

LIR 590ST

SocioTechnical Systems: Theory School of Labor and Employment Relations University of Illinois at Urbana-Champaign **Spring 2009**

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Course Hours: Tuesdays, 8:00 to 10:50AM, Room 43
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Course overview and objectives:

LIR 590ST is a half-semester course focused at the intersection of social and technical systems in the context of historical and contemporary systems; production, social, biological, industrial, and infrastructural. Understanding this intersection or point at which innovation is implemented is a critical value-add in today's dynamic business world. The readings will trace the course of change from craft production to mass production to knowledge-driven work systems. Early socio-technical systems experiments from the 1950s through the 1970s are examined, along with consideration of the implications for complex engineered systems and today's accelerating rates of technological change.

Systems thinking, systems architecture, and related systems principles will be introduced as a framework for analysis while a range of systems change initiatives will be introduced, such as lean production, six sigma, re-engineering, service systems, innovation networks, and others, illustrating their applications in different domains. Classes will feature a mix of case studies, class debates, lectures, and guest speaker presentations. Assessment will be based on short papers, active class participation, and a system analysis project.

Important themes include:

- sociotechnical theory
- systems thinking and theory
- collaboration theories
- workplace as system
- the embedded nature of culture and technology
- technology update

Objectives

The class will provide the students an opportunity to explore through a systems lens the intersection/interface of the social and technical aspects of the workplace.

Students will acquire a thorough understanding of the interdependencies of a socio technical system and will be able to use this knowledge to analyze systems they encounter during their work lives.

The course will provide the participants with better understanding of the contributions of others in their workplace with different skill sets and expertise.

Students will acquire a new set of tools and techniques to address challenging issues such as technological innovation and multicultural and multidisciplinary interaction in the workplace.

Course materials

The readings specified for each class session are required but there is no text book. Students are expected to be familiar with the reading so that they can participate fully in class discussion.

Grading and evaluation

In weeks 2 through 7, you will bring to class a 2-3 page double spaced reflection on one or more of the readings assigned for that week. These papers will help you prepare for class discussions and should take between 30 and 60 minutes to compose. You are expected to comment thoughtfully on the themes of the articles. Please interact with the material and don't just repeat it in your paper.

The Major Class Assignment

Teams have two options for this assignment. The first is that you may chose an industry or system from the following list or, the second is that you may well wish to do a system analysis related the problem that your team will be working in the second half of the semester.

a. The system analysis project will be done by the members of the project team. Each team will pick a major industry or industrial system from the list below for their analysis. These industries were selected because they have a heavy technology component and students may well work in one of these industries during their careers.

- the waste and recycling industry
- the public or mass transportation system
- a security/ surveillance system – may be completely electronic or include more physical components
- the food industry
- a utility industry, i.e. power, water, gas, etc.
- renewal of urban areas
- internet commerce
- infrastructure renewal
- global agriculture industry

- a communications industry, i.e. radio, TV, internet, newspapers
- the global commodities market for a crop
- the pharmaceutical industry
- the transportation industry, i.e. rail, trucking, shipping, aerospace
- internet activism, pick a site or a type of site i.e. internet loans in developing countries
- the global system for monitoring contagious disease
- the healthcare industry in the U.S.
- a manufacturing system overhaul or work design change

Systems/industries will be chosen by students on a first come-first serve basis so those teams, which select their topic early will be most likely to get their first choice. No system/industry may be analyzed by two teams.

Each analysis will include:

- a description of the system or industry that contains the relevant demographics and statistics about that system
- a visual representation/map of the system that identifies and makes visual the critical components of the system
- identification of the *exogenous and endogenous variables* of the system
- a list of the critical stakeholders in the system and their major interests
- a description of the technology used in the system
- a description of the interdependencies between the socio and the technical aspects of the system
- a discussion of how you imagine (in your future professional role) you might interact with the system (each team member is expected to complete this item)

Teams will prepare these analyses and present them to their classmates and invited guests during the final class session on March 10. The presentations must include the components listed above. An outline of the presentation from each team is due in class on February 10. The instructor will return these with comments the following week.

Teams should approach this presentation as they would an executive presentation for an employer group (it will serve as a practice session for the presentation to the sponsor company at the end of the fieldwork). This means appropriate business casual dress, use of presentation technology, and appropriate materials. The presentation should be polished and coherent. The team may use the presentation media of their choice so long as it can be integrated into the SLER system. Pay attention to the details of appropriate design of the slides or presentation materials.

Each presentation is expected to be 25 to 30 minutes with a short period for questions at the end. Additional information on the team presentations will be handed out during Session 4.

Course Grading

The course grade is based on a possible 100 points. Final grades will be determined by the number of cumulative points each student receives. Short reflection papers and class

participation are based on the work of the individual student and the major class assignment will receive a team grade and everyone on the team will receive the same grade for that assignment.

Short reflections: Six short 2 to 3 page reflection papers will be submitted – one each in Weeks 2-7 of class. These papers offer students the opportunity to reflect on how one of each week's readings relates to their future careers. Papers will be graded on their thoughtfulness and engagement with the issues or topics in the article. Students are expected to compare and contrast their own experiences with the content of the articles.

The papers should be structured and carefully written i.e. check spelling, grammar, citations, and punctuation. Please double space and leave 1 inch margins all around to allow space for comments. The grades for these papers will be averaged and represent **30%** of the overall grade. The papers will receive points (1-5) based on the quality of the thought and analysis you include in them.

Major class assignment: The system analysis project will represent **50%** of the overall grade. The grade will be awarded based two components; 1) on how well teams fulfill the content requirements (see below) and 2) team presentation skills, clarity, enthusiasm, and use of technology.

To repeat, each analysis will include:

- a description of the system or industry that contains the relevant demographics and statistics about that system
- a visual representation/map of the system that identifies and makes visual the critical components of the system
- identification of the *exogenous and endogenous variables* of the system
- a list of the critical stakeholders in the system and their major interests
- a description of the technology used in the system
- a description of the interdependencies between the socio and the technical aspects of the system
- a discussion of how you imagine (in your future professional role) you might interact with the system (each team member is expected to complete this item)

Class participation: Students are vital element of the system of the class. Participation by the students will support and sustain the dialogue in the class since they are considered to have stakeholder status equal to the presenters, professors, or guests. Participation is 20 % of the overall grade. Participation is understood to mean the ability to comment on and participate in discussion of the readings, performance during in class exercises, and other collaborative efforts. Theory and concepts from the readings should inform the analysis projects (citations are expected).

Schedule and Readings

Readings for this class have been carefully selected to provide a theoretical base for using sociotechnical systems theory. The readings fit into the broad thematic areas identified as core to the course (sociotechnical theory, systems thinking and theory, collaboration theories, workplace as system, the embedded nature of culture and technology, and technology update).

Session 1: January 20: Why are sociotechnical systems important to you?

Eric L. Trist, 1981, The Sociotechnical Perspective: The Evolution of Sociotechnical Systems as a Conceptual Framework and as an Action Research Program, in *Perspectives on Organization Design and Behavior*, Andrew VandeVen and William Joyce, (eds), Chapter 2, pp 19-75.

Lisl Klein, 1993, On the Collaboration Between Social Scientists and Engineers; Dynamics and Models, from *The Social Engagement of Social Science*, Volume 2, pp 369 -384.

Session 2: January 27: What theory must you know to understand the foundations of sociotechnical systems ?

****Applications for the team and fieldwork portion of the class are due (don't forget to attach your IRB training completion certificate)**

Frederick Taylor, 1911, *Scientific Management*, Chapter 1, pp 5-29

Frank Gilbreth, 1914, *Primer of Scientific Management*, pp1-30.

Augustine Brannigan and William Zwerman, *Society*, Jan/Feb 2001, vol38 iss2. The Real Hawthorne Effect, pp 55-60.

Session 3: February 3: How do I use knowledge of work organization systems?

****Teams assigned and system projects selected**

Cutcher-Gershenfeld, et al., 1998, *Knowledge-Driven Work: Unexpected Lessons from Japanese and United States Work Practices*, Chapter 1, pp 3-17.

Larry Hirschhorn, Phillip Noble, and Thomas Rankin, 2001, *Sociotechnical Systems in an Age of Mass Customization*, Journal of Engineering and Technology Management V 18, pp 241-252.

Thomas P. Hughes, 2004, *Human-Built World: How to Think about Technology and Culture*, Chapter 4, Technology as Systems, Controls, and Information pp. 78-109.

Session 4: February 10: How does the development of a technology change my work?

****System project outline due and additional information about presentation grading will be handed out.**

****Meet with sponsor representatives**

Steven H. Appelbaum, 1997, Socio-technical systems theory: an intervention strategy for organizational development, Management Decisions, (35/6) pp 452 – 463

Thomas P Hughes, *Edison and Electric Light*, in *The Social Shaping of Technology*, second edition, (eds.) Donald MacKenzie and Judy Wajcman, 2002, Open University Press, London, England, pp50 -63

Wagner James Au, 2008, *Avatar as Entrepreneur*, Chapter 9 The Making of Second Life: Notes from a New World, HarperCollins Publishers, New York NY., pp142-162

Session 5: February 17: How do I analyze the systems around me?

****System project outline comments returned**

Paul Adler, New Technologies, New Skills, *California Management Review*, Vol. XXIX, Number 1, Fall 1986, pp 9-28.

Donald Tapscott and Anthony D. Williams, *The Global Plant Floor*, in *Wikinomics: How Mass Collaboration Changes Everything*, 2006 Penguin Books, New York, NY pp213-238

(optional audio interview with Donald Tapscott)

<http://www.npr.org/templates/story/story.php?storyId=6711038>

Langdon Winner, “Do Artifacts Have Politics?” in *The Social Shaping of Technology*, second edition, (eds.) Donald MacKenzie and Judy Wajcman, 2002, Open University Press, London, England,

Session 6: February 24: How will knowledge of sociotechnical systems help me implement change and innovation?

Saul Rubenstein and Thomas Kochan, 2001, *Learning from Saturn*, Chapter 2, pp 13-39.

Harald Rohracher, 2001, *Managing the Technological Transition to Sustainable Construction of Buildings: A Socio-Technical Perspective*, Technology Analysis and Strategic Management, V 13, No. 1.

Frits Pil and Takahiro Fujimoto, Lean and reflective production: the dynamic nature of production models, in *International Journal of Production Research*, Vol. 45, No. 16, 15 August 2007, pp. 3741-3761

Session 7: March 3: What is the future of sociotechnical systems?

Donald Tapscott and Anthony D. Williams, *The Wiki Workplace, in Wikinomics: How Mass Collaboration Changes Everything*, 2006 Penguin Books, New York, NY pp239-267

Articles to be determined - will be distributed in Session 6

Session 8: March 10: Team Presentations

Each team will make 25-30 minute presentations of their system analysis using appropriate technology and covering the following items.

- a description of the system or industry that contains the relevant demographics and statistics about that system
- a visual representation/map of the system that identifies and makes visual the critical components of the system
- identification of the *exogenous and endogenous variables* of the system
- a list of the critical stakeholders in the system and their major interests
- a description of the technology used in the system
- a description of the interdependencies between the socio and the technical aspects of the system

If you chose to make handouts for those who attend, please bring 30 copies (we can copy them, if you get them to us 24 hours ahead).

Attire for this session is *business casual*. You will be presenting before your class mates, faculty leads, and other guests.

Field Project Information and Requirements

Students who intend to apply for the fieldwork project (590FW) need to be aware of the following points:

1. You must complete and submit an application if you want to participate in a fieldwork project.
2. You will be required to complete the Institutional Review Board training and submit the completion certificate with your application to for the fieldwork.
3. Based on your application and your experience, you will be assigned to a project team.
4. Attendance at the dedicated weekend training session on March 14 and 15 is required. The training runs from 9:00 to 5:00 approximately on both days. Training is at the School.
5. There will be a first meeting of the project teams with representatives from the sponsoring sites during class on February 10.
6. Each project team will be assigned a faculty lead who will help guide the team and oversee their work. She or he will also participate in the grading for the fieldwork projects.
7. The projects teams and faculty leads will meet for a progress report to the full group during the 8:00 to 10:50 time period on April 14.