

Space Solar Power: Creating Opportunities for Cooperation/Collaboration

Michael Swartwout
Saint Louis University

2017 International Space Development Conference

25 May 2017



SAINT LOUIS UNIVERSITY

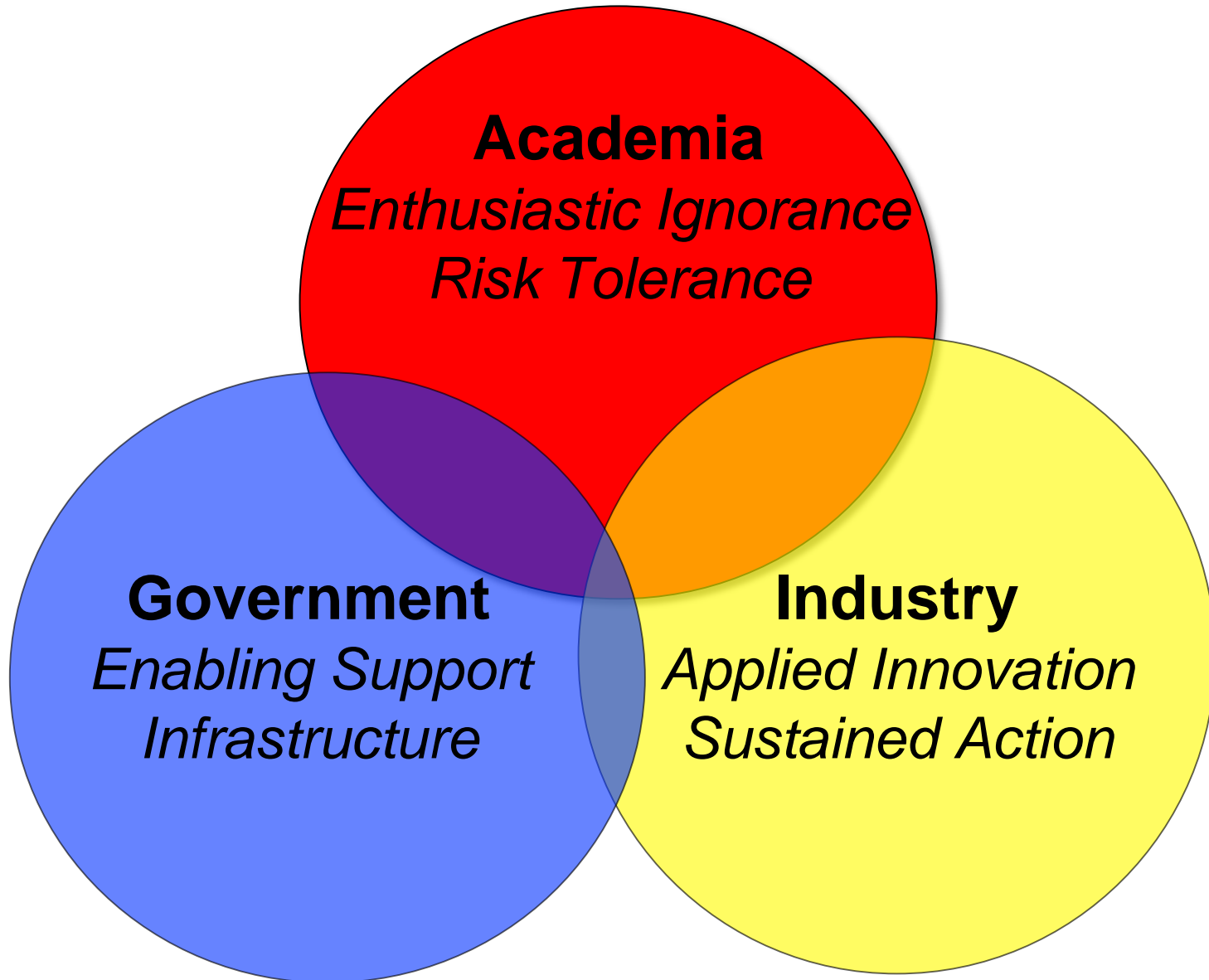
—
PARKS COLLEGE OF ENGINEERING,
AVIATION AND TECHNOLOGY

Space is Hard Work

1. Launch is the primary driver of (and obstacle against) all space activities
2. Physics is philosophically opposed to space flight
(and so launch is the obstacle)
3. Nothing ever works the first time you try it
(and so launch is the obstacle)
4. There is never enough time or money to do everything you want before launch
(and so launch is the obstacle)
5. Fear governs all decisions
(and so launch is the obstacle)



Matching Opportunity to Capability

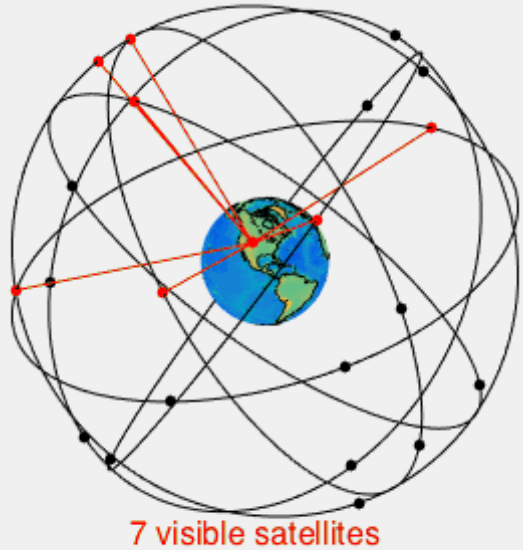


Industry - Academic Partnerships

- Directed research (contracts)
- Licensed inventions (patents)
- Professional training (internships)
- Startups/spinoffs (Google)

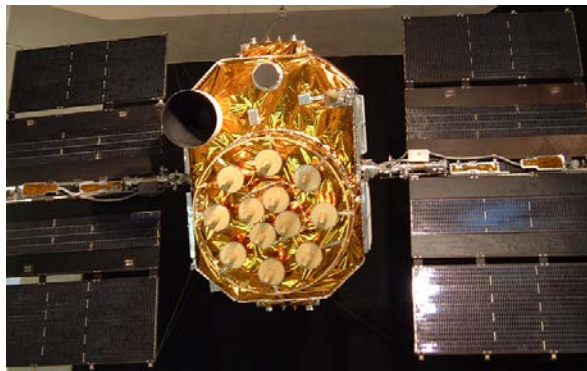


Government - Industry: GPS



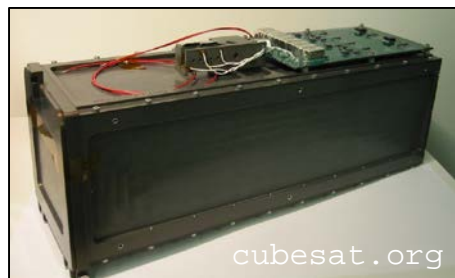
source: Wikimedia commons

1. Defense Department defines requirements for global navigation system (1973)
2. DoD contracts with Rockwell to launch first block (1978)
3. DoD expands signals and capabilities, increases number of contractors (1978-present)



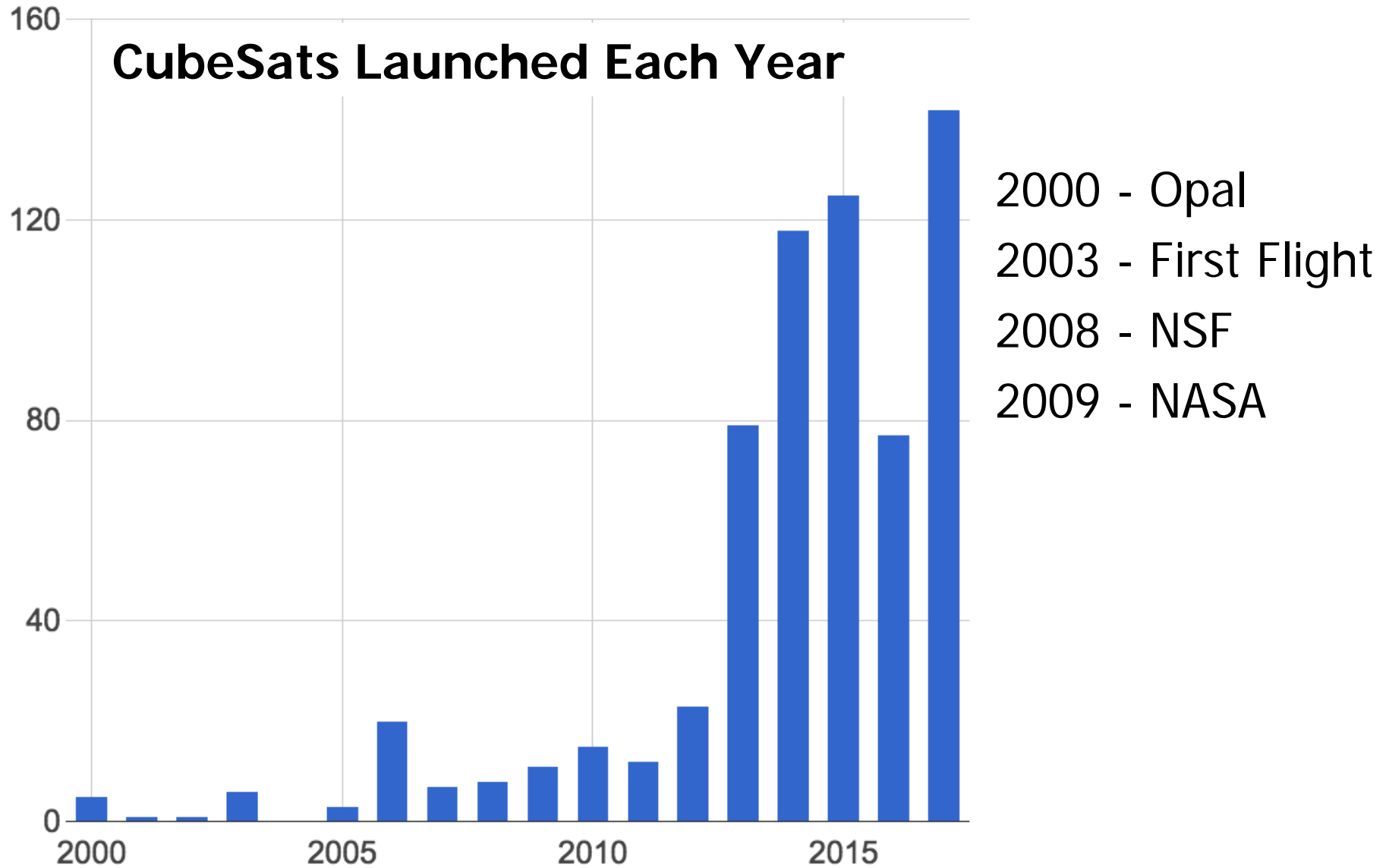
Very high performance
Billions of dollars
Years of development
Years of operations

University - Government: CubeSat



1. Stanford builds "hockey-puck" deployer for Aerospace Corp demo (OPAL, 2000)
2. Twiggs (Stanford) and Puig-Suari (Cal Poly) define a standard ejector/spacecraft pair to enable university missions
3. Universities from US, Japan, Denmark, Canada pay for first CubeSat flight (2003)
4. National Science Foundation sponsors \$1M CubeSat science missions (2008)
5. NASA Creates the ELaNa Program and flight-qualifies the deployer for every US launch vehicle (2009)

Remember Those Dates?



Sometimes, You Get All Three ...



source: @Space_Station 03/03/2015



View From a Semi-Outsider

- The Modified CubeSat Method
- First goal: Un-stick the process
 - Flight demonstrations!
 - CubeSats (academia/industry)
 - ISS platform
- Second goal: Recruit your angels
- Third goal: Make it real (but limited)
- Fourth goal: be open to abrupt left turns



Space Solar Power: Creating Opportunities for Cooperation/Collaboration

Michael Swartwout
Saint Louis University

2017 International Space Development Conference

25 May 2017



SAINT LOUIS UNIVERSITY

—
PARKS COLLEGE OF ENGINEERING,
AVIATION AND TECHNOLOGY