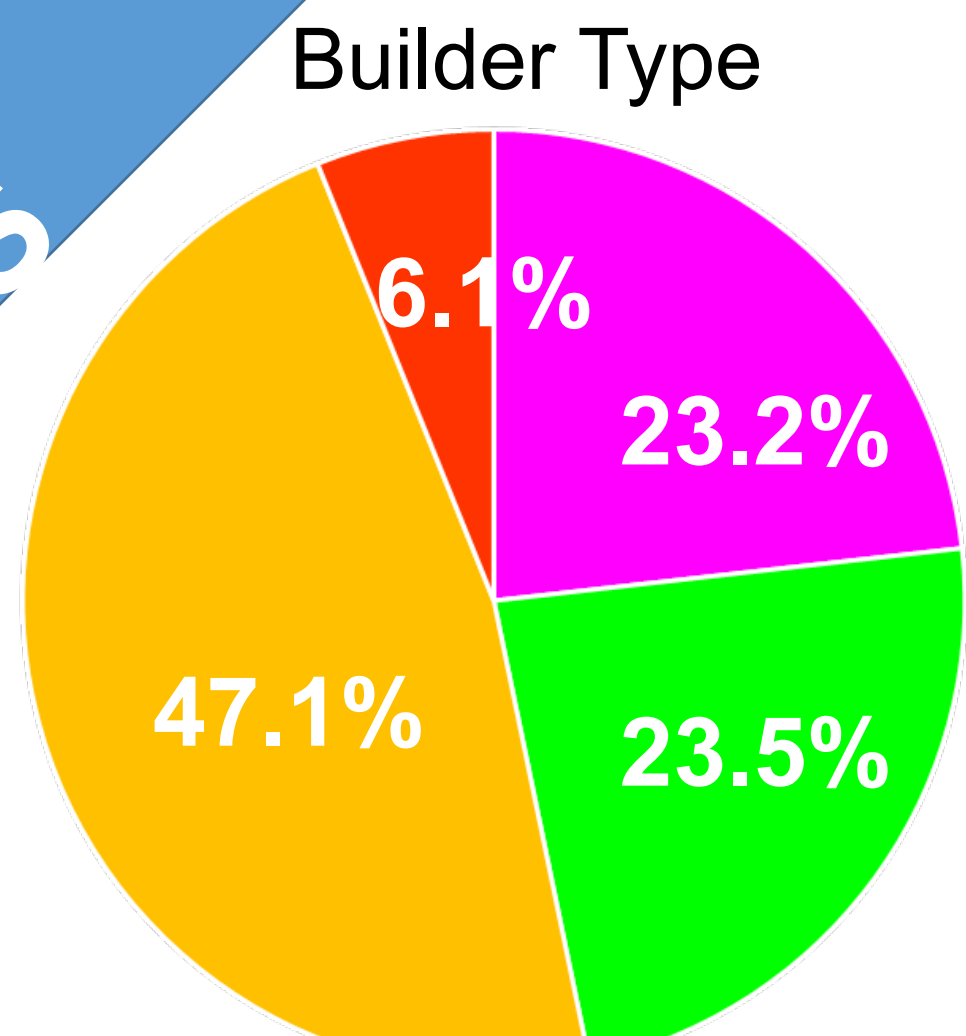


SHARE YOUR THOUGHTS

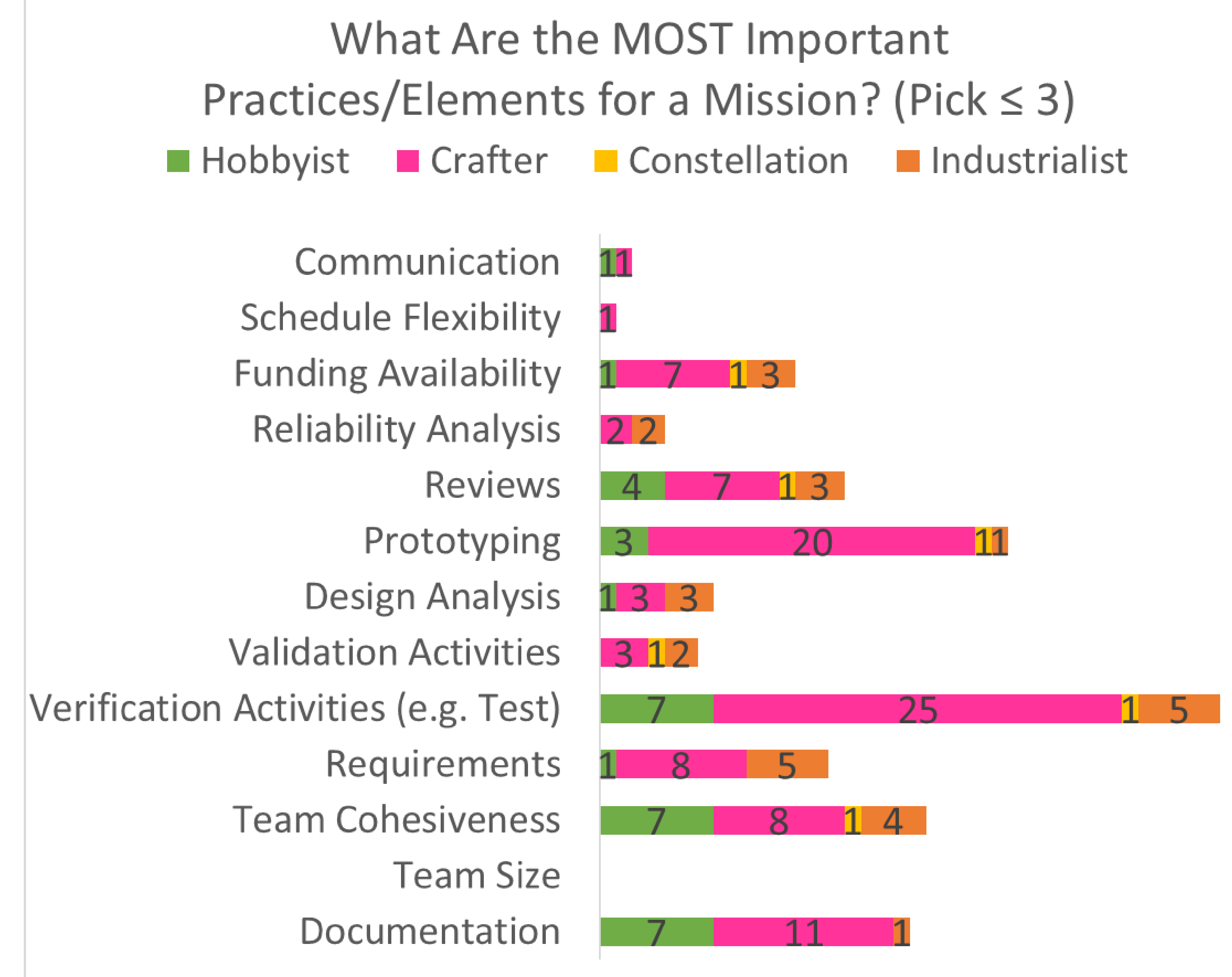
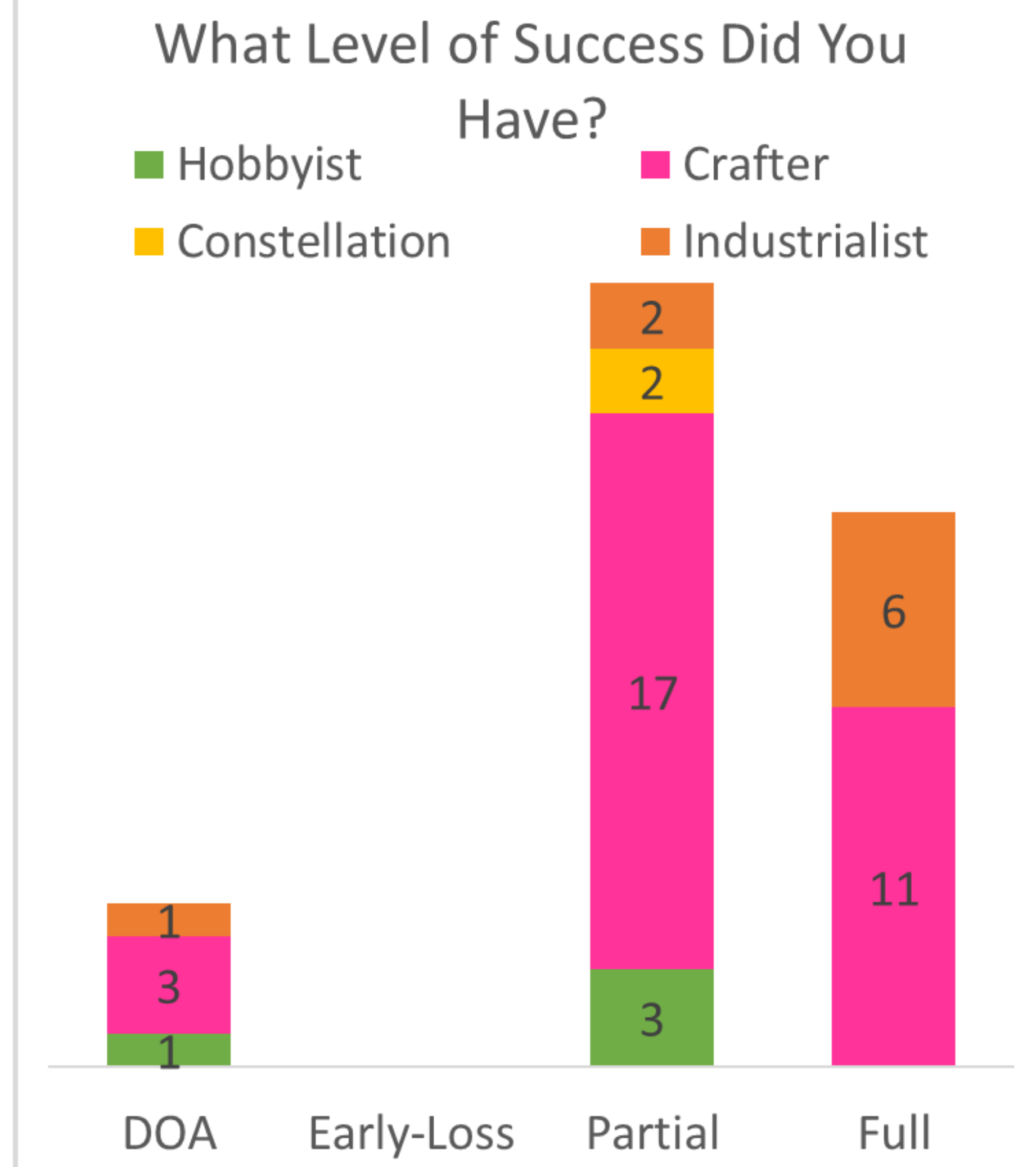
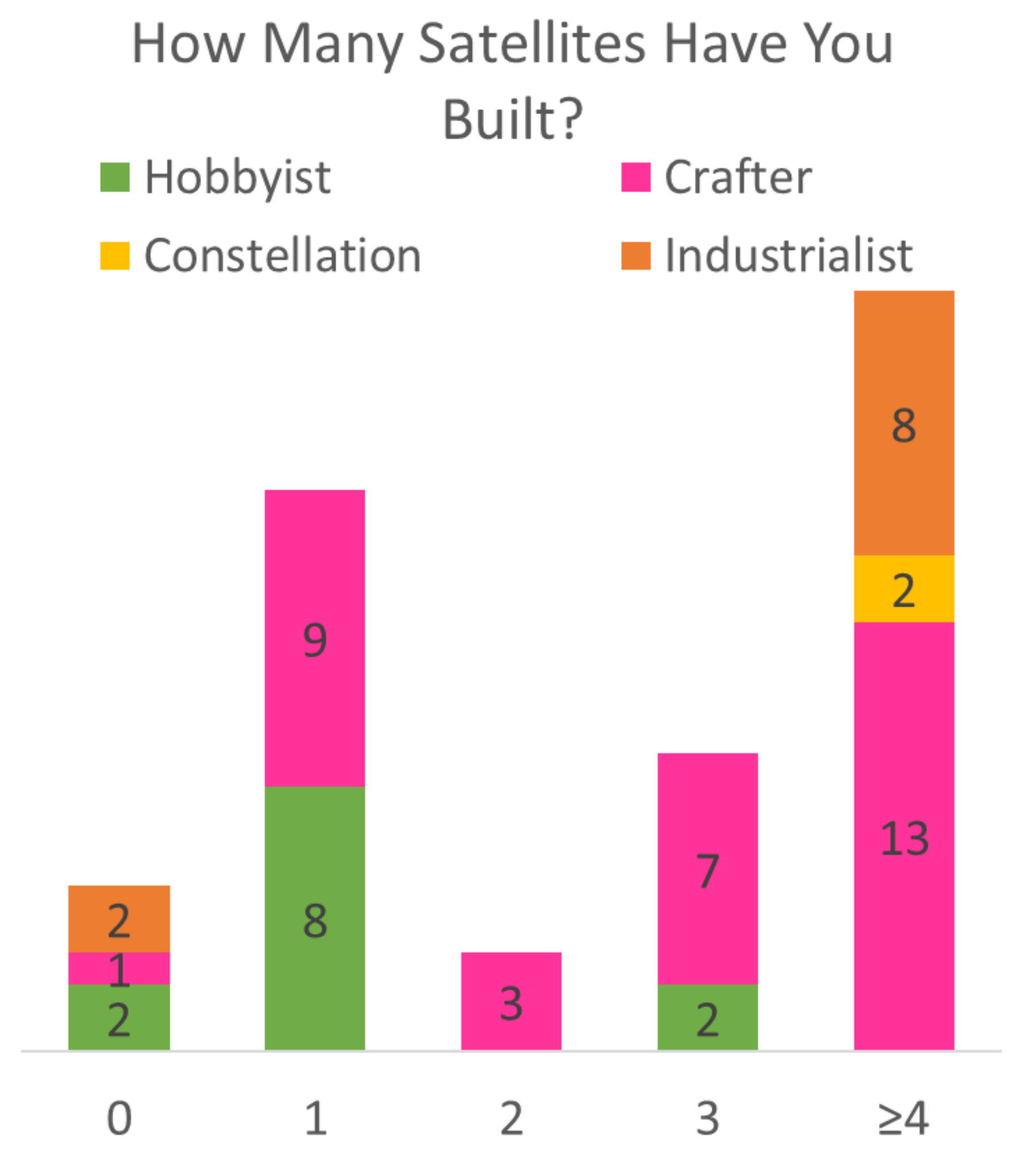


Hobbyists: no real experience; ad hoc practices
Crafters: experienced builder of small spacecraft; streamlined practices, experientially developed
Constellations: geographically-distributed service
Industrialists: experienced builder of big spacecraft; standard space system practices, with some truncation



Of 915 CubeSats reaching orbit from 2000-2018
 Swartwout, M., "CubeSat Mission Success: Are We Getting Better?,"
 Proceedings of the CubeSat Developers' Workshop, CalPoly, 23 April 2019

Results collected during a 3 hour poster session at the SmallSat Conference 2019. This represents a limited, but in person, set of responses from attendees.

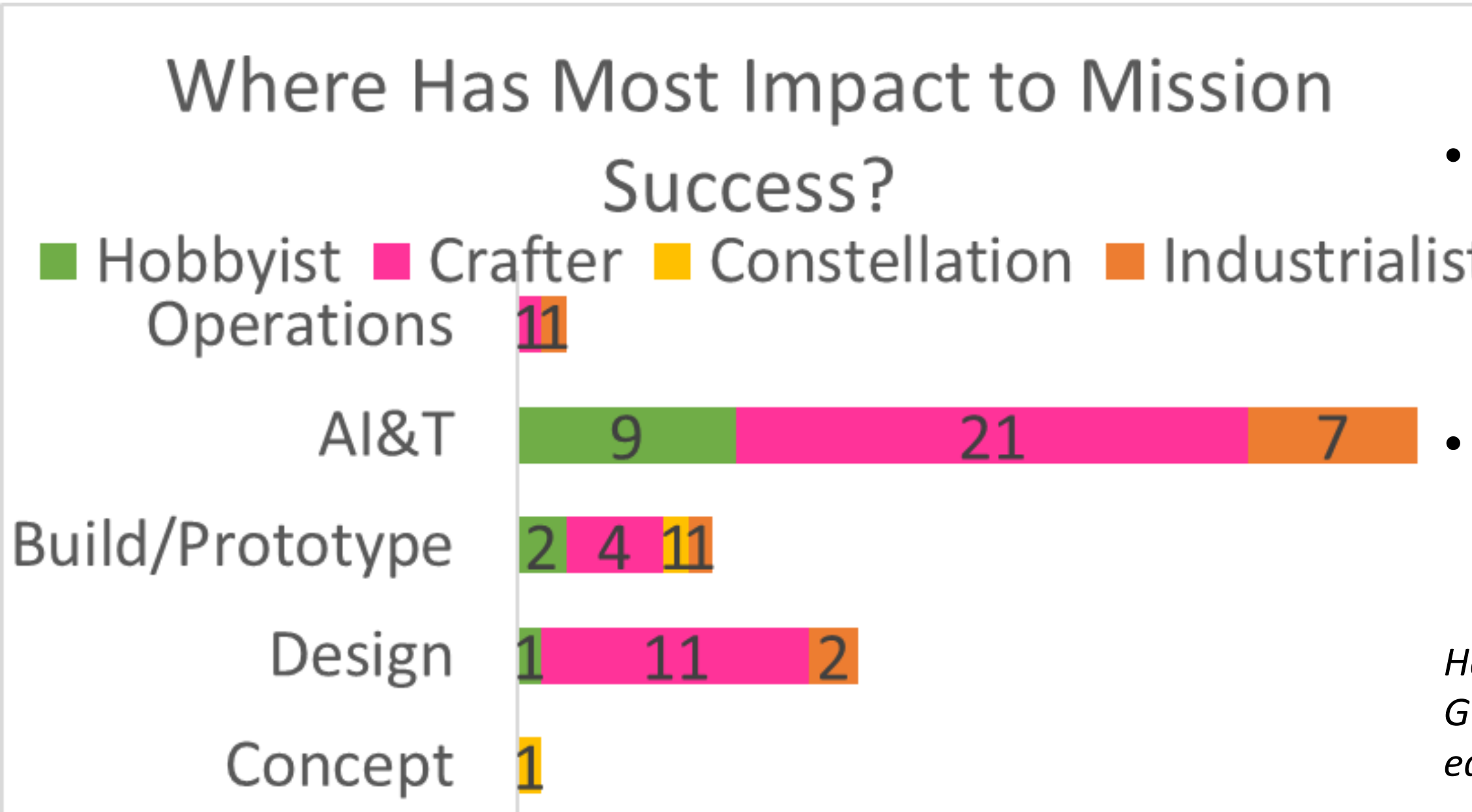
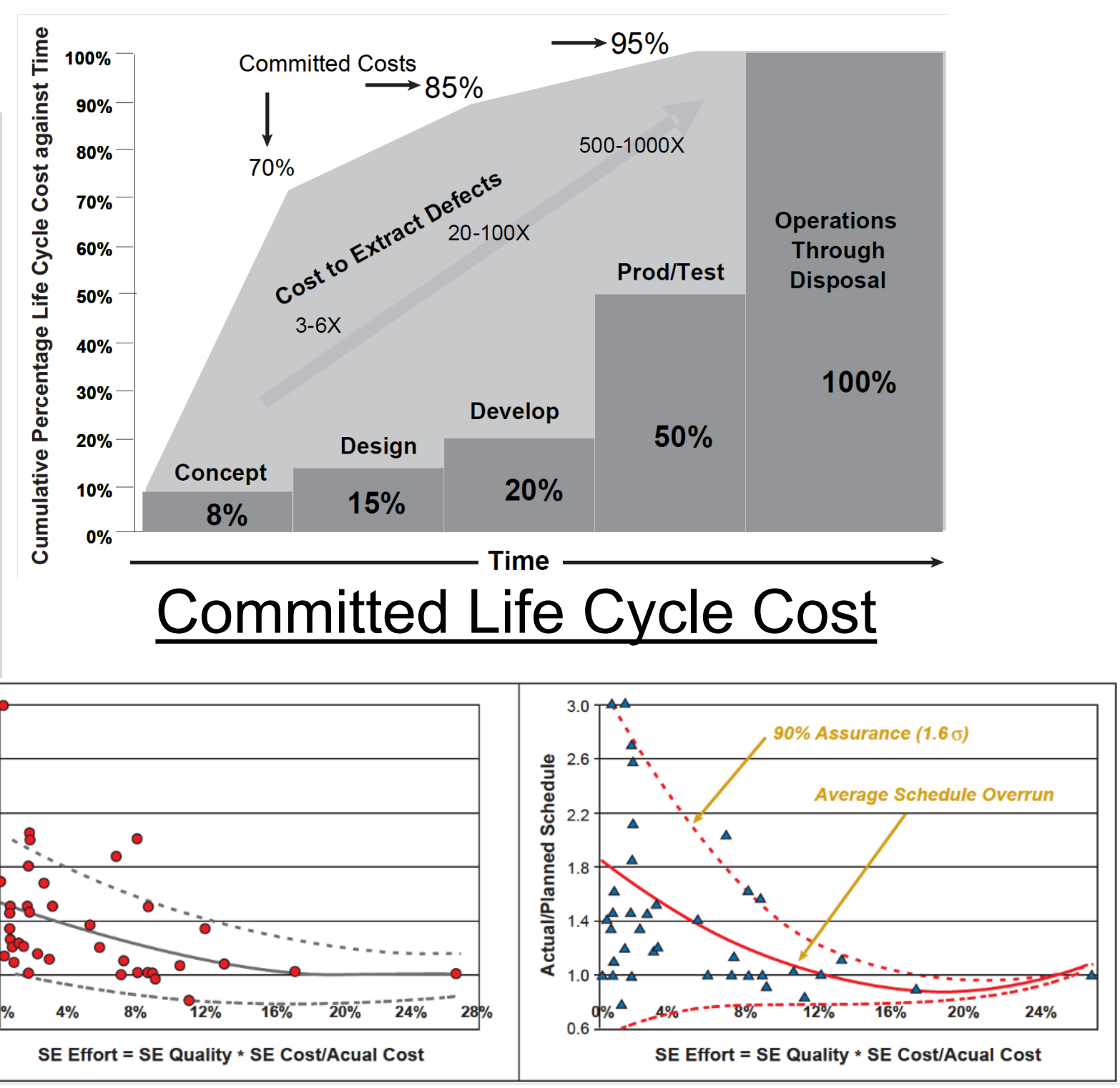
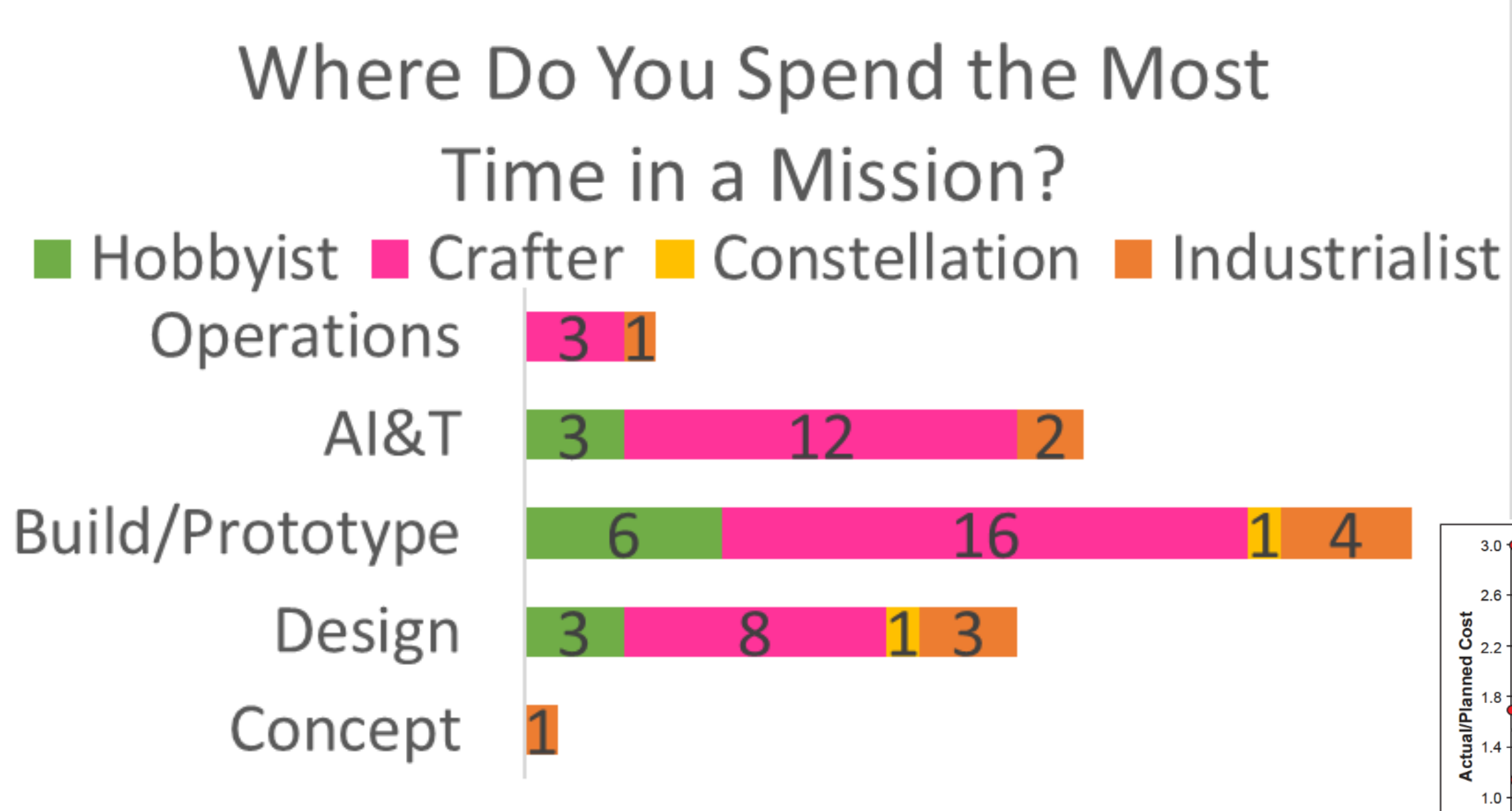


DO SMALL SATELLITES NEED NEW SYSTEM ENGINEERING AND MISSION ASSURANCE PARADIGMS?

Constraint-Based Mission Assurance for Small Satellites

Lee Jasper; Space Dynamics Laboratory
 Lauren Hunt, Charlie Jacka, Kate Yoshino; Air Force Research Laboratory

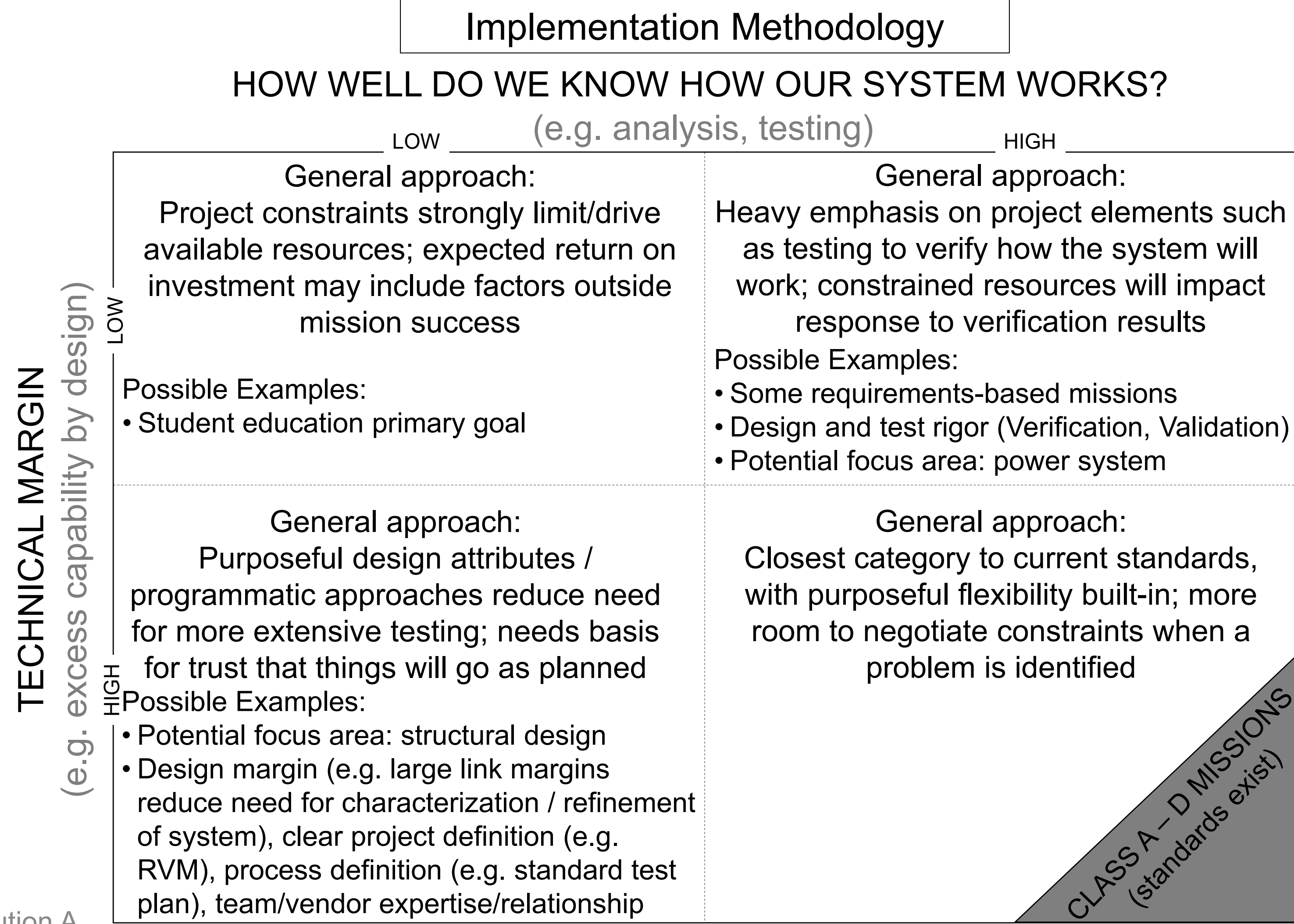
- IF small satellites really should be faster & cheaper, THEN the scope of the mission and its development activities should focus on highest impact practices
- Standards must be widely applicable and produce consistent results. The best we can achieve right now for constraint-based small satellites is to strive for normative satellite behaviors and/or consistent project processes.



Cost and schedule overrun

- Most cost is committed early in a project and the consequence of correcting problems increases greatly as a program proceeds.
- Early SE effort helps reduce cost and schedule variability and overall overruns experienced

Haskins, Cecilia, editor. Systems Engineering Handbook. A Guide for System Life Cycle Processes and Activities. 3rd ed., International Council on Systems Engineering, 2006.



Demonstrated Level of Capability	Implication
Do No Harm	DOA is ok (education and/or fully constrained and not requirement driven)
Survival	Not DOA (power + low-rate comm). May have no higher level functionality
Minimum Functionality	Min. Mission Success. Mission Recoverable in event of fault: Ex: LEOPS/start up Ex: Maintain Formation
Nominal (payload performance driven by constraints)	Full Mission Success. Full Functionality
Nominal (payload performance driven by requirements)	Full Mission Success. Full Functionality