



Robert Rauschenberg, *Trust Zone*, 1969, Lithograph

ORIGINS OF INNOVATION

STS 6614: Advanced Topics in Technology Studies

Time. Tuesdays, 9:15-11:45

Location. ICAT, Center for the Arts Building, Merryman Family Learning Studio II. Students will have additional access time to the ICAT Sandbox for course related activity

Instructor. Matt Wisnioski, Associate Professor of Science and Technology in Society and ICAT Fellow

Office. 331 Lane Hall and ICAT Sandbox

Office Hours. Wednesdays 2:00 to 4:00 in the Sandbox or by appointment

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Description

What is innovation? Where does it come from? What are its values? How are innovative careers made? Using collaborative student-directed inquiry, this seminar investigates how innovation has become the dominant organizing frame for knowledge work across the arts, design, engineering, and sciences.

The course is sponsored by the Institute for Creativity, Arts, and Technology (ICAT) and will count toward the Interdisciplinary Graduate Education Program in Human Centered Design (HCD-IGEP). We will apply the methods of Science and Technology Studies (STS). All these acronyms mean that we are uniquely positioned to take advantage of Virginia Tech's most innovative and interdisciplinary spaces.

We have five specific pedagogical goals. They are:

- analyze the ideals and practices of "innovation"
- introduce future engineers, scientists, and designers to the STS toolkit
- improve team based skills (especially for STSers accustomed to solitary writing)
- immerse ourselves in sites and techniques of innovative technoscientific practice
- instill methods of self-reflection so that we can better understand our career paths in cultural, historical, and social context

More broadly, this is an opportunity for us to be "creative" and proactive in our learning in ways that traditional courses often unintentionally discourage.

Course Media

The seminar utilizes a variety of media including, books, articles, films, sounds, and artifacts. Because many resources will be selected by students, the initial assigned reading/media analysis is comparatively light (usually less than 100 pages a week). Everything will be accessible via Scholar or the web, with the exception of the following book which will be on reserve in Newman Library:

Gina Neff. 2012. *Venture Labor: Work and the Burden of Risk in Innovative Industries*. Cambridge, MA: MIT Press.

I also will create a repository of optional media resources to which all are welcome to contribute.

Requirements

Rather than a rubric of points and percentages, the course is based on the assumption that we are here because we are intrinsically motivated to learn and to create. This does not mean that we lack a framework or that anything goes. Below I outline the major required elements of the course. I will provide feedback informally and formally throughout the semester to help advance your individual career/research goals and to improve your group projects.

Participation. Active engagement is this course's central feature. Participation means you must:

- o collaborate with peers
- o share frequently in small groups and in the seminar at large
- o ask questions as an equal partner during seminar discussions
- o be prepared with respect to readings, assignments, and group activities
- o complete all tasks in timely fashion

Initiative. Students in the class bring unique skills and perspectives from disciplines across campus. It is not enough to hang back and fulfill obligations as if checking boxes off an imaginary chart. You need to utilize your strengths and help to envision and articulate the course's direction and outcomes.

Weekly Assignments. Each week you will have tasks (sometimes individually and sometimes in groups) that vary from locating relevant resources to writing one-page essays, conducting micro-interviews, creating short presentations, etc. These are designed to enhance the conversation, to "scaffold" the group project, and to gain practice in a range of methods under low risk conditions so that you are more confident utilizing those methods in your larger projects.

Semester Group Projects. The course's main "product" will be a group project that researches, contextualizes, analyzes, and provides a prominent public accounting of a local innovative activity. Students will work in teams of three to four and will draw on all means and methods at hand to complete this project. The broad rationale for and parameters of the assignment will be presented by ICAT director Ben Knapp and myself; the specific cases and form of delivery, however, will very much be up to you. Outcomes may include a multi-media installation; a web site; a textual document with direct benefit to the stakeholders you are analyzing; really, anything that you can imagine and execute. Significant class-time will be devoted to work on these projects, including assistance from visiting "experts."

Other Elements

Equipment. We are positioned to get our hands on projectors, videos, 3D printers, laser cutters, etc. Don't be shy to ask: "can we use X?"

External Work. I highly encourage you to draw on any parallel projects on which you are working that you think might contribute to the seminar conversation. I consider it part of my obligation as the course's facilitator to offer feedback on them.

Failure. One of the most repeated axioms of innovation is: "fail often to succeed sooner." Not everything we do will work smoothly; that is a feature, not a bug.

Schedule

I. Introduction

All readings + assignments should be completed before the weekly meeting under which they are listed

August 27. What is Innovation? How can we study it?

White House. n.d. "Educate to Innovate." <http://www.whitehouse.gov/issues/education/k-12/educate-innovate>.

Bunker Roy. 2011. "Learning from a Barefoot Movement." *TED Talk* (October 17).
http://www.ted.com/talks/bunker_roy.html

September 3. Situated Learning and Critical Participation

Etienne Wenger. 1998. "Prologue." In *Communities of Practice: Learning, Meaning, and Identity*. Cambridge, UK: Cambridge University Press. Pp. 3-41.

"Science and Technology Studies." http://en.wikipedia.org/wiki/Science_and_technology_studies.

Tom Kelley and Jonathan Littman. 2001. "The Perfect Brainstorm." In *The Art of Innovation: Lessons in Creativity from IDEO, America's Leading Design Firm*. New York: Doubleday. Pp. 53-66.

"Media Lab Conversations Series: IDEO's David and Tom Kelley." (July 23, 2013).

<http://www.media.mit.edu/events/2013/07/23/media-lab-conversations-series-ideos-david-and-tom-kelley>.

Londa Schiebinger, et al. n.d. "Gendered Innovations in Science, Health & Medicine, Engineering, and Environment." <http://genderedinnovations.stanford.edu/>.

- Ben Knapp, ICAT director

September 10. The Contemporary Landscape of Innovation

National Science Foundation. 2012. "US NSF - News - Special Reports: NSF Innovation Corps." *NSF Innovation Corps*. http://www.nsf.gov/news/special_reports/i-corps/.

Etienne Wenger, Richard McDermott, and William M. Snyder. 2002. "Seven Principles for Cultivating Communities of Practice." In *Cultivating Communities of Practice: A Guide to Managing Knowledge*. Cambridge, MA: Harvard Business School Press. Pp. 49-64.

David Edwards. 2010. "Artsience Lab." In *The Lab: Creativity and Culture*. Cambridge, MA: Harvard University Press. 19-46.

Paul Polak. 2012. "The Next Digital Revolution." <http://www.paulpolak.com/>.

- Identify and share one illustrative and insightful reading/video/etc. about contemporary innovation and write a brief (1 page double-spaced) analysis of that source.
- Come prepared to discuss project topics and preferences
- half the session for project selection and team formation

II. Tools + Methods

September 17. Historical Origins

Richard F. Hirsh. 2011. "Historians of Technology in the Real World: Reflections on the Pursuit of Policy-Oriented History." *Technology and Culture* 52 (1) (January): 6-20.

Steven W. Usselman. 1992. "From Novelty to Utility: George Westinghouse and the Business of Innovation During the Age of Edison." *The Business History Review* 66 (2): 251-304.

H.G. Barnett. 1953. "Introduction" and "The Cultural Background." In *Innovation: The Basis of Cultural Change*. New York: McGraw-Hill. Pp. 1-16, 39-65.

Fred Turner. 2006. "Taking the Whole Earth Digital." In *From Counterculture to Cyberculture: Stewart Brand, the Whole Earth Network, and the Rise of Digital Utopianism*. Pp. 103-140.

Matthew Wisnioski. 2012. "Three Bridges to Creative Renewal." In *Engineers for Change: Competing Visions of Technology in 1960s America*. Cambridge, MA: MIT Press. Pp. 123-160.

- In teams, turn one of this week's readings into a short video presentation (no more than 5 minutes long). You are required to read that source, Hirsh, and one additional item on the syllabus carefully; the rest can be skimmed. This is in part an experiment to see how well you can convey the essence of the readings that others have not done carefully.
- *Dale Winling and Purdom Lindblad, Digital Humanists*

September 24. What Makes Innovators?

Judith Moyer. 1999. Step by Step Guide to Oral History.

http://dohistory.org/on_your_own/toolkit/oralHistory.html

Everett M. Rogers. 1963. "What Are Innovators Like?" *Theory into Practice*. 2 (5) (December): 252-256.

Steve Jobs. 1990. "Steve Jobs Lost Interview." <http://www.youtube.com/watch?v=2nMD6sjAe8I>

Jack Andraka. 2013. "A promising test for pancreatic cancer ... from a teenager." TED Talk (July).

http://www.ted.com/talks/jack_andraka_a_promising_test_for_pancreatic_cancer_from_a_teenager.html

- Conduct a 20 minute interview of a classmate and produce one page of presentable dialog (or a short video of 3 minutes or less).
- *David Cline, Oral and Public Historian*

October 1. Observing Innovation in Practice

Charles L. Briggs. 1986. Learning how to ask: a Sociolinguistic Appraisal of the Role of the Interview in Social Science Research. Cambridge: Cambridge University Press. Pp. 39-60.

Gina Neff. 2012. *Venture Labor: Work and the Burden of Risk in Innovative Industries*. Cambridge, MA: MIT Press.

- Do 30 minutes of observation and produce a page of presentable text from your notes.
- *Gary Downey, Alumni Distinguished Professor, founder of Engineering Studies.*

October 8. Group Work on Semester Project

October 15. Maker Culture

David Edgerton. 2007. "Introduction" and "Production." In *Shock of the Old: Technology and Global History Since 1900*. Oxford: Oxford University Press. Pp. xi-xvi, 52-74.

Nicholas de Monachaux. 2011. "Handmade." In *Spacesuit: Fashioning Apollo*. Cambridge, MA: MIT Press. Pp. 207-226.

Make. 2013. <http://makezine.com/>.

- *Maker Camp with Liesl Baum*

October 22. Spaces, Institutions, and Ecosystems

- Charles Bazerman. 1999. "Menlo Park: The Place of Invention." In *The Languages of Edison's Light*. Cambridge, MA: MIT Press. Pp. 47-84.
- Matthew Wisnioski. 2013. "Why MIT Institutionalized the Avant-Garde: Negotiating Aesthetic Virtue in the Postwar Defense Institute." *Configurations* 21 (1): 85-116.
- Nilo Lindgren. 1969. "The Splintering of the Solid State Electronics Industry." *Innovation* 8: 2-16.
- Corona, Leonel, Jérôme Doutriaux, and Sarfraz A. Mian. 2006. "U.S. Technology infrastructure and the development of regional innovation poles through incubation mechanisms." In *Building Knowledge Regions in North America: Emerging Technology Innovation Poles*. Northampton, MA: Edward Elgar Publishing. pp. 21-87.

October 29. Demonstrations I (Prototypes) + Group Project Work

- Rosental, Claude. 2005. "A Sociology of Demos." In *Making Things Public: Atmospheres of Democracy*, Bruno Latour and Peter Weibel, eds.(Cambridge: MIT Press), 346-348.
- Mary Fernandez. 2004. "Tips on Giving a Good Demo." *SIGMOD Record*. 34 (4) (December): 13-14.
- Douglas Engelbart. 1968. "The Mother of All Demos." (First 10 minutes)
<http://www.youtube.com/watch?v=yJDv-zdHzMY>.
- Steve Jobs. 1984. "Apple Macintosh." <http://www.youtube.com/watch?v=RcRQWGFJ5YY>.
- MakerBot. 2013. "Replicator 2." <http://www.youtube.com/watch?v=3o6pcbhyImQ>.

- Give short demos on different potential outcomes for your semester projects
- Troy Abel, Visual Communication Design, HCD director

November 5. Group Project Work

November 12. New Prototyping Technologies + Group Project Work

- Hands-on visit to the Implement Studio with Tom Martin, Electrical and Computer Engineering

November 19. Group Project Work

December 3. Demonstrations II (Fine Tuning) + Group Project Work

December 10. Group Project Work

Final Projects due December 19