



ISS Commercialization Activities

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Commercial Space Committee

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***Mike Read, Manager, ISS National Lab Office
George Nelson, Manager ISS Tech Demo Office***

Commercial Involvement In The ISS

- CASIS: Commercial Customers
 - Charged with bringing non-traditional users to the ISS
 - Partnerships to date or in work:
 - Merck (protein crystallization)
 - Novartis (rodents)
 - Cobra Puma (materials)
 - Baylor College of Medicine (Omics)
 - MD Anderson (stem cells)
 - Boston Museum of Science, MassChallenge, MIT
 - >\$2M outside funds committed to flight opportunities

ISS as a Business Model

- ISS National Lab
 - Encouraging traditional contractors to develop needed capabilities (hardware, onboard analytics, services) using a fee-for-services approach
 - Cost share with NASA, pre-buy of services, or pure commercial funding
 - Requires sharing of risk—difficult for small businesses to accept, and out of the norm for large firms
 - Benefit is multi-level marketing of the ISS—multiple partners with “skin in the game”

ISS as a Business Model

- NanoRacks
 - Only company to own h/w & sell services on ISS
 - Internal (CubeLabs, plate reader, microscopes, centrifuge)
 - External (exposed platform, CubeSat deployer)
 - To date, delivered 91 internal payloads and deployed 1 CubeSat from ISS
 - In pipeline, 70 internal payloads, 50 CubeSats, and 2 external payloads
 - IDIQ contract for services to US Gov't signed June 2013
 - Continues to seek out new capabilities and opportunities to expand business base

ISS as a Business Model (cont'd)

- Teledyne Brown Engineering
 - Investing ~\$20M in partnership with NASA to build, operate, and market a precision external pointing platform (MUSES)
 - Bays for 4 instruments (hyper/multi-spectral, high def visible, etc.)
 - Reached agreement in principle with first external instrument provider
 - Incentive to market use of ISS

Commercial Participation in ISS

Demonstration of Technologies

- Nearly all commercial technology proposals to date have requested or required NASA cost sharing. NASA has enabled some of these proposals through milestone completion based contracts.
- Technologies therefore have been limited to those for which NASA has possible needs.
- **Bigelow Expandable Activity Module (BEAM)**
 - Largest and most visible example of this cost sharing/contract method and in this case, fixed cost.
 - Currently baselined to launch on SpX8 (2015) and will be installed on Node 3 Aft. On orbit checkout to take place NLT October 2016.
- **The Sabatier system** continues to provide current service on ISS and was a successful implementation of contract with payments tied to on-orbit performance milestones.

Impediments to Commercial Research/Investment on ISS

- Lack of ISS exemption for Intellectual Property rights
 - For non-NASA funded users, IP rights reservation by US Gov't is problematic
 - Almost a deal breaker for Big Pharma
- Uncertainty as to ISS life extension
 - Hard to sell long term commitment with 2020 end of life
 - For Big Pharma, 10-15 year development cycle
 - For Big Aerospace, uncertain duration for ROI
 - Using micro-g requires different research approach, hard to convince users to change with limited life remaining
 - Catch-22: Life extension based on robust utilization: Full utilization based on longer life...

Impediments (cont'd)

- Time from selection to actual flight
 - Ex. rodents—first availability is after Sx6, > 18 mos
 - Not all experiments face this same challenge
- Must continue to evolve onboard capabilities
 - If similar to ground, easier to accept
 - Onboard analytics very important to speed results
- NASA requirements drive costs
 - Must continue to excise extraneous requirements