

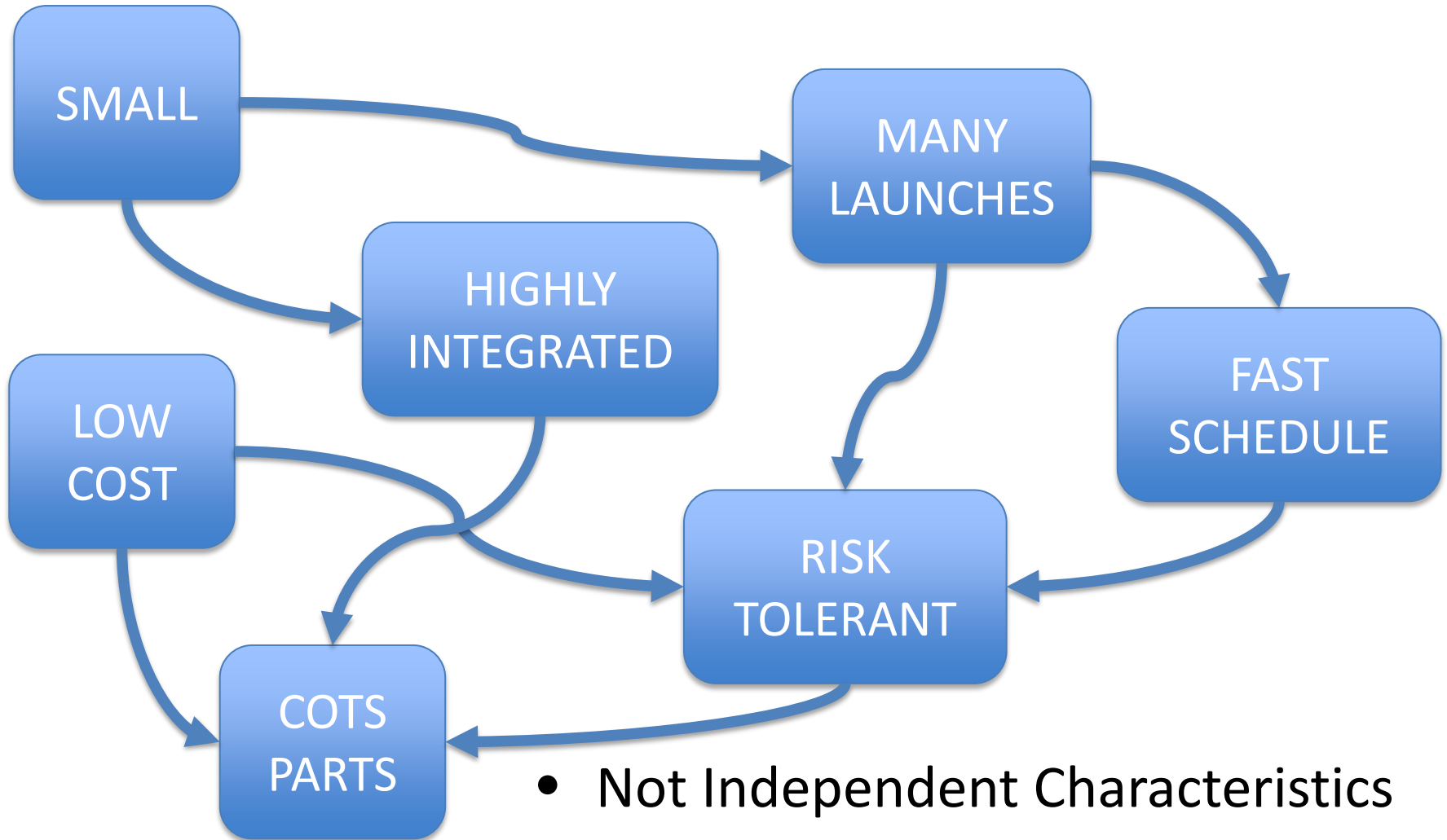
# How do we define what we do?

Jordi Puig-Suari

Founder & CSO: Tyvak Nano-Satellite Systems Inc.

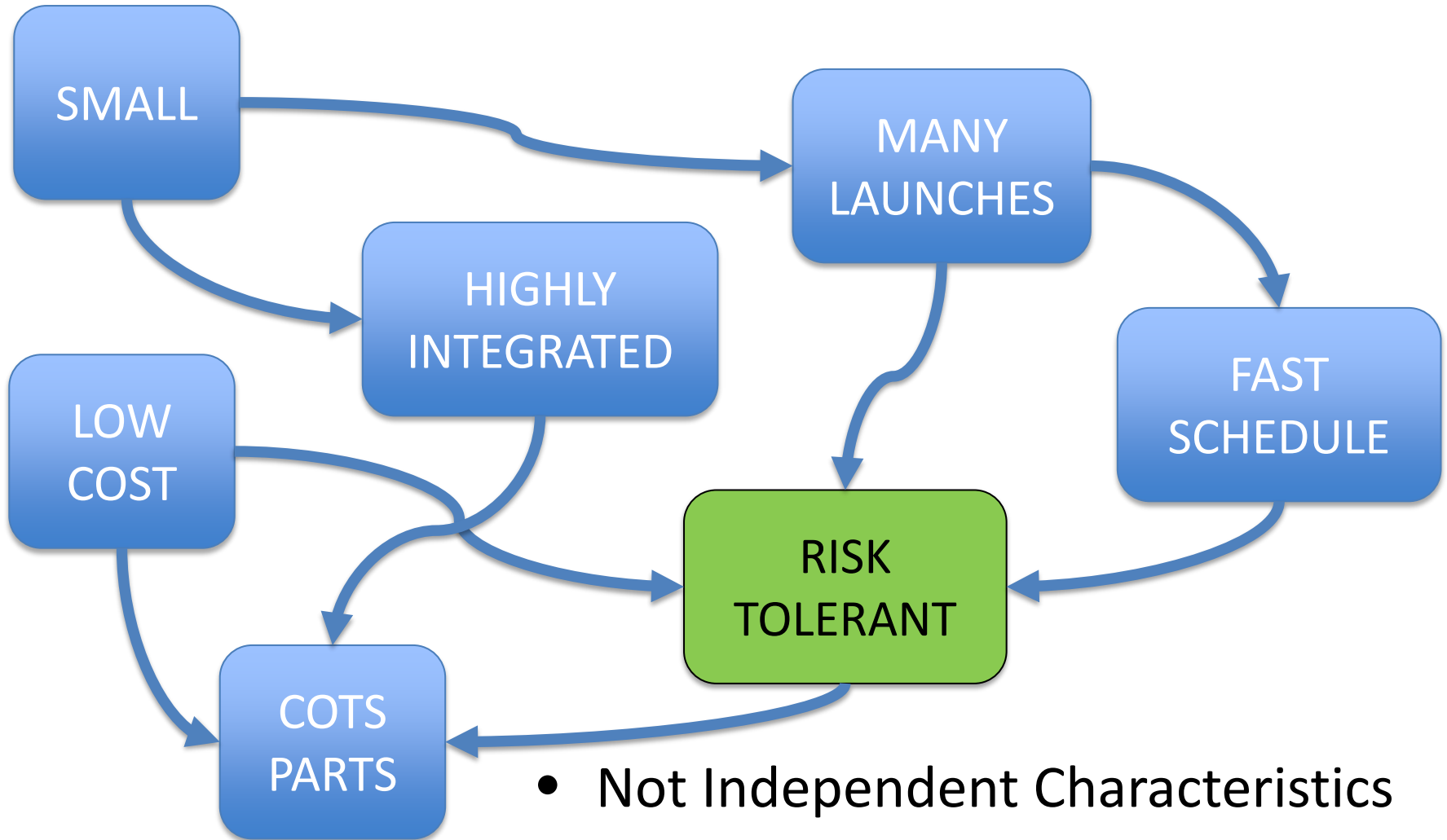
Professor: Aerospace Engineering, Cal Poly SLO

# CubeSat key Characteristics

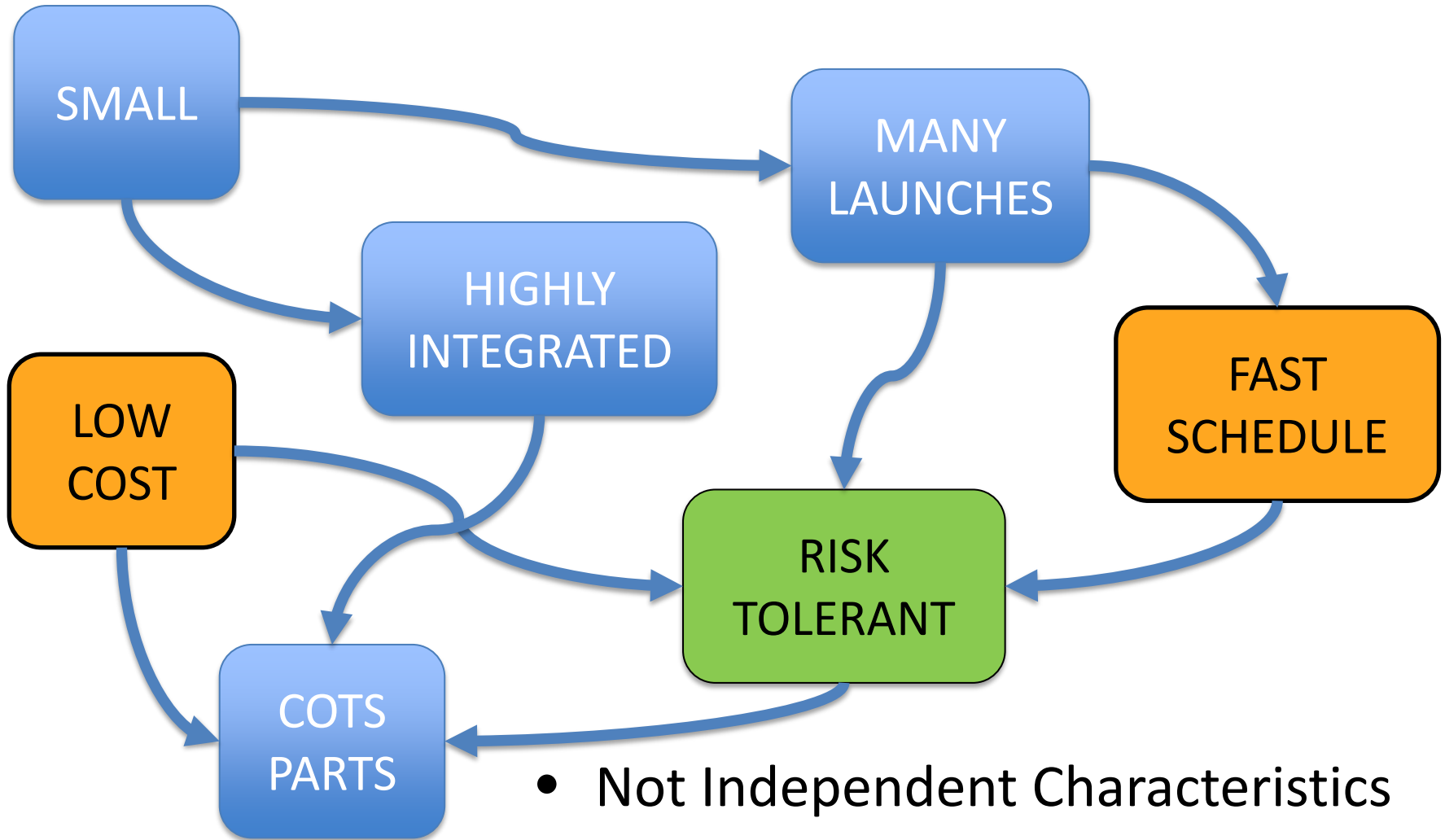


- Not Independent Characteristics

# CubeSat key Characteristics



# CubeSat key Characteristics



- Not Independent Characteristics

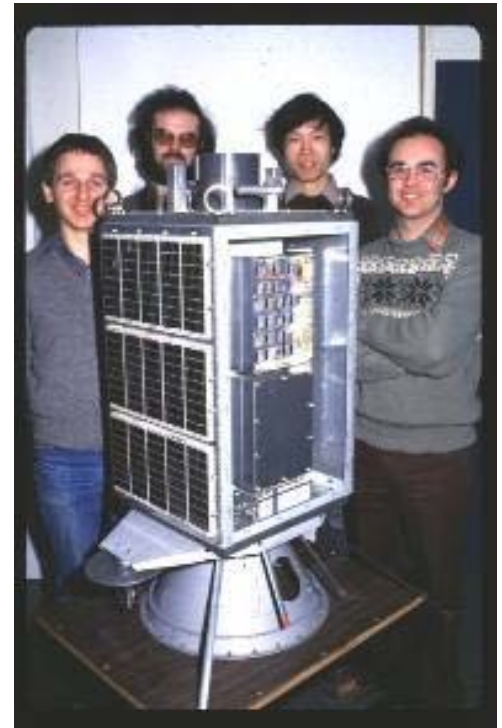
# Revolution or Evolution?

- 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?

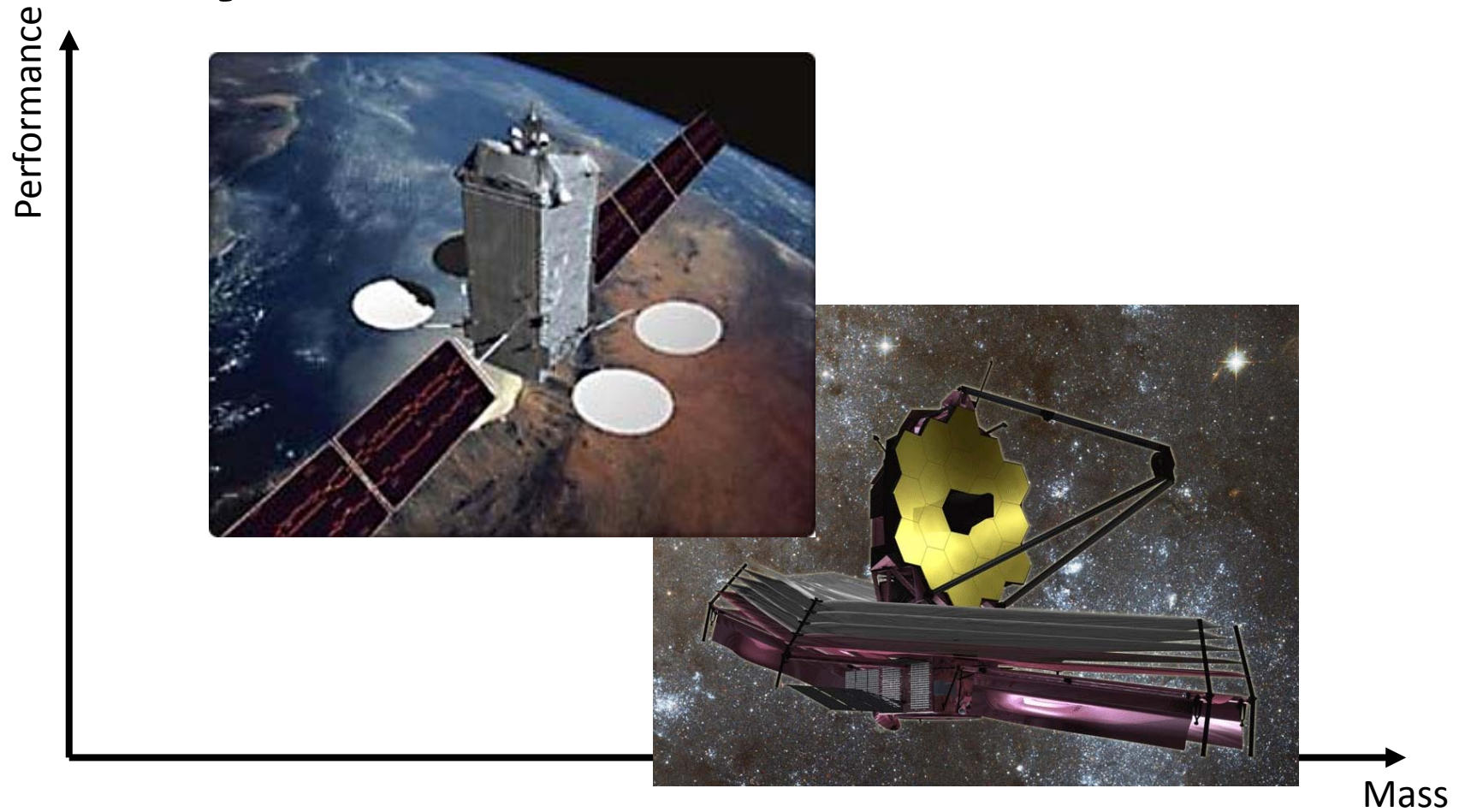
Popular definition:

~~Small Spacecraft~~

- No Philosophical Approach
- Leads to Confussion

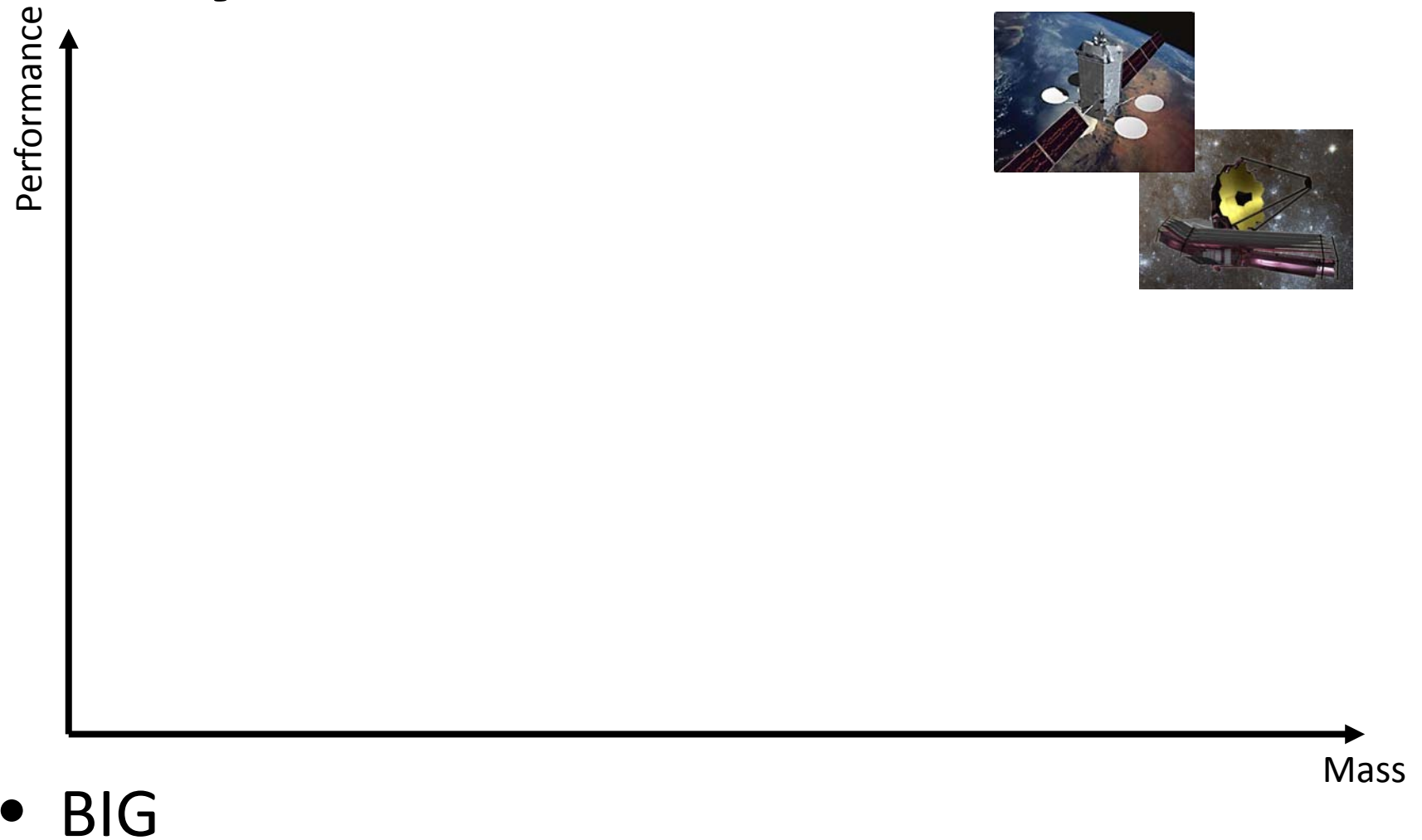


# Easy Definition at the Extremes

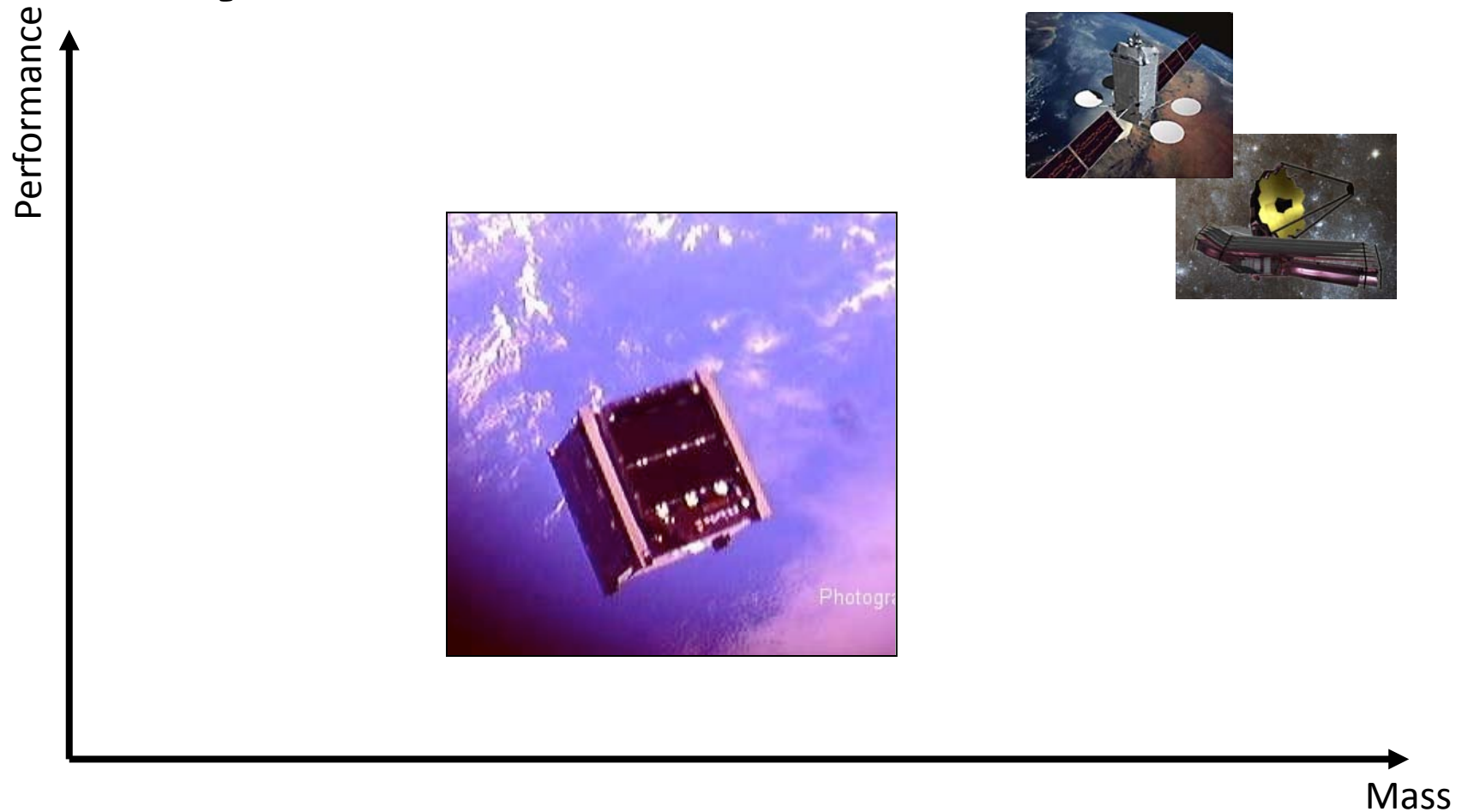


- BIG

# Easy Definition at the Extremes

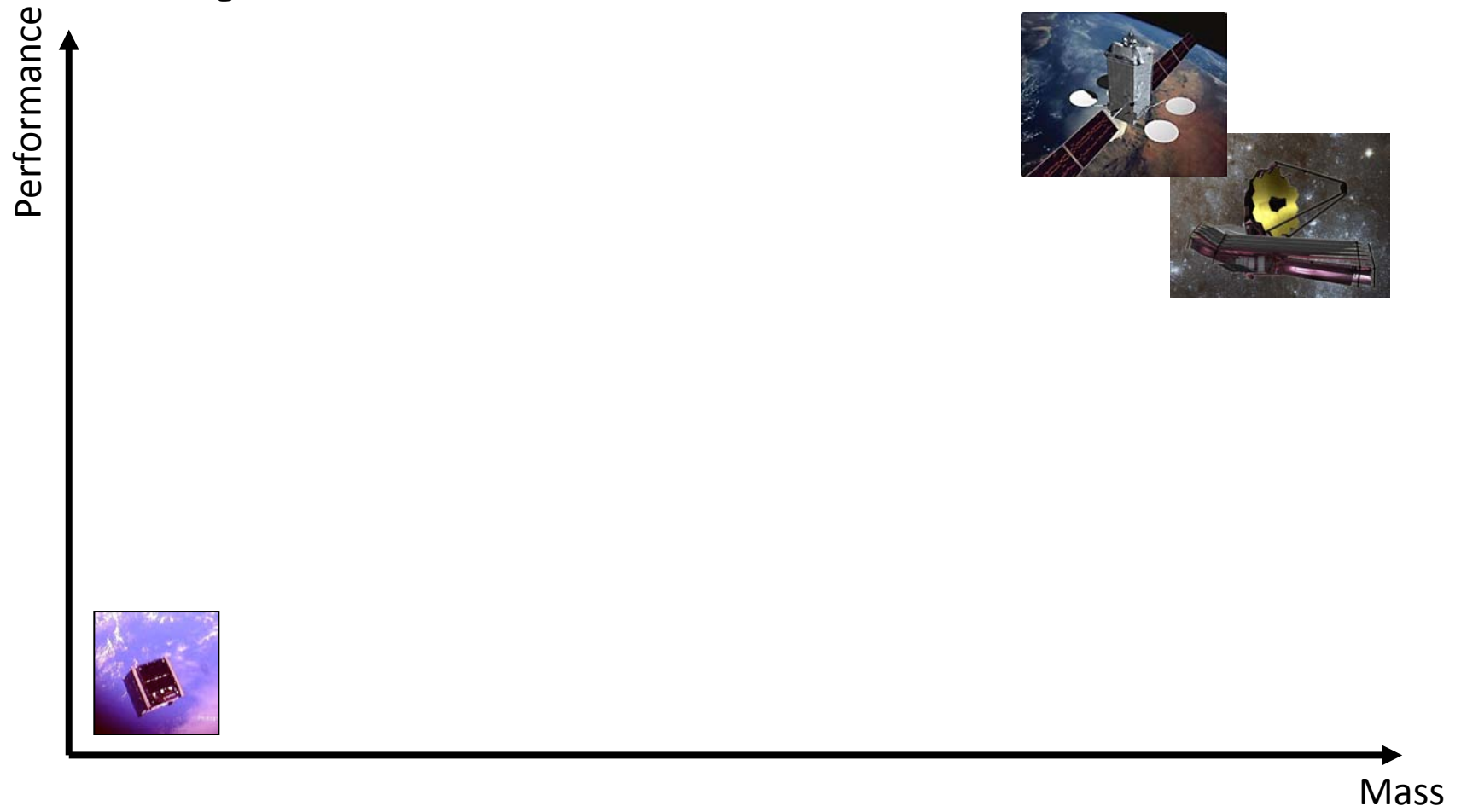


# Easy Definition at the Extremes



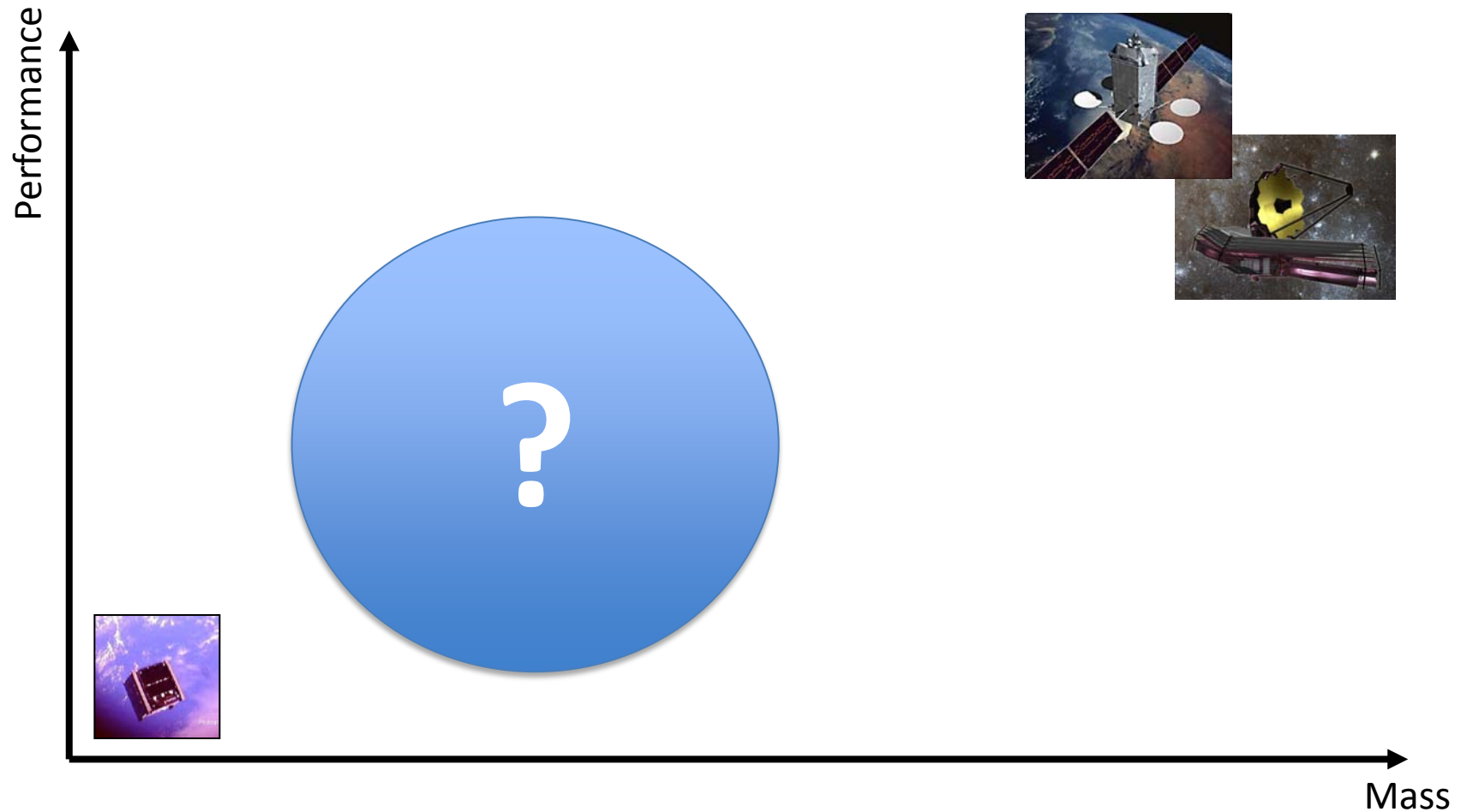
- Small

# Easy Definition at the Extremes

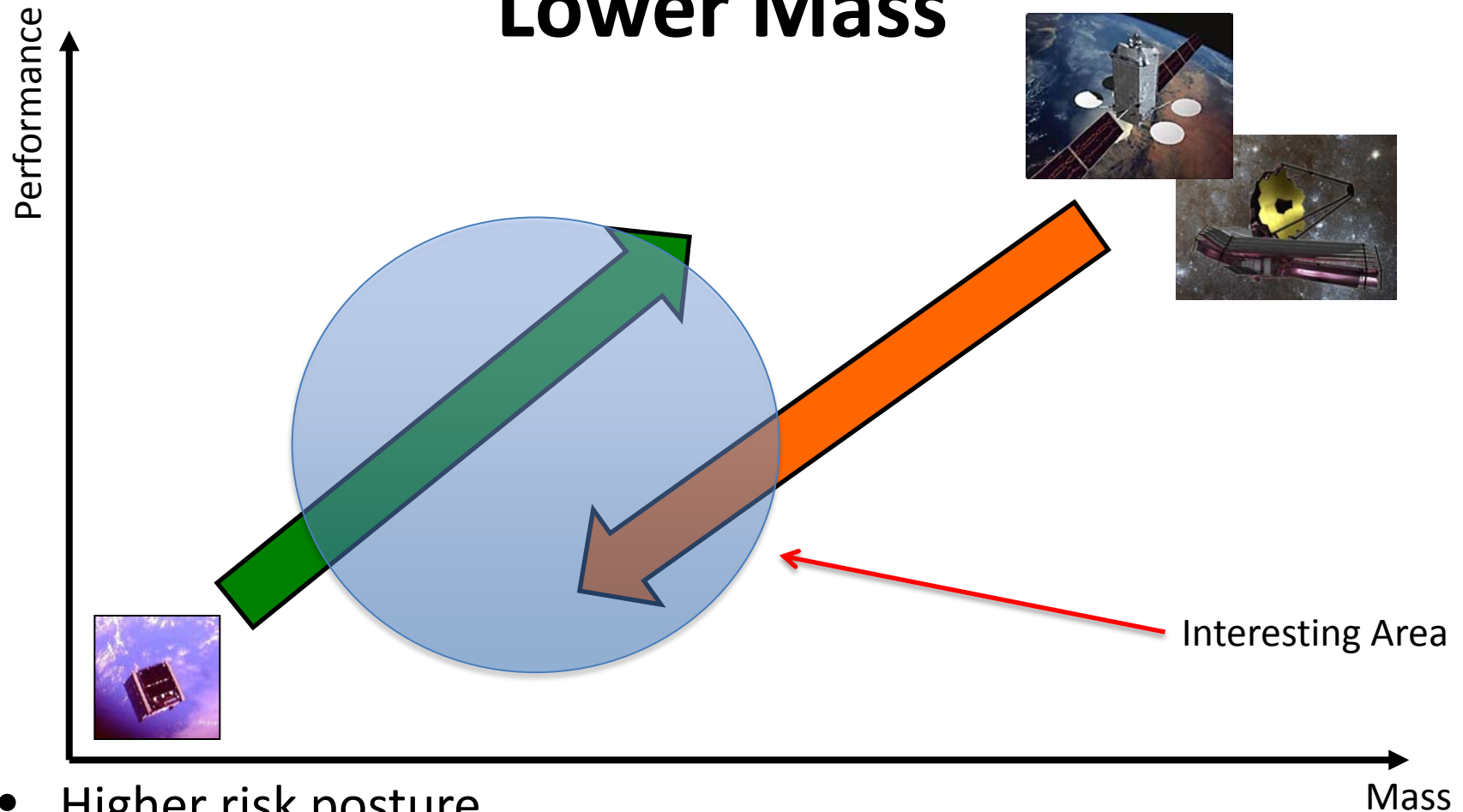


- Small

# 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?



**Thank You**

**Questions?**