From Ideas to Impact

Chris Scolese
NASA  Associate Administrator
25 October 2011
What They Say

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“The difficulty is that the program, as it has been built up, is not sound. The sad fact is that the program is more expensive than the country can now afford.”

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Vannevar Bush to James Webb, April 1963

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Dwight D. Eisenhower to House Republican Leader Charles Halleck, April 1963
The Myth of the Good Old Days (1/2)

Decisions in 1961-1962

F-1 or J-2 engine? Two-stage or three-stage?
Lunar orbit rendezvous, Earth orbit rendezvous, or Nova?
The Myth of the Good Old Days (2/2)

...the concern of some observers was that future development of Saturn was a "dead end road."

- letter from Hugh Dryden to Hugh Odishaw (National Academy of Sciences), 1961
What They Did
Aeronautics Research

**NASA’s work**
- Advanced composite structures
- Chevrons
- Laminar flow aerodynamics
- Advanced CFD and numeric simulation tools
- Advanced ice protection system

was transferred for use here

- **Boeing 787**
  - 20% more fuel efficient/reduced CO\(_2\) emissions
  - 28% lower NO\(_x\) emissions
  - 60% smaller noise footprint

801 confirmed orders through August 2011

- **Boeing 747-8**
  - 16% more fuel efficient/reduced CO\(_2\) emissions
  - 30% lower NO\(_x\) emissions
  - 30% smaller noise footprint than 747-400

114 confirmed orders through July 2011

- **CFM LEAP-X**
  - Compression system aerodynamic performance advances
  - Low NO\(_x\), TAPS II combustor
  - Low pressure turbine blade materials
  - High-pressure turbine shroud material
  - Nickel-aluminide bond coat for the high pressure turbine thermal barrier coating

with these benefits

- **Proposed for Airbus A320NEO, Boeing 737MAX**
  - 15% reduction in fuel burn/reduced CO\(_2\) emissions
  - 50% less NO\(_x\)
  - 15dB noise reduction

- **P&W PurePower 1000G**
  - Fan Aerodynamic and Acoustic Measurements
  - Low noise, high efficiency fan design
  - Ultra High Bypass technology
  - Acoustics Modeling and Simulation tools

16% reduction in fuel burn/reduced CO\(_2\) emissions

- **50% reduction in NO\(_x\)**
- **20dB noise reduction**

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- **Source: Pratt & Whitney**
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Science On-Deck Circle

MSL

NPP
Human Exploration & Operations

SLS

MPCV
International Space Station

International Docking Standard

Sabatier

Robotics

ECLSS
Advances in Engineering

External Tank Stringer Crack

J-2X Gas Generator

Robotic Lunar Lander

Fastsat
A Global Endeavor
NASA Impact on Society

Nobel Prize-winning discoveries w/ HST

- HST04Sas
- HST04Yow
- HST04Zwi
- HST05Lan
- HST05Str

Host Galaxies of Distant Supernovae
Hubble Space Telescope • Advanced Camera for Surveys

Reducing fracture risk in cancer patients (NSBRI)

NASA NPOL Radar MC3E 2155 UTC 24 May 2011 (El Reno/Piedmont Tornado)
Spaceflight did not happen because somebody thought it would be an intriguing thing to do, but because it is part of our human destiny, and because its time had come.

- Wernher von Braun
We can lick gravity, but sometimes the paperwork is overwhelming.

- Wernher von Braun