

Development of System Models for the Evaluation of Unmanned Airborne Early Warning Aircraft

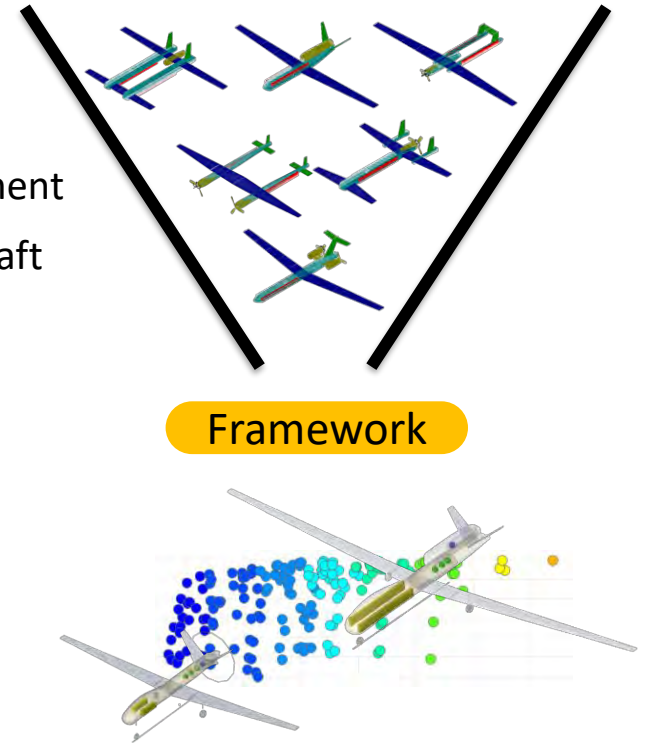
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MODPROD, 3 February 2021

Presented at the 15th MODPROD Workshop
3-4th February, Linköping, Sweden
www.modprod.org

Project overview

- Primary aim
 - To create a Trade Space Exploration (TSE) environment
 - For unmanned Airborne Early Warning (AEW) aircraft
 - By using system analysis and simulation models
- Expected results
 - Develop various concepts
 - Identify the performance metrics
 - Compare different alternatives
 - Propose viable solutions



Project overview

- What is an AEW aircraft?
 - Airborne system equipped with a radar
- What is the advantage of AEW?
 - Extended radar range due to high altitude
 - Increased survivability due to mobility
- Which are the main operational uses?
 - To detect aircraft, ships and vehicles at long ranges
 - To carry out surveillance and air traffic control
 - To perform command and control of the battlespace*

Vickers Wellington



Boeing E3 Sentry



SAAB 100B Argus

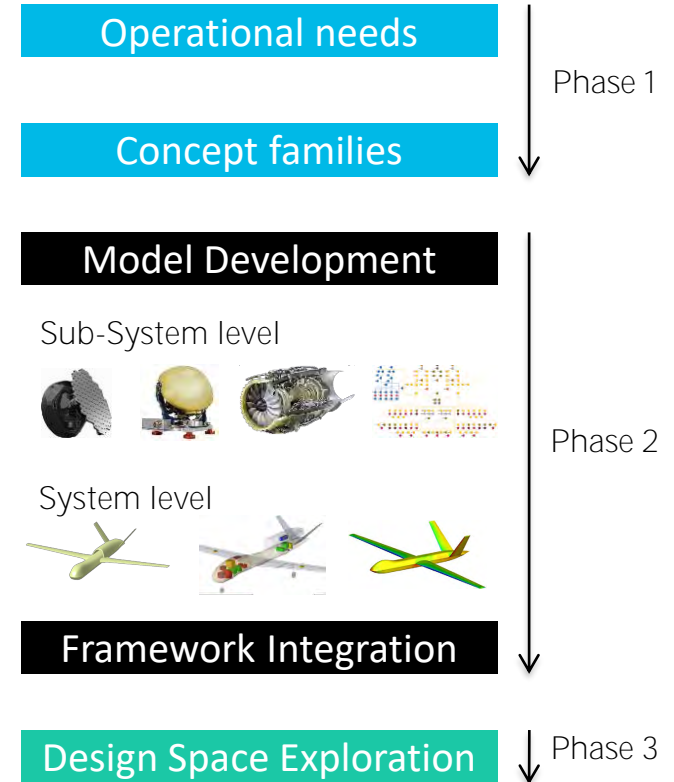


*In this case AEW&C

Project overview

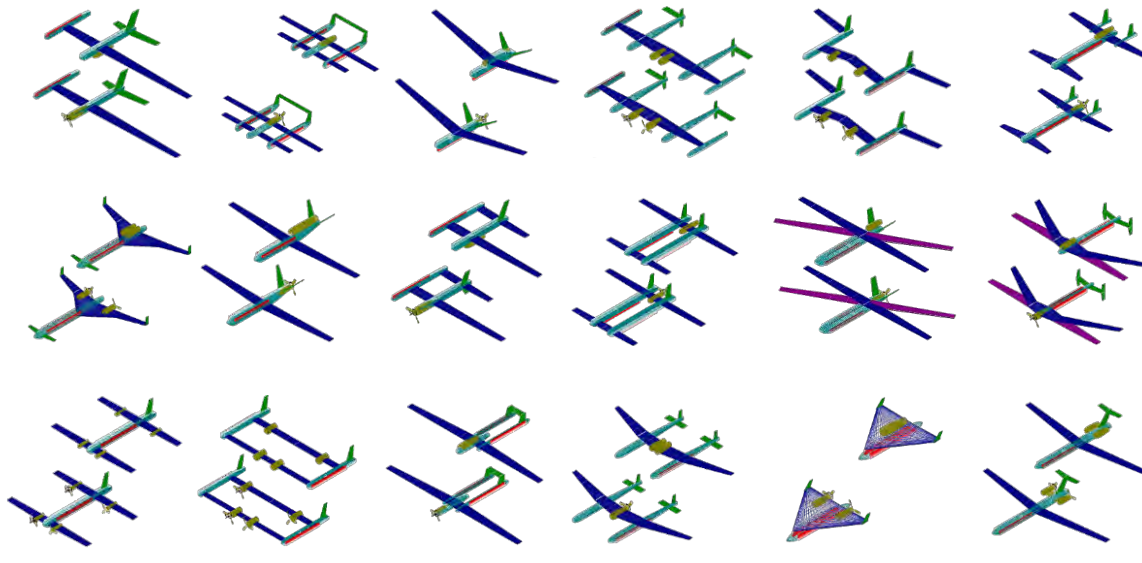
- Conflicting design requirements
 - Need for a long endurance at low speeds
 - Need for both low- and high-altitude capabilities
 - Need for a high cruise/escape speed
 - Need for an unobstructed/accessible radar
 - Need for to keep the operating costs low
- Approach

Operational needs → *Concepts* → *Models* →
→ *Framework* → *Design space exploration*



Phase 1 – Concept selection

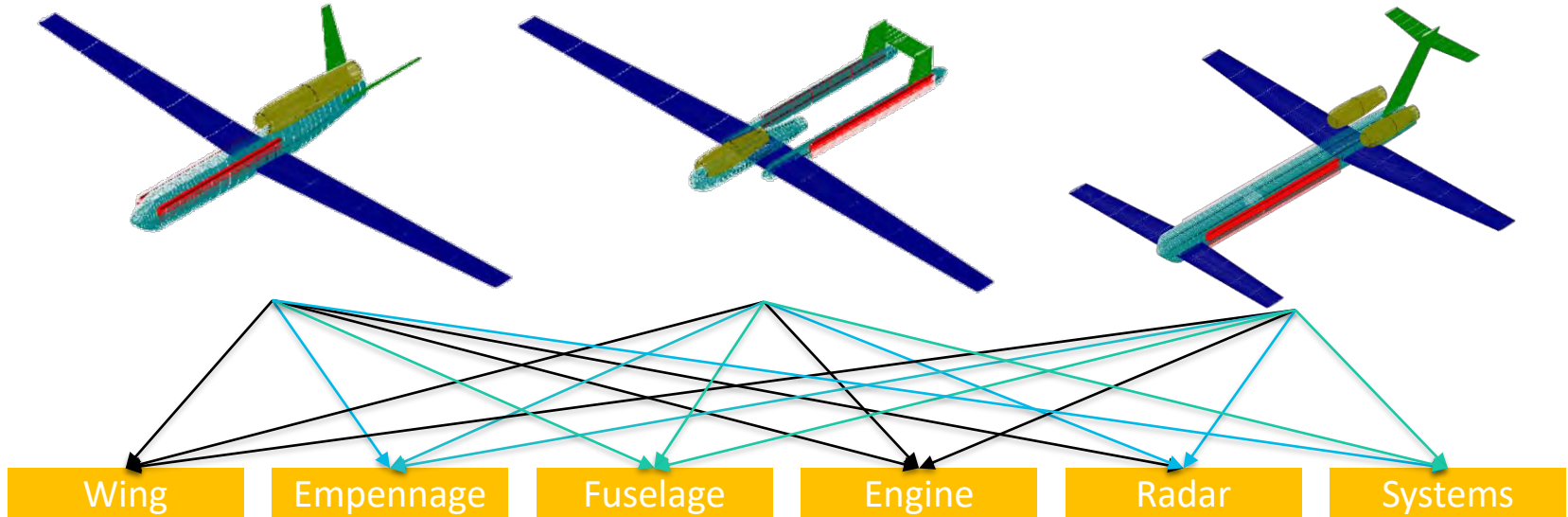
- Evaluation of several concepts*



Flying characteristics?
Radar integration?
Technology evaluation?

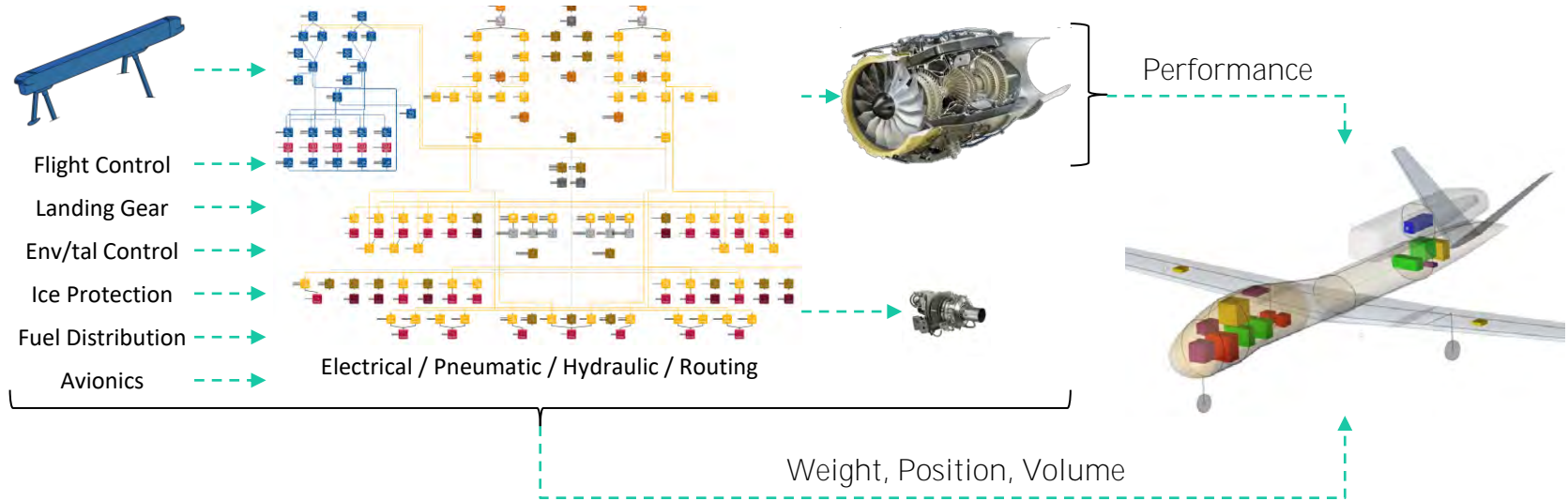
Phase 1 – Concept selection

- Three families as a starting point



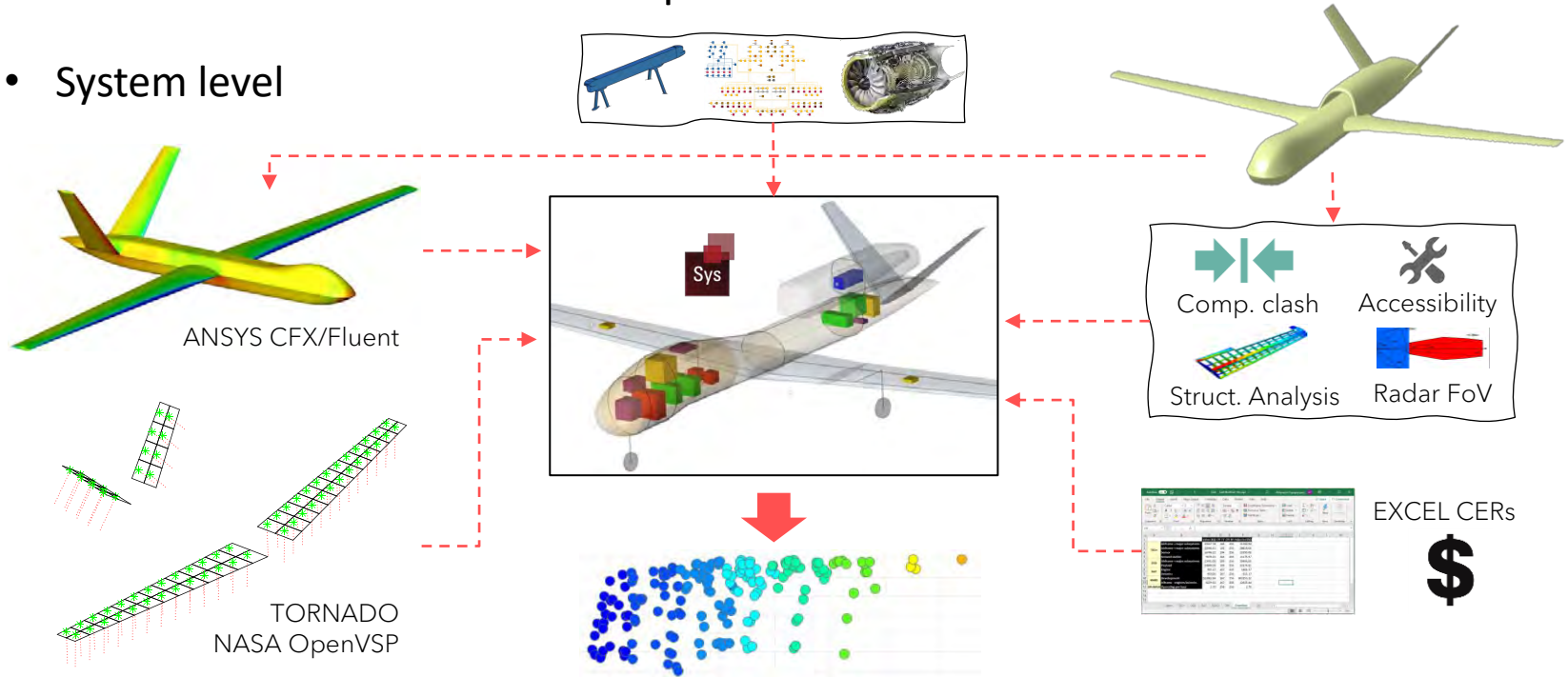
Phase 2 – Model development

- Sub-system level



Phase 2 – Model development

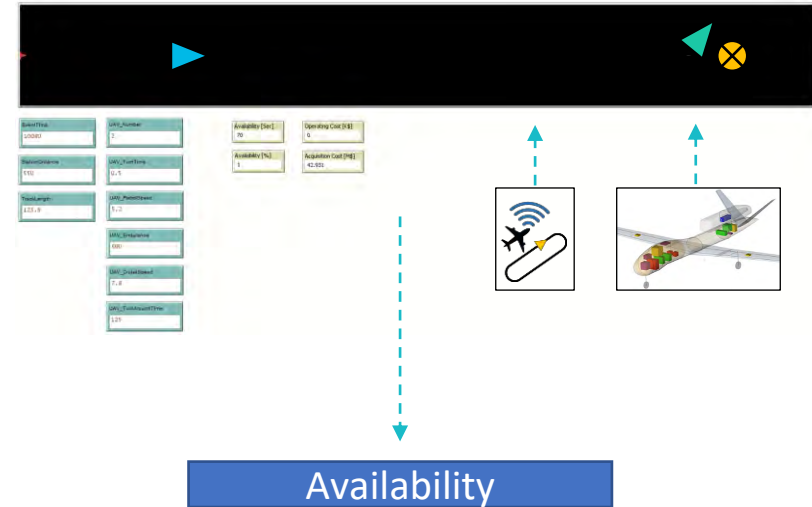
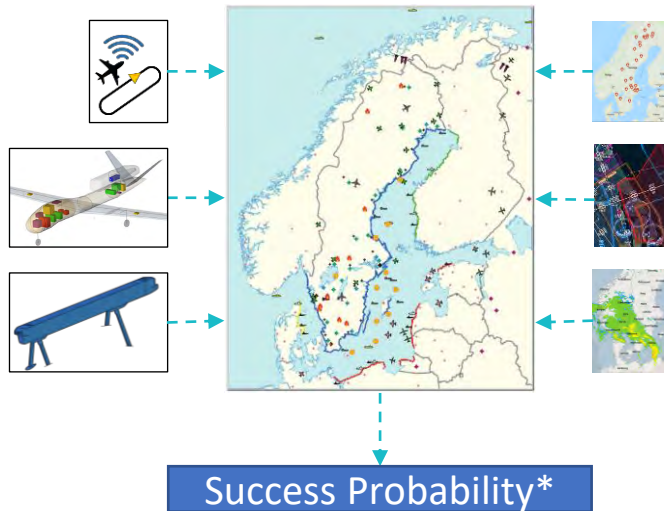
- System level



Phase 2 – Model development

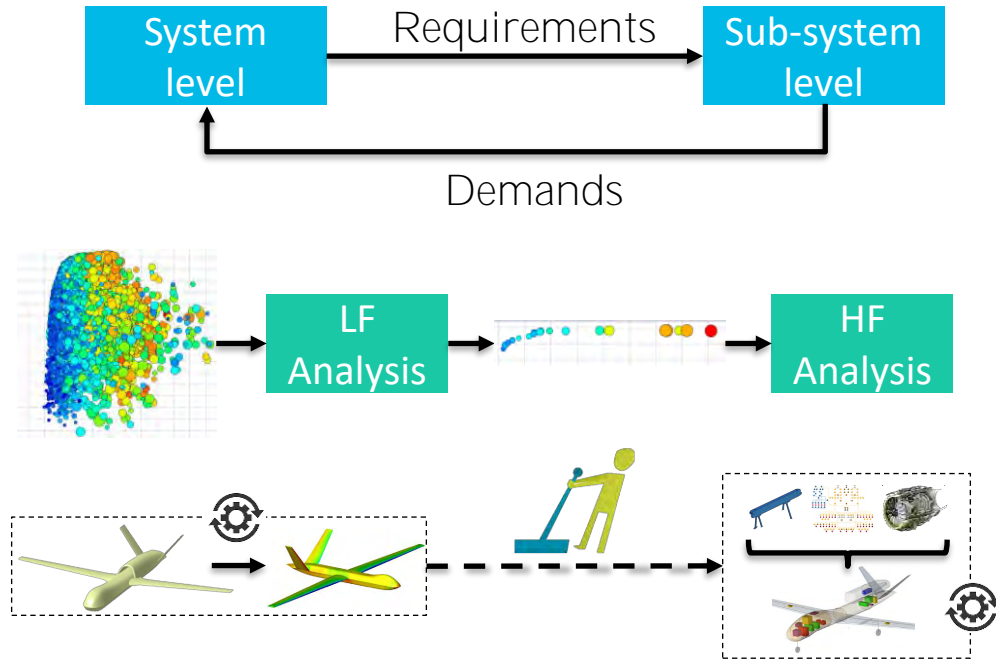


- System-of-Systems level



Phase 2 – Framework integration

- Challenge #1
 - PRO: dependencies
 - SOL: iterations/constrains
- Challenge #2
 - PRO: level of fidelity
 - SOL: multi-fidelity approach
- Challenge #3
 - PRO: full automation
 - SOL: partially automated



Phase 3 – Design space exploration

- Large scale
 - Expected to start in Q3 of 2021
- Small scale
 - Case study on the subsystem level
 - Case study on concept evaluation



**Planned representation
at AIAA AVIATION 2021**

Thank you for your attention

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