Should NASA
Foster a Commercial Satellite Servicing Industry?

Some Thoughts on applying an N.A.C.A. approach

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TO: International Workshop on On-Orbit Satellite Servicing

SPONSOR: Goddard Space Flight Center

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Executive Summary

- Obama Administration has established new strategy
  - It includes fostering commercial space industry
  - Economic growth and jobs are top presidential priorities
- NASA's Innovation Initiative Goals
  - *Stimulate a vibrant commercial space sector through helping to create new types of engagement, creation of new markets, and investments in future technologies*
- Satellite servicing is a potential new commercial market
  - NASA could foster a commercial satellite servicing industry
- What Might NASA Do? (Some thoughts)

Policy Statements of Administrator Bolden

Senate Comm on Commerce, Sci and Trans, 8 July 2009

- ***Lori and I can talk forever about the necessity to involve commercial entities**, what I call entrepreneurial persons in establishing where we're going.*

- *Franklin Chang-Diaz, **who is my idol,** another astronaut **who now is in the entrepreneurial space business***

- *the government cannot fund everything that we need to do, **but we can inspire and open the door for commercial entrepreneurial entities to become partners with NASA** in this research and development that will enable things to come about.*

Office of Chief Technologist

- **FY11 Budget Overview (1 February 2010)**
  - ***Funds advancements in next-generation technologies**, to help improve the Nation's leadership in key research areas, enable far-term capabilities, and **spawn game-changing innovations to make** NASA, other government **and commercial space activities more capable and affordable**.*

How about taking an NACA Approach?
Build an Industry — Not a Program

1. **NACA approach:** A proven open innovation model
   - Focus is on Industry as the "Customer"
   - Develop a partnership with all key agencies (USAF, DOT, DOC)
     - No gaps. Increased effectiveness
2. **Guiding Principle: "**Build an Industry, Not a Program"
3. **Guiding Strategy:**
   - Develop consensus on most important problems of industry
     - "Problems" broadly defined (much more than technology)
   - Develop Practical solutions to industry's prioritized problems
     - Involving more than one company (multiple winners)
     - No government competition with the private sector
   - Smaller, more numerous, more frequent projects and programs
     - No single-point failures
     - Diversify risk via portfolio investment approach

NACA's Mission was (in part) to *Foster an Industry Capability*

"… the members of the NACA believed to a man that the future of aviation in the United States depended on a healthy and prosperous aircraft-manufacturing industry, and that it was the NACA's duty to help where it could. From the outset, the NACA was an industry booster limited only by its need to be fair and impartial in disbursing favors and assistance."

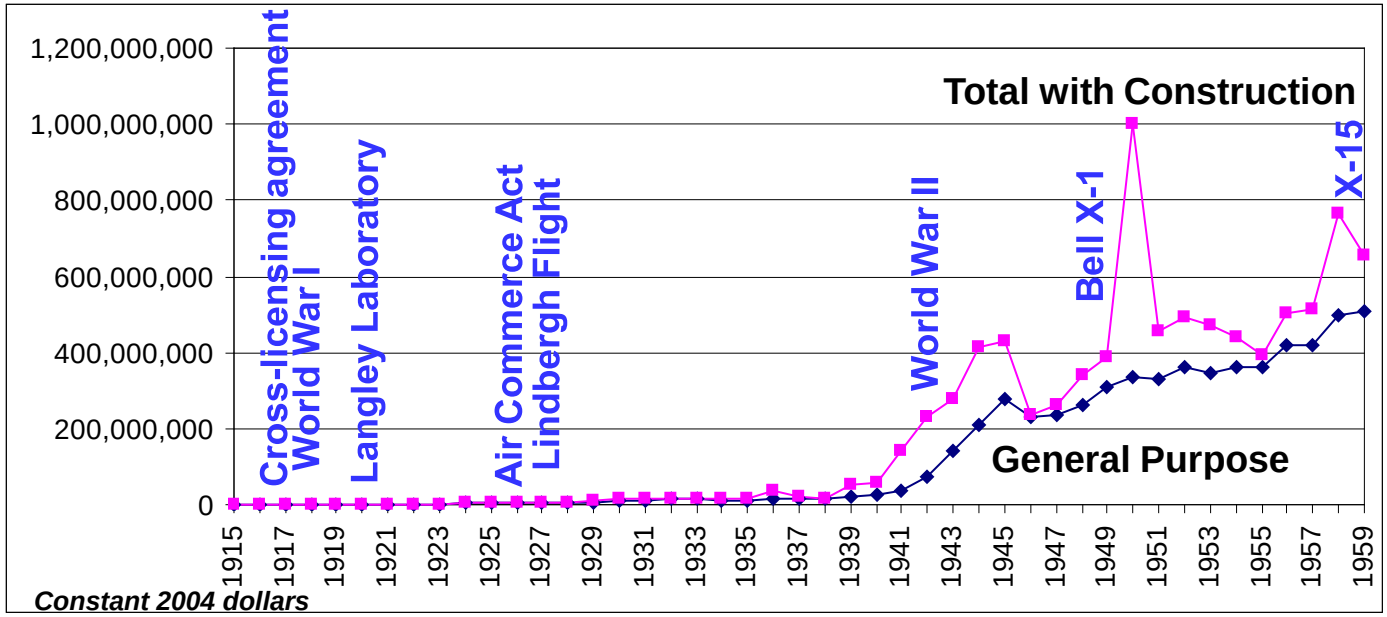
– Alex Roland, "Model Research", NASA History SP-4103, page 34

Why Did We Create N.A.C.A.?

- **Americans invented the airplane in 1903**
- **Leadership quickly went to Europe**
  - Aggressive investments created European technical lead
    - American firms fought (over patents) instead of building & innovating
    - U.S. govt bought very few planes before WWI, weakening industry
    - 10 nations created aeronautical research programs before the US govt
      - **U.S. finally creates NACA in 1915, copying British model**
- **Caused major U.S. national security problems in WWI**
  - U.S. was forced to buy European-designed airplanes for WWI
    - U.S. Trainer/Bombers: British De Havilland DH-4
    - U.S. Fighters: French Nieuport 28 and the Spad XIII
  - Dayton-Wright Corp. was only Dayton airplane company in 1917
    - built 3,604 British-designed De Havilland DH-4s for WWI

NACA Early History

- NACA brought together diverse federal agencies
  - Army, Navy, Smithsonian, Bureau Standards, Weather Bureau
  - Committee developed national consensus on critical problems
- NACA had greatest impact in early decades
  - When its budget was lowest
  - Coordination/cooperation function was as important as R&D

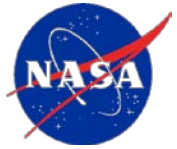


Source: Gary Oleson, Northrop Grumman IT TASC, "Toward Frequent, Affordable Space Access," Space Frontier Conference 14, Los Angeles, CA, October 2005

NACA's Early Successes did not involve lots of cash

- NACA took "holistic" systems view of national priorities
  - Clearly focused on building a healthy competitive industry
- Solved practical aviation problems for U.S. Govt & industry
  - Facilitated aircraft patent cross-licensing agreement
    - Ended destructive U.S. industry patent fight between Wright's & Curtiss
  - Created cooperative partnerships between government & industry
    - Intervened on WWI aircraft engine deadlock resulting in Liberty engine
  - Started advocating purchase of air mail services (beginning in 1916)
    - Leading to Kelly (Air Mail) Act in 1925
  - Persuaded commercial insurers to start insuring aviation
  - Recommended budget increase to President for Weather Bureau
    - to promote safety in aeronautics
  - Recommended the creation of Bureau of Aeronautics
    - Predecessor of the Federal Aviation Administration
  - Developed methods for mapping from planes

NACA Technical Successes
Also Critical, But Came Later



- Langley wind tunnel begins research operations in 1920
- Produced many broad technical advancements
  - Specialized in drag reduction for all vehicles
  - Openly published test data
  - Developed low-drag engine cowling
  - De-icing, airfoils, variable pitch propeller, etc.
- KEY POINT:
  - NACA focus was still on needs of external customers
    - Solving prioritized “practical problems” of DoD & Industry

Examples of Use of NACA Model
in other focus areas

- **National Defense Research Committee (WWII)**
  - Led by Vannevar Bush, Chairman of NACA
  - To improve coordination/cooperation among scientists
  - Produced critically needed innovation in War War II
    - Radar, sonar, proximity fuses, bomb sights, amphib. vehicles
    - Set up Manhattan Project
- **Advanced General Aviation Transport Experiments** (AGATE)
  - Led by Bruce Holmes & Langley RC (1994-2001)
  - Problem: Decline of American general aviation
  - Formed consortium of more than 70 organizations
    - Conducted consensus-based research of broad utility to industry
  - Utilized NASA "Joint Sponsored Research Agreement"
  - http://www.nasa.gov/centers/langley/news/factsheets/AGATE.html

Some NACA-like Options to Foster A Commercial Satellite Servicing Industry

1. Purchase commercial services (advance purchase commitments)
2. Funded Space Act Agreements (e.g., COTS)
3. Joint Sponsored Research Announcements (e.g., AGATE)
4. Loan Guarantees
   - Commercial Reusable In-Space Transportation Act of 2002
5. Partner with DOD and national security community?
   - DARPA on technology and risk reduction
   - USAF/NRO as additional non-NASA customers
6. Identify & help solve other non-technical impediments to industry
   - New customers/markets, ITAR
7. New technology (develop, demonstrate, and broadly share)
   - Many smaller X-projects, don't put all eggs in one basket
     - Mitigate strategic risk, and program risk, with portfolio diversification

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