

HTS 4081, Spring 2006  
W, 3:05-5:55  
Smith 203

Professor S. W. Usselman  
Smith 315  
TTh, 2-3, and by appointment  
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## INNOVATION IN AMERICA

“Just now, in civilization, and the arts, the people of Asia are entirely behind those of Europe; those of the East of Europe behind those of the West of it; while we, here in America, *think* we discover, and invent, and improve, faster than any of them... In anciently inhabited countries, the dust of ages – a real downright old-fogyism – seems to settle upon, and smother the intellects and energies of man. It is in this view that I have mentioned the discovery of America as an event greatly favoring and facilitating useful discoveries and inventions.” – Abraham Lincoln, Speech on Discoveries and Inventions, February 11, 1859

### Introduction

Abraham Lincoln is one among countless Americans who have claimed for their country and its people a special talent for inventiveness and innovation. This seminar examines that proposition. Through readings and discussion, we will examine several contexts over the course of American history in which technical innovation appears to have thrived. We'll begin with Lincoln's own time – the world of the Yankee workshop – and then move forward in time, pausing in Edison's world before passing into the twentieth century with its corporate research laboratories, technological universities, and world wars. We'll finish in Silicon Valley, which for two decades or more has served as the Holy Grail for those wishing to foster technical creativity and innovation.

Our goal is to gain some understanding of the conditions that supported innovation in these contexts. Was New England really so innovative before the Civil War? If so, why? How did it differ from, say, the American South? Why did individual inventors such as Edison appear to have thrived in the decades after the Civil War? Did the patent system, which these inventors worked more heavily than any technologists before or since, have something to do with it? And why did these independents become eclipsed by corporate laboratories in the twentieth century? Where do institutions such as Georgia Tech fit into the picture? And how did war influence innovation? By 1960, Dwight Eisenhower spoke of something called the military-industrial-university complex. What did he mean, and was that complex conducive to innovation? What, for instance, might it have contributed to Silicon Valley?

These sorts of questions will occupy us as a group for most of the course. Each week, we will meet to discuss common readings. Before class, you will submit a question about those readings, along with a brief explanation of why you think the question is important.

In class, you will discuss your own question but also those of your classmates. You are expected to contribute regularly. Students, not the professor, carry this course.

Over the course of the term, you will also complete a major research paper of relevance to the subject of this course. You may choose to do an extended case study of a particular innovation; you might want to look at a time or place that we have not chosen to focus upon as a group; you might look at a particular group of Americans; you might examine literary or social critiques of innovation. The choice is wide. But no matter what the particular topic, your paper should seek to shed light upon the social and cultural context of innovation.

### Requirements and Readings

You are expected to complete the assigned readings before class and submit a question and brief explanation of its significance to Professor Usselman via email by noon each Wednesday. Most of the readings will come from journal articles available online, in the HTS Reading Room, or in the library. You may be asked to acquire one or two books for the latter part of the term. Readings will be assigned sequentially as we go along, as I want to retain flexibility to delve more or less deeply into topics as interest warrants.

The term paper will be due the second to last week of class, so that you may have time to present your findings to the class and perform final revisions.

Class participation, including your written questions and contributions to discussion, count 50% of your grade. Your term paper counts the other half. As a last resort, I reserve the right to give quizzes or other examination tools to cover the assigned readings. These will be applied toward the participation grade.

You are expected to observe the Georgia Tech honor code. This is especially important with regard to plagiarism. We will discuss this more fully in class when we cover requirements for the term paper.

## **SCHEDULE**

**1/11 Introduction**

**1/18 Cultural Background: American-ness of American Technology**

### Common Readings:

Eugene Ferguson, "The American-ness of American Technology," *Technology and Culture* 20 (1979): 3-24.

John Kouwenhoven, *The Beer Can by the Highway*, Ch. 2 and 8.

## **1/25 Ingenious Yankees?**

### Common Readings:

Claudia Goldin and Kenneth Sokoloff, "Women, Children, and Industrialization in Early New England: Evidence from the Manufacturing Censuses," *Journal of Economic History* 42, 4 (1982): 741-774.

Anne Kelly Knowles, "Labor, Race, and Technology in the Confederate Iron Industry," *T&C* 42 (2001): 1-26.

### Supplemental Readings:

David J. Jeremy, "Innovation in American Textile Technology in the Early 19<sup>th</sup> Century," *T&C* 14 (1973): 40-76.

Judith McGaw, "Accounting for Innovation: Technological Change and Business Practice in the Berkshire County Paper Industry," *T&C* 26(1985): 703-725.

## **2/1 Nineteenth-Century Knowledge Base**

### Common Readings:

Robert G. Angevine, "Individuals, Organizations, and Engineering: U. S. Army Officers and the American Railroads, 1827-1838," *T&C* 42 (2001): 292-320.

Nina Lerman, "'Preparing for the Duties and Practical Business of Life': Technological Knowledge and Social Structure in Mid-19th-Century Philadelphia," *T&C* 38 (1997): 31-59.

John K. Brown, "Design Plans, Working Drawings, National Styles: Engineering Practice in Great Britain and the United States, 1775-1945," *T&C* 41 (2000): 195-238.

### Supplemental Readings:

Todd Shallatt, "Building Waterways, 1802-1861: Science and the United States Army in Early Public Works," *T&C* 31 (1990): 18-50.

Peter A. Ford, "Charles S. Storrow, Civil Engineer: A Case Study of European Training and Technological Transfer in the Antebellum Period," *T&C* 34 (1993): 271-299.

## **2/8 Learning in the Age of Industry**

### Common Readings:

Roger Burt, "Innovation or Imitation?: Technological Dependency in the American Nonferrous Mining Industry," *T&C* 41 (2000): 321-347.

Nathan Rosenberg and Manuel Trajtenberg, "A General-Purpose Technology at Work: The Corliss Steam Engine in the Late-Nineteenth-Century United States," *JEH* 64 (2004): 61-99.

Arwen Palmer Mohun, "Laundrymen Construct Their World: Gender and the Transformation of a Domestic Task to an Industrial Process," *T&C* 38 (1997): 97-120.

Supplemental Readings:

Robert B. Gordon, "Who Turned the Mechanical Ideal into Mechanical Reality?" *T&C* 29 (1988): 744-778.

Ross Thomson, "Crossover Inventors and Technological Linkages: American Shoemaking and the Broader Economy, 1848-1901," *T&C* 32 (1991): 1018-1046.

Wendy Gamber, "'Reduced to Science': Gender, Technology, and Power in the American Dressmaking Trade, 1860-1910," *T&C* 36 (1995): 455-482.

**2/15 The Age of Invention**

Common Readings:

Naomi R. Lamoreaux and Kenneth L. Sokoloff, "Long-Term Change in the Location of Inventive Activity," *Proceedings of the National Academy of Science* 93 (1996): 12686-12692.

Steven W. Usselman, "From Novelty to Utility: George Westinghouse and the Business of Innovation during the Age of Edison," *Business History Review* 66 (1992): 251-304.

Bruce Epperson, "Failed Colossus: Strategic Error at the Pope Manufacturing Company, 1870-1900," *T&C* 41 (April 2000): 300-320.

Supplemental Reading:

David A. Carlton and Peter C. Coclanis, "The Uninventive South?: A Quantitative Look at Region and Inventiveness," *T&C* 36 (1995): 302-326.

David A. Hounshell, "Elisha Gray and the Telephone: On the Disadvantages of Being an Expert," *T&C* 16 (1975): 133-161.

Reese Jenkins, "Technology and the Market: George Eastman and the Origins of Mass Amateur Photography," *T&C* 16 (1975): 1-19.

## **2/22 Corporate R&D: Origins and Overview**

### Common Readings:

Lamoreaux and Sokoloff, "The Decline of the Independent Inventor: A Schumpeterian Story?" [available on BuzzPort]

Tom Nicholas, "Schumpeter and Innovation in the 1920s U.S.," *JEH* 63 (2003): 1023-1058.

Louis Galambos, "Theodore N. Vail and the Role of Innovation in the Modern Bell System," *BHR* 66 (1992): 95-126.

Thomas C. Lassman, "Industrial Research Transformed: Edwin Condon at the Westinghouse Electric and Manufacturing Company, 1935-1942," *T&C* 44 (2003): 306-339.

### Supplemental Readings:

George Wise, "A New Role for Professional Scientists in Industry: Industrial Research at General Electric, 1900-1916," *T&C* 21 (1980): 408-429.

Leonard Reich, "Irving Langmuir and the Pursuit of Science and Technology in the Corporate Environment," *T&C* 24 (1983): 199-221.

Lillian Hoddeson, "The Emergence of Basic Research at Bell, 1875-1915," *T&C* 22 (1981): 512-544.

## **3/1 Corporate R&D: Product Innovation**

### Common Readings:

Leonard S. Reich, "Lighting the Path to Profit: GE's Control of the Electric Lamp Industry, 1892-1941" *BHR* 66 (1992): 305-334.

Leonard S. Reich, "Research, Patents, and the Struggle to Control Radio: A Study of Big Business and the Uses of Industrial Research," *BHR* 51 (1977): 208-235.

Shelley Nickles, "'Preserving Women': Refrigerator Design as Social Process in the 1930s," *T&C* 43 (2002): 693-727.

Ruth Schwartz Cowan, "How the Refrigerator Got Its Hum."

Supplemental Readings:

Stuart W. Leslie, "Charles F. Kettering and the Copper-cooled Engine," *T&C* 20 (1979): 752-776.

John K. Smith, "The Ten-Year Invention: Neoprene and Du Pont Research, 1930-1939," *T&C* 26 (1985): 34-55.

Mark Clark, "Suppressing Innovation: Bell Laboratories and Magnetic Recording," *T&C* 34 (1993): 516-539.

**3/8 No Class – Individual Meetings**

**3/15 Public Institutions before WWII**

Common Readings:

Matthew Roth, "Mulholland," *T&C* 40 (1999): 545-575.

John Servos, "Sponsored Research at Michigan," *T&C* 37 (1996): 721-762.

David Morton, "Armour Research Foundation: How Academic Engineers Fail," *T&C* 39 (1998): 213-244.

William McBride, "The Unstable Dynamics of a Strategic Technology: Disarmament, Unemployment, and the Interwar Battleship," *T&C* 38 (1997): 386-423.

Supplemental Readings:

Bruce Seely, "The Scientific Mystique in Engineering: Highway Research at the Bureau of Public Roads, 1918-1940," *T&C* 25 (1984): 798-831.

James E. Brittain and Robert C. McMath, Jr., "Engineers and the New South Creed: The Formation and Early Development of Georgia Tech," *T&C* 18 (1977): 175-201.

Kenneth S. Mernitz, "Governmental Research and the Corporate State: The Rittman Refining Process," *T&C* 31 (1990): 83-113.

David K. van Kueren, "Science, Progressivism, and Military Preparedness: The Case of the Naval Research Laboratory, 1915-1923," *T&C* 33 (1992): 710-736.

**3/22 No Class – Spring Break**

**3/29 WWII and the Cold War**

Common Readings:

Larry Owens, "The Counterproductive Management of Science in the Second World War: Vannevar Bush and the Office of Scientific Research and Development," *Business History Review* (1994): 515-576.

Joanne Abel Goldman, "National Science in the Nation's Heartland: The Ames Laboratory and the Iowa State University, 1942-1965," *T&C* 41 (July 2000): 435-459.

Hugh R. Slotten, "Satellite Communications, Globalization, and the Cold War," *T&C* 43 (2002): 315-350.

Supplemental Readings:

Jonathan Zeitlin, "Airplane Manufacture in World War II," *T&C* 36 (1995): 46-79.

James H. Capshew, "Engineering Behavior: Project Pigeon, World War II, and the Conditioning of B. F. Skinner," *T&C* 34 (1993): 835-857.

**4/5 Silicon Valley I**

**4/12 Silicon Valley II**

Readings for these two weeks will come from Martin Kenney, ed., *Understanding Silicon Valley: The Anatomy of an Entrepreneurial Region* (Stanford University Press, 2000).