

Department of Information Studies, University of California, Los Angeles

INFS 282 – Systems Analysis and Design*

Spring 2011

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Course information:

Number: INF STD 282
Title: Principles of Information Systems Analysis and Design
ID: 628-493-200
Quarter: Spring 2011
Location: room 121, GSE&IS Bldg.
Time: Tuesdays, 9am-12h30pm
Web site: <https://ccle.ucla.edu/course/view.php?name=11S-INFSTD282-1>

Instructor information:

Instructor: Jean-François Blanchette
Office: room 218, GSE&IS Bldg.
Phone: 310 267 5137
Fax: 310 206 4460
Email: blanchette@ucla.edu
Web: polaris.gseis.ucla.edu/blanchette
Office hours: Mondays 1-3pm

UCLA catalog description:

Discussion, four hours. Theories and principles of special systems development, including determination of requirements, technical design and evaluation, and internal organization. S/U or letter grading.

1. Motivation

In an era of ubiquitous and pervasive information technologies and services, LIS professionals are increasingly tasked with the creation and implementation of novel, innovative and effective information infrastructures and practices. Such innovation involves intimate knowledge of the social context of activities and relationships within which new devices and services will be deployed, as well as an enhanced understanding of the constraints and possibilities of software and hardware platforms, infrastructure, and design methodologies.

* This syllabus borrows heavily from Phil Agre's syllabi for Spring 2000, 2005, and 2006. In particular, the description for the "Seeing Information Happens," assignment is entirely Phil's. The syllabus has been also inspired by those of Chris Borgman (Winter 2007 and 2008), as well as Matt Ratto's "Critical Making: Critical Information Studies meets Design-Oriented Research." I am grateful for their generosity.

Design-based research methods are particularly appropriate to the development of modern information systems and services, where the physical form of computing is no longer restricted to the mainframe or the desktop. Computing devices may today be directly and transparently embedded into the environment, gathering data from a wide range of sensor types, communicating wirelessly with users and with other devices. Given this much large space of design, it becomes essential to learn more about the networks of activities and relationships within which devices and services will be used, about how they will “fit” into the world around them, on multiple levels – ergonomic, cognitive, institutional, economic, etc. (Agre 2000). The skills necessary for this work of contextualization (including empathy, communication, and collaboration), are not primarily technical, and, in fact, quite compatible with the humanities background of many LIS professionals.

The course provides a complementary experience to IS270, “Introduction to Information technologies.” It approaches system analysis using methods derived from industrial design. In this framework, design is conceived as a process of discovery, and convergence towards an acceptable solution is achieved by iteration, that is, generating tentative designs, confronting with relevant stakeholders, and armed with reactions, comments, and death threats, generate a new and refined design. The discussion between designers and their constituents does not end with the fielding/production of the design, but continues with the understanding that technologies continue to evolve in the hands of users, institutions, etc.

2. Course Objectives

TBD

3. Course Requirements

- You must have already taken IS-270, “Introduction to Information Technologies.”
- Come to class prepared to discuss the readings. See “How to Read a Book,” (<http://pne.people.si.umich.edu/PDF/howtoread.pdf>). The reading load will be kept light.
- Forfeit the use of your laptop and other electronic devices during class time.
- Participate in discussions. In particular, speak up when you disagree. A classroom is a space for discussion, not just a lecture. This course will explore new and rapidly evolving issues. Often, little consensus has emerged as to the best course of action. You are thus particularly encouraged to question the assumptions of the readings, the instructor, and your fellow students, as long as you do so respectfully. In doing so, you will sharpen your ability for

critical thinking, innovation, debate, and public speaking, skills fundamental to your future professional life.

- Written work should be of high quality. If you have concerns about writing, address them early. A useful resource is UCLA's Graduate Writing Center (<http://gsrc.ucla.edu/gwc/>).
- Assignments must be turned in according to the scheduled due dates. In particular, no incompletes will be given.
- If you feel that you may need an accommodation for a disability or have any other special needs, make an appointment to discuss this with the instructor. I will best be able to address special circumstances if I know about them early in the term. The website for the UCLA Office for Students with Disabilities (www.osd.ucla.edu) contains a wealth of useful information as well as official policies about this issue.

4. Method/Assignments

The course is structured around three key elements: a studio-based pedagogical framework, an emphasis on observing information “in the wild,” and the technical ability to “read” information systems. The class will be organized around discussions of selected design texts, short exercises to sharpen your attunement to the design process, and a final project using the “programmable web.”

- **Class participation:** 15%
- **Sketching** – you must acquire a sketchbook, which you will use to draw, write down notes, observations, etc. You will have to submit the sketchbook at the end of the course: 15%, due Week 11.
- **“Seeing information happens” exercise:** 10%, due Week 4.
- **Cognitive biography of an object:** 10%, due Week 6
- **Design of a metric:** 10%, due Week 8
- **Final project – Mashup Probe (groups of two):** 40%, due Week 11.

5. Schedule, readings, and due dates

Week 1 (March 29): Cancelled

Week 2 (April 5): Introduction

Discussion: What is good design?

Activity: Introduction to Yahoo! Pipes and RSS.

Week 3 (April 12): The scope of design

Read

Christopher Hawthorne, "The IDEO Cure," *Metropolis*, October 2002.

Edwin Hutchins, "How a cockpit remember its speed," *Cognitive Science* **19**, 265-288 (1995).

Nicholson Baker, *The Mezzanine*, chapter 1, Widened & Nicolson, 1988.

Yee, Chapter 4.

Activity: Using RSS Feeds

Week 4 (April 19): Design and Values

Guest speaker: Katie Shilton, Ph.D. Candidate, UCLA Department of Information Studies and Center for Embedded Network Sensing.

Read

Friedman, B., Kahn, P. H., & Borning, A. (2006). Value sensitive design and information systems. In D. Galletta & P. Zhang (Eds.), *Human-Computer Interaction and Management Information Systems: Applications* (Vol. 6). New York:

Bruno Latour, "A Cautious Prometheus? A Few Steps Towards a Philosophy of Design (with Special Attention to Peter Sloterdijk)," Keynote for *Networks of Design* meeting of the Design History Society, Cornwall, September 3rd, 2008.

Due: Seeing information happens

Week 5 (April 26): The cognitive life of things

Read

David de Léon, "The cognitive biographies of things," in Alan Costall & Ole Dreier (eds), *Doing Things with Things: The Design and Use of Everyday Objects*, Ashgate, 2006, pp. 113-130.

Charles Goodwin, "Things and their Embodied Environments," Chapter 10 in Lambros Malafouris & Colin Renfrew (eds) *The Cognitive Life of Things: Recasting*

the Boundaries of the Mind, McDonald Institute for Anthropological Research, 2010, pp. 103-120.

Week 6 (May 3): Sketching

Read

Buxton, W. (2007). "The Anatomy of Sketching" in *Sketching user experiences: Getting the design right and the right design*. Amsterdam: Elsevier/Morgan Kaufmann.

Fish, Jonathan. (2001). "Cognitive Catalysis: Sketches for a Time-lagged Brain," in Gabriela Goldschmidt and William L. Porter. (eds.), *Design Representation*. Springer, pp. 151-184.

Due: Cognitive biography of object.

Week 7 (May 10): Probing

Read

Giver, B., Dunne, T., and Placenta, E. (1999) "Design: Cultural probes." *Interactions* 6, 1 (Jan. 1999), 21-29.

Kirsten Boehner, Janet Vertis, Phoebe Singers, and Paul Nourish. 2007. "How HCI interprets the probes." In Proceedings of the SIGCHI conference on Human factors in computing systems (CHI '07). ACM, New York, NY, USA, 1077-1086.

Week 8 (May 17): Users

Read

Brand, S. (1994). "Function Melts Form," chapter 10 in *How buildings learn: What happens after they're built*. New York: Viking.

Philip E. Agree. 1995. "Conceptions of the user in computer systems design." In *The social and interactional dimensions of human-computer interfaces*, Peter J. Thomas (Ed.). Cambridge University Press, New York, NY, USA 67-106.

Due: metric.

Week 9 (May 24): Modularity and Layering

Read

Karl T. Ulrich, "The Architecture of Artifacts", chapter four of *Design: Creation of Artifacts in Society*. <http://www.ulrichbook.org>, 2007.

Face book API:

<http://developers.facebook.com/docs/opengraph>

Week 10 (May 31): TBD

Selection from Beaudrillard, *System of Objects*.

Eric Bergman and Rob Haitani (2000) "Designing the Palm Pilot: A Conversation with Rob Haitani", in Eric Bergman (ed.) *Information Appliances and Beyond: Interaction Design for Consumer Products*. Morgan Kaufmann Publisher, pages 82-102.

Week 11 (June 7th): Final presentations

Due: sketchbook and mashup probe.

6. Assignments

We will begin with two small exercises, to open up your sense of investigation and your abilities to observe and think the world in terms of information flows.

Exercise #1 – Seeing information happens*

This week's exercise is intended to give us a fresh look at information in the world. Our goal for this week is not to invent something, only to see what's already there. Your task is to go out in the world and look at information as a phenomenon of the physically realized social world. You may well have done such exercises before in a class such as information seeking behavior; if so then great. But our goal here is not to apply any single theoretical framework for understanding information-in-the-world. Rather, our goal is to see something new.

Before you start designing, your goal is to watch, and see how information happens. Think broadly about everything information means there. Look at signs. How do people know where to go? What is on their minds? What are the most common activities the people are engaged in, and what kinds of information do those activities require? What do they wish they knew? What kinds of information would, if available, cause them to act differently? Have they come to get information? If they had different kinds of information, would they be there at all? Who interacts with whom, and how and why, and what information is part of this? Do the people have plans, do they check hypotheses, do they make mistakes? Is there a difference between newcomers and oldtimers? How does someone learn to conduct themselves in this place? What information-conveying stuff do people carry on their bodies? Interpret "information" in a broad sense. Those are just a few questions aimed at stirring up your thinking as you watch. You might know the answers just by watching the people, since you can draw on your own experience of doing what they're doing. Or you might have to camp out, or interview people.

This exercise is harder than it sounds. You will of course find a bunch of stuff, but in what sense does it convey information? This is sustained looking, looking

* **Important note:** These exercises will require you to talk to people and observe their lives. Ethical rules therefore apply. You are welcome to observe and make pictures of people in public places without their permission, so long as you do not make them feel paranoid. That's what it means to be a public place. If you talk to someone, use common sense. Do not represent yourself as anything except UCLA students doing a class project. Say that you're not going to tell anyone their name. If this were a formal research project then you would need to go through a formal "informed consent" procedure, but this is a class and the potential for harm is almost zero. But if anyone says no or otherwise doesn't want to cooperate, that's their right. Don't interview any children except your own. You will probably have an easier time talking to people you already know, other things being equal, but that's not necessarily the case. Use your judgement.

plus brainstorming, and the goal is to see things that you haven't seen before. If you haven't seen them before then we probably haven't seen them either. Put names on them. The goal here is to build a culture of design in the group.

- Go to a place where people do lots of complicated things. A train station. A courthouse. Westwood Village. Someplace where you will see things that are not going to be obvious to everyone already.
- Talk to three very different people who use many sorts of information in their lives. Show us how the different sorts of information fit into their lives. Rhythms, cycles, patterns. Roles, tasks, relationships. Interruptions, boundaries, improvisation. Not just a list of different kinds of information and their uses, but the interactions between among them.
- Look at signs, or "signage" as the architects call it. How are they meant to be used? What do they convey? Can they be interestingly categorized? What makes them good or bad? Learn to look at the world as a bunch of signs with buildings and streets etc attached to them. What are their purposes? What do their designers think about the people who use them? What questions do real people have in their minds, that the signs answer or don't answer? "Read" the signs the way a literary critic would read a poem: over and over, closely, backwards and sideways, until it gives up a deeper level of meaning. Can signs be biased? Ideological? What representational schemes do they employ, and what representational skills do they presuppose? How does one learn to use them?
- What information-conveying stuff do people carry on their bodies? Get people to go through their wallets, purses, backpacks, pockets, etc, and show you what's in there. Look at their personal effects as a kind of design: vernacular design. How do people design the insides of their wallets, purses, etc? Look for reminders, databases, etc. You'll find address books and notepads, but you'll also find information-carrying objects that are not made of paper. Can things carry information because one has them along at all? Because of which pocket they're in?
- Talk to some people about making plans. Watch them make plans together. Plans for the evening, for a vacation, for a business, for a meeting. What needs to get coordinated? What information do they need? What constraints do they discover and reconcile? What conventions does their culture or industry or discipline provide for the planning? How do people who know one another well make plans together, as opposed to people who are strangers? Notice yourself making plans. Keep talking about these things with people, and putting names on them, until you spontaneously notice more examples of them. Document their plans and planning processes. Do their stories after the fact convey the real complexity?

Write-up your observations in 500 words and be ready to present your observations in class for Week 4. You are welcome to take pictures, or scan images from your sketch pad, or play sounds, or whatever else.

Exercise #2 – Biography of an object

Pick an object or a service in your home or workplace. Write your joint biography. When did you come into the object's life? What role does the object fill in your life? Has that role evolved over time? Describe precisely the sequence of interactions that occur when you use the object. Do you always use the object in ways intended by its designer? Have you modified the object/service so that it better fits your purposes? (500 words, due Week 6).

Exercise #3 – Metrics

Design a metric, a new type of data that will be commonly available in 10 years and play a role in information services. Take into account advances in sensors, social mores, and technological infrastructure. The metric can be based on any domain – communication, energy, transportation, education, etc. They can be direct measurements (e.g., GPS), statistical aggregates of various populations (e.g., total calorie intake consumed by UCLA students per hour), derivatives of existing metrics (e.g., total carbon footprints). Along with the description of the metric, you should describe the technological infrastructure that makes possible its capture and dissemination. (500 words, due Week 8).

Exercise #4 – Mashup probe (teams of two)

The final project will involve the design of a “mashup probe” using Yahoo! Pipes (Y!P) (pipes.yahoo.com). Y!P is a set of simple programming tools that can be used to rapidly aggregate, manipulate, and combine a broad range of content (tabular data of all kinds, feeds from blogs, alerts, etc.). The output of a pipe can be imported into various data visualization programs, including Google Maps, and Google Earth. We will be learning how to use Y!P throughout the term, and directly experiment with the modular nature of web-based information systems, (including APIs).

The mashup will combine at least two sources of encoded data available on the Web, together with a set of measurements of your imagined metric, which you will place in tabulated format in a web-accessible file. The goal of the probe is to question the conventions underlying information services.

A useful resource for the final project is:

Raymond Yee, *Pro Web 2.0 Mashups – Remixing Data and Web Services*, Apress 2008. Available at: <http://www.springerlink.com/content/978-1-59059-858-0>, or <http://blog.mashupguide.net/toc/>

During the final week (11), we will present the work of the class.

Edwin Hutchins, "Material anchors for conceptual blends," *Journal of Pragmatics*, Volume 37, Issue 10, Conceptual Blending Theory, October 2005, Pages 1555-1577.

Christiane Floyd (1987) "Outline of a Paradigm Change in Software Engineering," in Gro Bjercknes, Pelle Ehn, and Morten Kyng (eds.), *Computers and Democracy: A Scandinavian Challenge*. Avebury.

Martin C. Pedersen & Paul Makovsky, "Power of Place: A School Play," *Metropolis*, October 2002.

Ken Fry, "The Experience Imperative: A Manifesto for Industrial Designers," *Core77*, December 2009.

Donald Schön (1998), "Towards a Marriage of Artistry & Applied Science in the Architectural Design Studio," *Journal of Architectural Education* **41**(4):4-10.

Pelle Ehn (1988) "From System Design to Design of Computer Artifacts," chapter 6 in *Work-Oriented Design of Computer Artifacts*. Stockholm: Arbetslivscentrum, pp. 153-172.

Graeme C. Simsion and Graham C. Witt (2005) "What is Data Modeling" in *Data Modelling Essentials (3rd ed.)* Morgan Kaufmann.

Dennis, Wixom and Roth (2006), "Data Modeling," chapter 7 in *Systems Analysis and Design (3rd ed)*. John Wiley and Sons.

Goodwin, K. (2009). "Making Sense of your Data: Modeling", Chapter 10 in *Designing for the digital age: How to create human-centered products and services*. Indianapolis, IN: Wiley Pub.

Goldschmidt, G. (2001). "Visual analogy - a strategy for design reasoning and learning," in Eastman, C., Newsletter, W. & McCracken, M. (eds.), *Design Knowing and Learning: Cognition in Design Education*. New York: Elsevier, 199-219.

Goodwin, K. (2009). "Understanding Potential Users and Customers", Chapter 7 in *Designing for the digital age: How to create human-centered products and services*. Indianapolis, IN: Wiley Pub.