

Department of Information Studies, University of California, Los Angeles

INFS 282 — Design as Research Method*

Spring 2014

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Course information:

Number: INF STD 282
Title: Principles of Information Systems Analysis and Design
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Quarter: Spring 2014
Location: room 245, GSE&IS Bldg.
Time: Tuesdays, 9am-12h30pm
Web site: <https://ccl.e.ucla.edu/course/view.php?name=14S-INFSTD282-1>

Instructor information:

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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.

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

* This syllabus was inspired by 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 in sharing their work.

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.

The social life of data

This year’s theme for the course will be “the social life of data”: we are currently under the sway of an “avalanche of numbers” of epic proportions, a new era of Big Data that will reconstruct no less than the nature of decision making itself, from one based on (analog, slow) experience and intuition to one based on (digital, real-time) statistical processing—or so goes the argument. This putative transformation is enabled by the convergence of several social and technological trends, some recent, some less so:

First and foremost, a deluge of data, fed by a multiplicity of new sources: one affluent is produced by small and cheap sensors, embedded in the environment, or carried about by individuals in their smartphones, connected wirelessly to networks and to data centers, continuously measuring location, physical activity, pollution; another affluent flows from the automatic collection of multiple data points in the context of online interactions — IP addresses, pages visited, location — the “metadata” surveillance practices that Edward Snowden has famously revealed to the world; more streams of data are accrued from massive “datafication” projects, such as Google’s Street View or Pandora’s Music Genome Project and yet more produced by reviews, ranking, and ratings, the analysis of Twitter feeds and Facebook likes. In addition to these new sources, the Open Data movement seeks to incentivize institutions to make their traditional data sets available to the public to foster both accountability and innovation.

Secondly, cloud and computing has dramatically altered the economics of computing, making possible the distributed storage, processing, and circulation of such massive streams of data at plummeting costs, while mobile computing provide the means for distributed and interactive access to this data anywhere,

anytime. Thirdly, software tools for statistical analysis, data visualization, and predictive analytics have become widely available to perform processing on these datasets. In particular, machine learning tools increasingly bring the power of statistical automation to tasks as diverse as internet search, language translation, and spam filters.

These convergent waves of techno-scientific innovation take place in the context of an undisputed cultural dominance of data as the foundation for objective and impersonal decision making. Already several centuries old, this dominance shows no signs of abating: despite its many shortcomings, data is the informational form that continues to be most closely associated with facts themselves, the unaltered voice of nature.¹ In the post-modern age, the pie chart remains mightier than the pen.

Each of these new data sources and trends offer opportunities for those who seek to leverage data's capacity in the service of social, economic, and institutional innovation. To do so however, it is necessary to go beyond the prevalent portrayal of data as immaterial and untainted information that objectively records characteristics of phenomena.² Such a characterization actively obscures the careful and attentive labor that is necessary to turn phenomena into decisions. Multiple complex social and technical processes, beginning with sensing and measurement, but including standardization, normalization, aggregation, description, algorithmic processing, and curation, must intervene before a piece of data can claim to be a reliable stand-in of the real world event it seeks to represent. Mindful of this, this course we will seek to identify how LIS professionals can use their skills to design data-based services that further their professional goals and espouse their values.

2. Course outcomes

Upon satisfactory completion of this course, participants will have demonstrated their understanding of, and familiarity with:

- Sketching as a method of inquiry;
- The use of mock-ups and prototypes in the design process;
- Methods for the identification of societal and technological trends;
- The spatial and material foundations of cognitive processes.

3. Course Requirements

- You must have already taken IS-270, "Introduction to Information Technologies."
- Come to class prepared to discuss the readings. The reading load will be kept light—usually no more than two papers a week.

¹ See Porter

² See James Gleick, *The Information: A History, A Theory, A Flood* (Pantheon, 2011) for an eloquent presentation of this view.

- Laptops and other electronic devices must be closed during lectures and presentations by other participants, but are welcome during class exercises.
- Attend class every week, starting at 9am (that is, not 9h15 or 9h30).
- 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/>).
- Be reasonably available for group meetings outside of class time; accept with grace and humor the inevitable compromises entailed by group work;
- 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 follows a studio-based pedagogical framework—that is, emphasis will be on hands-on learning of design as a research method. Through a series of short exercises, participants will gradually engage with various research techniques, including sketching, prototyping, technological prediction,

The class will be organized around discussions of selected design texts, short exercises to sharpen your attunement to the design process, and a final group assignment that will bring it all together.

1. **Class participation:** 15%
2. **Sketching** — I recommend that you acquire a sketchbook, which you will use to draw, write down notes, observations, relative to your project. The sketches will often provide material for your in-class presentations. You will have the option to submit the sketchbook at the end of the course for an extra 10%.
3. **Seeing information happens:** 15%, due Week 4.
4. **The social life of data:** 15%, due Week 6

5. **Hacking/DIY/low cost design:** 15%, due Week 8
6. **Speculative design:** 40%, due Week 10.

5. Schedule, readings, and due dates

Week 1 (April 1): Introduction

Noelle Carter, "Organizing your recipes online? Of course, there's an app for that." *Los Angeles Times*, March 21, 2014.

<http://www.latimes.com/food/la-fo-recipe-organization-20140322,0,4620904.story?>

Week 2 (April 8): Seeing information happens

Information studies tends to focus on information conveyed through language and in documents. Yet, this dimension of our information experience is perhaps overplayed: much of the information we rely is embodied in the environment and processed directly by our perceptual system. This has important implications for design.

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

David Kirsh, "The intelligent use of space," *Artificial Intelligence* 73 (1995), p. 31-68.

Week 3 (April 15): Functionality

John F. Pile, "The Objectives of Design," in *Design: Purpose, Form, and Meaning*, Norton 1979.

Anthony Dunne and Fiona Raby, "Design Noir," in *Design Noir: The Secret Life of Electronic Objects*, August/Birkhäuser, 2001, p. 45-74.

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

Due: Seeing information happen

Week 4 (April 22): The social life of data

Lisa Gitelman and Virginia Jackson, "Introduction," in *"Raw Data" is an Oxymoron*, (Lisa Gitelman, ed.), pp. 1-14, The MIT Press, 2012.

Melanie Swan, "The Quantified Self: Fundamental Disruption in Big Data Science and Biological Discovery," (2013) *Big Data* 1(2):85-99.

Eliza Strickland, "Tracking Every Tomato," *IEEE Spectrum*, June 2013, pp. 72-73

Week 5 (April 29): Probing

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

William Gaver et al., "Electronic Furniture for the Curious Home: Assessing Ludic Designs in the Field," *International Journal of HCI*, 22, no 1 &2, pp. 119-152.

Due: The social life of data.

Week 6 (May 6): Sketching /Prototyping

Karl T. Ulrich, "Exploration," chapter 4 in *Design: Creation of Artifacts in Society*, <http://opim.wharton.upenn.edu/~ulrich/designbook.html>

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

Pelle Ehn and Morten Kyng, "Cardboard Computers: Mocking-It-Up or Hands-On the Future," in *Design at Work: Cooperative Design of Computer Systems*, Ed. Joan Greenbaum and Morten Kyng. Hillsdale, N.J., Lawrence Erlbaum Associates, 1991, pp. 169-195.

Week 7 (May 13): Hacking/DIY/appropriation/Low cost design

Tom Fisher, Janet Shipton, "Re-use Practices and Design," in *Designing for Re-Use: The Life of Consumer Packaging*. Routledge, 2009.

Buur, Jacob, and Ben Matthews. "Participatory innovation." *International Journal of Innovation Management* 12(3): 255-273 (sept. 2008).

(peruse in class) Daniele Pario Perra, *Low Cost Design Vol. 1 and 2*, Silvana Editoriale, 2010/11

Due: Group discussion of projects

Week 8 (May 20): Design fictions

Julian Bleecker, *Design Fiction: A short essay on design, science, fact and fiction*, March 2009.

http://drbfw5wflxon.cloudfront.net/writing/DesignFiction_WebEdition.pdf

Due: Hacking/DIY

Week 9 (May 27): Opposing

Carl DiSalvo, "Revealing Hegemony: Agonistic Information Design," in *Adversarial Design*, The MIT Press, 2012.

Finn Brunton and Helen Nissenbaum (2013), "Vernacular Resistance to Data Collection and Analysis: A Political Theory of Obfuscation," *First Monday*, 16(5), May 2011.

Week 10 (June 3): Final project presentations

6. Assignments

These exercises are meant 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 the people around you in a public space. 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 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.

- **Because this is too close to our typical understanding of information, you may not focus on signs for this exercise.** 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 1000 words and be ready to present your observations in class for **Week 3**. You are welcome to take pictures, or scan images from your sketch pad, or play sounds, or whatever else.

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. In all cases, *use your judgment*.

Exercise #2 —The social and institutional life of data (1000 words, due Week 5).

The goal in this exercise is to help you sharpen your ability to analyze data in terms of the institutional and social networks that define and circulate it. Such an analysis will serve as the foundation for the design of innovative data-based appliances and services.

Pick a certain piece of data or data set — this could be for example, the US GDP,³ the body-mass index,⁴ Twitter trends,⁵ the most recent census figures, university rankings — it can come from the ecological, medical, economic or any other domains. Answer the following questions:

When was the data first created? How is it captured or calculated? Must special instruments/sensors/statistical processes/procedures be used? How costly are these? Does the data depend on a certain technological infrastructure (e.g., electrical grid, the Internet)?

How accurate is the data with respect to what it seeks to represent? How reliable? Does it depend on other data? Are any controversies related to what the data represents?

What institutions or individuals are associated with the data, e.g., standardization or accreditation bodies, private corporations, device manufacturers, government bodies, etc.? What are their role in the data's ecosystem?

What kind of uses is the data put to? Are there authorized vs. unauthorized usages? Is the data repurposed by other institutions? Are any competences or skills required to use the data? What kind of economic, social, or personal value is generated by the data? How does the data impact the day-to-day life of ordinary individuals?

Write-up your analysis in 750-1000 words and be ready to present your observations in class for **Week 5**. You are welcome to take pictures, or scan images from your sketch pad, or play sounds, or whatever else.

Exercise #3 —DIY/Hacking/Low cost design

Pick an object (this can include software and electronics) whose function (as intended by its designer) you have subverted, modified, extended, or enhanced so that it better fits your needs. Post a step-by-step explanation (with pictures) of your hack on <http://www.instructables.com> (you will need to create an account using your real name or any pseudonym you choose). Your project can be as technically simple or complex as you want. It will be judged based on its

³ Dickinson, Elizabeth. "GDP: a brief history." Foreign Policy (2011).

⁴ Joseph O'Connell, "Metrology: The Creation of Universality by the Circulation of Particulars" (1993) *Social Studies of Science* 23:129-173.

⁵ Tarleton Gillespie, <http://culturedigitally.org/2011/10/can-an-algorithm-be-wrong/>

originality, usefulness, elegance, and clarity of presentation. Be ready to present your project in class for Week 8.

#4: — Final assignment

Assignments from previous years:

<http://polaris.gseis.ucla.edu/blanchette/282/2010/>

<http://polaris.gseis.ucla.edu/blanchette/282/2012/>

<http://polaris.gseis.ucla.edu/blanchette/282/2013/>

The main assignment will consist in a design for an information appliance or service that revolves around the theme of “the social life of data.” The design must be one centered around a type of data you forecast will become commonly available in 10 years.⁶ Take into account advances in sensors, social practices, and technological infrastructure. The data can be based on direct measurements (e.g., GPS), statistical aggregates of various populations (e.g., total calorie intake consumed by UCLA students per hour), derivatives of other data sets (e.g., total carbon footprints).

Your description of the data should include (a) how is the obtained, what tools provide for its capture? (b) How is it processed (statistically), aggregated, visualized? (c) What technological infrastructure (sensors, standards, APIs, computational devices, interfaces) makes possible its capture and dissemination? (d) What social and cultural forces were leveraged/overcome in the process?

Deliverables will consist of:

- 1) A mock-up/prototype of the design, that simulates its main functionalities;
- 2) A 10 minute pitch to an audience of investors (traditional power point presentations are not acceptable);
- 3) A folder containing four supporting one-page documents that describe (a) description of resources share; (b) technological infrastructure required; (c) trends analysis that support the case for the design; (d) expected context of use.
- 4) A web page containing the elements of the presentation (summary, pictures, sketches) as well as digital versions of the folder in a format specified by the instructor.

⁶ “ ... in the technology industry a prototype “works” when the technology has been implemented, even if aesthetic and cultural issues are neglected. In design the opposite is true: A prototype “works” when it successfully captures the experience of using a given device, even if implementation issues are not fully resolved. At the same time, we see little value in “science fiction” concepts which rely on technological effects that can or do not exist. Instead, the proposals are intended to be *technologically plausible*, in the sense that it seems likely that they can be realized even if the exact means are unknown or unspecified. In practice, achieving plausibility depends on designers’ knowledge and judgment, while and evaluation of the results may depend on discussion with technical experts.” (Gaver and Martin 2000)