National Nanotechnology Initiative Review: Assessment and Recommendations

March 12, 2010

The National Nanotechnology Initiative:

- Began in 2001 with six agencies
- In 2010, is comprised of 25 agencies
- The FY2011 request $1.8B
- The US Government has invested $12B

PCAST NNI Review

- 21st Century Nanotechnology Research and Development Act of 2003 calls for a National Nanotechnology Advisory Panel to review the NNI
- By Executive Order, PCAST was designated to serve as the National Nanotechnology Advisory Panel
- This is the third PCAST assessment: 2005, 2008, 2010

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Statement of Task

- Included congressionally-mandated requirements for assessment:

  (section 4 of Public Law 108-153)

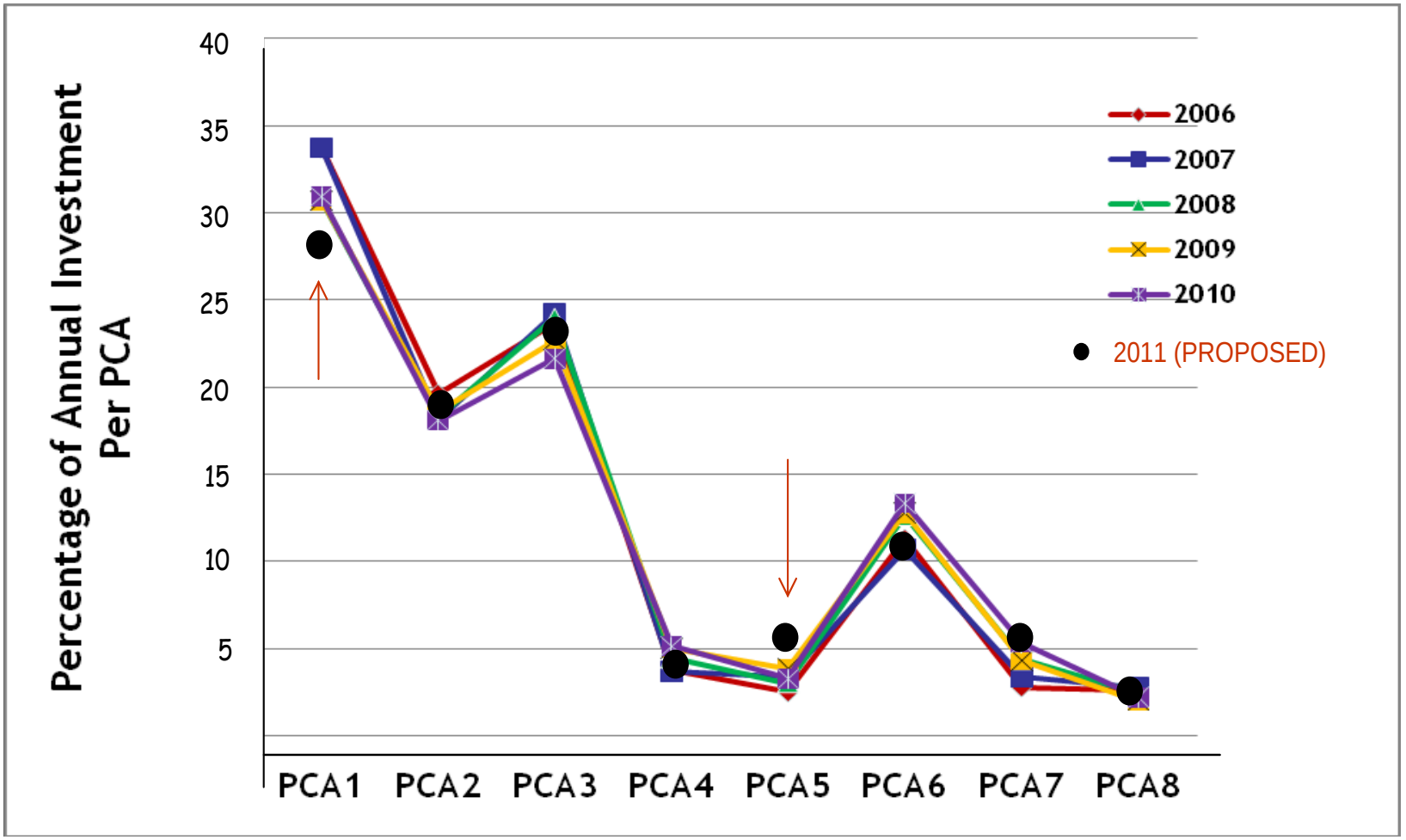
  - trends and developments in nanotechnology science and engineering.
  - progress made in implementing the program.
  - the need to revise the program.
  - the balance among the components of the program, including funding levels for the program component areas.
  - whether the program component areas, priorities, and technical goals developed by the Council are helping to maintain United States leadership in nanotechnology.
  - the management, coordination, implementation, and activities of the program.
  - whether societal, ethical, legal, environmental, and workforce concerns are adequately addressed by the program.

- Also addressed 44 specific questions focused in four areas:
  - Program management
  - Outputs of nanotechnology
  - Environment, health and safety
  - Vision for nanotechnology

Key Findings of the Review of NNI

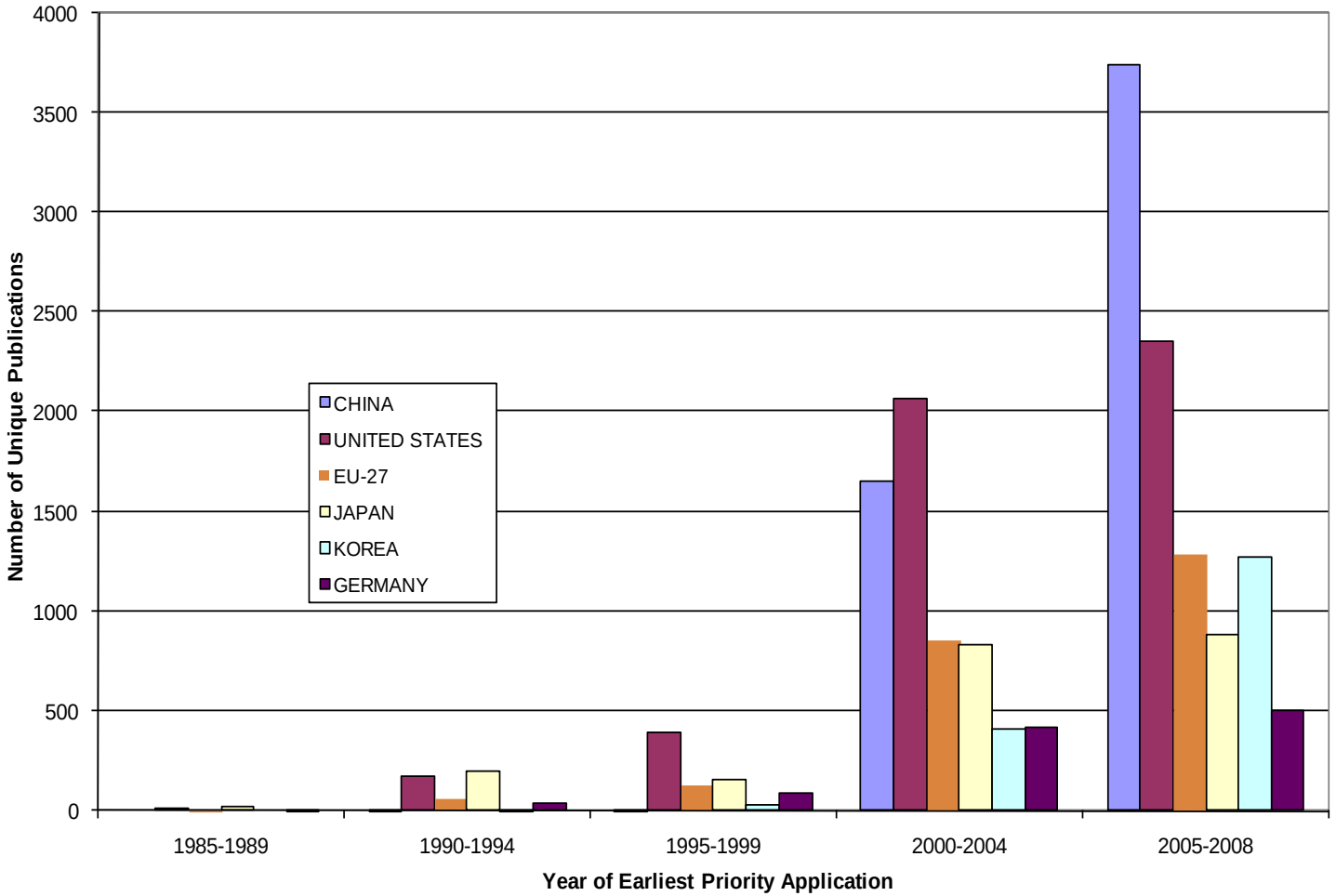
- The US is the world leader in nanotechnology R&D and commercialization, but its lead may be transient
- The NNI has had catalytic and substantial impact on the field of nanotechnology
- The program management of NNI is effective but opportunities for improvement exist
- Economic competition from other countries has dramatically increased
- Commercial activities have gained momentum as the field has evolved
- The scarcity of standardized commercialization data challenges the tracking of benefits of nanotechnology
- The identification and management of risks for environment, health and safety are crucial to the responsible commercialization of nanotechnology-related products
- The lack of an American skilled workforce presents a significant challenge to the nanotechnology-related business community.

Percentages of Annual NNI Investment per Program Component Area: 2006-2011



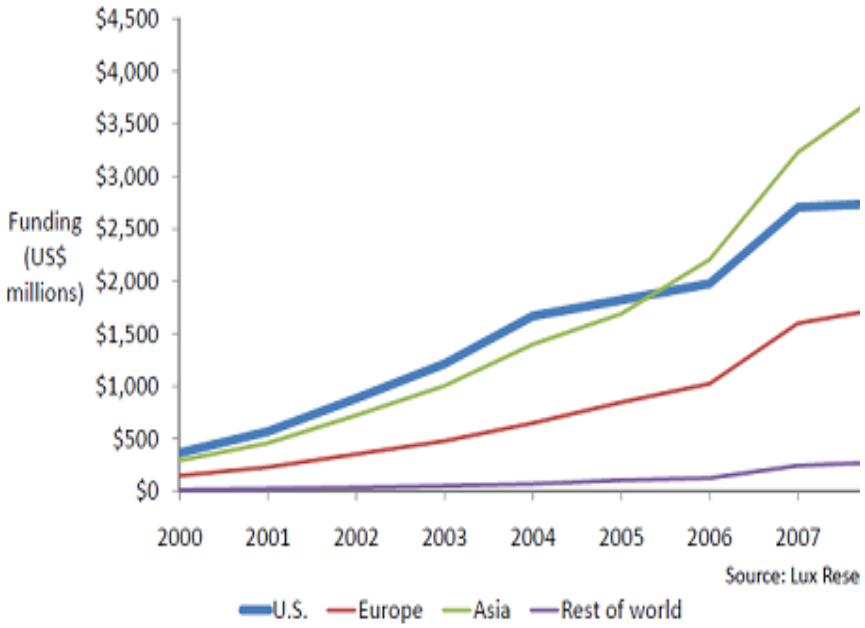
Source: C. Teague, Survey (2006-2010) and NNI – Supplement to the President's 2011 Budget. Red arrows indicate the major changes in allocation of the 2011 proposed budget.

Nanotechnology patent applications

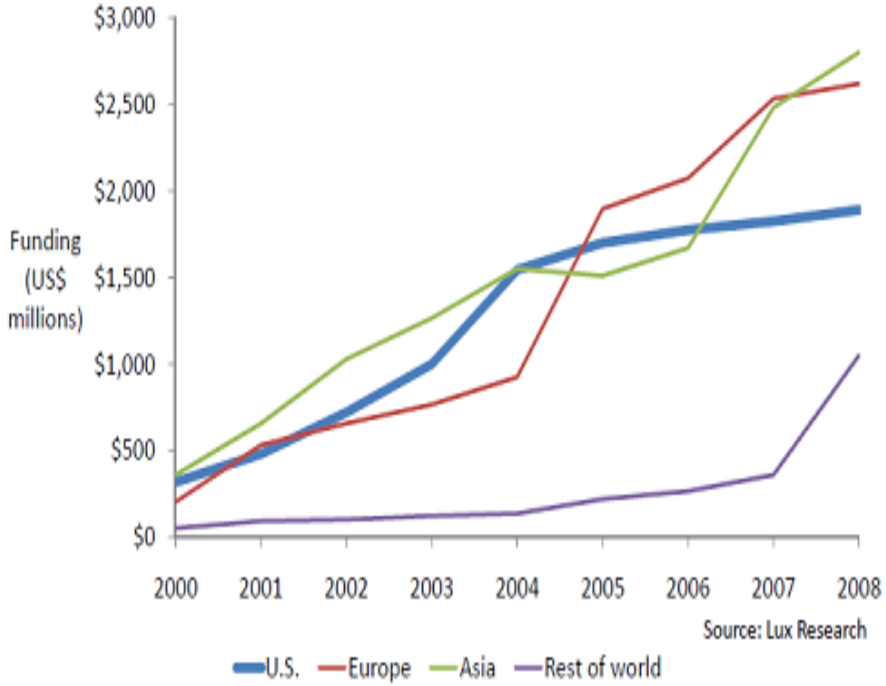


Nanotechnology-related patent applications published for the first time, organized by country of the assignee, for different 4-year periods.

Global funding for nanotechnology



Total funding for nanotechnology (from all sources, including government, corporate R&D, and venture capital), plotted by year, shows Asia in the lead since 2006.



Over the same period, government funding in the U.S. has lagged that in Europe and Asia.

Major Recommendations

- Increase NNI funding for nanomanufacturing research while maintaining support for basic research
- Strengthen the NNCO, the NNI coordinating entity, with additional funds, and a broader mandate
- Require that metrics be developed to track benefits of nanotechnology, such as job creation
- Develop a cross agency strategy plan that links environment, health, and safety research with knowledge gaps and decision-making needs
- Expedite the citizenship review process for those receiving advanced degrees in science and engineering