National Security and Visa Restrictions: Saving the US Science Enterprise

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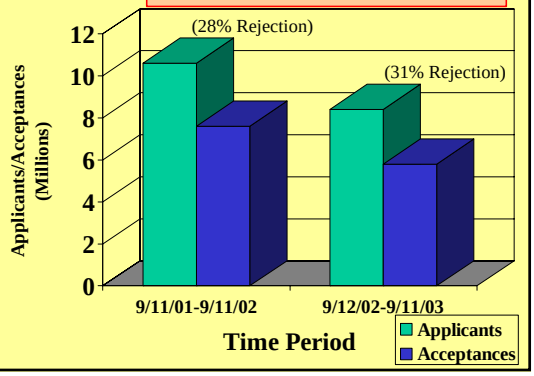
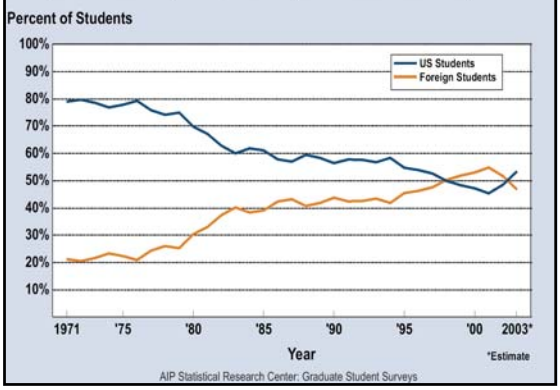
Non-Immigrant Visas after 9/11



AIP Pub. Number R-437 June 2003
Physics Students From Abroad in the Post-9/11 Era

- After decades of steady increases … the population of foreign **students entering graduate physics programs has declined** noticeably in the past two years.
- In the past year, **two-thirds of the PhD-granting departments, and almost half of the Masters departments, report that … foreign students …were unable to attend** because of visa difficulties.
- Overall, it appears that about **20% of admitted foreign students were at least initially prevented from attending** in the fall of 2002.
- In numerical terms, Chinese students were by far … commonly denied entrance. … **Chinese, along with middle eastern students, felt the greatest impact.**
- **Many departments report major effects on course enrollments**, and on their ability to fill openings for RA's and especially TA's.
- **Most departments are maintaining their current admissions policies for now.**

Figure 1. Citizenship of First-Year Physics Graduate Students, 1971-2003.



Visa Problems for Delegates to the International Symposium in Lepton Photon Interactions Fermi Lab

At LP-1999 held at Stanford, 12 of 16 invited Chinese citizens and 7 of 25 invited citizens of the former Soviet Union attended. At LP-2003 only one of about 20 invited Chinese and 5 of 20 invited Russians attended. Almost all of Russians who did attend traveled with multi-entry visa or were already in the US.

What do the personal tragedies portend for the international and domestic enterprises?

- Students prevented from returning from foreign meetings or after attending to urgent family business (many denied or delayed at the outset).
- Colleagues unable to pursue major long-term research owing to visa restrictions.
- Colleagues subjected to summary imprisonment for minor violations of immigration laws.
- Colleagues denied or delayed visas to attend meetings.
- Colleagues at risk in authoritarian states denied sanctuary.

Laws	*Executive Orders/ Advisories/Directives*	*Consequences*
•1994 Foreign Relations Security Act		*•Holds consular officials liable if terrorists slip in.*
	•VISAS Mantis	*•Technology theft/WMD Proliferation*
•1996 INA		*•Defines criminal penalties for consular misconduct*
	•VISAS Condor -Country Groups	*•National Security/Extends watch to certain countries*
•2002 Enhanced Border Security and Visa Entry Reform Act		*•Imposes border control (INS) on DHS*
	•Terrorism List	*•7 nations special scrutiny*
	•Export Control Posts	*•Prevent proliferation*
	•Technology Alert List	*•Military and Economic*
•2002 Patriot Act		*•SEVIS, Consular Authority split (State/DHS)*
	•May 03 Memo Expanding personal interviews	*•Everyone between 16 and 60 •previous clearance irrelevant*

LISTS

Visas Mantis and Visas Condor
Directives from the Secretary of State

- ***State Sponsors of Terrorism list (Cuba, Libya, Iran, Iraq, North Korea, Sudan and Syria)***
- ***Non-Proliferation Export Control Posts (China, India, Israel, Pakistan, and Russia***
- ***Visas Condor List (classified countries list)***
- ***Technology Alert list contains 16 categories (munitions, warheads and projectiles, nuclear, missiles, aircraft and missile propulsion, navigation and guidance, chemical engineering and biotechnology, remote imaging and reconnaissance, advanced computers, materials, cryptography, lasers and directed energy systems, acoustic and sensors technologies, marine technology, robotics, ceramics, high performance metals and alloys)***

Special Scrutiny

- The first group of individuals subject to Special Registration included:
  - **Iran, Iraq, Libya, Sudan**, or **Syria**
- The second group of individuals subject to Special Registration included:
  - **Afghanistan, Algeria, Bahrain, Eritrea, Lebanon, Morocco, North Korea, Oman, Qatar, Somalia, Tunisia, United Arab Emirates**, or **Yemen**
- The third group of individuals subject to Special Registration includes:
  - **Pakistan** or **Saudi Arabia**
- The fourth group of individuals subject to Special Registration includes:
  - **Bangladesh, Egypt, Indonesia, Jordan,** or **Kuwait**
- ***These in addition to the Technology Alert Post countries***

May 3, 2003, State Department Memo to Embassies: BORDER SECURITY - WAIVER OF PERSONAL APPEARANCE FOR NONIMMIGRANT VISA APPLICANTS - REVISION TO THE REGULATIONS

- ***the visa interview is a crucial tool—in many cases the key tool—in determining visa eligibility. … we have revised substantially the Code of Federal Regulations and … guidelines on when personal appearance and interview can be waived for nonimmigrant visa applicants. This is the next step in preparing for the eventual fingerprinting …***
- ***the requirement for personal appearance for nonimmigrant visa applicants can in general be waived by a consular officer only for a person who the consular officer concludes presents no national security concerns requiring an interview and who: (5) Is an applicant who within twelve months of the expiration of the applicant's previously issued visa is seeking re-issuance of a nonimmigrant visa in the same classification at the consular post of the alien's usual residence, and for whom the consular officer has no indication of visa ineligibility or noncompliance with U.S. immigration laws and regulations. … Let me emphasize strongly, however, that consular officers are not required to waive interview in such cases.***

US-VISIT (United States Visitor and Immigrant Status Indicator Technology) Program

automated entry/exit system to,

- Collect, maintain, and share information, including biometric identifiers (fingerprints, photos), through a dynamic system, on foreign nationals …
- Enhance traffic flow for individuals entering or exiting the U.S. for legitimate purpose …

US-VISIT Program

- The US-VISIT system … information will be stored in databases maintained by DHS and the Department of State as part of an individual's travel record.
- The information in the US-VISIT system will be available to inspectors at ports of entry, special agents in the Bureau of Immigration and Customs Enforcement (ICE), adjudications staff at immigration services offices, U.S. consular offices, and other law enforcement agencies.

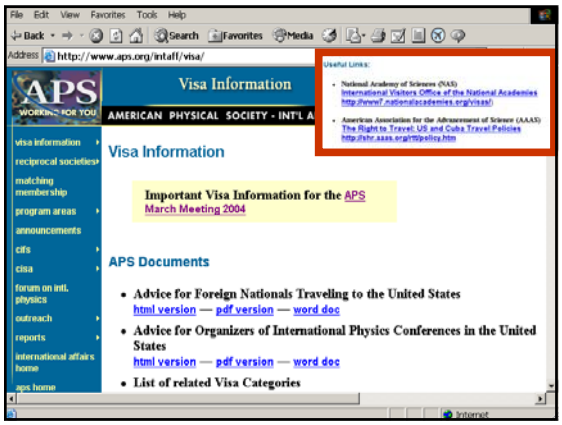
Reaction of colleagues:

"This is an Orwellian nightmare. If a visit to Fermi Lab implies fingerprinting, I'll stay at home."

German colleague currently at FNAL

Troubles for Students

- **Caution:** Due to recent changes to U.S. immigration law, travel outside of the United States may have severe consequences for aliens who are in the process of adjusting their status, extending their nonimmigrant stay, or changing their nonimmigrant status. Upon return, these aliens may be found inadmissible, their applications may be denied, or both. It is important that the alien obtain the proper documentation before leaving the U.S.
  - **Bureau of Citizenship and Immigration Services, DHS**
- A critical document is the U.S. visa stamp in your passport. It is important to remember that obtaining a new visa stamp is never guaranteed. Now, more than ever, it is possible that you may experience delays at a U.S. embassy or consulate, regardless of your country of citizenship.
- If you changed to F-1 status in the U.S., you will need to apply for an F-1 visa to match your new F-1 status for reentry into the U.S. A new F-1 visa cannot be issued in the U.S.



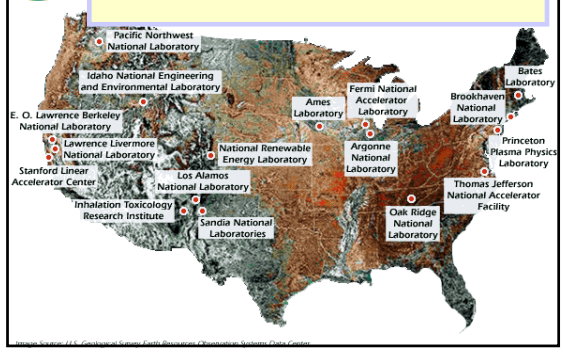
IPASS or Something more Viscous?

- *of approximately 30 million foreign visitors who enter the US each year, roughly a half million come as students on F, M and J visas. And approximately 175,000 of these come to study science*
- *jointly directed by State and Homeland Security (visa authority is now shared between the departments)*
- *will be advisory only with no direct authority over the issuance of visas since the law imposes such authority on State and Homeland Security*
- *will evaluate candidates for visas whose course of study might give them information or skills that are "unique" to the US and its closest allies and which information or skills could be used against the US*
- *"Patriot Law" has already authorized the implementation of the Student and Exchange Visitor Information System (SEVIS) to monitor those who come to the US under the Student Exchange and Visitor Program (SEVP). The Patriot Act has also imposed a two-tier review system over consular officers*

Needed Changes

- *Time limits for security reviews for visiting students and scholars (those subject to Visa Mantis and Visa Condor scrutiny).*
- *Modify application of 214(b) for J-1, F-1 and B visa applications by scientific students and visitors.*
- *Classify as "returning scholars" all employees, students and long-time visitors supported by government funds (DoE, NSF, NASA, etc).*
- *Extend parole by Bureau of Citizenship and Immigration Services of the Department of Homeland Security to students and scholars.*
- *Consular officials should not be held liable for such post-hoc charges as "criminal negligence."*
- *Widen the visa waiver program to provide for extended visits for J-1 and H-1B scholars and their families.*

The DoE Labs: A Case in Point



Weapons and non-weapons Operations: A Sketch

Snapshot: DOE Weapons Operations
Percentage of Budget: Roughly $6 billion, a third of the Department's $18 billion FY99 budget.
Allocation of Weapons-Related Budget:
Defense Programs $4.4 billion
Nonproliferation/Nat. Sec. 0.7
Fissile Material Disposal 0.2
Naval Reactors 0.7
Number of Contract Employees: 34,190
Number of Contract Employees Per Lab
Los Alamos 6,900
Sandia 7,500
L. Livermore 6,400
Pantex 2,860
Oak Ridge (Y-12) 5,500
Kansas City 3,150
Nevada Test Site 1,880
SOURCE: DEPT. OF ENERGY FIELD FACTBOOK, MAY 1998

The International Connection: A Sketch

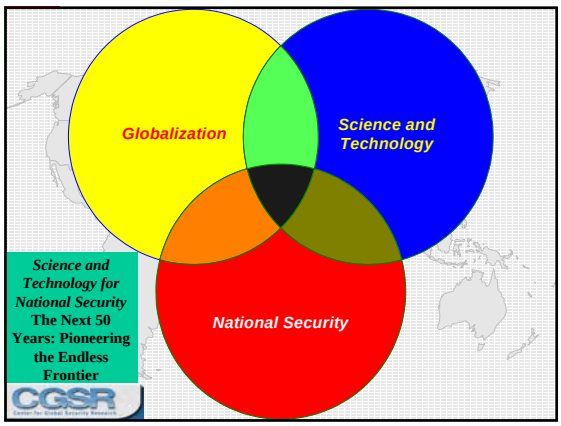
The 3 weapons laboratories--Los Alamos, Lawrence Livermore and Sandia--received some 6,398 foreign visitors or assignees (stays from 30 days to 2 years) in 1998 including 1,824 visitors from sensitive countries.

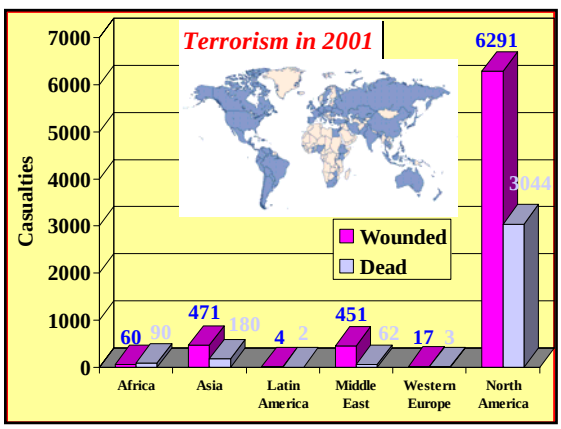
In addition, employees traveled to foreign laboratories or scientific conferences encompassing 5,799 trips to include 1,814 trips to sensitive countries.

Result: enhanced access to the 70-75% unclassified work needed to progress in weapons-related research, open scientific research, and cooperative international programs.

The Introduction of More Restrictive Measures

- **New classifications for material already in the public domain.**
- **Special identity badges for foreign nationals.**
- **New restrictions on access to unclassified facilities.**
- **Attempts to place non-classified facilities under restrictive controls.**
- **Increased dependence on procedures of doubtful value--ie, polygraph testing.**
- **New and more draconian classification procedures that threaten to restrict the distribution of scientific information.**
- **Complex management schemes that further dissipate lines of responsibility and authority.**
- **Impose security regimens on non-weapons labs. The "tier system" is now dead.**





S&T Indicators	*Advantages*	*Disadvantages*	*Available since*
R&D	Common, Standardized	Updating, Variable national coverage, Differing concepts, Difficulty in distinguishing R&D activities, Difficulty in estimating time occupied in S&T activities	1960 in industrial nations
Human Resources	International classifications, regularly collected	Vagaries in on-the-job training, correspondence between training and jobs	1950 almost everywhere
Innovation	Regular surveys, wide spectrum	Costs and expenses uneven, concepts vague, industrial statistics vary	1992 in OECD and Europe—some LA
Publications	Main output of knowledge systems	Variable, coverage incomplete, citation index not whole story	1970 collected by NGOs
Patents	Number requested and issued known	Small numbers and importance unknown	1980 (EPO, USPTO, JPO)
Output and Impact (balance of payments, technology trade, etc)	Assess benefits of S&T investments	Limited to economic impacts, require good and transparent accounting, not measuring cause	1980 (OECD, EuroStat)

International R&D expenditures and R&D as a percentage of GDP: 1981–98

Year	*United States*	*Japan*	*Germany*	*France*	*Kingdom*	*Italy*	*Canada*
			Total R&D expenditures in billions of constant 1992 U.S. dollars				
1981	*109.5*	*NA*	*23.4*	*16.6*	*17.3*	*6.9*	*5.3*
1985	*146.1*	*48.3*	*28.3*	*20.3*	*18.4*	*9.6*	*6.9*
1990	*162.4*	*67.3*	*34.1*	*25.4*	*21.3*	*12.8*	*8.0*
1995	*170.4*	*73.6*	*36.6*	*25.7*	*20.1*	*10.7*	*9.7*
1998	*201.6*	*NA*	*38.6*	*NA*	*NA*	*12.3*	*10.6*

R&D as a percentage of gross domestic product

Sweden	*3.85*	*Russian Federation*	*0.95*	*Canada*	*1.60*	*Colombia*	*0.41*
Japan	*2.92*	*Venezuela*	*0.89*	*Belgium*	*1.58*	*Argentina*	*0.38*
South Korea	*2.89*	*Spain*	*0.86*	*Iceland*	*1.56*	*Panama*	*0.38*
Finland	*2.78*	*Brazil (1996)*	*0.76*	*Austria*	*1.52*	*Malaysia*	*0.34*
Switzerland (1996)	*2.74*	*Poland*	*0.76*	*Singapore*	*1.47*	*Bolivia*	*0.33*
United States	*2.60*	*Hungary*	*0.73*	*Ireland*	*1.43*	*Mexico*	*0.42*
Germany	*2.31*	*Cuba*	*0.70*	*Czech Rep.*	*1.19*	*Philippines*	*0.21*
Israel	*2.30*	*South Africa*	*0.69*	*Slovak Rep.*	*1.18*	*Thailand*	*0.12*
France	*2.23*	*China*	*0.65*	*Costa Rica*	*1.13*	*Hong Kong*	*0.10*
Netherlands (1996)	*2.09*	*Portugal*	*0.65*	*New Zealand*	*1.10*	*Ecuador*	*0.08*
Denmark	*2.03*	*Chile*	*0.64*	*Italy*	*1.08*	*Uruguay*	*0.42*
China (Taipei)	*1.92*	*Indonesia (1995)*	*0.50*	*Norway*	*1.68*	*Turkey*	*0.45*
United Kingdom	*1.87*	*Greece (1993)*	*0.48*	*Australia*	*1.68*		

Emerging Shortages in the National Talent Pool.

… there has been a serious weakening of the nation's available scientific and technical workforce. The number of R&D workers as a percentage of the total workforce has been declining since the late 1980s, at a time when the need for them is rising. … Graduate school populations in engineering and the physical sciences, even in computer sciences, are also static or declining. … an increasing proportion of [foreign graduates] are returning to their home country …. While the training of international students has been a historical strength of American higher education, these trends suggest an emerging shortage for the American R&D labor market.

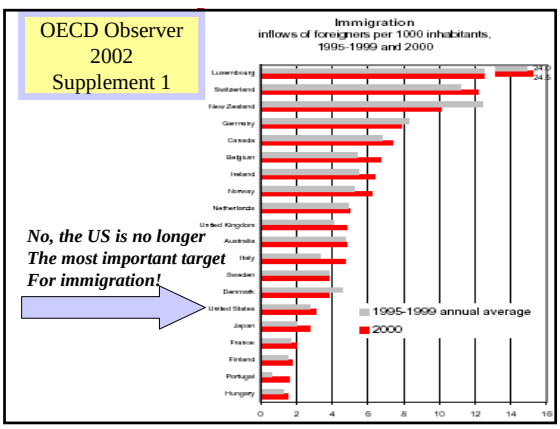
Emerging Shortages in the National Talent Pool?

- *Data for the first and second quarters of 2003 released by the Bureau of Labor Statistics showed surprisingly high unemployment rates in science and engineering fields. … All engineering … 4.4 percent unemployment, … the rates for the high-tech fields of electrical and electronic engineering are in the range of 6.4 to 7 percent. Reported unemployment in the life, physical, and social sciences ranges from 2.8 to 4.1 percent.*

- *Still, … the available data show sufficient numbers or even surpluses of highly qualified candidates with extensive postgraduate education. This is especially the case in the academy, which has become risk-averse about replacing departing tenured faculty with tenure-track junior positions. Instead, many universities in the United States have been filling such open slots with temporary and part-time appointees they find in ample pools of highly educated applicants.*

Michael S. Teitelbaum *is program director at the Alfred P. Sloan Foundation*

OECD Observer
2002
Supplement 1

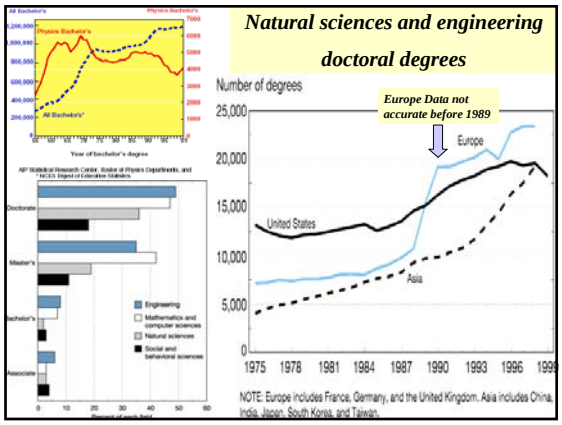


No, the US is no longer The most important target For immigration!

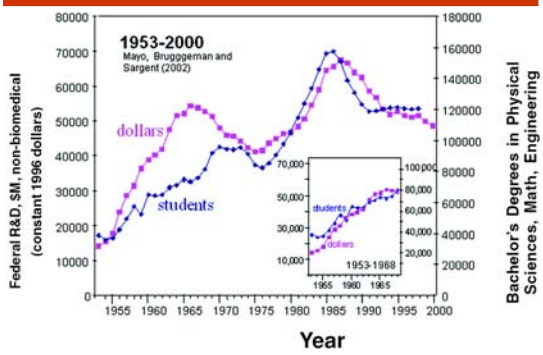
Why U.S. Leadership Will Be Challenged

- ***More nations are acquiring high-end innovation capabilities with concerted investment in research and development (R&D) and technical talent. Other nations are acquiring fast-follower capabilities to rapidly commercialize innovation originating elsewhere.***
- ***The supply of scientists, engineers and technicians is growing substantially faster abroad than in the United States.***
- ***The U.S. first-mover advantage in information technology (IT) is diminishing with aggressive IT investment and deployment overseas.***

Natural sciences and engineering doctoral degrees



Correlation between Federal R&D expenditures and bachelors' student production in the physical sciences, math, and engineering 1953 to 2000

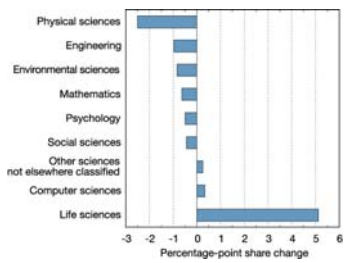


a handful of critical factors are highly and positively correlated with the success of a nation's innovation system, including:

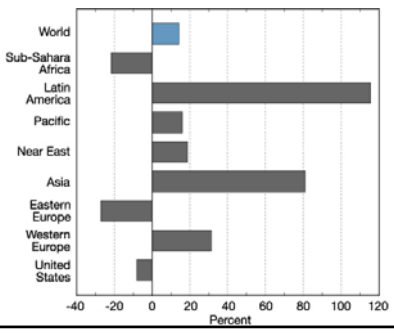
- ***the size of the labor force dedicated to R&D and other technically oriented work***
- ***the amount of investment directed at R&D***
- ***the resources devoted to higher education***
- ***the degree to which national policy encourages investment in innovation and commercialization***

The New Challenge to America's Prosperity: Findings from the Innovation Index--1999

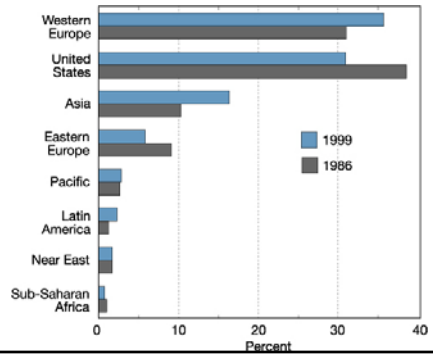
Changes in share of Federal Academic research obligations, by field: 1990-99



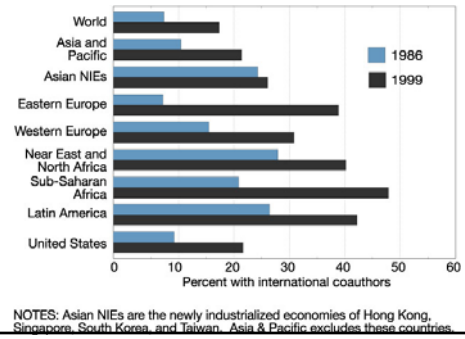
Growth trends in scientific and technical publications by region: 1986–99



Scientific publications: regional share of world output

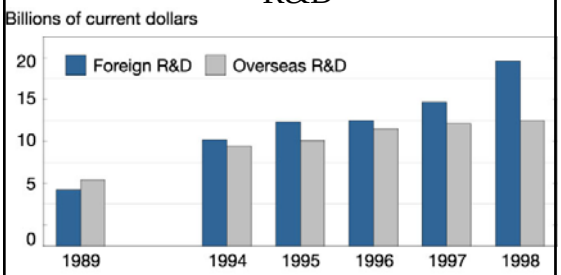


International coauthorship of scientific papers



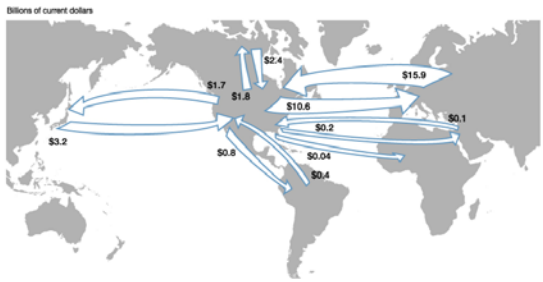
NOTES: Asian NIEs are the newly industrialized economies of Hong Kong, Singapore, South Korea, and Taiwan. Asia & Pacific excludes these countries.

Globalization of U.S. industrial R&D



NOTES: Foreign R&D refers to R&D performed in the United States by U.S. affiliates of foreign parent companies. Overseas R&D refers to R&D performed abroad by foreign affiliates of U.S. parent companies.

Industrial R&D spending flows of U.S. and foreign affiliates, by world region: 1998



1997 Rand Study by C.S. Wagner:
"International Cooperation in Research and Development:An Inventory of U.S. Government Spending and a a Framework for Measuring Benefits"
[http://www.rand.org/publications/MR/MR900/NR900web/MR900.sum.html]

~$3.5 billion distributed through government programs
74% of which goes to promote collaboration in science.

- ***scale of equipment or investment is large***
- ***project is global***
- ***unique expertise is located elsewhere***
- ***mission of funding agency is to support international cooperation***

⇨ ***ENHANCED PRODUCTIVITY OF SELF-ORGANIZED COLLABORATIONS***

Productivity and Telecommunications

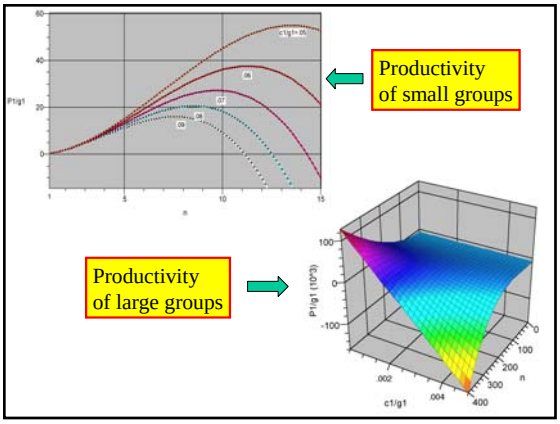
Productivity gain of a group = gain contributed by each new partner - the costs and impediments

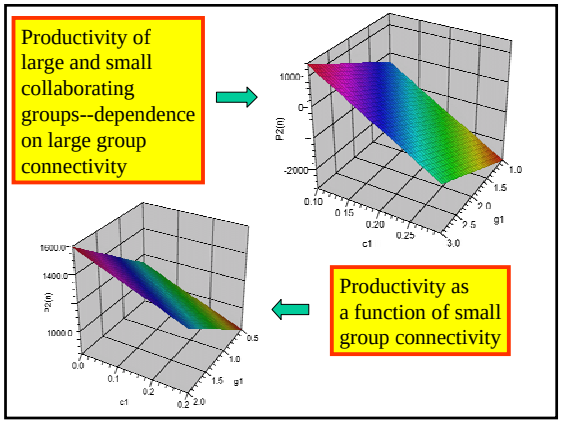
$$P_1(n) = g_1 n(n\text{-}1) - c_1 n^2(n\text{-}1)$$

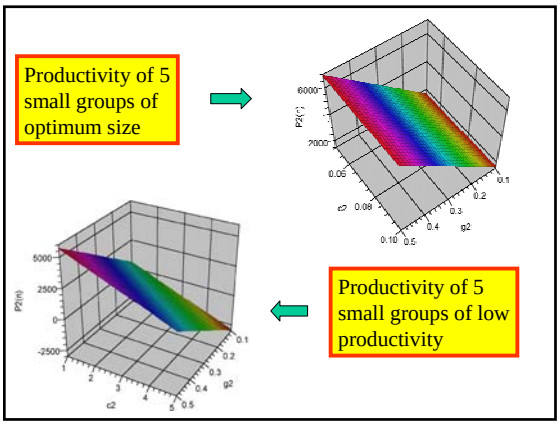
$$P_2(n) = \sum_{i=1}^{I} P_1(n_i) + g_2 \sum_{i \neq j} n_i P_1(n_j) - c_2 I(I-1) \sum_{i=1}^{I} n_i$$

$$P_k = g_k I_k^2 I_{k-1} P_{k-1} - c_k I_{k-1} I_k^3$$

B. Drossel, "Simple Model for the Formation of a Complex Organism," ***Physical Review Letters***, Volume 82, Number 25, 21, June, 1999, pages 5144-5147







Conclusions:

- ***Small groups with relatively high connectivity costs may still make significant contributions***
- ***It is possible to achieve alliances which improve total productivity without incurring excessive connectivity costs***
- ***It may be possible to avoid "stratification" of telecommunities based on access***

Instruments Impeding Free Exchange: The U.S. Armamentarium

Visa denials

- *Sensitive Countries List*
  - *Russia, Israel, India, Pakistan, China, Iran, Iraq, Syria, etc…*
- *Critical Technologies*
  - *Dual use, encryption, combat boots, etc…*
- *Economic and Military Embargoes*
  - *Cuba, India, Pakistan, Iran, Iraq, etc…*
- *Economic Proscriptions*
  - *Risk for illegal immigration*
- *National Security*
  - *Risk of stealing our secrets*
- *Criminal*
  - *Wants to come to do evil*

The Dangers to the National Interest

- **Stifle vital international exchange**
  - *non-defense research*
  - *defense-related research*
  - *visitors programs*
- **Impair University and lab productivity and morale**
  - *create suspicion and resentment*
  - *institutionalize racism*
- **Impose cosmetic solutions while ignoring the real threat**
  - *focus on ethnicity rather than deed*
  - *failure to implement meaningful reform*
- **Denigrate standards of justice and equal protection**
- **Sacrifice the future**
  - *recruitment*
  - *loss of experienced researchers*
  - *declines in appointments and visitors*

National Security Trends

- Threats come from smaller states, sub-national groups and/or coalitions of these
- Defense base is increasingly a commercial industrial base
- Threat technologies will be based upon commercial off-the-shelf products (COTS)
- Law enforcement & weapons controls will be weak in fragile & failed states
- Compelling ideologies likely to be destabilizing
- Security alliances and trade alliances form new base of emerging security architecture

S&T impacts on National Security

- **Enhanced robustness of infrastructures**
- **Monitoring of WMD and associated activities**
- **Process engineering to remove hazardous intermediates**
- **Assessing the implications of S&T innovations and revolutions**
- **Interdiction of distributed networks**
- **Intel tools to detect, warn, diagnose and interdict**
- **Living with and managing complex systems (stable and unstable)**
- **Understanding and public discourse on national security**
- **Micro- and nano-scale self-replicating systems**
- **Engineered biological threats**
- **Cognitive science and mind control by external means**