architecture Definition (5h)
  - Logical architecture (functional, behavioral, temporal), physical architecture (properties, structure, constraints) and allocations
  - SysML modeling: Activity, state machine, blocks, allocations table, parametric, Requirements and traceability.

- ## 3.3. System Design Definition(1h)
  - Identification of trades, analysis, assessment and selection of best solution
  - SysML Modeling: Parametric

- ## 3.4 . System Analysis and Simulation(1h)
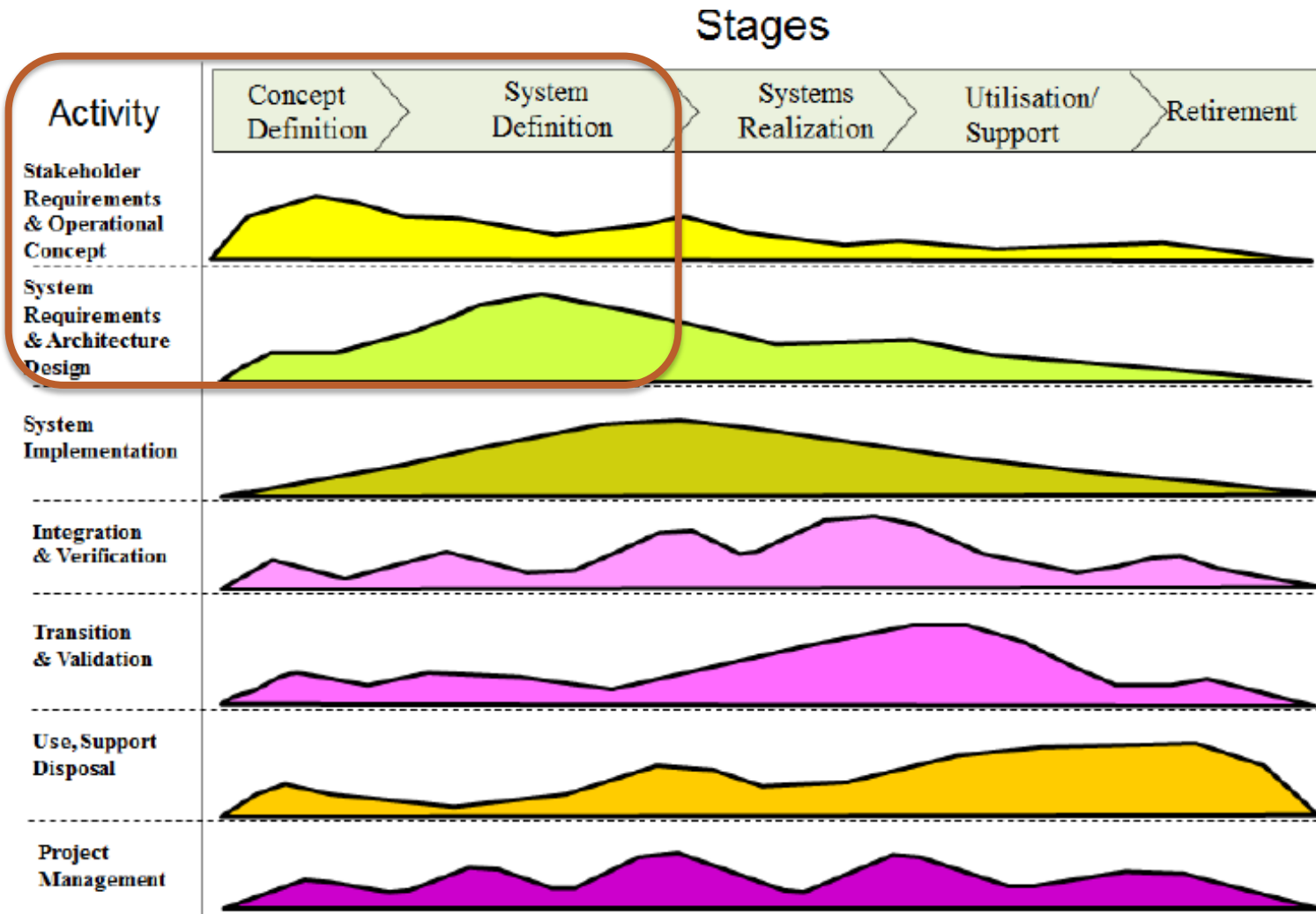 - SysML limits: introduction to other modeling languages/tools
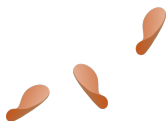
Figure 1: Generic Relationships between life cycle stages and processes (modified from Lawson 2010)

Mission analysis

results

Stakeholder needs and requirements

Stakeholders

Problem space (concepts)

Solution space (définition)

System requirements (by system provider)

feedback

System architecture definition

System design

System provider

Target system analysis (and simulation)