



# Princeton University

**Woodrow Wilson School of  
Public and International Affairs  
WWS555A**

**TECHNICAL INNOVATION IN FOREIGN POLICY**

Thursday 1:00-4:00 PM  
Fall 2003

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**Course Description**

This seminar analyzes how technical innovation in the private sector serves to create or resolve international disputes. Students will learn to assess the impact of rapid, discontinuous technical innovation on foreign policy outcomes, analyze the conditions for successful or flawed technical innovation, and trace the underlying scientific source of these innovations.

Cases include Space Imaging Inc. and high resolution satellite imaging; Merck, protease inhibitors, and the African HIV pandemic; DoubleClick, Internet database mining, and the European Privacy Directive; Myriad Genomics and the breast cancer gene patent dispute; and Monsanto, transgenic grains, and the WTO. These cases are used to illustrate a set of management tools such as development cycles, return on investment criteria, “nested” innovation, and R&D portfolio evaluation.

From a more theoretical perspective, this course focuses on the interface between regulatory policy and markets, between the theory of public goods and the hard realities of private profit. The lessons from these cases will be useful for students who become regulators or NGO administrators seeking to harness private sector innovation to public policy goals, as well as (conversely) for those who become business managers grappling with complex international regulatory challenges.

## **Course Requirements and Grading**

Course grades are based on:

- ❑ Class participation – 50%
- ❑ Short mid-term paper – 20%
- ❑ Final term paper – 30%

### *Class Participation:*

Class participation is evaluated on the basis of students' insights and contributions to class discussion.

### *Midterm Paper (5 pages):*

Thought piece: how does technical innovation in foreign policy differ from innovation in the private sector or in domestic public policy?

### *Term Paper (10 pages):*

Pick a case in which technical innovation affects a foreign policy issue of particular personal or professional interest to the student. Outline the policy alternatives, evaluate them, and make a recommendation.

The cases and reading materials are posted in electronic format on the Blackboard software environment, which is also used to administer the course, in order to minimize overhead and expense for students. Student's time is a precious commodity; all classes start and end promptly.

## **Cases and Questions**

### ***Session 1: Space Imaging and High-Resolution Satellite Imaging***

*Policy Decision:* Should Space Imaging support or contest a proposed new Presidential Policy Directive (PPD) that may restrict the commercial market in high-resolution imaging, even while expanding government purchases from civilian imaging firms?

### *Study Questions:*

- ❑ What technical and market forces propelled high-resolution satellite imaging out of the national security box? How much finer is this resolution going to become?
- ❑ What are the security risks posed by the prospect of foreign and non-state actors getting access to such imagery? Are there any gains?

### *Readings:*

STIA Case Study: *Space Imaging and the High Frontier*

STIA Note: *Cracking the Case: The Technology Manager's Toolkit*

### *Optional Readings:*

National Imagery and Mapping Agency, <http://www.nima.mil>

Federation of American Scientists, Intelligence Resource Program, "IMINT 101: Introduction to Imaging Intelligence," [http://www.fas.org/irp/imint/imint\\_101.htm](http://www.fas.org/irp/imint/imint_101.htm) (examine the photo samples for resolution and swath).

Vernon Loeb, "Candid Cameras Cover the Bases," *The Washington Post*, December 15, 2002, <http://www.washingtonpost.com/wp-dyn/articles/A55521-2002Dec14.html>

John Baker and Ray Williamson, "The Implications of Emerging Satellite Information Technologies for Global Transparency and International Security", Chapter 8 in Bernard Finel and Kristin Lord, eds. *Power and Conflict in the Age of Transparency*, pp.223-255.

### ***Session 2: Merck and the Race Against HIV***

*Policy Decision:* Should Merck urge the U.S. Trade Representative to bring a case before the WTO disputing South Africa's Medicines and Related Substances Act No. 101 of 1965?

*Study Questions:*

- ❑ What are South Africa's motives for passing the Medicines Act?
- ❑ What are Merck's commercial and legal alternatives to deal with this? How much of the firm's business is at risk?
- ❑ In what ways can this dispute affect Merck's on-going research relationship with the NIH?

*Readings:*

STIA Case Study, "Merck and the Race Against HIV."

*Optional Readings:*

The Kaiser Family Foundation, "One Page Background on Africa AIDS Drugs and Clinton Executive Order," January 23, 2001. <http://bernie.house.gov/pc/issues/aidsbackground.pdf>

Washingtonpost.com, "AIDS in Africa," <http://www.washingtonpost.com/wp-dyn/world/issues/aidsinafrica/index.html>

Section 15c of the South Africa Medicines Act, <http://lists.essential.org/pipermail/pharm-policy/2001-January/000607.html>

UNAIDS/WHO Fact Sheet, "Epidemiological Fact Sheets on HIV/AIDS and Sexually Transmitted Infections: South Africa," 2002 update.

Médecins Sans Frontières, "Access to Essential Medicines Campaign." <http://www.accessmed-msf.org/>

Consumer Project on Technology, "South Africa." <http://www.cptech.org/ip/health/sa/>

Tamara Straus, "The Moral Calculus of AIDS," Altnet, April 10, 2001. <http://www.altnet.org/story.html?StoryID=10706>

Amir Attaran and Lee Gillespie-White, "Do Patents for Antiretroviral Drugs Constrain Access to AIDS Treatment in Africa," *Journal of The American Medical Association*, Vol. 286, No. 15, October 17, 2001. 1886-1892.

### ***Session 3: GPS: The Pentagon's Public Good and Europe's Challenge***

*Decision:* How should Garmin chart its development strategy to deal with the EU "go-ahead" announcement on Galileo?

*Study Questions:*

- ❑ How will technical enhancements such as differential GPS, digital mapping, and lower IC costs affect the balance between military and civilian applications?

*Readings:*

STIA Case “*GPS versus Galileo: Garmin and the Struggle for Global Positioning*”

*Optional Readings:*

MIT *Technology Review*, “Has GPS Lost its Way?,” July 1, 1999.

”Europe's Galileo satellite navigation system gets green light from EU ministers,” *Aerospace Daily*, March 27, 2002.

C. Shapiro and H. Varian, “The Art of Standards Wars”, *California Management Review*, Vol.41 Winter 1999, R#CMR140.

Scott Pace, “The Global Positioning System: Policy Issues for an Information Technology”, *Space Policy*, 12, 265-76 (1996).

#### ***Session 4: Myriad Genetics and the Breast Cancer Gene***

*Policy Decision:* How should Myriad respond to the EU genome lawsuits?

*Study Questions:*

- ❑ Why did the European Parliament file a lawsuit against the European Patent Office to have Myriad’s patents revoked?
- ❑ What role did Myriad Genetics play in creating the markers and technology necessary to identify BCRA1 mutations?
- ❑ What is at stake with patent ownership for both Myriad and European biotech firms?

*Readings*

STIA Case Study, “*Myriad’s 17<sup>th</sup> Chromosome: Who Owns the Cancer Gene*”

*Optional Readings:*

Visit the Myriad Genetics website, <http://www.myriad.com>

Eliot Marshall, “The Battle Over BRCA1 Goes to Court.” *Science*, vol. 278 no. 5345, 12 December 1997.

Lori B. Andrews, “Genes and Patent Policy: Rethinking Intellectual Property Rights.” *Nature*, vol. 3, October 2002.

#### ***Session 5: DoubleClick: Database Marketing vs. Europe’s Data Protection Directive***

*Policy Decision:* Should DoubleClick press the U.S. government to revise the Safe Harbor agreement – or just pretend it doesn’t exist?

*Study Questions:*

- ❑ What are the political roots of the EC’s Data Protection Directive?
- ❑ What motivated the Commerce Department to negotiate the Safe Harbor Agreement with the EC?
- ❑ How effective has the Safe Harbor agreement been?

*Readings:*

STIA Case “DoubleClick Selling Your Cookies”

*Optional Readings:*

European Commission, *Staff Working Paper On Application of Safe Harbour Privacy, Principles and European Parliament Data Privacy*, 2/13/02,

[http://europa.eu.int/comm/internal\\_market/en/dataprot/news/02-196\\_en.pdf](http://europa.eu.int/comm/internal_market/en/dataprot/news/02-196_en.pdf).

*Intellectual Property & Technology Law Journal*, “US corporations may fail to meet EU privacy standards,” November 2001, Vol. 13, No. 11; Pg. 28-29

Barbara S. Wellbery, “Bridging the Difference: The Safe Harbor and Information Privacy in the United States and the European Union,” *Privacy & Information Law Report*, February 2001, pg 13

***Session 6: Acambis’ Vaccine and the Variola Scourge.***

*Policy Decision:* Should Acambis focus on making smallpox vaccines for the U.S. government, or build a wider market for infectious disease vaccines?

*Study Questions:*

- ❑ What is the probability that hidden stocks of *variola* – possibly altered by recombinant DNA techniques – remain in the hands of hostile state or non-state actors?
- ❑ Is there a market case for investing in research for more smallpox vaccines?

*Readings:*

*STIA Case Study*, “Acambis’ Vaccine and the Variola Scourge”,

Jon Cohen, “Designer Bugs”, *The Atlantic*, July/August 2002.

<http://www.theatlantic.com/issues/2002/07/cohen-j.htm>

*Optional Readings:*

Acambis website, <http://www.acambis.com>

Alan Smith “Acambis Smallpox Vaccine Boosts Biotech,” *Business Weekly*, September 18, 2002,

[http://www.businessweekly.co.uk/news/view\\_article.asp?article\\_id=6990](http://www.businessweekly.co.uk/news/view_article.asp?article_id=6990)

Joseph B. Verrengia, “Science Journals to Join Fight Against Terrorists,” *The Washington Post*, February, 16, 2002. pg. A09. <http://www.washingtonpost.com/wp-dyn/articles/A14222-2003Feb15.html>

Jonathan Tucker, *Scourge: The Once and Future Threat of Smallpox*, Chapters 9, 10, and 11.

***Session 7: Open Source Governance: ICANN and Global Domain-naming***

*Policy Decision:* Should the U.S. government let the Internet Corporation for Assigned Names and Numbers (ICANN) sort out its own governance and technical procedures?

*Study Questions:*

- ❑ How did the domain naming conventions emerge from the Internet’s early development processes? At what point did scale and volume problems “break” this solution?

- ❑ How well did the self-ordering of the International Ad Hoc Committee (IAHC) work? How did the organizational innovation of ICANN resolve these problems?

*Readings:*

*ICANN: Experiment in Global Self Governance*, KSG# 1610 and 1610.1

*Optional Readings:*

Visit the ICANN website, <http://www.icann.org>

MIT *Technology Review*, “The Web’s Unelected Government”, November/December 1998, pp.39-55.

Ken Young, “ICANN in the Dock,” *Legal Week Global*, December 17, 2002.

*Washington Internet Daily*, “Congress to Step Up Collaboration With and Scrutiny of ICANN” September 23, 2002

Lawrence Lessig, “The Internet Under Siege”, *Foreign Policy*, November-December 2001,

[http://www.foreignpolicy.com/issue\\_novdec\\_2001/lessig.htm](http://www.foreignpolicy.com/issue_novdec_2001/lessig.htm)

Eric Raymond, *The Cathedral & the Bazaar: Musings on Linux and Open Source by an Accidental Revolutionary*, Chapter 5.

### ***Session 8: Celera and the Race for the Genome***

*Policy Decision:* Should Celera acknowledge or side-step the Bermuda accords?

*Study Questions:*

- ❑ What role has the National Institutes of Health played in the mapping of the human genome? How did Venter’s new mapping technique revolutionize the mapping race?
- ❑ What role did the Bermuda Accords play in strengthening Venter’s legitimate claims to gene patents? What was the legal status of this Accord –and why was it not enshrined in a treaty or regime?

*Readings:*

STIA Case Study, “*Celera and the HGP*”

The White House, Office of the Press Secretary. “Joint Statement of President Clinton and Prime Minister Tony Blair.” *Office of Science and Technology Policy*. 14 March 2000,

<http://clinton4.nara.gov/textonly/WH/EOP/OSTP/html/00314.html>

*Optional Readings:*

“Compaq and the Human Genome Project.” *Compaq*,

[http://h18024.www1.hp.com/us/newengland/compaq\\_and\\_hgp.pdf](http://h18024.www1.hp.com/us/newengland/compaq_and_hgp.pdf)

US Department of Energy. “Genetics and Patenting.” *The Human Genome Project*. 24 August, 2002.

<http://www.ornl.gov/hgmis/elsi/patents.html>

Michael A. Heller and Rebecca S. Eisenberg, “Can Patents Deter Innovation? The Anticommons in Biomedical Research.” *Science*, 280 (1 May 1998): 698-700

### ***Session 9: Public Key Encryption, Entrust, and the NSA***

*Policy decision:* Should the U.S. government strike a deal to limit foreign access to PKE?

*Study Questions:*

- ❑ What are the national security risks of public key encryption?
- ❑ What were the technical and market hurdles to widespread civilian use of public key encryption?

*Readings*

STIA Case Study, “*Entrust, Public Key Encryption and the NSA.*”

*Optional Readings:*

Visit the website of RSA, <http://www.rsasecurity.com>

Visit the website of PGP, <http://www.pgp.com>

Tom Athanasiou, “Encryption: Technology, Privacy, and National Security,” *Technology Review*, August-September 1986.

Steven Levy, *Crypto: How the Code Rebels Beat the Government – Saving Privacy in the Digital Age*, 2000, Chapters 4 (“Public Key”) and 5 (“Prime Time”), pp.66-124.

### ***Session 10: Monsanto, Transgenic Crops and the WTO***

*Policy Decision:* Should Monsanto lobby the U.S. Trade Representative to file a WTO complaint against the EC’s ban on genetically-modified grain imports?

*Study Questions:*

- ❑ How did the European Commission decide to impose its ban on the import of GM foodstuffs?
- ❑ On what grounds could the U.S. file a WTO complaint? How strong is this case?
- ❑ What are the business risks for Monsanto of openly tangling with the EC?

*Readings:*

Case: *Monsanto's March into Biotechnology (A) and (B)*, HBS#9-690-009.

*Optional Readings:*

Visit the Monsanto website, <http://www.monsanto.com>

Lizette Alvarez, “Europe Showing Growing Distaste for Genetic Foods,” *The New York Times*, February 10, 2003, <http://www.nytimes.com/2003/02/11/international/europe/11FOOD.html>

Forest Reinhardt, *Agricultural Biotechnology and Its Regulation*, HBS# 9-701-004, 7/2000.

David Victor and C.Ford Runge, “A Policy Strategy for Crop Engineering,” CFR Report 2002, [http://www.cfr.org/pdf/GMO\\_concept.pdf](http://www.cfr.org/pdf/GMO_concept.pdf)

European Commission, “Commission Services on Traceability and Labeling of GMO’s and Products Derived from GMO’s”, ENV 620/2000,

[http://europa.eu.int/comm/food/fs/gmo/biotech01\\_en.pdf](http://europa.eu.int/comm/food/fs/gmo/biotech01_en.pdf)

A. Moffat, “Toting Up the Early Harvest of Transgenic Plants,” *Science* (18 December 1998, Vol. 282), pp.2176-2178.

Council for Agricultural Science and Technology, *Evaluation of the U.S. Regulatory Process for Crops Developed through Biotechnology*, October 2001, <http://www.cast-science.org/pubs/cropregulation.pdf>

### **Session 11: Technology & Counter Terrorism**

*Policy Decision:* Should the Homeland Security Department apply data-mining software developed by DARPA's Total Information Awareness project?

*Study Questions:*

- ❑ Does DARPA's TIA architecture make sense?
- ❑ What are the barriers to incorporating these techniques in a Federal counter-terror IT system? How can the privacy concerns be addressed?

*Readings:*

Ryan Singel, "Total Info System Totally Touchy," *Wired*, December 12, 2002. <http://www.wired.com/news/politics/0,1283,56620,00.html>

Adam Clymer, "Conferees in Conference Bar Using a Pentagon Project on Americans," *The New York Times*, February 12, 2003. <http://www.nytimes.com/2003/02/12/politics/12PRIV.html>

Cynthia L. Webb, "The Big Brother Dilemma," *The Washington Post*, February 12, 2003. <http://www.washingtonpost.com/wp-dyn/articles/A61656-2003Feb12.html>

James Shinn and Jan Lodal, *Red Teaming the Data Gap: Report to the Task Force on America's Response to Terrorism*, Council on Foreign Relations, May 13, 2002, available online at [www.cfr.org](http://www.cfr.org).

Total Information Awareness Systems at <http://www.darpa.mil/iao/TIASystems.htm>

*Optional Readings:*

"What is Extreme Programming?" at <http://www.xprogramming.com>.

Shane Ham and Robert D. Atkinson, *Using Technology to Detect and Prevent Terrorism*, [http://www.ppionline.org/ppi\\_ci.cfm?knlgAreaID=124&subsecID=307&contentID=250070](http://www.ppionline.org/ppi_ci.cfm?knlgAreaID=124&subsecID=307&contentID=250070)

### **Session 12: Wrap Up and Lessons Learned**

#### **Instructor:**

James Shinn is Visiting Professor in the Science, Technology, and International Affairs Program of Georgetown's School of Foreign Service, Lecturer at Princeton University, and a Fellow at the Council on Foreign Relations.

After serving in the U.S. Department of State, he spent 15 years in Silicon Valley, first at Advanced Micro Devices, an integrated circuit firm, and then at Dialogic, which he co-founded. Dialogic did an IPO in 1992 and is now a division of Intel Corporation.

Jim has a BA from Princeton, an MBA from Harvard, and PhD from Princeton. He served as the Bush Administration's Public Delegate to the United Nations in 2002-2003.