# NASA Langley's Revitalization Strategy

Presented by Cathy Mangum

Michael Mastaler, Erik Weiser, Steve Craft, Drew Hope and Jerry Kegelman

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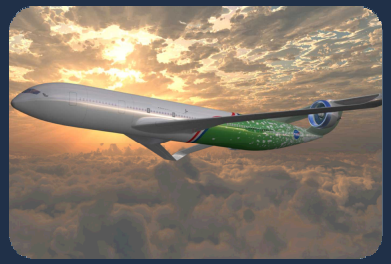
# Historical Contributions

FIRST CENTER
*Langley Memorial Aeronautical Laboratory*

FIRST SOLID ROCKET BOOSTER PAYLOAD-TO-ORBIT
*Scout*

NUMEROUS NEW TECHNOLOGIES APPLIED to COMMERCIAL & MILITARY AIRCRAFT



FIRST SCRAMJET-POWERED MACH 7 and 10 FLIGHT
*X-43A*

FIRST SPACE GROUP
*Space Task Group*

FIRST MARS MISSION
*Viking*

# NASA Langley at a Glance (2011)

**Langley's Economic Impact (2009)**

- National economic output of $2B and generates 16,490 high-tech jobs
- Virginia economic output of $920M and generates 8,138 high-tech jobs

**Founded in 1917**

1st civil aeronautical research lab

**~$774m PY2011 Budget**

~$738M NASA Langley Budget
~$36M External Business

**~3,700 Workforce**

~1,900 Civil Servants
~1,800 Contractors (on/near-site)
~250 Students

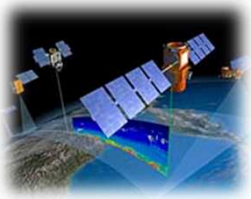
**Infrastructure/Facilities**

788 acres, 181 Buildings
~$3.3B Replacement Value

Aeronautics
48%

Exploration
17%

Science
29%



Space Operations
3%

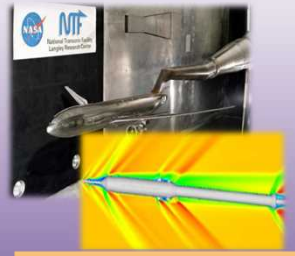
Education
3%

## Structures & Materials

- State-of-the-art facilities for Nanotechnology
- Composites processing, testing & characterization
- Radiation protection
- Polymer, metal & ceramic hybrids for structural efficiencies

LaRC Core Capabilities

Aerosciences



Systems Analysis

Characterization of all Atmospheres

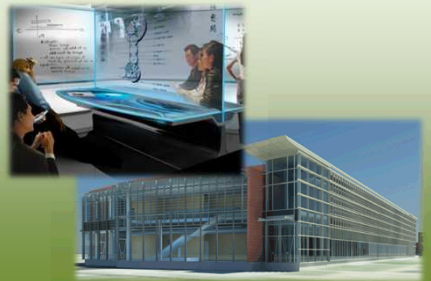
Entry, Descent & Landing

Structures & Materials

Systems Engineering

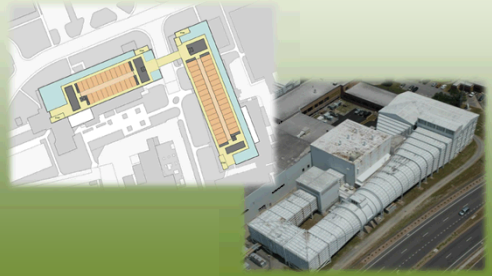
LaRC Mission Success

Collaboration



Innovation

Revitalization



# Aging Infrastructure Poses Risk to Mission

- More than 80 percent of NASA's infrastructure and facilities by value are beyond their design life – thus more likely to be unsuitable for current and future missions.
  - Aging, Apollo-era legacy infrastructure is inefficient and costly to maintain and operate.
  - Assets over 40 years old (typical design life is 30 years) pose a risk to NASA's unique research and development mission.
- Risk severity rises as assets age beyond 40.
  - To control risk, control the share and average age of assets >40
- Maintenance backlog continues to grow.

Whitlow – "NASA Facility Strategy Presentation" at the 2011 Facilities Engineering Conference

LaRC's oldest building is close to 80 years old and the Center average is 44 years old

# Creating the LaRC of 2050

Transform the Center to enable LaRC to make vital contributions to NASA missions in the very long term. Establish a stimulating work environment, processes and infrastructure which reflect the accelerating pace of technology development and the associated societal changes.

A Center that is:

- Designed to enable the full spectrum of research and development
- Configured and integrated to enhance and promote collaboration, productivity, diversity and inclusion
- Flexible and adaptive to changing mission requirements
- Environmentally sustainable
- Embracing future work environments (virtual worlds)

# LaRC's Revitalization Approach

- Center Director established the LaRC Revitalization Project Team referred to as the Vibrant Transformation to Advance LaRC (ViTAL) Team
- Includes representatives from Center Operations, Research, Engineering, Technology, Test Facilities, Strategy

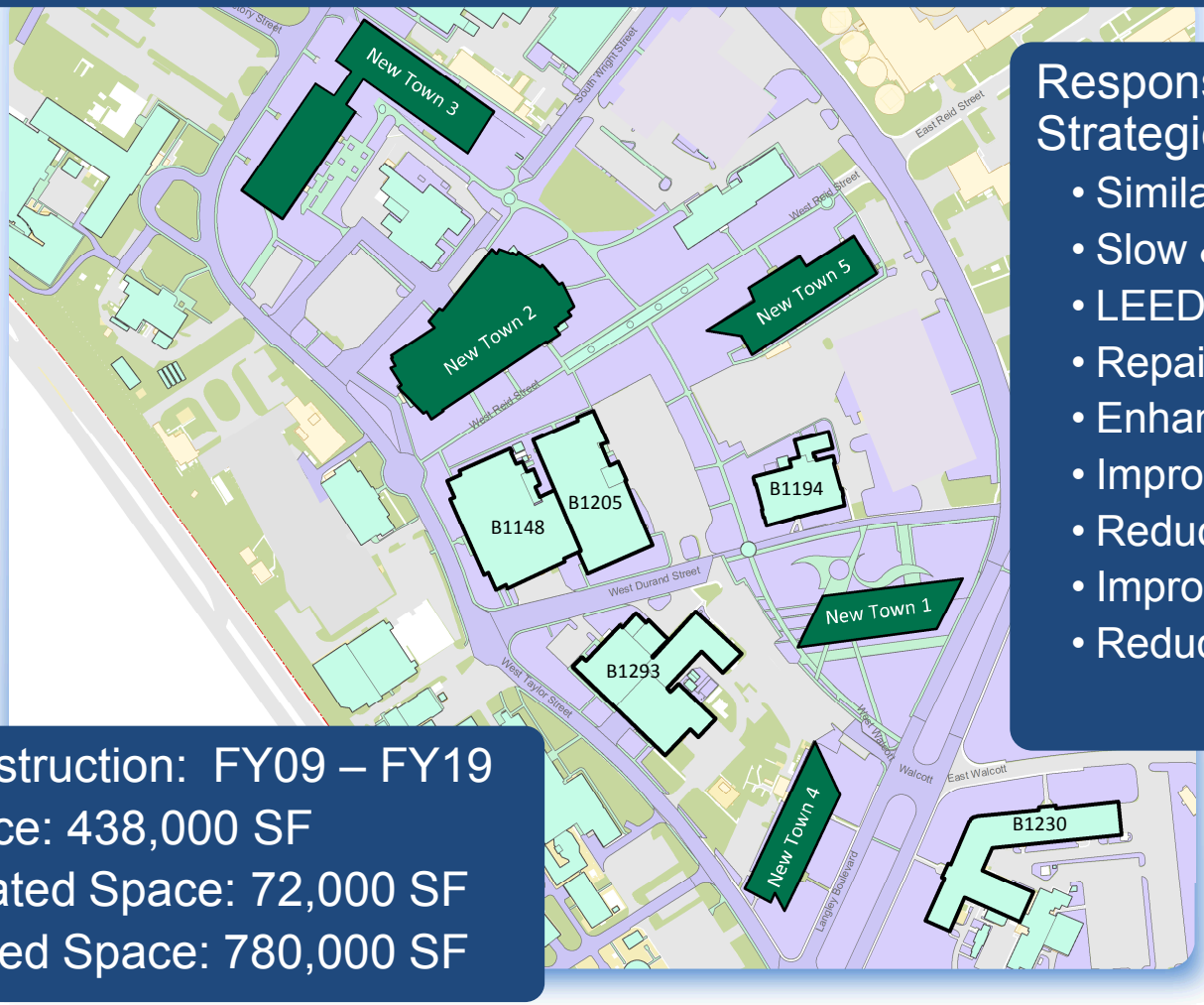
# ViTAL Mission

Continually update the Integrated Center Strategy which incorporates technical roadmaps, core competencies and Agency and Center Master Plans to guide investment/divestment decisions.

- Decadal Studies, National Aeronautics R&D Policy and Plan, and Test and Evaluation Infrastructure Plan
- Office of Chief Technologist Roadmaps
- NRC and Science Decadal studies, etc.
- Internal Evaluation of Future Technical Capabilities


# Future Investments
## New Town Strategy

## Primary Development Focus: New Town Core Area




Responsive to Agency Strategies:

- Similar, but Smaller
- Slow & Steady
- LEED Certification
- Repair-by-Replacement
- Enhanced collaboration
- Improved flexibility
- Reduced costs for O&M
- Improved FCI
- Reduced DM

- New Construction: FY09 – FY19
- New Space: 438,000 SF
- Rehabilitated Space: 72,000 SF
- Demolished Space: 780,000 SF

# Phase 1: LaRC Headquarters

- 79,000 GSF, three floors
- Six organizations, 250 occupants
- Designed to achieve LEED [illegible] certification

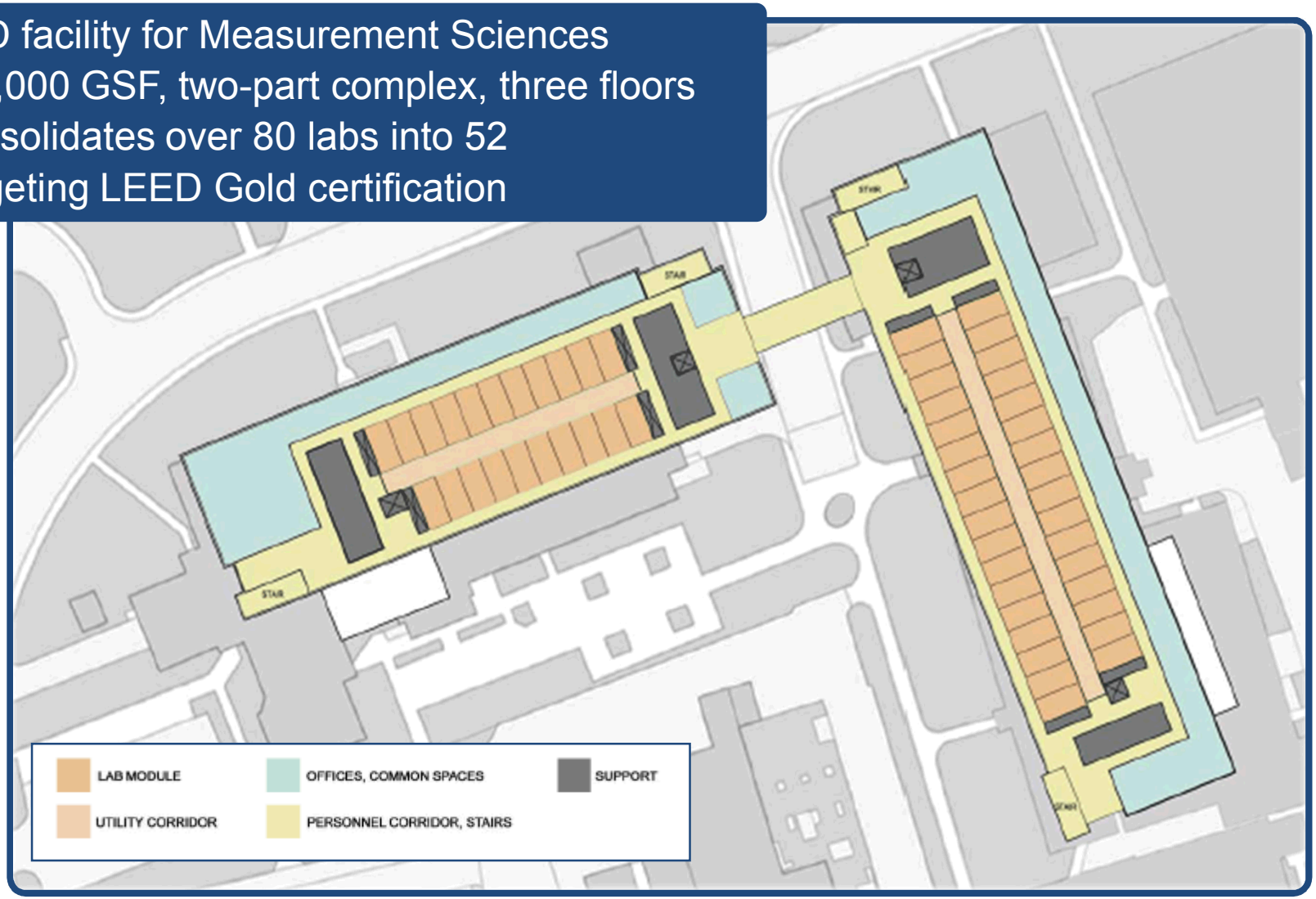
PLATINUM

# Phase 2: R&D Collaboration Center

- Collaboration Center, Cafeteria, Training
- 139,000 GSF, two floors
- Hoteling and universal availability
- Targeting LEED Gold certification

# Phase 3: Measurement Science Lab

- R&D facility for Measurement Sciences
- 120,000 GSF, two-part complex, three floors
- Consolidates over 80 labs into 52
- Targeting LEED Gold certification



# New Town Bldgs 4 thru 8 – The Outyears

| Phase | FY Start | Type | Concepts |
|---|---|---|---|
| 4 | 2017 | **Lab:** Materials Research | Multi-disciplinary research & development spanning TRL |
| 5 | 2019 (earliest) | **Lab:** Engineering & Science | Environmental testing and mission qualification |
| 6 | 2020 (earliest) | **Lab:** Integrated Systems Development | Instrument Conceptualization and Development; Digital Manufacturing |
| 7 | 2023 (earliest) | **Aerosciences Complex** | Small scale, variable speed Research Tunnel |
| 8 | 2028 (earliest) | **Core Competency Complex(es)** | Structures, Aerosciences, EDL |

# Divestment and Demolition

- Demolition plays a central role in LaRC's revitalization strategy through the reductions in foot print, DM, CRV, and cost.
- Area demolished:
  - Since 2005 - 381,000 $ft^2$
  - Planned for FY12 - 125,000 $ft^2$

- Area demolished by 2023 will be 1,065,000 $ft^2$
  - This is one-forth of the approximately 4,000,000 $ft^2$ LaRC had in 2005

# Revitalization Benefits

- Enable new technical capabilities to adapt to evolving and new mission requirements
- Increase sustainability practices
- Improve the flexibility and rightsizing of labs and office spaces by removing underutilized, redundant and/or inefficient facilities, labs, equipment and systems
- Attract and retain the best and brightest employees
- Reduce operational costs in a declining budget world

# Risks of Not Changing

- **Losing technical relevance**. Pushing more institutional and infrastructure cost to programs and researchers means there will be less funding available for research, idea generation, concept development, and testing and validation.
- **Higher cost to conduct research and development**. This impacts our ability to attract collaborators, partners, employees, and business.
- **Unreliable systems and equipment**. As we continue to utilize legacy equipment and facilities with inadequate Operations and Maintenance funding, more and more systems will become operationally limited and run-to-fail. This high-risk strategy is unsustainable, and the NRC identified this as a LaRC deficiency in their report last year.
- **LaRC will have limited and continually decreasing funds available to invest** in new technical capability if we indiscriminately attempt to retain all our legacy equipment and facilities.

# Summary

- A key to creating Langley's future is investing in modern offices and laboratories, energy efficient, collaborative work space and embracing new virtual work environments.
- Savings gained from reduced operational and maintenance costs will allow us to keep Langley competitive and able to attract collaborators, partners and programs.

A Revitalized Langley will allow us to maintain our tradition of technical excellence and increase our ability to continue to make a difference in the world.

# NASA Langley's Future is Bright

# BACKUP

National Aeronautics and Space Administration

# Creating Langley's Future It's ViTAL

www.nasa.gov

- "Mother Center"
- NACA
- National Aeronautics Lab
- Unitary Plan
- Birth of Space Program

Heritage

- "New Town"
- Revitalize Langley
- Lab Consolidation
- Balanced Portfolio
- Repair by Replacement
- Recapitalization

Present

- Operate at the Pace of Technology
- Drive Innovation to System Solutions
- Flexibility
- Similar and Smaller
- Virtual

Future

## LaRC's Revitalization Strategy