NASA Glenn Research Center

Prepared for

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Outline

- Core Competencies
- Civil Workforce Snapshot
- Strategic Action Plan
  - Framework
  - Initiatives
- Key Points

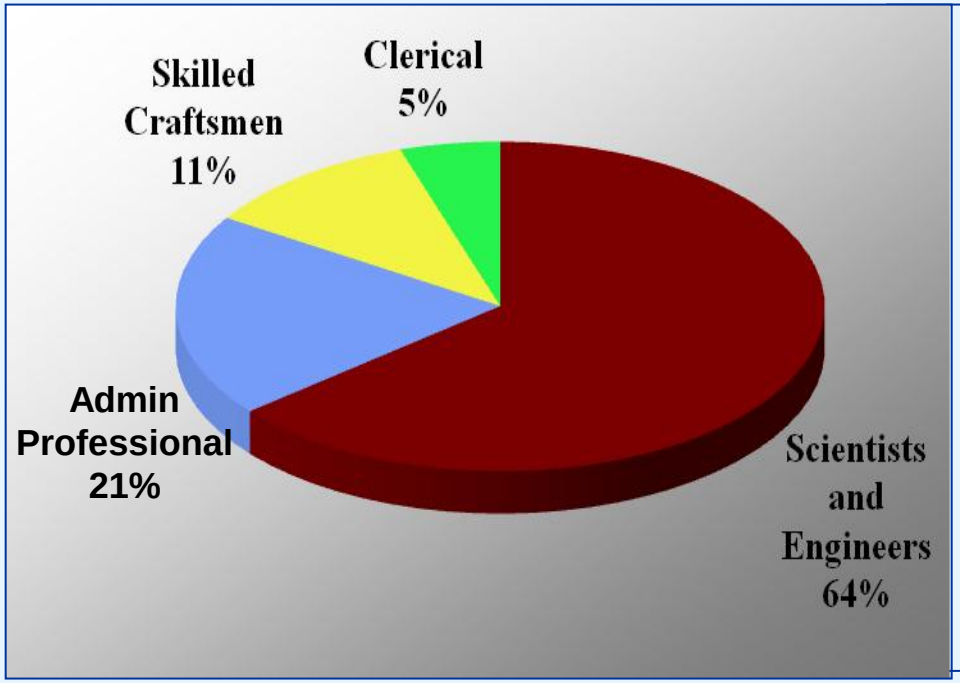
Civil Service Workforce

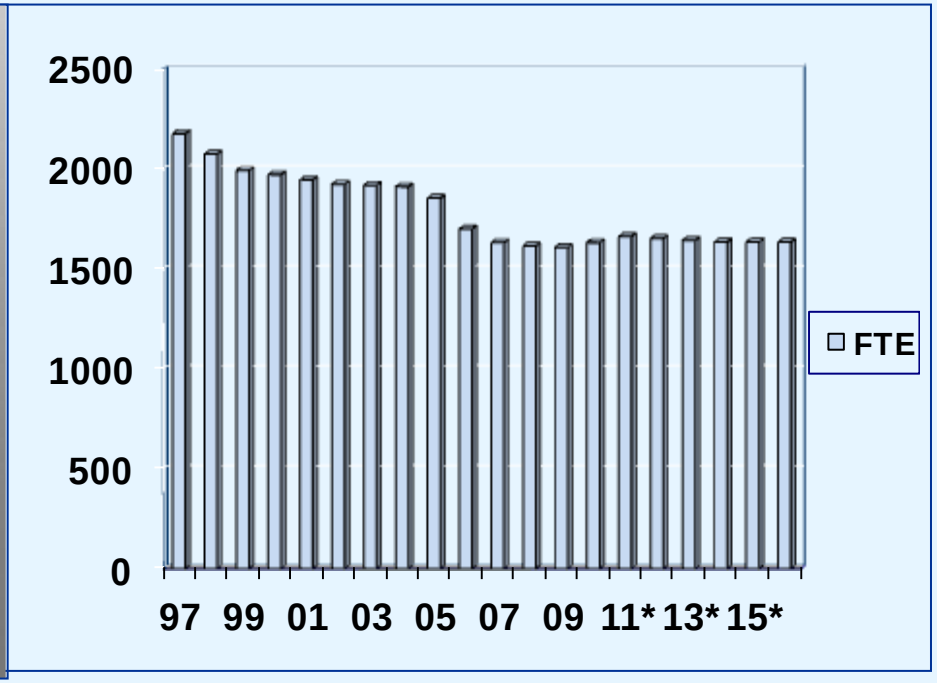
- 66 percent of workforce charges their time directly to the technical mission
- 69 percent of scientists and engineers earned advanced degrees, 25 percent with PhDs

Administrative and Clerical

Scientists and Engineers

Skilled Craftsman





As of 02/17/11

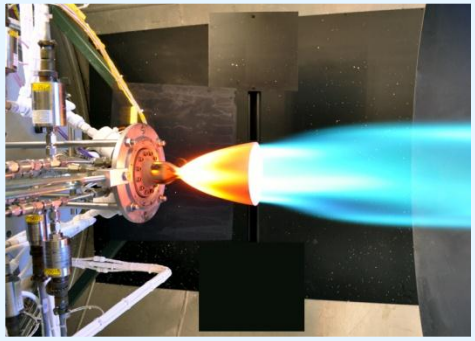
*Projected Workforce Level

Core Competency Definition

- Core competency is a source of uniqueness that a company can do uniquely well, offering a competitive advantage that competitors can't quickly copy (Prahalad & Gary Hamel, 1990 ,"The Core Competence of the Corporation.")

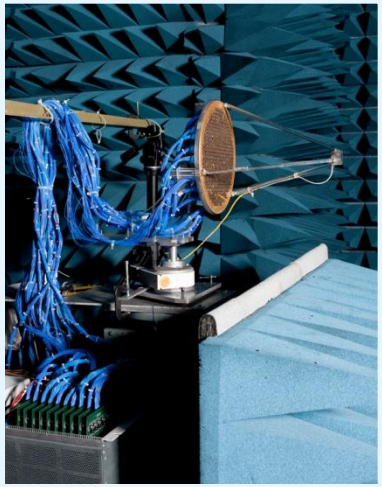
Glenn Core Competencies

Air-Breathing Propulsion



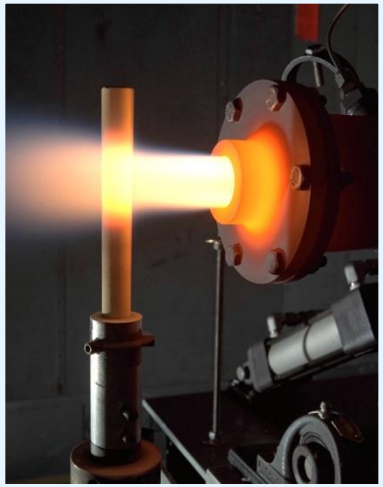
In-Space Propulsion and Cryogenic Fluids Management

Physical Sciences and Biomedical Technologies in Space



Communications Technology and Development

Power, Energy Storage and Conversion

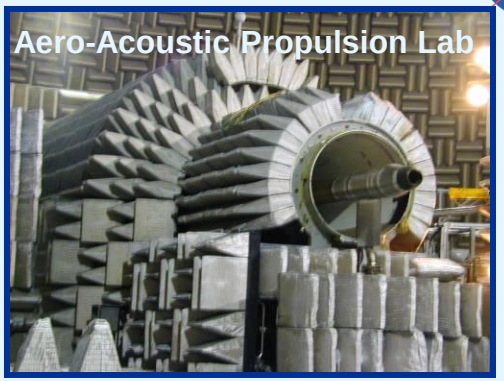


Materials and Structures for Extreme Environments

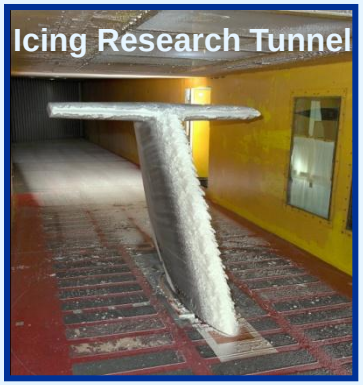
NASA GRC Unique Aero Test Facilities

Subsonic Propulsion Wind Tunnels
- Noise suppression
- Inlet/Airframe integration
- STOVL hot gas ingestion

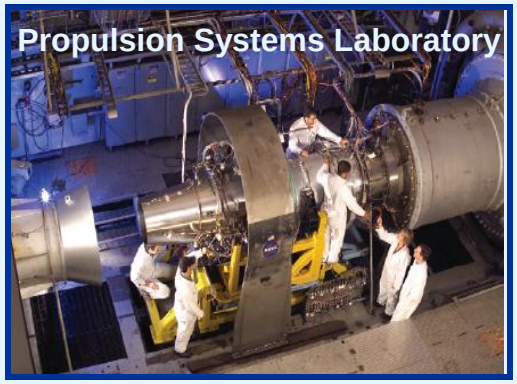
Transonic and Supersonic Propulsion Wind Tunnels
- Advanced propulsion concepts
- Inlet/Airframe Integration
- Internal/external aerodynamics



Engine Acoustic Research Facility
- Fan/nozzle acoustics research
- Simulate hot engine nozzles in flight
- Aerodynamic and Aeroacoustic measurements capabilities

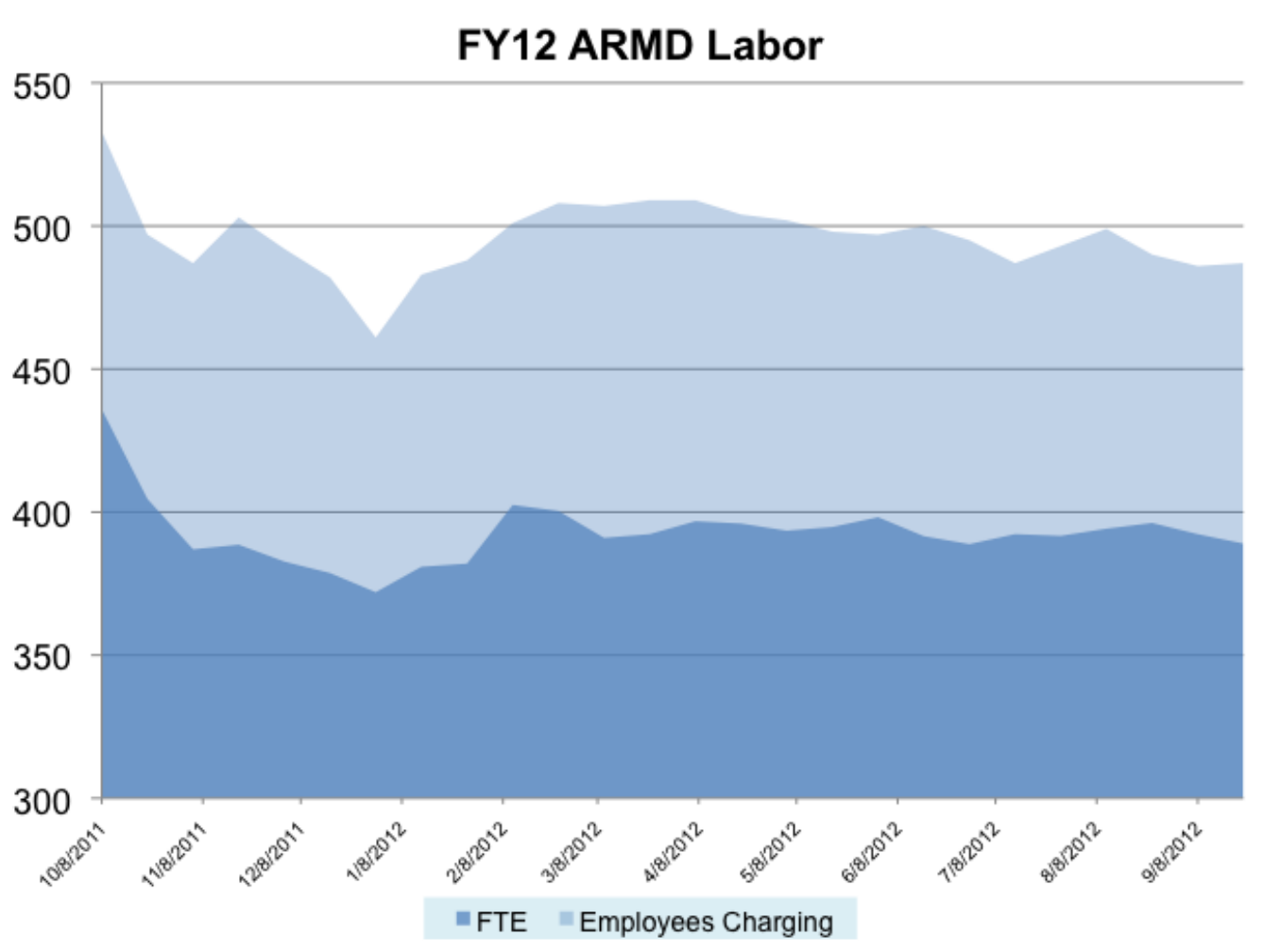


Largest Icing Tunnel in US
- Aircraft icing certification
- Ice protection systems development
- Icing prediction/code validation

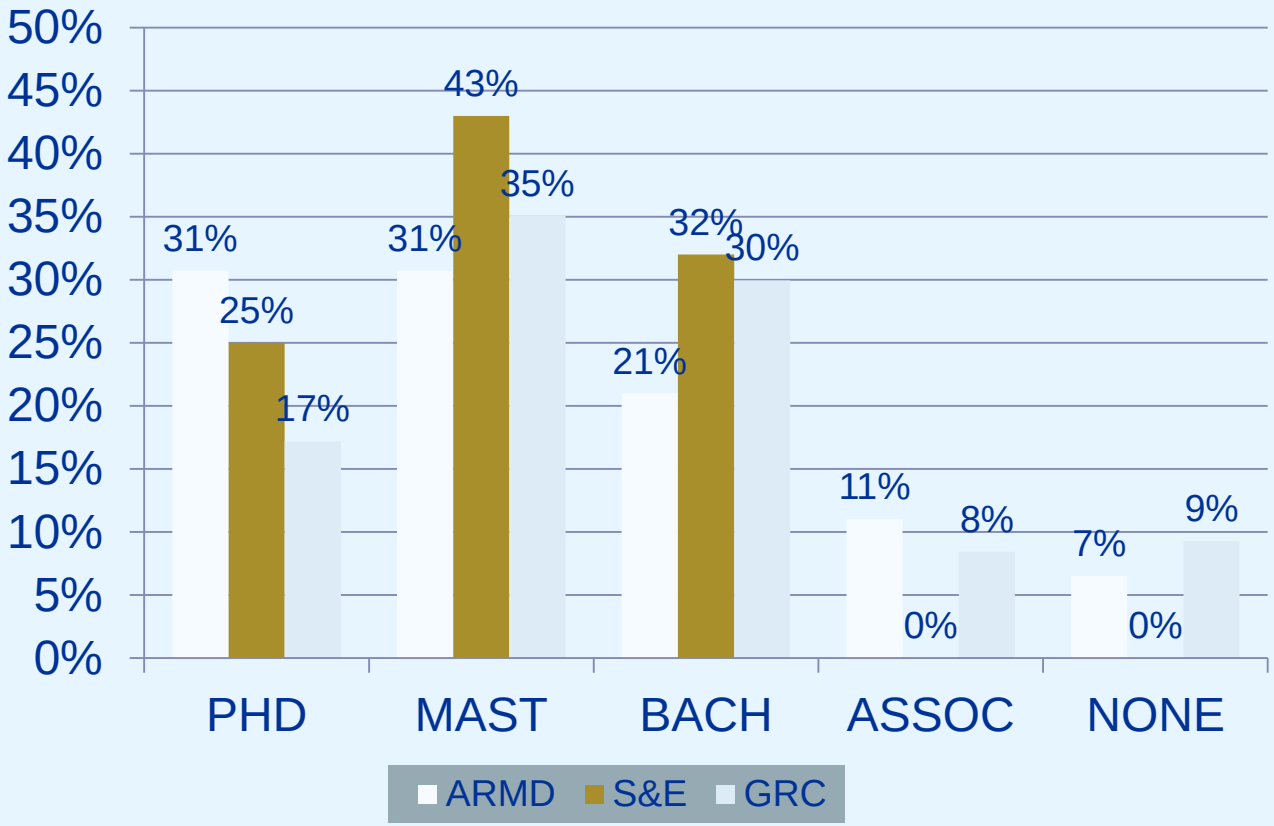


NASA’s only altitude full-scale engine facility
- Engine operability/performance
- High altitude, inlet distortion simulation
- Nozzle-engine integration/development

Over 50 Versatile Engine Component Facilities
- Combustor and Heat Transfer
- Compressor and Turbine
- Inlets and Nozzles

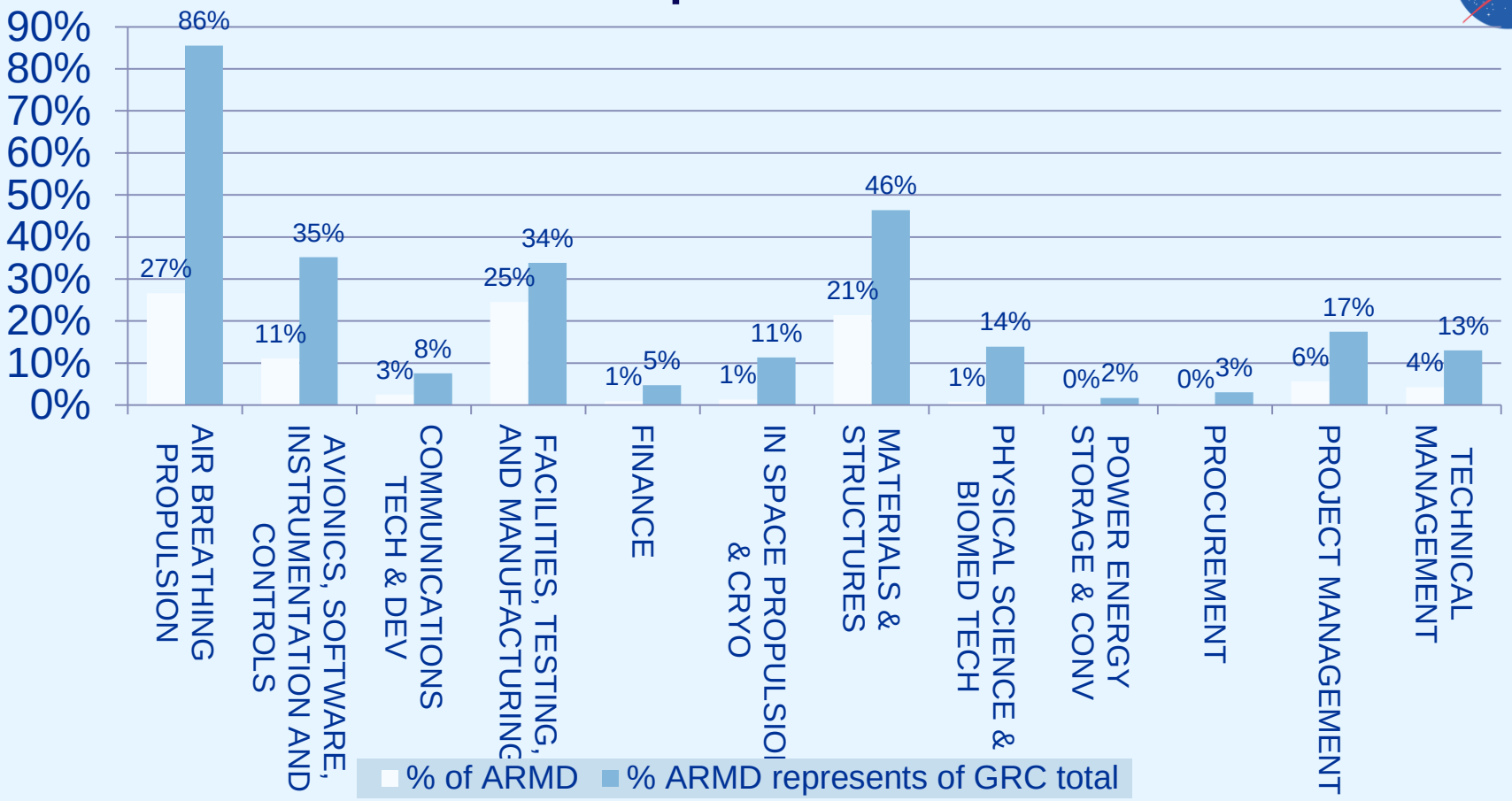

FY12 ARMD Labor
550
500
450
400
350
300
10/8/2011
11/8/2011
12/8/2011
1/8/2012
2/8/2012
3/8/2012
4/8/2012
5/8/2012
6/8/2012
7/8/2012
8/8/2012
9/8/2012
FTE
Employees Charging

Education Levels



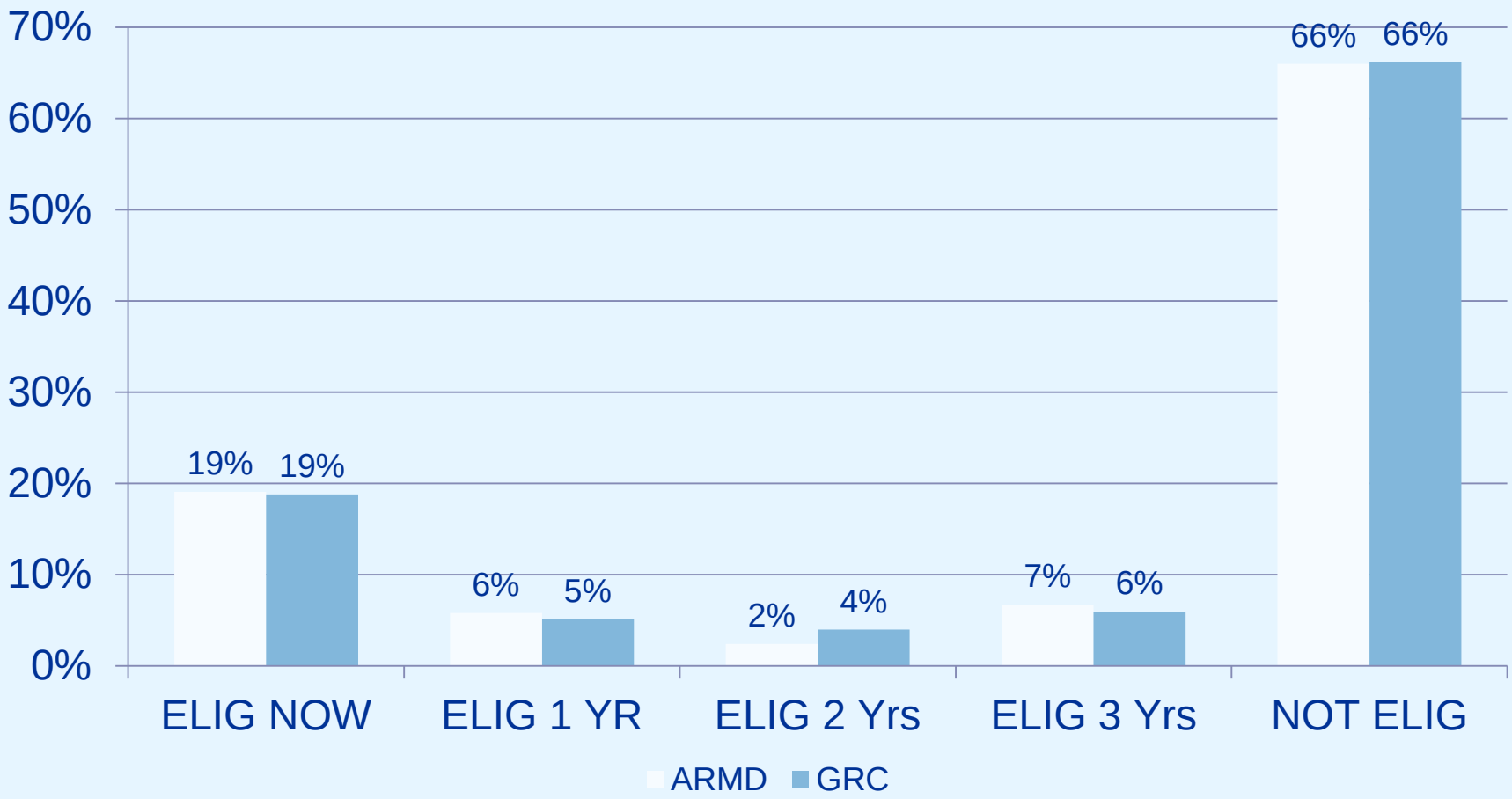
- 1660 FTEs – NASA GRC Ceiling in FY12
- 390.7 FTEs– NASA GRC supporting ARMD in FY12
- 62% of FTEs supporting ARMD at GRC hold graduate degrees

Competencies



- Driven by a need to advance aeronautical technologies toward reducing propulsion systems noise, emissions, increasing fuel burn efficiency, and improve aviation safety, NASA Glenn makes effective and strategic use of its Aeronautic testing facilities.
  - Alignment with Center's competencies: Air-breathing propulsion competency support to ARMD at a Center level is 86%, Materials and Structures at 46 % and Facilities 34%

Retirement Eligibility



- A need for a strategic thinking and management of identified challenges in sustaining core competencies in support of Aeronautics

Hierarchy

GRC Strategic Action Plan

Goals

Objectives

Strategic Initiatives

Metrics/Measures

In response to our environment, the Center senior leadership team developed the Glenn Leadership Philosophy to define the strategic vision that will advance the Center forward.

U.S. Economic Drivers

Budget Cuts Across Government Agencies

National Debt Reduction

Agency Drivers

Retirement of the Shuttle Program and End of Constellation

NASA Strategic Plan

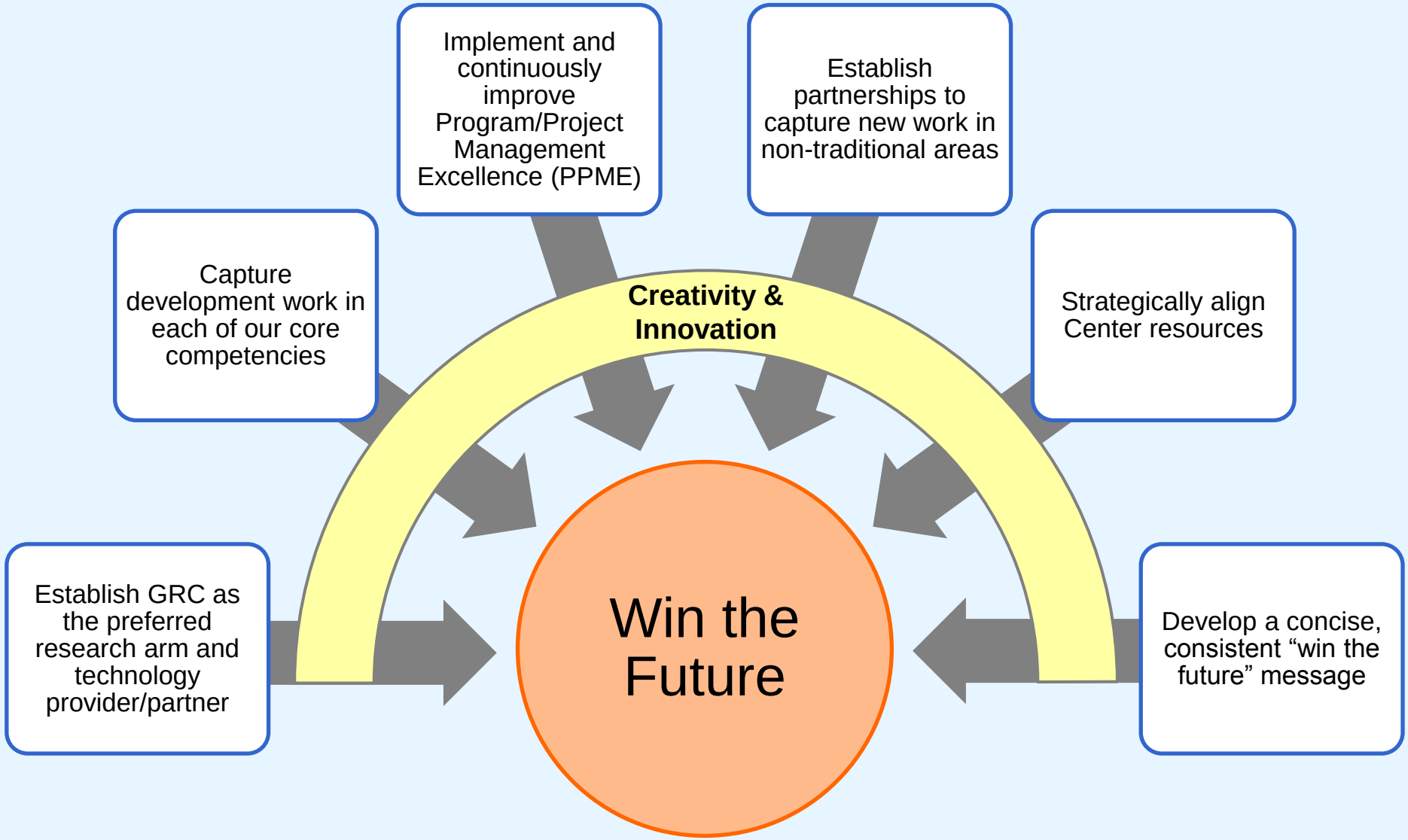
The Glenn Leadership Philosophy is to deliver the mission while leading strategically to

1. **Build Better Relationships**
   - Strengthen relations within the Glenn workforce
   - Strengthen partnerships with the technical community
2. **Align Constrained Resources**
   - "Start Stop Continue" Study
   - Lean Six Sigma Program
3. **Take Control of Glenn's Destiny**
   - Establish credibility to lead a mission
   - Transition our technologies
   - Establish New Business Board
4. **Drive a Culture of Accountability**
   - Assign an owner to each Glenn goal
   - Link Strategic Action Plan to individual performance plans

GRC fiscal year (FY) 2012 priorities to position ourselves to win the future:

- Ensure Appropriate Funding for R&TD
- Align Our Portfolio
- Improve Our Productivity/Efficiency
- Improve Program and Project Management
- Provide an Inclusive, Diverse Workforce
- Focus Our Partnerships

Our Initiatives Position Us to Win the Future



Establishment and execution of a systematic approach to make decisions

- Core competencies definition
- Evaluation and assessment of core competencies
  - Core competencies owners
  - Peer reviews
- Goal Team
- Start, Stop, Continue
- Monthly Strategic Management Meetings

Glenn's Strategic Direction and Mission
We have defined our strategic direction using our mission, goals, core competencies, and mission-enabling capabilities.

Opportunities for partnerships and to sustain an innovative workforce

- Educational Opportunities
  - LERCIP (Lewis' Educational and Research Collaborative Internship Project) consists of internships for High School Students, College Students, and Secondary School Teachers (Apply Nov l-Feb 1)
  - NASA Academy at Glenn consists of Undergraduate and Graduate Students participating in an intensive lO-week leadership development project.
  - USRP (Undergraduate Student Research Program) consists of Undergraduate Students working in internship positions with a mentor and receiving a stipend.
  - GSRP (Graduate Student Research Program) consists of Graduate Students leading to masters or doctoral degrees in STEM fields related to NASA Research and Development.
  - MUST (Motivating Undergraduate in Science and Technology) awards scholarships and internships to Undergraduate Students pursuing degrees in STEM fields.
  - JPFP (Harriet G. Jenkins Predoctoral Fellowship Program) provides full-time underrepresented graduate students in STEM disciplines financial support for education in NASA-related studies.

Opportunities for partnerships and to sustain an innovative workforce

- Innovative research and investment strategies
  - Seedling Concepts – revolutionary ideas
  - Center Director Discretionary Funds
  - New Business and Partnerships
  - Infrastructure Investments

ARRA Project IRT Refrigeration System Replacement

ARRA Project

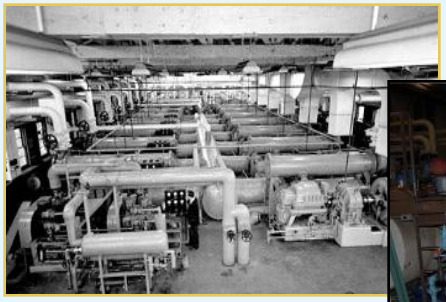
Category Type: Technical Facility

Total Cost: ~ $18M

Scope:

Replace existing refrigeration system in use since 1943 with modern (off-the-shelf) equipment to reduce improve performance while reducing operation and maintenance cost.

New building and plant are under construction while test operations continues, minimizing facility downtime.



Original Refrigeration Plant, 1950

1 of 7 Operational Compressors

Graphic Project Depiction

Technical Impact

Increase cooling capacity to approximately 2000 tons and achieve minimum temperature of -40 ºC at all air speeds.

Use modern screw compressors and a secondary heat transfer fluid.

Achieve current temperature stability and temperature transition performance specifications.

Remediate ice shedding issue off the current heat exchanger.

Economic Consideration

Increase reliability while reducing operation and maintenance cost. IRT is in high demand, typically running 150-180 days a year with testing scheduled out 12-18 months.

The current system cannot meet pressure piping code standards without replacing all of the original piping. This would be a significant cost and a long downtime while not providing any technical or operational improvements.

Project schedule focused on minimizing downtime through an incentivized construction contract.

PSL Icing Capability to Meet Engine Core Icing Research Needs

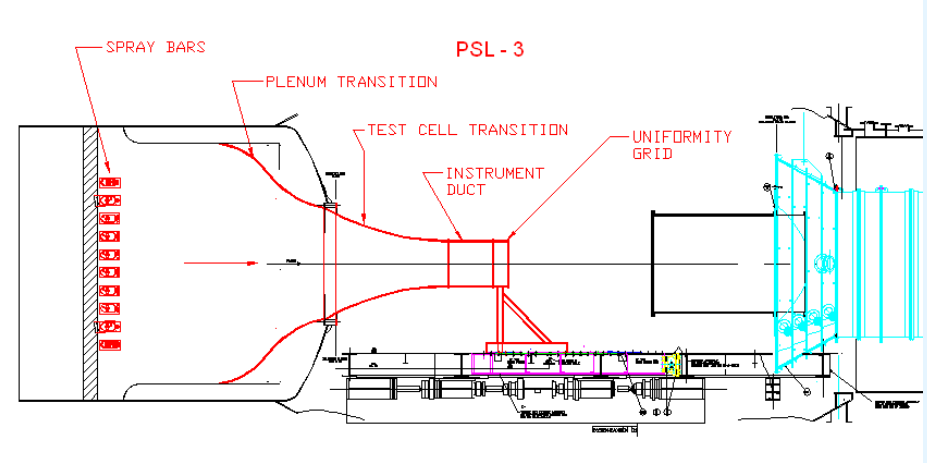
Unique features PSL will provide:

- ✓ Altitude capability: (4000-40,000 ft.) No other engine test facility can provide this range of altitude capability.
- ✓ Ice Water Content: (0.5-9.0 grams/m^3) Very large range of water content is unique to HIWC icing. It is a key parameter to study the problem.
- ✓ Air Temperature: (-60 to 15 deg F) Most existing and planned engine core icing test facilities are reliant upon cold weather for air supply temperature or have limited air temperature ranges. PSL provides a unique, wide range of temperatures.
- ✓ Full operating engine test capability will permit validation testing with a high confidence level.

Program Summary
PSL Icing - $7M

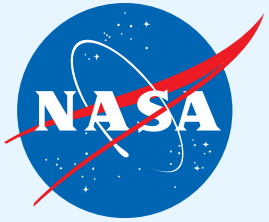
- **Project goal: Enhance PSL to provide industry and government a facility that will address turbine engine core icing at altitude conditions.**
- **Collaborate with industry/government to plan utilization of system**
- **Seeking a cooperative test with engine manufacturer via an NRA**
- **Targeting construction completion April 2011, followed by Integrated Systems Testing and Calibration to completed by April 2012**
- **PSL and IRT will provide a central world class icing capability**

Facility Options	Ice Particle	Liquid Water	Altitude	Cold Air Supply	Notes
NRC/GE Mirabel – Quebec		■			
NRC/IAR Canada	■	■			Ice from solid blocks
McKinley Climatic Lab Eglin Air Force Base		■		■	Environmental chamber
ASTEF C-2 AEDC Tullahoma, TN		■	■	■	Highly utilized Non research
General Electric Peebles Test Site	■	■			Ice particles with LN2
PSL Cell-3 NASA GRC	■	■	■	■	



Key Points in Sustaining Core Competencies

- Strategic framework established and implemented
- Collaborations with Academia, Industry and other Federal Agencies
  - Exchange of personnel (e.g IPAs)
  - New business & Partnerships opportunities (reimbursable)
- Professional Development (internal and external programs)
- Investments in our infrastructure (facilities, maintenance)
- Augmentation of workforce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