# 21st Century Propulsion Preeminence

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PCAST Workshop on Federal-State
R & D Cooperation

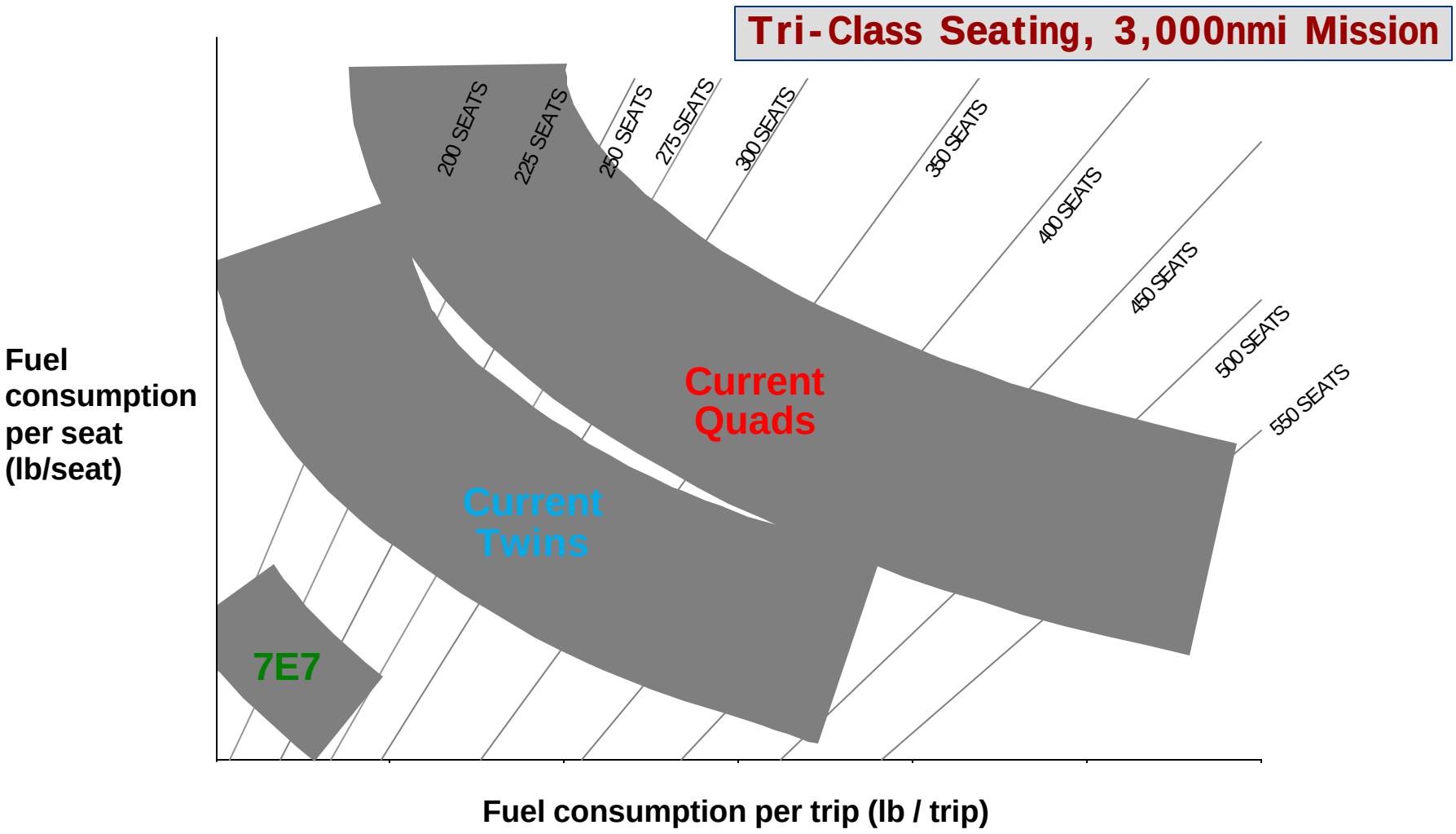
Aerospace: A Case Study of
Sustaining a Mature Sector

29 June 2004

# Response to "Charge"

- **Title of Panel: Aerospace as a Mature Sector**
  - What is mature?
    - Established?
    - Learned out?
    - Are semi-conductors mature by the same measure?
- **Q1: Strategies to sustain success**
  - New, affordable technology is essential
  - Competition makes everyone better, but need level playing field
- **Q2: Lessons Learned**
  - Transfer of military technology to commercial products used to be the basis for new commercial products
  - Commercial focus changes the rules of engagement
  - Globalization is a plus and a minus
- **Q3: Federally Funded Programs**
  - Military engines and demonstrators are useful
  - Supplier base getting limited help; depends on production

# Breakthrough Fuel Efficiency



# Aero-propulsion is Important in Ohio


- Key players exist
- Many linkages exist
- Opportunity to sustain world-class capability
- Large upside potential

**Estimated 20,000 propulsion related jobs in Ohio**

# Manufacturing and the US Economy

## Net Export & Import Data* – ($B)

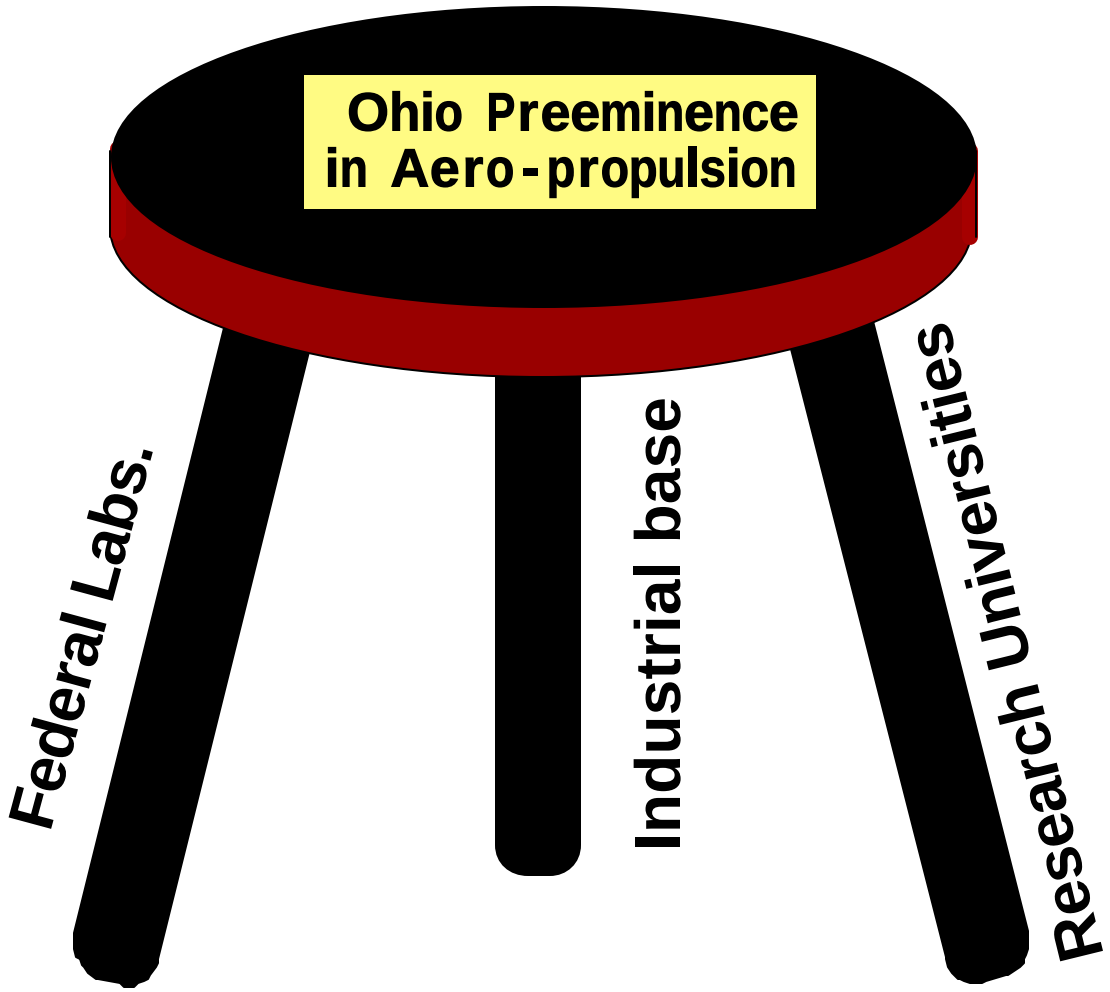
| Year | 1997 | 1998 | 1999 | 2000 | Trend |
|---|---|---|---|---|---|
| Aircraft | 20.8 | 28.3 | 23.9 | 12.3 | ↓ |
| Aero Engines | 0.8 | 0.9 | 2.0 | 3.1 | ↑ |
| Chemicals | 16.1 | 10.7 | 4.6 | 1.0 | ↓ |
| Pharmaceuticals | -3.7 | -5.9 | -10.2 | -13.3 | ↓ |
| Computers | -22 | -23 | -27.7 | -31.4 | ↓ |
| Autos | -67.8 | -75.5 | -93.9 | -105 | ↓ |

* Source U. S. Department of Commerce

Units – $B

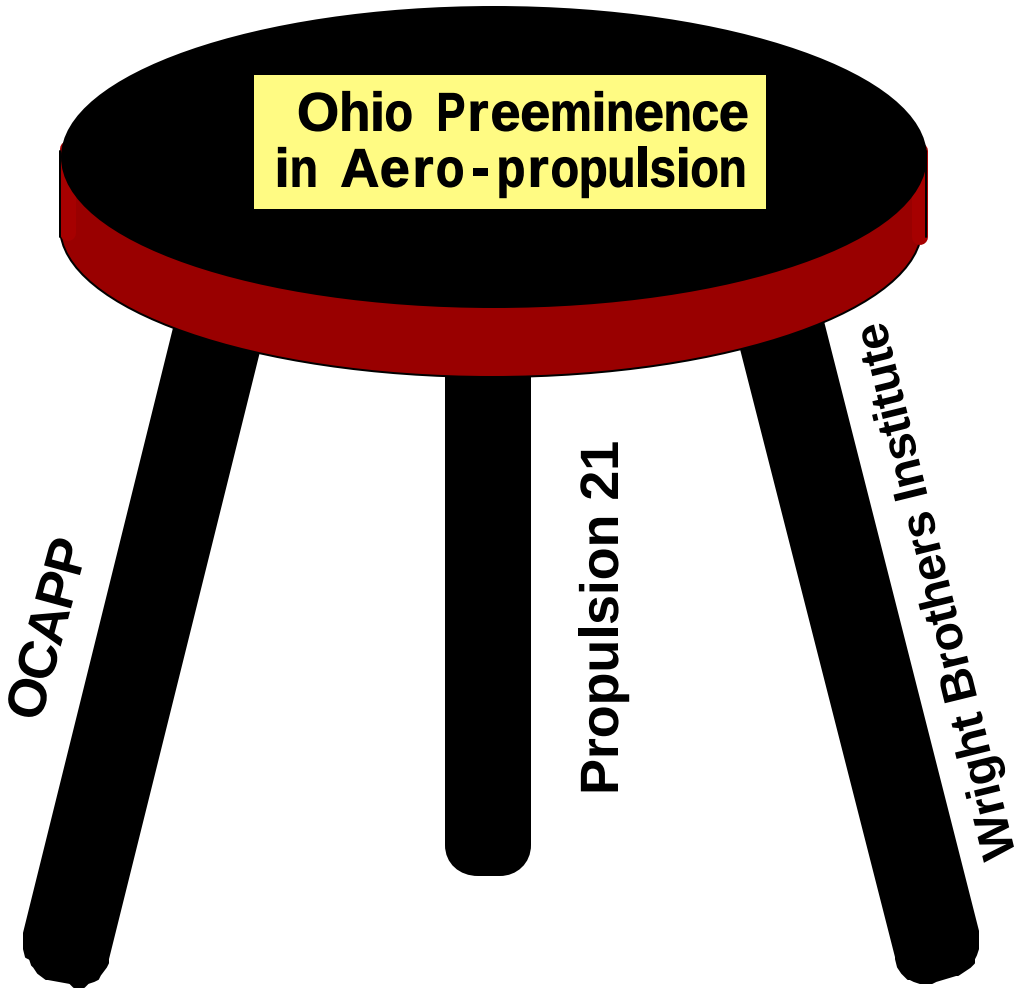
**Even for our "winners" the trends are troublesome!**

# What Assets Do We Need to Win?




**Ohio has these assets today!**

# What Resources Do We Have?



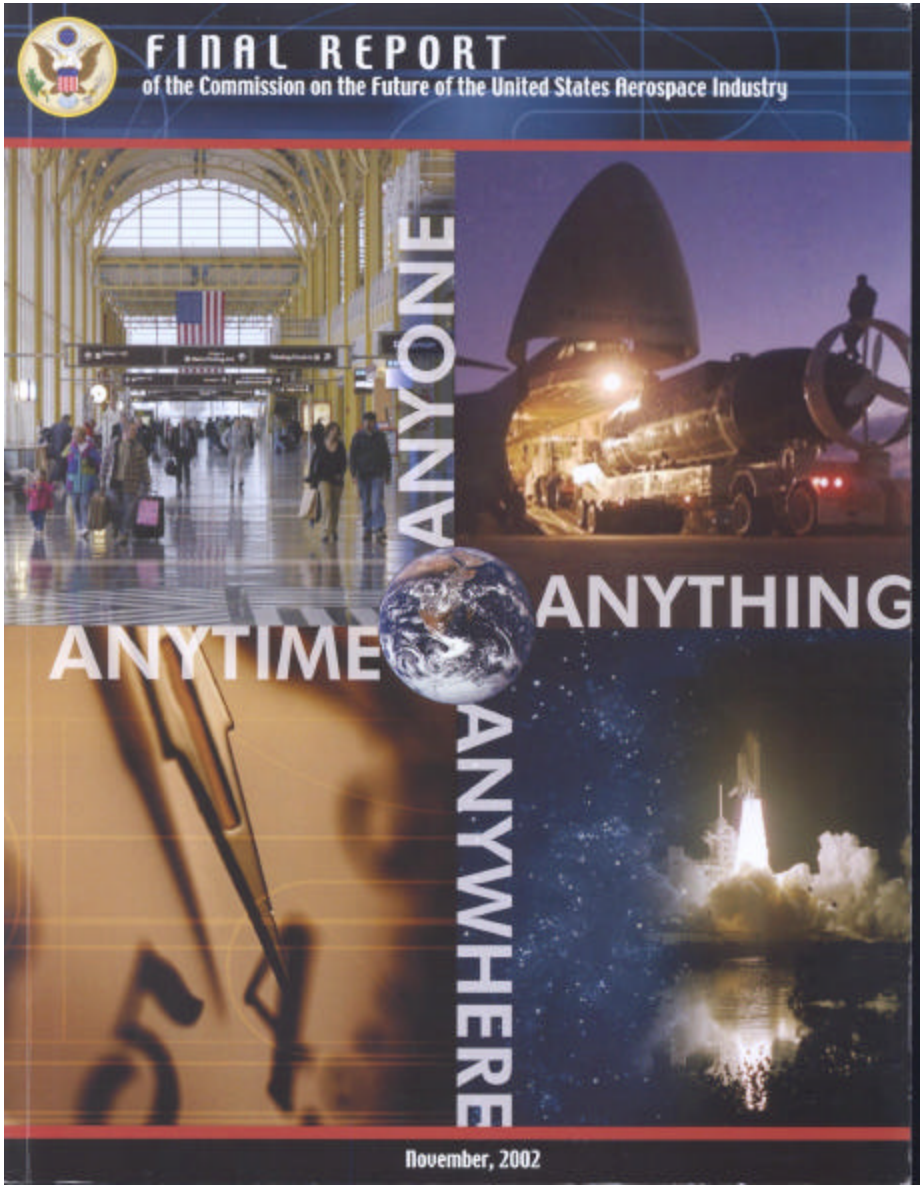

**Create a Coordinated Aero-propulsion Effort**

# Creating a Balanced National Technology Agenda

- **The "hangover" from the Gingrich days is costing us market share among our current "winners"**
  - Don't pick winners
  - Avoid "Corporate Welfare"
  - These trends are inconsistent with the Walker Report
  - Can't compete with Europe-21 with these "rules"
- **We must reach a balance that sustains our winners while creating new sectors for the future**
  - Aero-propulsion is important to our national and our economic security
  - It is a proven sector where we can win

**Now is the time for America to expand its lead in this vital sector**

# Walker Commission Report




## Report issued Nov. 2002

**Contains 9 Recommendations:**

- All but one relate to aeronautics
- Implementation progress slow if at all
- Urgency of situation clear

**How can we move ahead?**

# Summary

- **Aero-propulsion is important to America and to Ohio**
  - Currently accounts for more than 20,000 good jobs in Ohio
  - This can be a strength for our economy
- **We need to take decisive action to sustain America's leadership in aero-propulsion**
  - Propulsion 21 and OCAPP give Ohio a great start
  - Third Frontier operating funds are essential to sustain Propulsion 21 funding
- **Ohio has the necessary assets to be the world center for aero-propulsion**
  - Industrial base – OEM and suppliers **(Products & jobs)**
  - Federal Laboratories **(Technology)**
  - Research universities **(Technology & human capital)**

**The opportunity is here, the time to act is now!!**

# End of Formal Presentation

**(Remaining charts are for back-up)**

# Issues in "High Tech" R&D Investment

- **Seldom is there any effort made to assess commercial potential**
- **The cost of scale-up, if successful, is usually underestimated**
- **Current cost-match requirements can exclude the most qualified players**
  - Often required even for basic research these days
  - In-kind "accounting rules" not well-defined or uniform across agencies
- **Repackaging to appear to comply with national initiatives is common in funding agencies**
  - Often would not withstand "truth in advertising" scrutiny
  - Still leads to distortion of program balance

**Bottom Line: Major New Initiatives Require New Money**

# Commercial Subsonic Product Demand

## EIS* 2010 - 2030

| Aircraft Type | A/C Quantity | Engines Per A/C | Total Engines |
|---|---|---|---|
| Narrow Body | 3,500 | 2 | 7,800 |
| Wide Body | 4,300 | 2 & 4 | 14,000 |
| Regional | 5,000 | 2 | 11,000 |
| | | | 32,800 |

* Entry Into Service

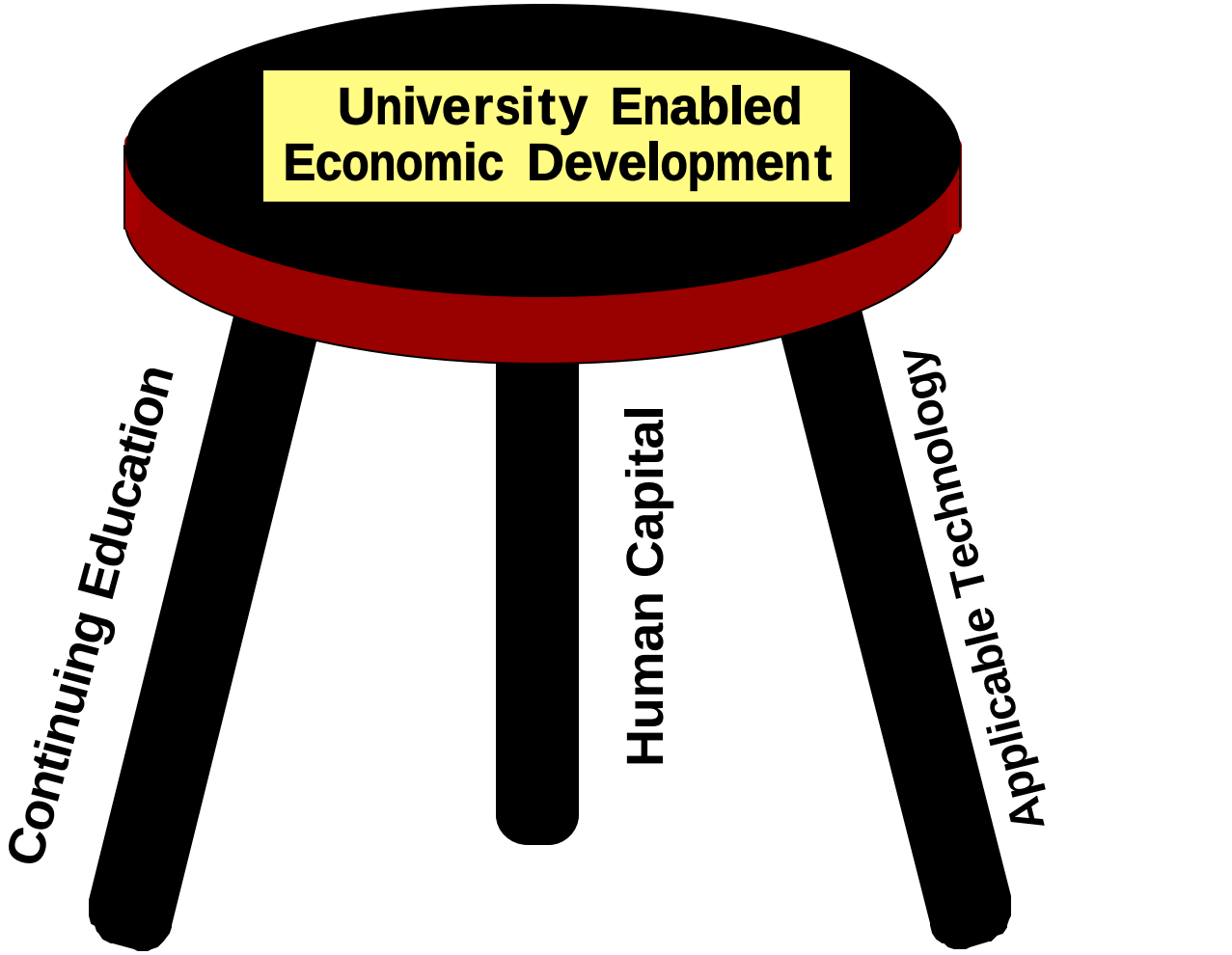
US Jobs!

# Supersonic/Hypersonic Product Demand

| Aircraft Type | EIS | A/C Quantity | Engines Per A/C | Total Engines |
|---|---|---|---|---|
| SSBJ | 2010 | 400 | 2 | 1,000 |
| LRSA | 2015 | 500 | 4 | 2,500 |
| SST | 2020 | 500 | 4 | 2,500 |
| Access-to-Space | 2015 | 50 | 8 | 500 |
| | | | | *6,500* |

***More US Jobs!***

# Where Do Universities Fit?




**Universities contribute in 3 ways!**

# "Fad" Driven Technology Investment in a Fixed Sum Game is Foolhardy

**Two notable recent "fads" have robbed our current winners of ongoing investment**

- High Tc Superconductivity (Earlier)
- NanoTechnology (as we speak)

# Nanotechnology as an Example

**Question:** "Why the big interest in Nanotechnology?"

**Short Answer:**

**Research funding**

- National Nanotechnology Initiative
- Gov. FY 2001 showed $422M for nanotech.
- Gov. FY 2002 shows +23% increase for nanotech.

**Longer Answer:**

**Promise of new products**

- Micro circuits
- Small instruments for precise measurements
- Bioengineering devices
- Fuel cell membranes

**Comment:** Both of these answers are fine, provided the funding is not an "either/or" proposition!

# Bottom Line - Propulsion Investment

**A Government investment of $500 million in FY 03-07, will create a new generation of propulsion systems which are expected to:**

- **Create $320 billion in engine sales over the next 20 years**
- **Create 80,000 new jobs in all industries**
- **Generate $20.55 billion per year in household earnings across all industries**
- **Which will result in $7 billion in federal and state tax owed each year**

**Government Investment in Aeronautics Pays Off**