Andrew S. Grove
Chairman, Intel Corporation

“Twin Engines of the Economy”

Joint Economic Committee
United States Congress 6/6/2000

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Twin Engines of The Economy

- Trade > 'Globalization'
  - Three decades of trade agreements bearing fruit
- Technology > 'Digitization'
  - Independent of stock market gyrations, IT remains the driving force of the economy as IT-based productivity gains take hold

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Trade: What Has Worked

- US-Japan Semiconductor Agreement (1986)
  - After 20 yrs of being shut out by Japan's MITI, the US went from 8% > 30% semiconductor market share
- Information Technology Agreement (1997)
  - 52 countries (95%+ of WW IT trade, i.e. $600B)
  - Eliminated 100% of IT tariffs by 2000
  - Saved $1.5B US/Europe semiconductor tariffs (7/97-1/00, SIA)
- US-China WTO Agreement (1999)
  - After 10 years of negotiations China agreed to open its markets and adopt the same WTO trade rules 134 other nations use
  - … just as China has become the #3 IT market in the world

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Trade: What Must Be Done

- China PNTR:
  - WTO agreement was the 1st step
  - US House approval was the 2nd
  - We now ask the US Senate to do the same

Trade: What Must Be Done

- e-Commerce Trade Rules:
  - Internet will transform goods like software from “atoms” to “bits”
  - WTO’s GATT classifies ‘off-the-shelf’ SW (atoms) as a “good”
    - Result: SW moves around the world virtually tariff & barrier free
  - EU proposes that all e-Commerce (bits) be classified as “services”
    - Result: SW would come under more trade restrictive GATS rules
  - This could lead to “e-Protectionism”… country-by-country
  - Our trade principle must be ‘technology neutrality’ --
    - In this case: ‘goods are goods’ no matter how delivered

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Trade: What Must Be Done

- "Mass Market" Export Controls:
  - Currently: US Government set MTOPS based export controls
  - But government 'cycle time' is slower than technology
  - New: base controls on market size, not performance
- "World Class Talent" Import Controls:
  - Currently: 55% of US Engineering PhDs are foreign born
  - Educating them and then making them leave makes no sense
  - Even when cap raised from 65K to 115K, visas ran out 3/2000
  - New: A comprehensive review of skills-based immigration in an age when the high technology worker is the key resource

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Technology: Work in Progress

- Telecom Act (1996)
  - The Internet is about connected computing
  - Prior to TA there were increasingly "free" MIPS (computing)…
  - …but no reduction in cost of bauds (connection)
  - De-regulation has brought mergers, acquisitions and increased competition
  - Generally positive, but consumers still waiting for bandwidth

Tech: What Must Be Done

- **Federal IT Research funding:**
  - **Total federal Information Technology R&D is declining:**
    - **From $75B in 1990 to $62B in 1999***
    - **While High Tech industry grew 10-30% per year****
  - **Industrial, federal R&D for "computers and electronics" is not matched:**
    - **30% of industrial R&D* (#1), but only 6% of federal R&D***
  - **Recommendation:**
    - **Rationalize federal R&D with GDP contribution of sector**
    - **IT was 11%* of GDP in 1997 (probably 12%+ last year)**

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*Source: NSF, 1998 **Source: Bureau of Economic Analysis, Milken Institute

Tech: What Must Be Done

- Two issues of "Atom - Bit Parity" ('Technology Neutrality'):

- Internet taxation:
  - No sound basis for tax advantaging the Internet
  - Tax neutrality has to be achieved or we contribute to digital divide

- Internet privacy:
  - Treat private data like user's private property
  - Consequently, protect it like other forms of property
  - Develop a single, national policy for privacy:
    - Don't legislate tech solutions (e.g. focus on code)
    - Leave room for self-regulation

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Tech: What Must Be Done

- 21st Century Patent Office:
  - '98 to '99: PTO applications up 11%, funding down 16%
  - Major problem: diversion of PTO fees to general treasury:
    - $564M to date, another $113M in FY'01
    - PTO needs money to improve training, search technologies
  - Stop the fee diversion

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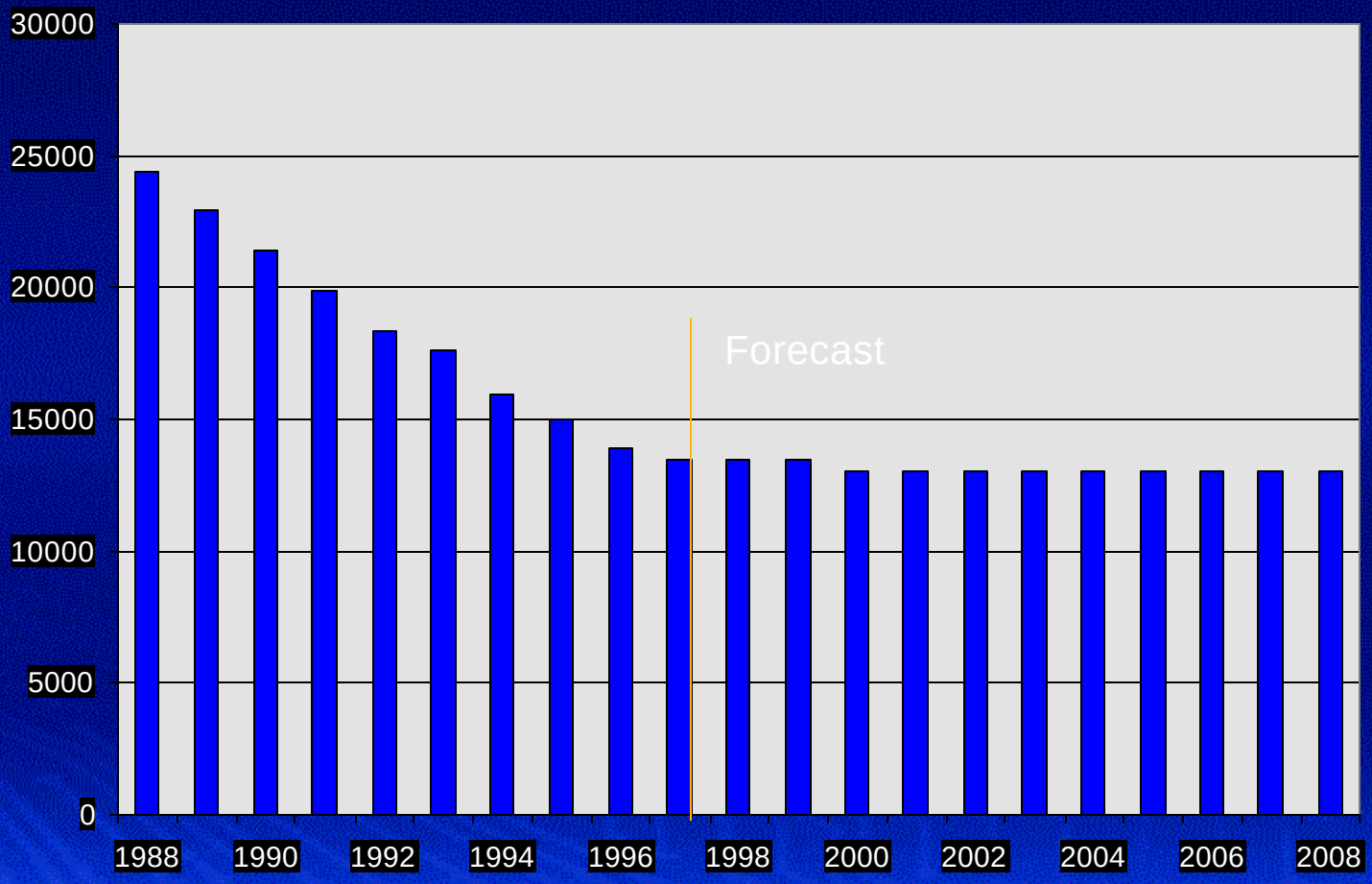
Tech: What Must Be Done

- World Class Math & Science Education:
  - All degrees inc. from 1.4M to 1.6M from ’88 to ’98
  - EE, CS, CE degrees declined in same period
  - e.g. BS in EE down 25k to 14K ‘88 to ‘98

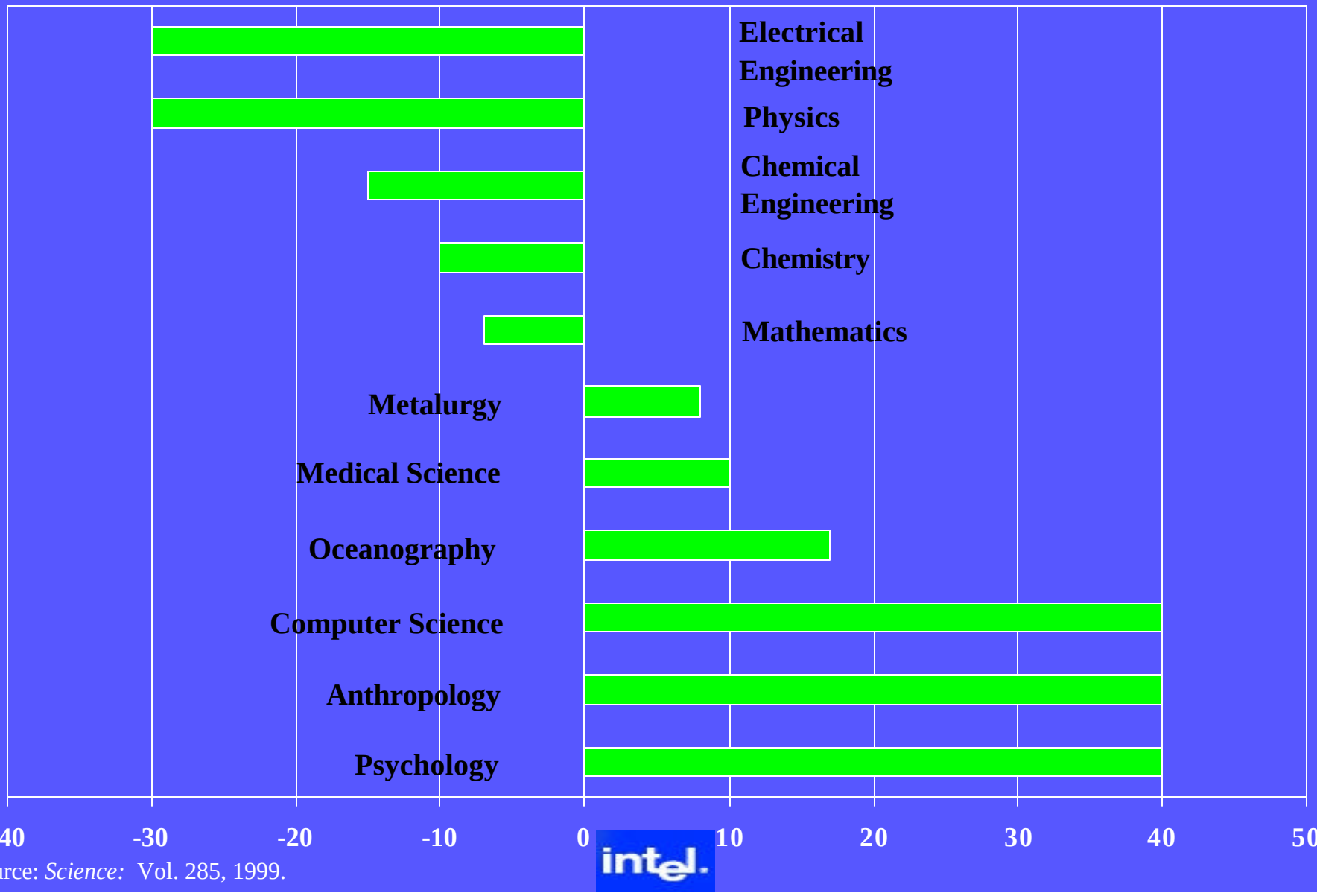
B.S. Electrical & Electronic Engineering Graduates



Source: Engineering Workforce Commission[17] through 1997; SRC Model 1998 - 2008

Percentage Change in Federal Basic Research Funding FY 1993-97

**** in constant dollars***



Source: *Science:* Vol. 285, 1999.

Tech: What Must Be Done

- World Class Math & Science Education (cont'd):
  - What Intel is doing…
  - Teacher Development:
    - Teach to the Future (400K teachers)
  - Community Based Education:
    - Computer Clubhouses (100 centers over 5 years)
  - Competitions:
    - Intel Science Talent Search
    - Intel International Science and Engineering Fair

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Suggested General Principles

- "First, do no harm"
  - We have avoided "Department of the Internet"
  - Understand problems before moving to solutions
- Be consistent
  - Enable private sector planning
- Achieve atom - bit parity (technology neutrality)
  - For trade, taxation and privacy
- Digital Economy is all about human resources
  - Education
  - Immigration
  - Research & Development funding

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