

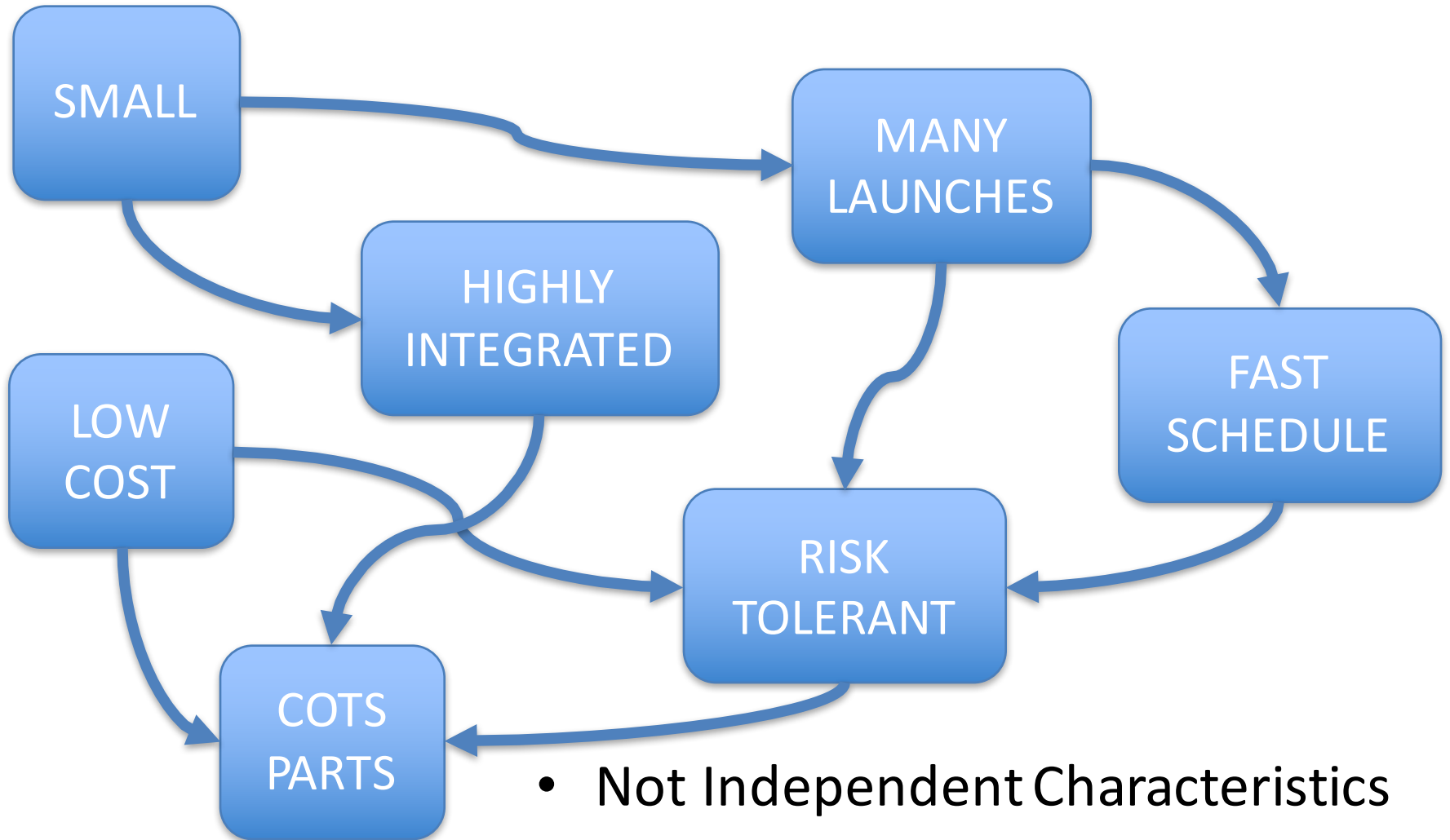
How do we define what we do?

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Founder & CSO: Tyvak Nano-Satellite Systems Inc.

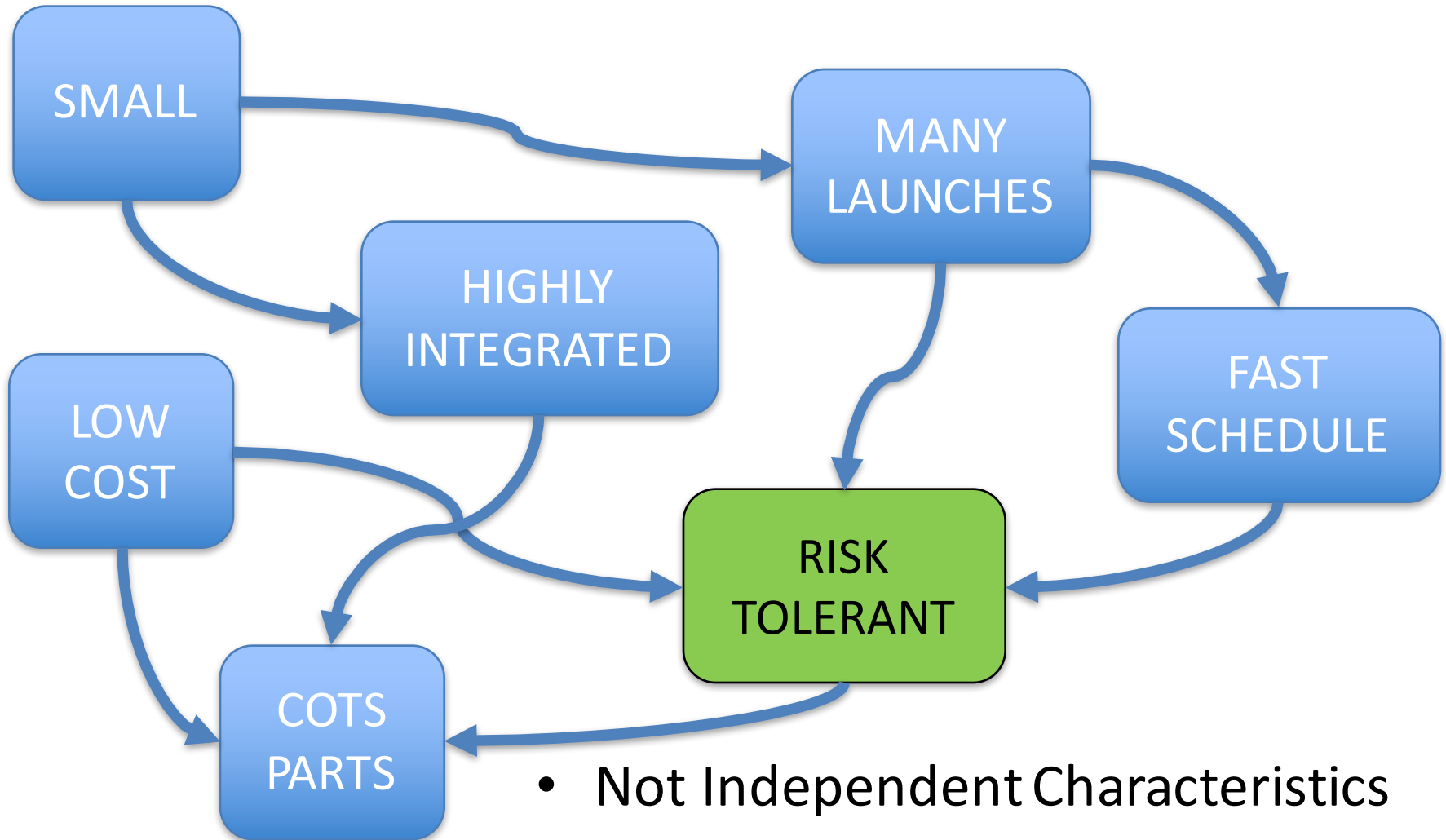
Professor: Aerospace Engineering, Cal Poly SLO

CubeSat key Characteristics



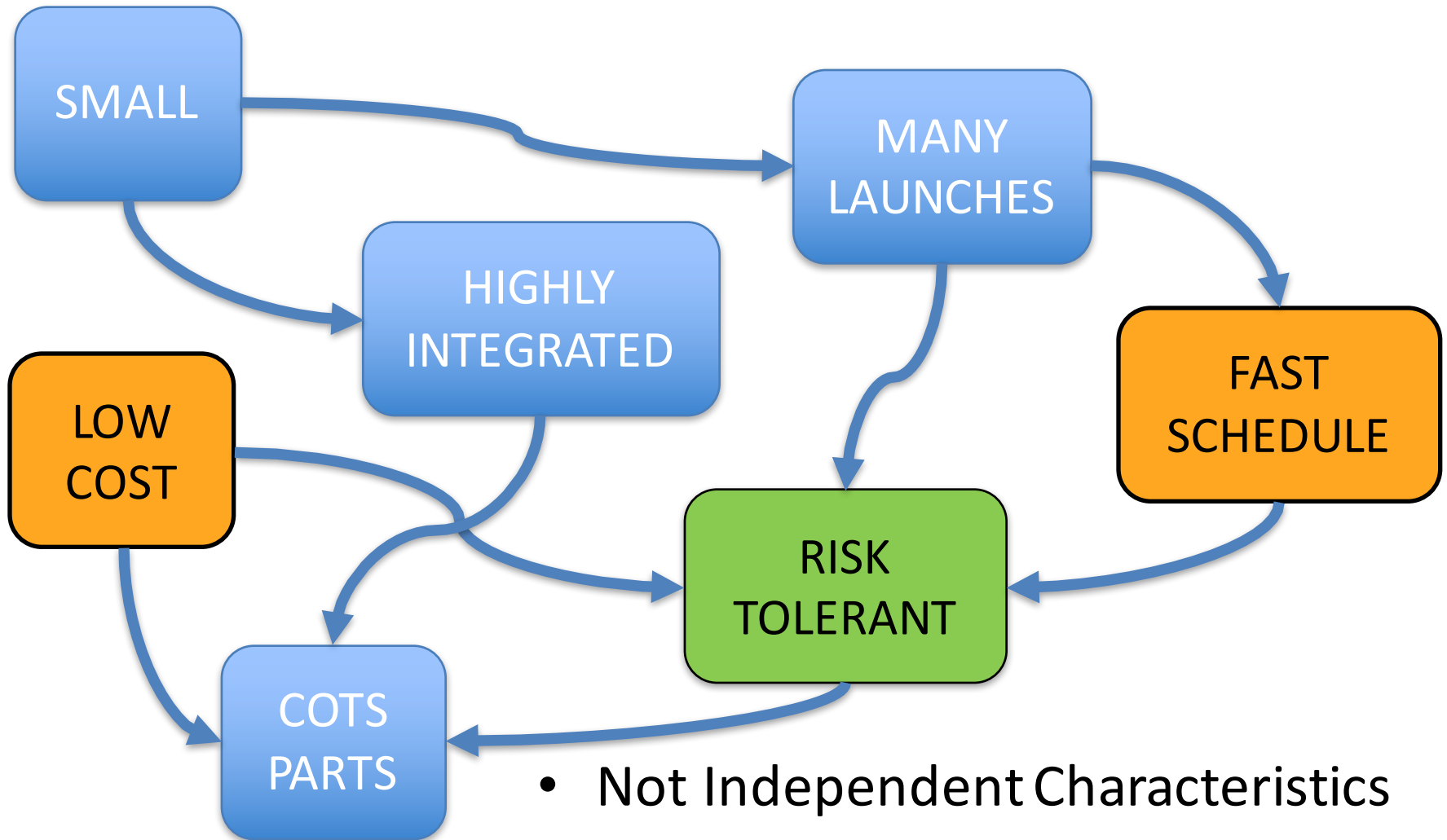
- Not Independent Characteristics

CubeSat key Characteristics



- Not Independent Characteristics

CubeSat key Characteristics



- Not Independent Characteristics

Revolution or Evolution?

- Evolution:
Smaller Spacecraft
- Revolution:
New Way of Doing Space
 - Higher Risk Tolerance
 - More Flexible Launches
 - Higher Numbers
 - Lower Cost / Complexity
 - Standardization
 - COTS Electronics



Observation

- This is not a new thing
 - Surrey, AmSat, Shuttle Gas Can, . . .
- CubeSat took it too new level
 - Standardization
 - Worldwide Interest
 - Electronics Revolution
 - Very High Performance/cost ratio



Problem:

- How do we describe this “new way” of doing space?

Popular definition:

Small Spacecraft

Problem:

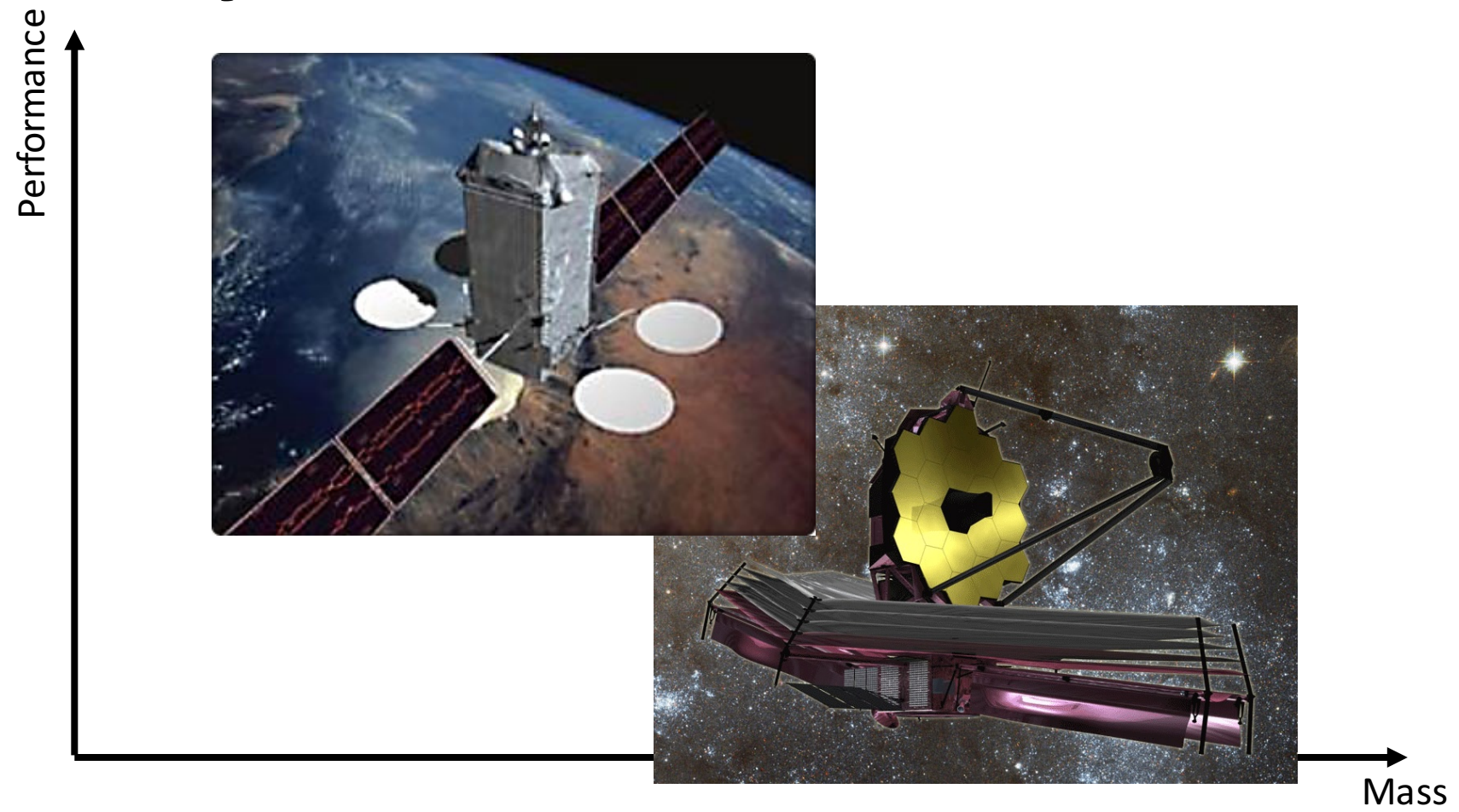
- How do we describe this “new way” of doing space?

Popular definition:

~~Small Spacecraft~~

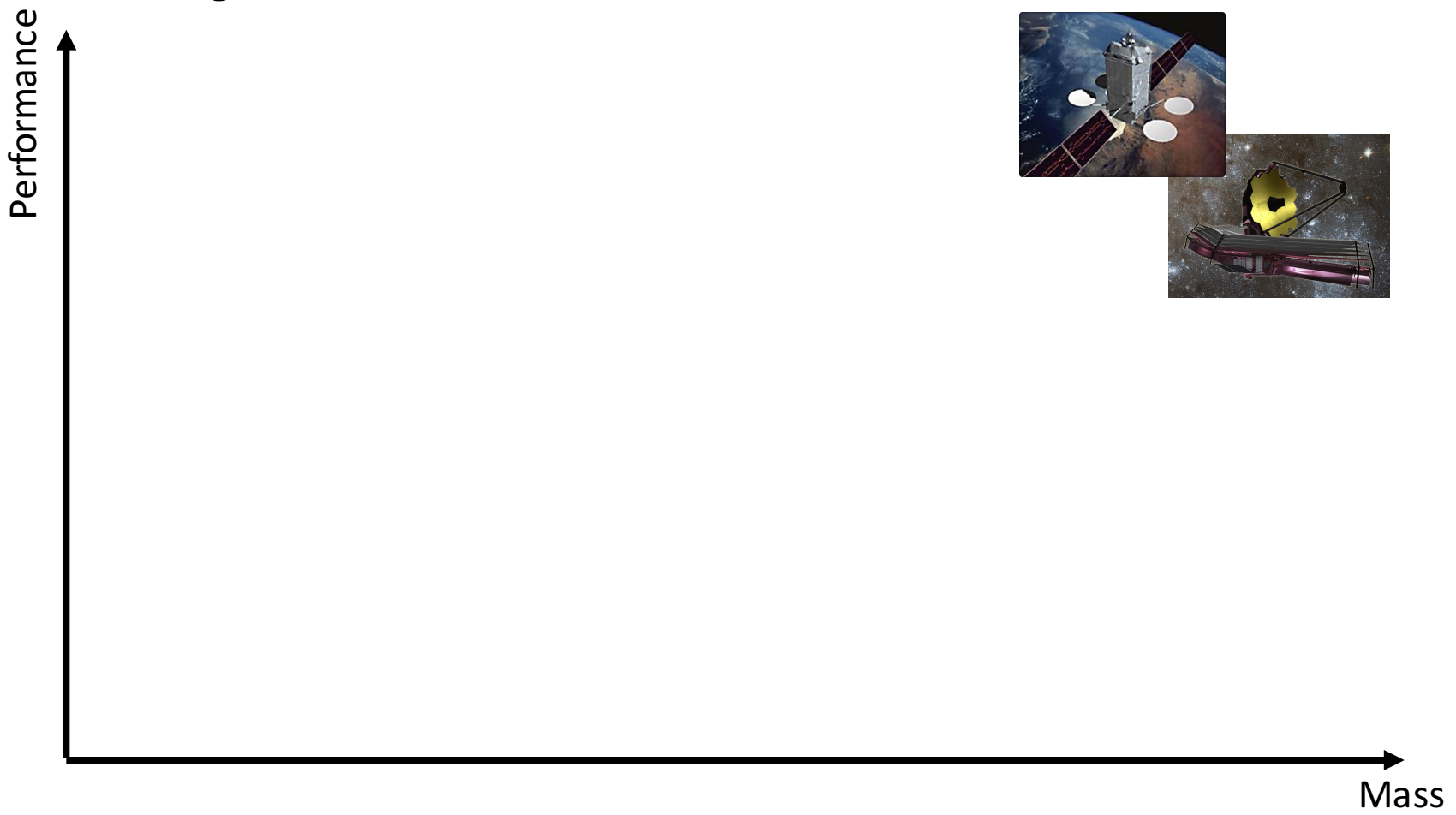
- No Philosophical Approach
- Leads to Confussion

Easy Definition at the Extremes



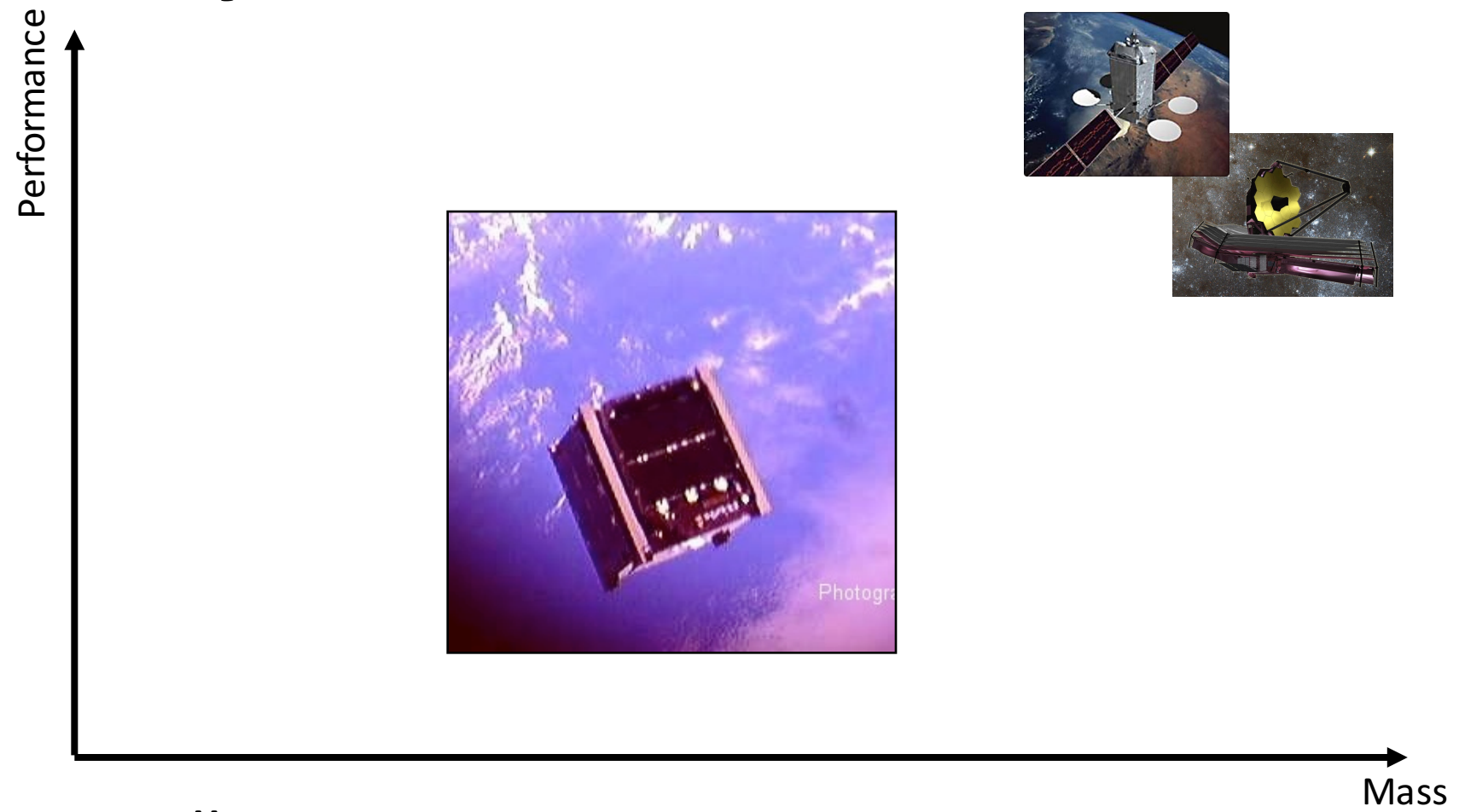
- BIG

Easy Definition at the Extremes



- BIG

Easy Definition at the Extremes



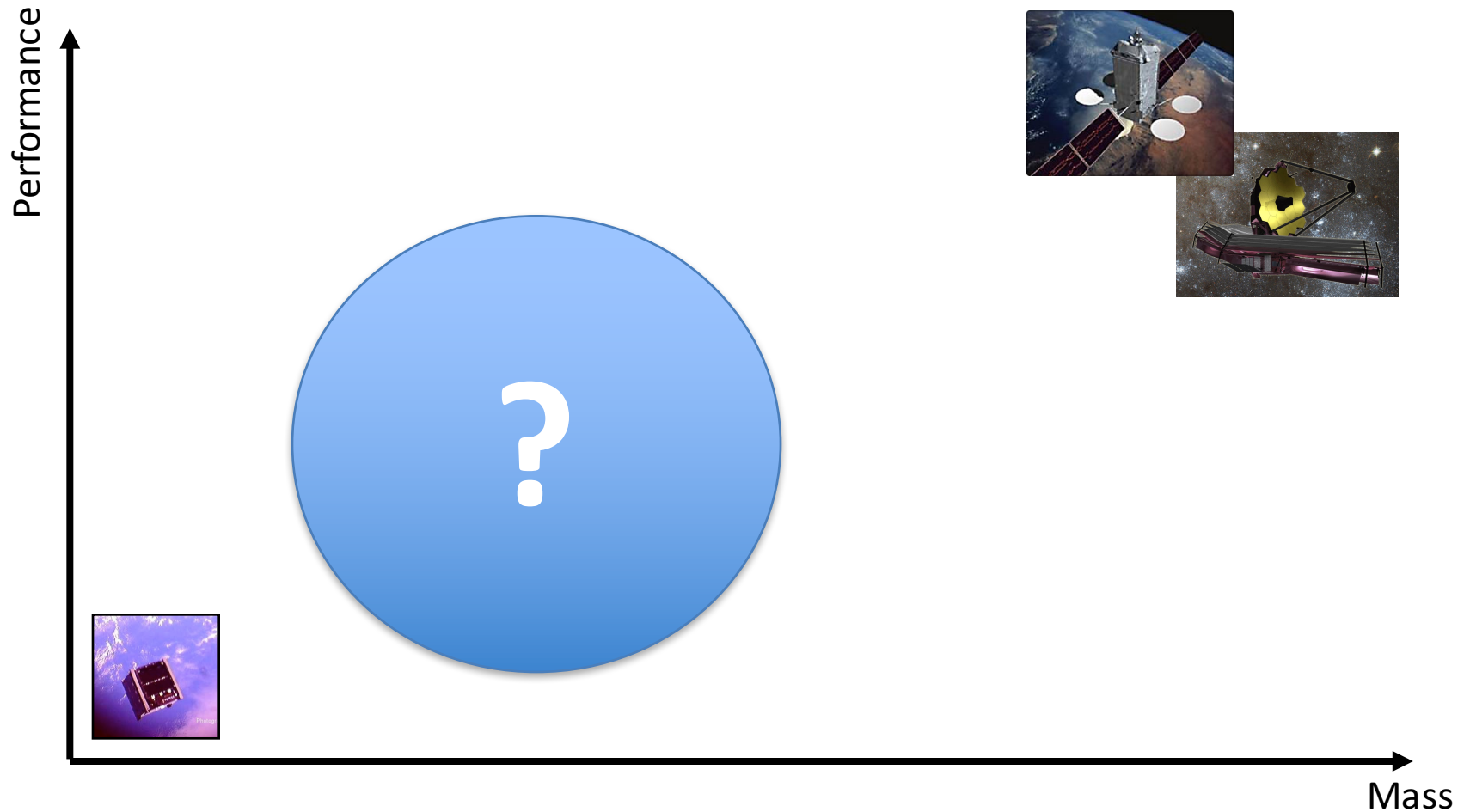
- Small

Easy Definition at the Extremes

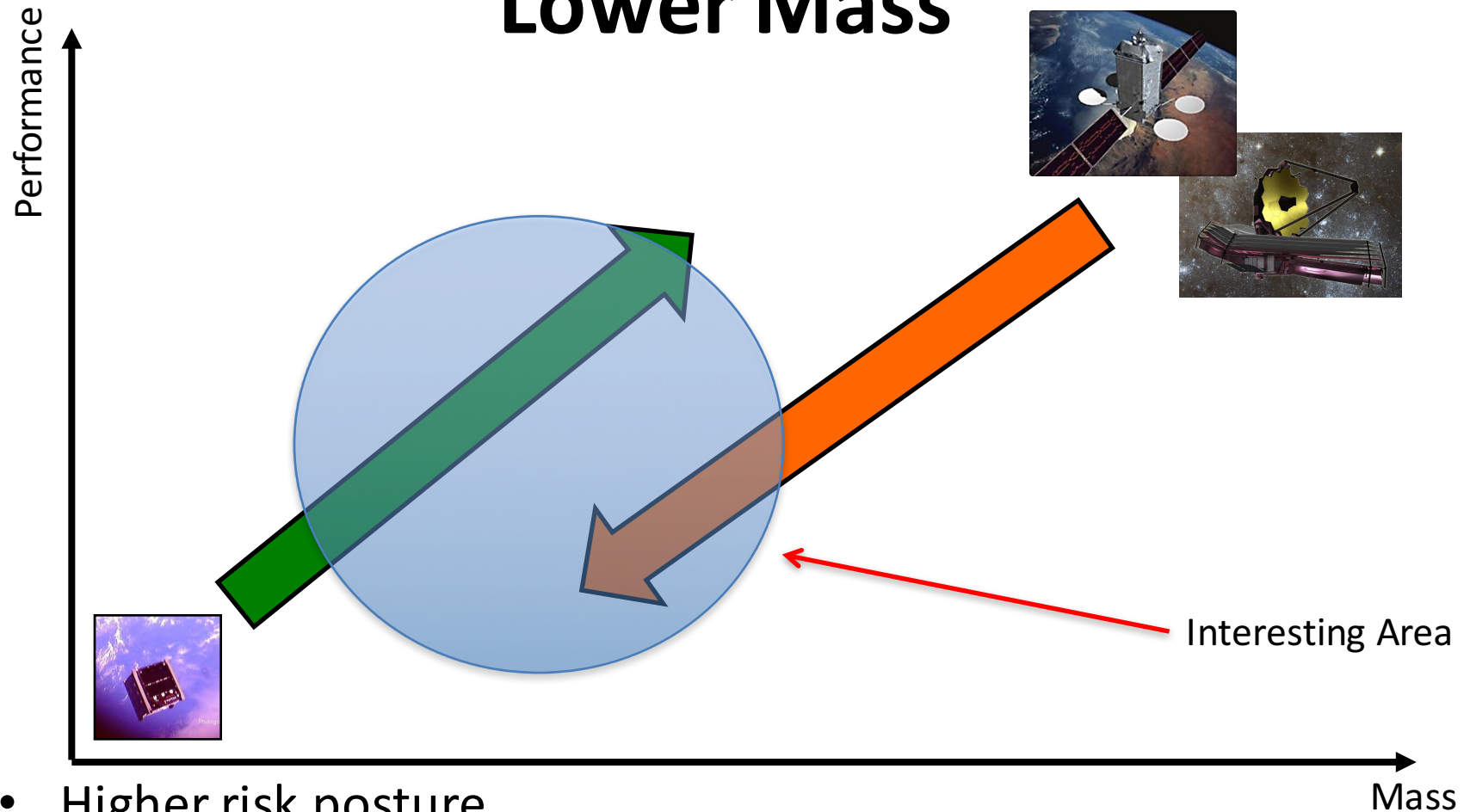


- Small

Harder to Define in Between



Match/Exceed Performance with Lower Mass



- Higher risk posture
- Use of High performance COTS components
- Constellations/Swarms

Realization

- Size is not the key defining factor
- Key factor is development philosophy
 - Need new definition

Proposals:

New Space
Agile Space
Lean Space

Widely Used Lean Concept

- Lean Manufacturing, Lean Management, Lean Enterprise, Lean s/w Development, . . .
- Lean Concepts:
 - Eliminate Waste
 - Increase Efficiency
 - Maximize Value
 - Reduce Cost
- Fits well with our approach

Next Step: Better Define *our* Philosophy

- Involve Global Community
 - Mostly Small Sat Groups
 - Academic, Industry and Gov.
- Develop Specific Processes
 - IAA Study Group
 - ISO Small Sat testing Standard

Conclusions

- CubeSat community demonstrated new philosophy for space development
 - More important than size
- Small Spacecraft is not a good way to define our approach
- Need new terms to describe Development Philosophy
 - Lean?

A large, rectangular solar panel array is shown in space, oriented vertically. The panel is composed of a grid of small, dark solar cells. Three small, rectangular satellite components are attached to the panel. The background is a view of Earth from space, showing blue oceans and white clouds. The text "Thank You" is overlaid in white, bold font in the upper center of the image.

Thank You

Questions?