SysML Behaviors for Mission Decision

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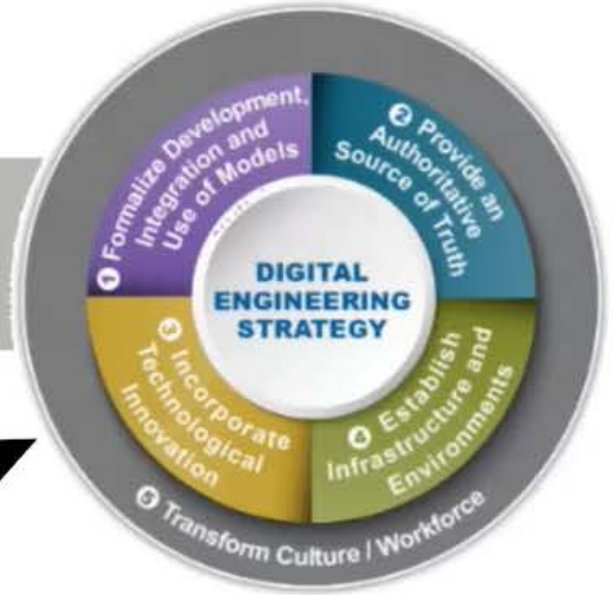
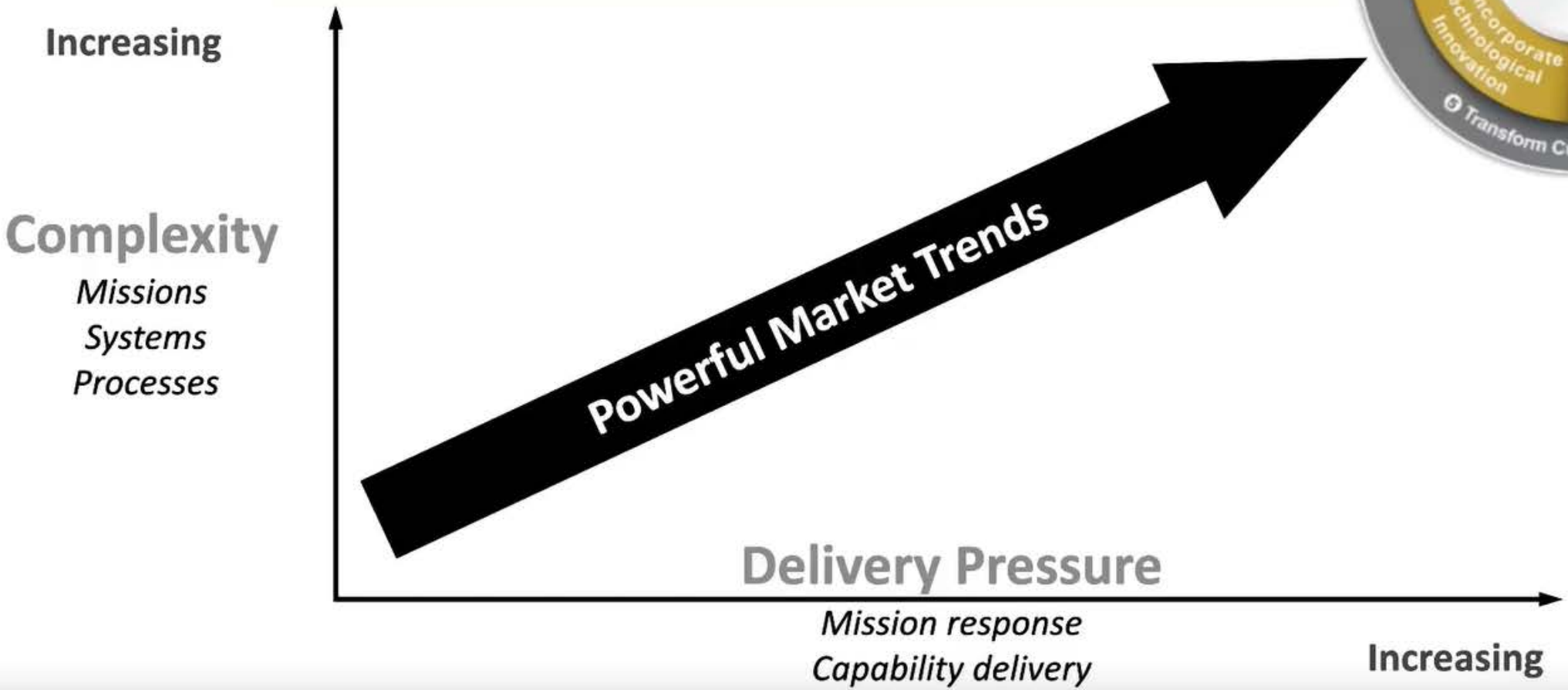
The Imperative for Digital Engineering

> ***"Our competitors are taking away the luxury of time."***
> - Gen. Raymond, former USSF Chief of Space Operations





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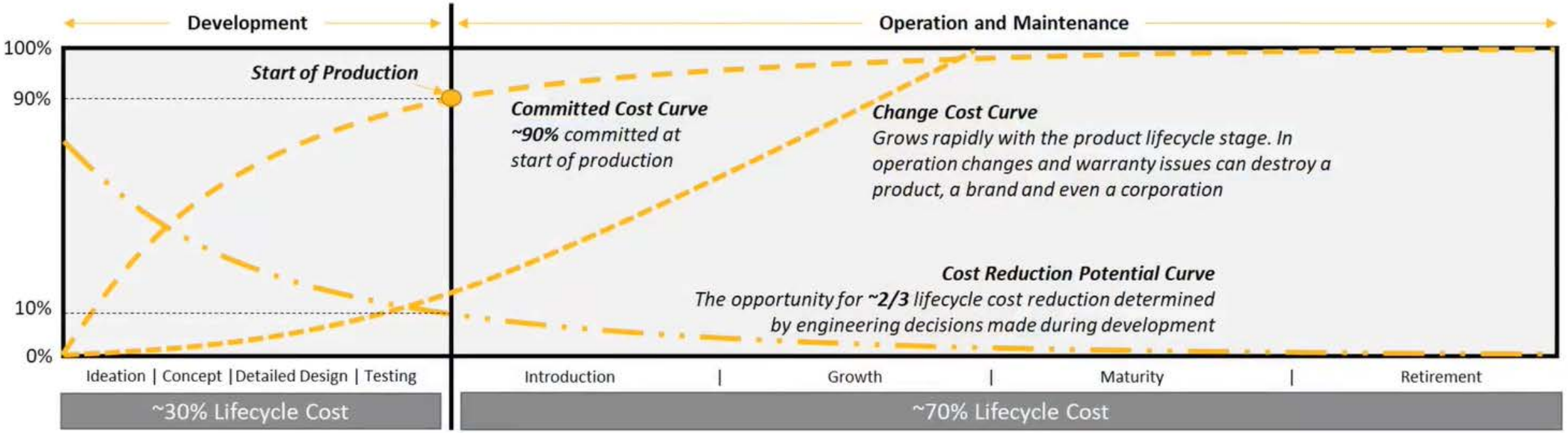


Limited connectivity between the stages of the lifecycle result in costly total lifecycle systems.

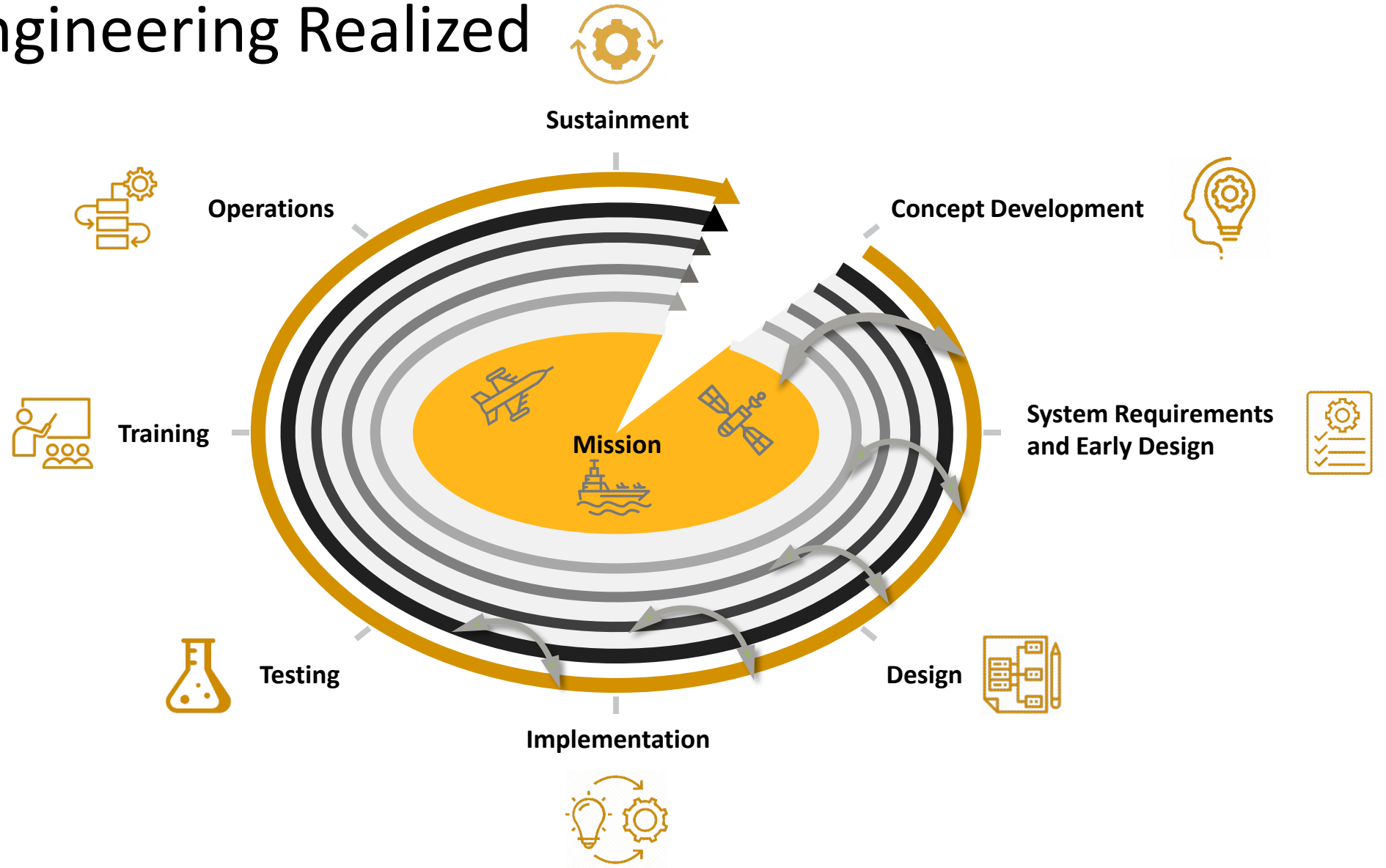
Early stovepipe Cost, Schedule, and Performance decisions lock in downstream costs.

Isolated models

No Common Thread

Duplication of Effort

Digital Engineering Realized



Open Ecosystem | **Mission-Centric** | **Connected Digital Thread**

Why SysML?

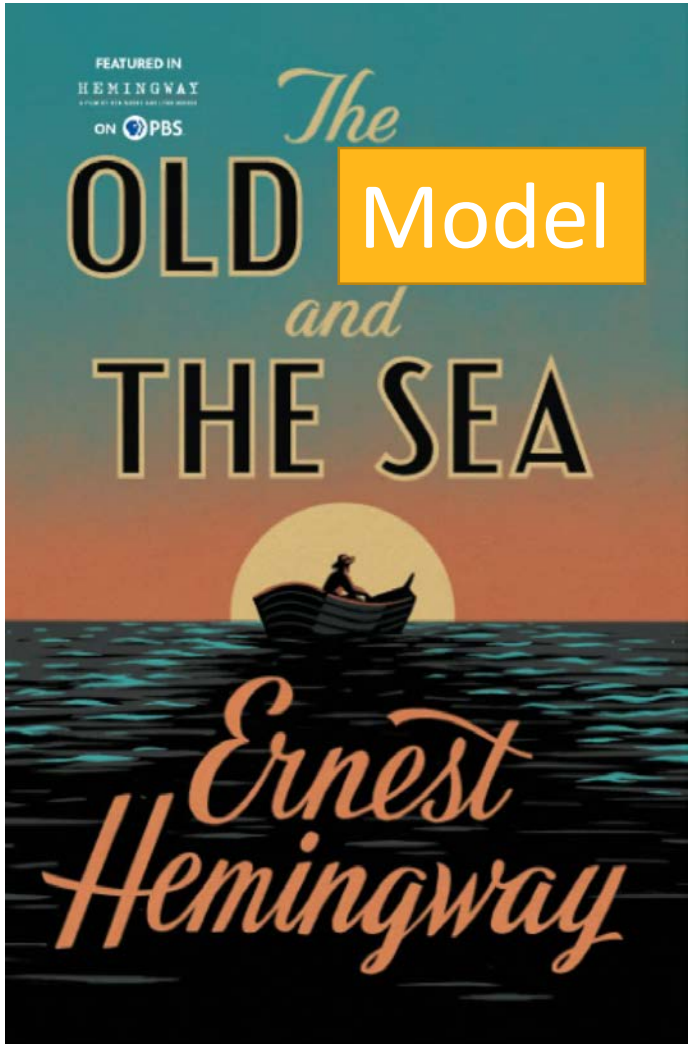
- Extensible standard built on UML
  - (UML) Unified Modeling Language adopted as a standard in 1996
  - SysML v1.0 adopted 2007, SysML v1.6 adopted 2019 with v1.7 and v2.0 pending
- Profile system allows broad customization
  - UPDM / DoDAF / MoDAF built on SysML
  - UAF (Unified Architecture Framework) built on SysML
  - **Established and sometimes mandated use in FA&D … DE Mandate 2018**
- Focus on Behavior not available in other ontology modeling languages
  - State machines take each step based on when events occur in the environment of the behavior being performed

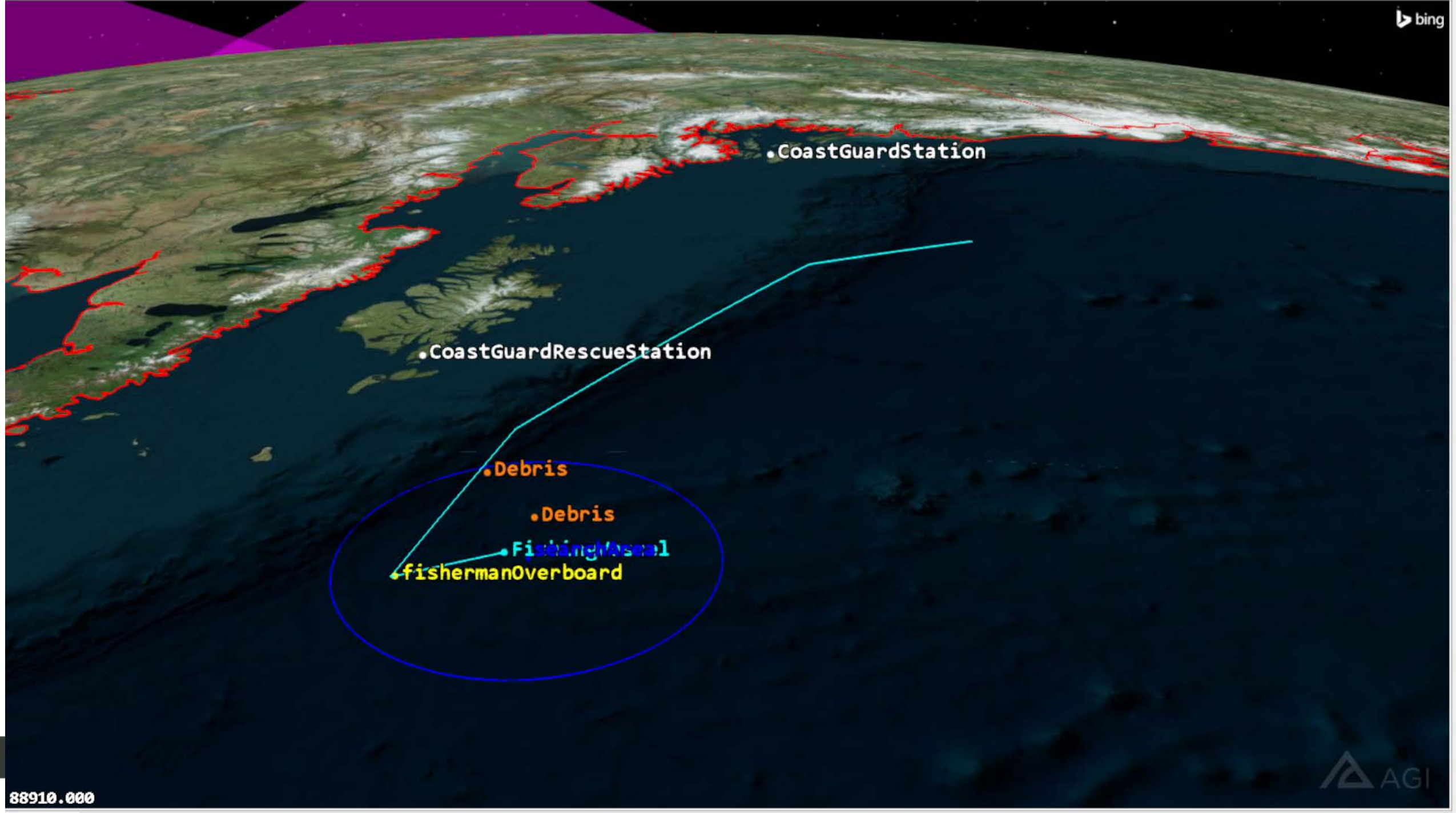
SysML is simply a means to achieve **“Connected Model-Based Engineering”**

Consider this **Mission**: Maritime Search and Rescue

- Sailor lost overboard far from land
- Hard limit for temperature exposure in the water
- Satellites attempt to locate a distress beacon
- Coast Guard must dispatch assets to save the day!
- Can they find the lost soul in time? (and within budget?)
- Feature example for UAF (Unified Architecture Framework)

https://www.omg.org/spec/UAF
https://www.omg.org/cgi-bin/doc?formal/22-07-09.pdf

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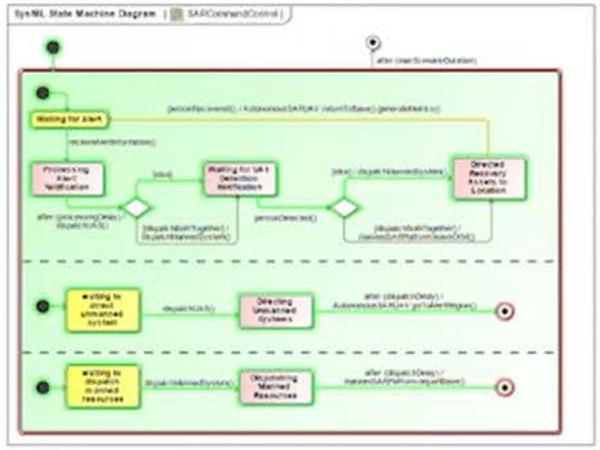
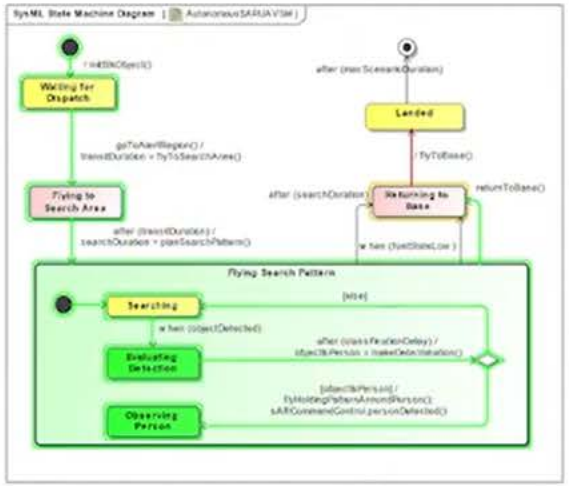
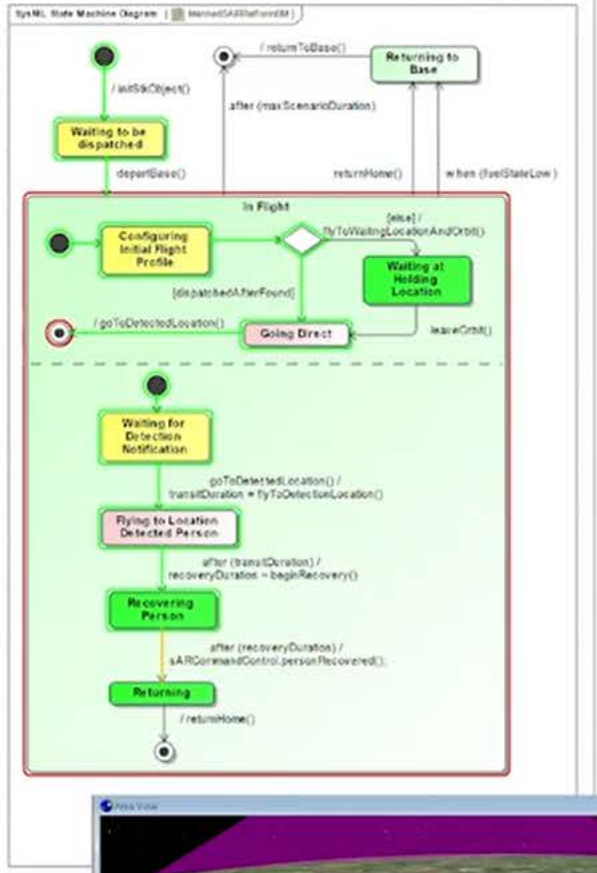
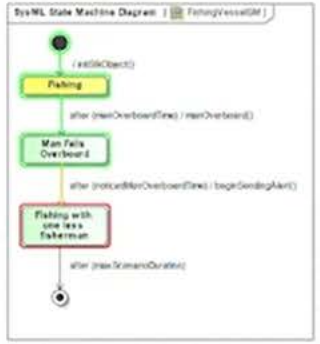
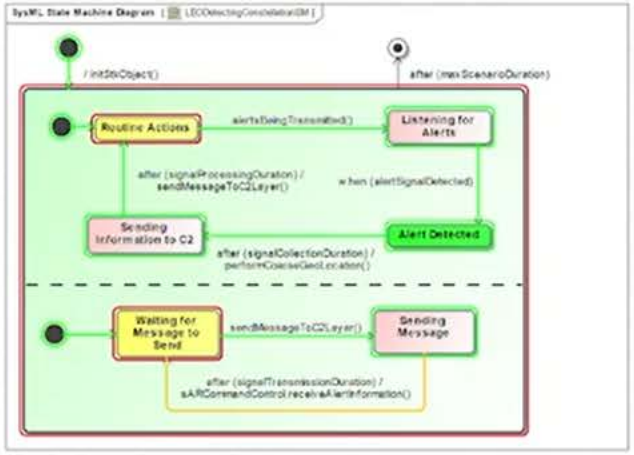
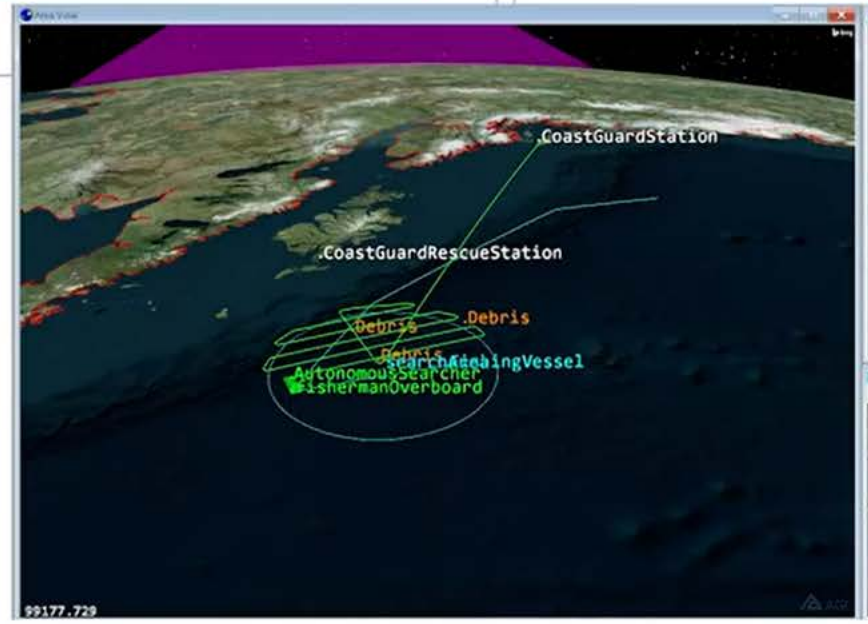


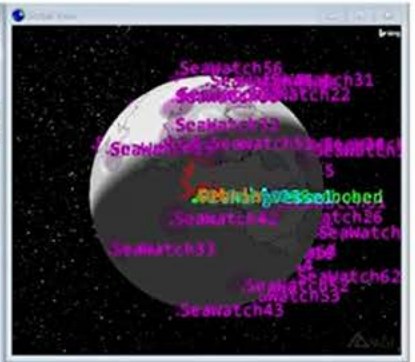


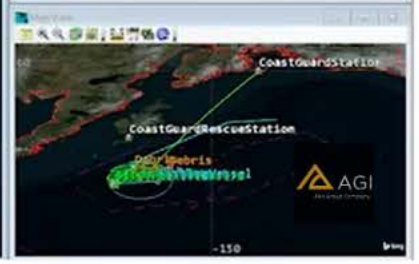










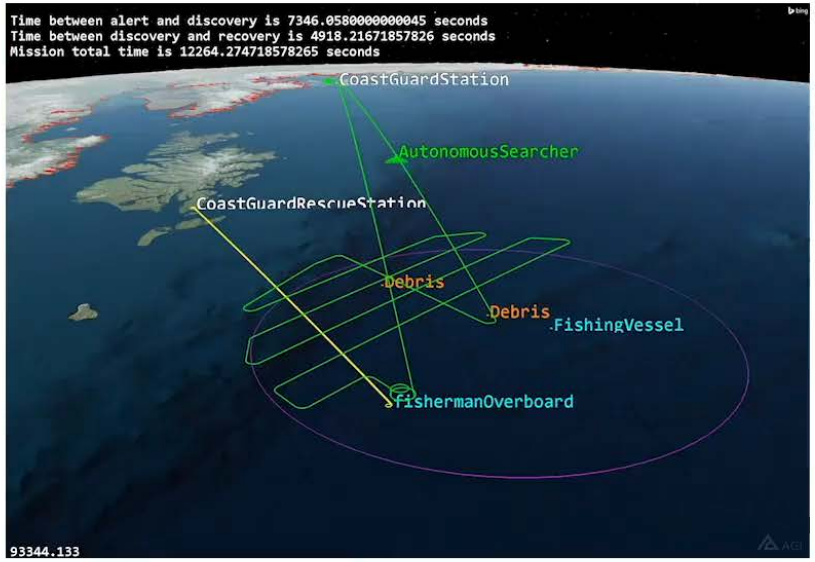


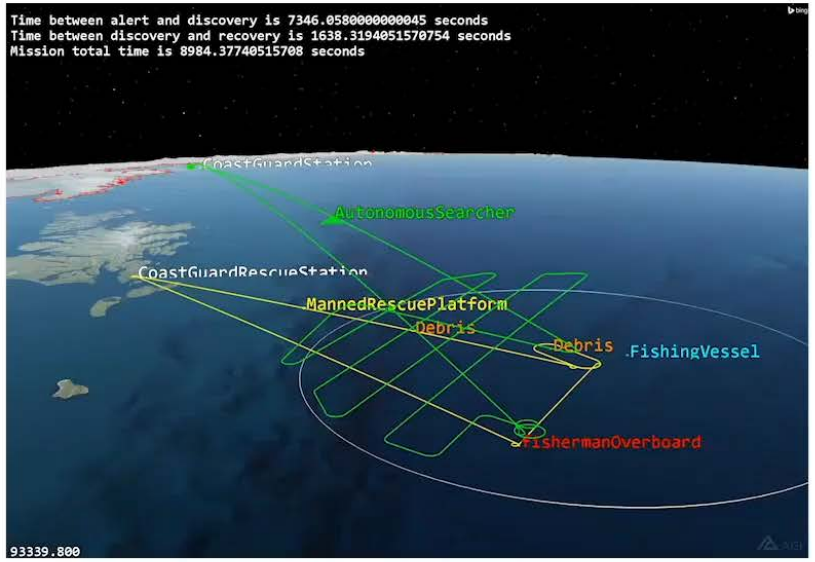
Would you remember which systems depend on which other systems?

What if your ConOps changes?

… or *when* your systems change?

Complexity of being able to define behaviors





Which vehicles do you dispatch first to save a lost fisherman at sea?

What if a small change in the mission plan means life or death?

How many permutations and component systems would you want to explore?

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