

# Competence Cluster Concept methods and System of System methods

The cluster focus on early design phase of airborne systems, where the goal is to understand customer requirements and produce suitable solutions. Looking at design of complex airborne systems, it can be noted that the complexity of modern design efforts has increased dramatically over time. For instance, it is not sufficient to consider aircraft or sub-system performance (e.g. speed, turn rates, field performance, radar range, weapon load, data link transmission rate or similar) only, but perspective needs to be elevated to “system-of-systems”. Modelling of the surrounding world and incorporating any type of solution, even outside of core solution, keeping track of uncertainties and assumptions, is a key for understanding the customers’ needs and for quickly responding to the ever-changing challenges and needs. This has the following implications:

- An extremely large amount of data needs to be generated, processed, analysed and understood.
- Multiple disciplines are required to describe the problem, and their interactions need to be integrated.
- Very large number of variables and the physics behind the system are too profound or esoteric to be fully understood.
- The disciplinary interactions are so intricately coupled that a parametric environment is necessary to avoid re-iterating the design process until all requirements are met.

The competence cluster focus:

- **Methods**
  - MDO
  - Multilevel
  - Understand System of System demands
  - System of System analyses and modeling
- **Modeling**
  - From semi-empirical to physical based
  - More model based
  - Uncertainties in model
- **Simulation**
  - Pyramid of simulation
  - Democratization of models/re-use
  - System of system simulations

The cluster aim to create a large multidisciplinary community around relevant questions and research possibilities.