CCA, IxD, MDes, Systems
2017, Spring

Weekly Schedule

1	T	1/17	Introduction + systems diagrams
2	T	1/24	Systems diagrams: restaurant
3	T	1/31	Recipes as platform, template, and CMS
4	T	2/7	Recipe redesign + template; restaurant plan + map
5	T	2/14	Menu Book and Restaurant Book
6	T	2/21	Basic Application Model
7	T	2/28	Dynamic Systems: Modeling Stocks and Flows
8	T	3/7	Dynamic Systems: Interactive Models
9	T	3/14	Automatic Feedback Systems Diagrams
10	T	3/21	Spring Break—no class meeting
11	T	3/28	User Conceptual Models: Home Thermostat
12	T	4/4	Final Project: Product Service Ecology, current state model
13	T	4/11	Proposed future state model
14	T	4/18	Prototype the future state
15	T	4/25	Prototype presentation
16	T	5/2	Crit; last class meeting
	T	5/9	Final project revisions and web site due—no class meeting
	F	5/12	Grades due

###

Description

This studio course introduces grad students to the basic language and frameworks of systems, in the context of interaction design. Please see the vocabulary below.

Objectives

Students will learn to
- Understand systems—recognize common system structures and use them to model a specific situation
- Represent systems—build a model of a system and use the model to inform design of interfaces, services, and platforms
- Design systems—use common system structures to identify breakdowns, diagnose problems, and generate improvements

Requirements

Attendance is required for all class meetings. Tardiness will affect final grades. You must construct a web site for your work, and you must post your assignments before each class.

Grading

Weekly assignments will be graded plus/check/minus.
Weekly assignments receiving a minus should be revised.
The overall course grade will be calculated as follows:
- In-class participation counts for 20%.
- Weekly assignments count for a total of 20%; final web site with all assignments counts for 20%.
- Preparatory sketches for final project counts for 20%; final project counts for 20%.

In-class participation is affected by contributing to discussion and critiques; missed readings and lack of preparation will also be noted. Participation will be summed and can shift the overall grade by one letter. No incomplete will be given except in extenuating and unforeseen circumstances, and you must have already completed a substantial portion of the course, with passing grades. Grade scale:
A = Outstanding achievement, A– = Less so
B = Good achievement, B+ = More so, B– = Less so
C = Satisfactory achievement, C+ = More so, C– = Less so
D = Poor achievement, D+ = Not so, D– = Less
F = Failure

Required Readings

On Modeling

- Excerpts from Novak & Gowin, *Learning How to Learn*
http://www.dubberly.com/courses/design_theory_2016/01._a_Learning_How_To_Learn.pdf

- Dubberly, H., "Creating Concept Maps"
http://www.dubberly.com/courses/design_theory_2016/01._b_Creating_Concept_Maps.pdf

- Dubberly, H., "Models of Models"
http://www.dubberly.com/courses/design_theory_2016/01._c_Models_of_Models.pdf

On Systems Theory

- Boulding, K., "General Systems Theory—The Skeleton of Science"
http://emergentpublications.com/eco/ECO_other/Issue_6_1-2_18_CP.pdf?AspxAutoDetectCookieSupport=1

- Joi Ito, "Design and Science," http://www.pubpub.org/pub/designandscience

- Michael Porter, "How Smart, Connected Products Are Transforming Competition,"
https://hbr.org/2014/11/how-smart-connected-products-are-transforming-competition

- Capra, F., and Luisi, P. L., *The Systems View of Life: A Unifying Vision,* Cambridge University Press, Cambridge, 2014.

- Meadows, D., *Thinking in Systems,* Chelsea Green, 2008.
Chapter 1: The Basics

- Shannon, C., "A Theory of Communications," 1964, pages 31-35.
http://www.dubberly.com/courses/design_theory_2016/03._a_Shannon.pdf

- Ashby, W. R., *An Introduction to Cybernetics,* Chapman and Hall, 1957.
Chapter 1: What Is New, and Chapter 11: Requisite Variety.
http://pespmc1.vub.ac.be/books/introcyb.pdf

- Glanville, R., "Second-order Cybernetics,"
http://www.facstaff.bucknell.edu/jvt002/brainmind/Readings/SecondOrderCybernetics.pdf

- Pask, G., "The Architectural Relevance of Cybernetics," 1969.
http://workgroups.clemson.edu/AAH0503_ANIMATED_ARCH/879Readings/GordonPask_Architectural%20Relevance%20of%20Cybernetics.pdf

Suggested Additional Readings

On Systems and Design

- Gerstner, K., *Designing Programmes,* Hastings House, New York, 1964.

- Rittel, H., "On the Planning Crisis: Systems Analysis of the First and Second Generations," 1972. http://www.dubberly.com/courses/design_theory_2016/08._b_Rittel:_On_the_Planning_Crisis.pdf

- Haque, U., "On the Architectural Relevance of Gordon Pask," 2007. http://isites.harvard.edu/fs/docs/icb.topic983682.files/Week%2005/W05-2%20Usman%20Haque-%20The%20Architectural%20Relevance%20of%20Gordon%20Pask-.pdf

- Dubberly, Haque, & Pangaro, "What is Interaction?" 2009. http://www.dubberly.com/wp-content/uploads/2009/01/ddo_article_whatisinteraction.pdf

- Dubberly & Pangaro, "What is Conversation?" 2011 http://www.dubberly.com/wp-content/uploads/2009/07/ddo_article_whatisconversation.pdf

On Systems and Ethics

- Buchanan, R., "Design Ethics," 2005. http://www.dubberly.com/courses/design_theory_2016/03._b_Buchanan,%20Design%20Ethics.pdf

- von Foerster, H., "Ethics and Second-order Cybernetics," Stanford Humanities Review, Volume 4, Issue 2, 1995. http://dl.acm.org/citation.cfm?id=212248

- Maturana, H., "Meta-design," 1997. http://www.inteco.cl/articulos/006/texto_ing.htm

On the History of Systems Thinking

- Dubberly, H., "How cybernetics connects computing, counterculture, and design," 2015. http://www.dubberly.com/wp-content/uploads/2015/10/Cybernetics_and_Counterculture.pdf

Primary Systems Models and Related Terms
What you should learn in this course.

Combinations and Permutations
- theme and variations
- counting in base 2, 3, and 16 (hex)
- cellular automata, recursion, fractals

Basic Information Structures + Criteria
- name-value pair, array, matrix, tree, web (graph)
- principle of least means (Ockham's razor)
- principle of consistency (form + content)
- necessary and sufficient
- MECE (mutually exclusive, collectively exhaustive)
- CIPU (clear if previously understood)

Systems Dynamics, from Donella Meadows
- dynamic equilibrium—stocks, flows, lag, source, sink
- process, transform functions—proportional, inverse, S-curve, hockey stick, long tail
- resource cycles, tragedy of the commons
- leverage points
- open loop, closed loop

Communications, from Shannon
- sender, code, message, channel, noise, receiver

Control Mechanisms
- system, environment, boundary, homeostasis
- feedback loop—goal (set-point, threshold), action, measure
- mechanism—sensor, comparator, actuator (effector)
- essential variable, range, resolution, frequency,
- virtuous and vicious cycles
- explosion, collapse
- negative feedback, positive feedback
- reinforcing, dampening, balancing
- current state, desired state
- error, detection, correction
- circular processes, circular causality

User Conceptual Model, from Jeff Johnson & Austin Henderson
- object, link, action, attribute

Bootstrapping, from Douglas Engelbart
- basic process, improving the process, improving improving

Levels of Systems, from Kenneth Boulding
- static, dynamic, feedback, self-organizing, learning, etc

More Advanced Systems Models

Requisite Variety
- stability, invariant organization
- disturbances, responses

Second-order Systems
- goal-means trees
- observer, observed, controller, controlled

Co-evolution
- population, trait, variation, selection
- cost, advantage
- cooperation and competition as evolutionary mechanisms
- drift

Models of Learning, e.g., Nonaka

Models of Conversation, from Pask
constructivism
agreement, (mis-)understanding
"an agreement over an understanding"
bio-cost, bio-gain

Other Systems Thinking Vocabulary Terms

servo-mechanism, governor, hunting, oscillation, prediction
control, communication, structure, organization,
teleology, purpose, goal-directed, self-regulating, co-ordination, regulation

emergence, feed-forward, back-talk
first order, second order

dissipative systems
autopoiesis, allopoetic systems
- structural coupling
  (Behavior is structurally determined—history, individualism, learning.)
- "consensual co-ordination of consensual co-ordination"
- "conservation of a manner of living"

black box
explanatory principle "organizational closure" self-reference, reflexive

ethical imperative, "generosity in design"

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Assignment 1
Systems Diagrams

Due: Tuesday, January 24,

Create two diagrams of systems based on the same restaurant:
- One should be in the form of a concept map
- The other should be in a different form (which you are free to choose).

Select a restaurant that you have visited.
Make a list of the systems inside the restaurant.
Pick one of the internal systems and make a diagram of it.
Make a list of the systems in which the restaurant is embedded.
Pick one of the external systems and make a diagram of it.
Consider the elements of the system, their connections, and activities.
Who are the actors? How are they related? What do they do?

Be sure to add a title block to both sheets including:
- Title of the diagram
- Your name
- The date

Format: 11 x 17 inches; landscape (horizontal)
Save as a PDF, upload to your web site, and bring a print of each sheet to class.

Please read:

- Excerpts from Novak & Gowin, *Learning How to Learn*
http://www.dubberly.com/courses/design_theory_2016/01._a_Learning_How_To_Learn.pdf

- Dubberly, H., "Creating Concept Maps"
http://www.dubberly.com/courses/design_theory_2016/01._b_Creating_Concept_Maps.pdf

- Dubberly, H., "Models of Models"
http://www.dubberly.com/courses/design_theory_2016/01._c_Models_of_Models.pdf

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Assignment 2
Recipes as platform, template, and CMS

Due: Tuesday, January 31

Please read:

- Boulding, K., "General Systems Theory—The Skeleton of Science"
http://emergentpublications.com/eco/ECO_other/Issue_6_1-2_18_CP.pdf?AspxAutoDetectCookieSupport=1

Assignment Part 1

Collect at least 3 different recipes for the *same* dish,
e.g., lasagna, chile con carne, pho, quiche, béchamel sauce, etc.

The recipes should be from different cookbooks or different web sites, e.g.,
- http://cooking.nytimes.com
- http://allrecipes.com
- http://www.simplyrecipes.com
- http://www.foodnetwork.com/recipes.html
- http://www.food.com

Create a diagram analyzing the structure of the recipe presentation on each site.
- Abstract the recipes into a common typographic form.
- What are the pros and cons of each presentation?

Create a diagram analyzing the recipes and showing where ingredients overlap.
- What ingredients are common? How can you show that?

Create a new representation of the recipe, including both a "main" path and "alternative" paths—substitutions or variations that cooks might make.

Be sure to add a title block to all three sheets.
Format: 11 x 17 inches; landscape (horizontal)
Save as a PDF, upload to your web site, and bring a print of each sheet to class.

Assignment Part 2

Pick one of the recipe web sites.

Explore the site thoroughly.
Identify all the different types of screens.
Take screenshots, so that you have one example of each screen type.

Create a map of the entire site showing all the screen types on one surface.
Indicate how users navigate from one screen to the next.

Your map will likely be fairly large, e.g., 36 x 72 inches.
Please bring a printed version with you to class.
Consider using a roll-fed plotter to print.

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Assignment 3
Recipe redesign + template; restaurant plan + map

Due: Tuesday, February 7

Please read:

- Joi Ito, "Design and Science," http://www.pubpub.org/pub/designandscience

- Michael Porter, "How Smart, Connected Products Are Transforming Competition," https://hbr.org/2014/11/how-smart-connected-products-are-transforming-competition

Assignment Part 1

Redesign the recipe page from your recipe website.
Maintain the brand style (e.g., type and color) as much as possible.
Propose at least 3 functional improvements; provide rationale for each.
One improvement should be handling alternative ingredients.
The result should show a web page, with callouts.

Create a second plate showing content blocks—your page template.
The template should be overlaid on your recipe example page.
The example should be ghosted back, so that the template pops out.
Add callouts to explain the template elements—the information "chunks".

Format: 11 x 17 inches; may be vertical, if need be.
Bring a print to class and post to your web site.

Assignment Part 2

Create a diagram representing your restaurant as a physical space, i.e., a plan.
The plan may be approximate (not precisely measured), but it must be believable.
Map a customer journey on top of your plan.
Add a food-prep path on top, too; show where it intersects the customer journey.

Create a second diagram representing your restaurant's neighborhood, i.e., a map.
Feel free to use Google maps or any other existing source. (Be sure to cite sources.)
Highlight your restaurant, show all nearby restaurants, and highlight competitors.

Format: 11 x 17 inches; landscape (horizontal format).
Bring a print to class and post to your web site.

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Assignment 4
Menu Book and Restaurant Book

Due: Tuesday, February 14

Please read:
Shannon and Weaver, "A Mathematical Theory of Communication."
http://www.dubberly.com/courses/design_theory_2016/03._a_Shannon.pdf

Assignment Part 1

Create a book showing logical steps in the development of a new menu page.
- Start with three existing menu pages (web or print); show screen shots or scans.
- Translate the menus into to the same typographic format, including all menu text.
- Include a page comparing ingredients and process steps.
- Show and explain your proposed redesign.
- Show and explain your template (generalized recipe).
- Include a page proposing a scheme for classifying recipes; locate yours in it.

Here, "book" means a cover plus a sequence of pages with a common format.
Your book should make sense as a whole;
consider title, headlines, and explanatory text, as well as diagrams.

Assignment Part 2

Create a book showing various ways to describe your restaurant as a system.
- Begin with an establishing shot (photo) of the outside and the interior.
- Include the neighborhood map and restaurant plan.
- Include a process "map" of a "meal" (e.g., order, prepare, deliver, consume, pay.)
- Include a map showing the flow of goods, services, and money through the system.
- Include a page proposing a scheme for classifying restaurants; locate yours in it.

Here, "book" means a cover plus a sequence of pages with a common format.
Your book should make sense as a whole;
consider title, headlines, and explanatory text, as well as diagrams.

Be sure to add a title and your name to both books.
Bring prints to class and post to your web site as PDFs.

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Assignment 5
Basic Application Model

Due: Tuesday, February 21

Please read:
- Meadows, D., *Thinking in Systems,* Chelsea Green, 2008.
  Chapter 1: The Basics

Assignment:
Create a model of a desktop application as a system.

Choose from this set:
word processor, spreadsheet, paint program, or object-oriented drawing program.

Imagine your audience is a bright fifth grader (a ten year old).

Organize your model in terms of user "view", engine (or "controller"), and file (or database or data "model").

Create an example data set (or file); keep it as simple as possible;
include enough detail to convey the basic function of the app.
In addition, describe what an empty data set looks like.

Show how your example data set is represented at various "levels" of the system.
Show at least three levels and how they map to each other.
- What does the user see?
- What's the conceptual or high-level data format behind what the user sees?
- How is the high-level data format stored in memory—reduced to hex or binary?

Describe and show how data is created (input), selected, and updated (changed).

Include your name, a title, captions, and brief explanations as needed.
Consider content, writing, and typography.
Format: 11 x 17 inches; landscape (horizontal format).

Bring a print to class and post to your web site.

###

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Assignment 6
Dynamic Systems: Modeling Stocks and Flows

Due: Tuesday, February 28

Watch the BBC short documentary on re-introducing wolves to Yellowstone.
http://www.bbc.com/future/story/20140128-how-wolves-saved-a-famous-park

Part 1 — Create a concept map of the ecosystem described in the documentary.

Consider:
- Who are the actors? i.e., animals, plants, and other elements of the ecosystem
- How are the actors related? i.e., describe the structure as nodes and links
- What actions do the actors take? i.e., what does actor A *do* to actor B?
- Do the actors have any special properties?

The concept map should include names of the actors (nodes),
and lines should be labeled to define relationships (links),
e.g., ELK ----- eat -----> GRASS.

Part 2 — Create a second diagram representing the ecosystem as stocks and flows.
For more on stocks and flows, see Donella Meadow's, *Thinking in Systems*.
http://www.ess.inpe.br/courses/lib/exe/fetch.php?media=wiki:user:andre.zopelari:thinking_in_systems_a_primer.pdf (especially Chapter 1)

How does one actor (a stock) affect the quantities of other actors? (create a flow)
Use the flows to organize your diagram—by showing relationships between stocks.

Consider the ecosystem *before* wolves were re-introduced.
Create a first version representing the quantities of each actor (stock) *before* re-intro.

Then consider the ecosystem *after* wolves were re-introduced.
Create a second version representing the quantities of each actor (stock) *after* re-intro.

Format: 11 x 17 inches; landscape (horizontal format).
Part 1 should be on one page.
Part 2 should be on a second page (with 2 versions of the stocks + flows diagram).

Bring a print to class and post to your web site.
###

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Assignment 7
Dynamic Systems: Interactive Models

Due: Tuesday, March 7

Revisit your stocks-and-flows diagram of the Yellowstone ecosystem.
Improve whatever aspects need work.

Part 3 — Design an interactive version of your diagram—a simulation—
and create a "clickable prototype" or "demo" demonstrating how a user might interact with your simulation. (Extra points for making your prototype truly interactive.)

Think of this project as creating a component of an online or mobile educational app for students in grade 5.

Your prototype should illustrate the effects changing at least one stock has on other stocks in the system (increasing and decreasing). That is, you should illustrate the following scenario of use:

- Student encounters the simulation. (What is its initial state?)

- Student realizes that simulation is interactive. (What indicates potential for action?)

- Student quadruples the number of wolves. (How does the user provide input?)

- Student sees the number of elk decrease. Other stocks change as appropriate. (What is the resulting state?)

- Student halves the number of wolves. (What is the resulting state?)

Format: Sized appropriately for tablet or laptop screen.
You may use whichever tools you prefer, eg., make a PDF, Keynote, PowerPoint, HTML, processing, etc.

Be sure to include a title page (which is not part of your demo) with your name etc.
Post to your site or provide a link to the demo.

###

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Assignment 8
Automatic Feedback System Diagram

Due: Tuesday, March 14

Identify a system that includes automatic feedback.
- The system should *not* rely on a person to manually close the feedback loop.
- Please use an example other than a boat pilot or a thermostat.

Part 1 — Create a realistic illustration of the system and its operation, e.g, a photo.
- Identify the specific components of the system (the mechanism) and their functions
  (e.g., lever, height indicator).
- Label the components in cybernetic terms
  (e.g., significant variable, goal, sensor, comparator, actuator, disturbances).

Part 2 — Create a diagram of the system, "abstracted" in terms of feedback.
- Include all the components of the feedback loop
  (e.g., significant variable, goal, sensor, comparator, actuator, disturbances).
- Represent the relationships between components visually.
- Label each cybernetic component and note the corresponding physical part.

Your diagram should help the audience answer these questions:
- Where is the boundary between the system and its environment?
- What are the relevant components of the system?
  (A relevant element is one that is required to understand
  how the goal-action-measure feedback loop is closed.)
- How is information transmitted between components? In what form?
- What is the goal (desired state) of the system? How is the goal set?
- What forces typically disturb the system or push it away from its goal?
- What does the system measure (to create feedback)? How?
- What part of the system matches feedback (current state) to goal (desired state)?
- What part of the system determines its response to its environment?
- How does the system respond to disturbances?

Format: 11 x 17 inches; landscape (horizontal format).
Part 1 and Part 2 should be on the same page.

Include your name and a title describing each part.
Post to your web site.

###

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Assignment 9
User Conceptual Models: Home Thermostat

Due: Tuesday, March 28 (after Spring Break)

Create a diagram of a home HVAC system (model of physical components) and a user conceptual model of the system—make it the basis for designing a user interface for a new thermostat. Create 3 UI options.

Start by reading "Conceptual Models in a Nutshell." http://rivcons.com/wp-content/uploads/2015/07/Conceptual-Models-in-a-Nutshell-«-Boxes-and-Arrows.pdf and watching "Conceptual Models: Core to Good Design" https://www.youtube.com/watch?v=i_DWYYZD31w&noredirect=1

Part 1 — Create a diagram of a home HVAC system.
- What are the physical elements of the system? (stocks + flows)
- What are the information elements of the system? (information + feedback)

Part 2 — Create a "user conceptual model" of a thermostat that controls the system.
- What does the user need to know in order to successfully use the system?
- What "tasks" do users undertake when using it?
- What "objects" do users encounter?
- What "actions" can users take on the objects?
- What "properties" do the objects have?
- What are the "relations" between the objects?

Write out a list of user tasks and create a table of objects, actions, and properties.
Your model should NOT include presentation issues or implementation issues.

Part 3 — Create 3 themostat UI options (sets of displays and controls).
The physical form factor is up to you (e.g., 1.94 x 2.91 inches, touch screen is OK).
The 3 UI options should be as different as you can make them.

Your UI should map directly to your "user conceptual model".
Once you start designing your UI, you may find that you need to modify your model.

Create a mock-up of the displays and controls (what users see + change).
Specify how users will interact with the thermostat.

Format: printed page, 11 x 17 inches; landscape (horizontal format).
Bring printouts and post to your web site.

###

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Assignment 10 — Final Project
Product-Service Ecology — Wellness

Due: Part 1 - 4/4; Part 2 - 4/11; Part 3 - 4/18; Part 4 - 4/25

Find a person you can talk with, who has a chronic (on-going) health condition, e.g., arthritis, asthma, CAD, CHF, Chrons's, COPD, diabetes, HIV, hypertension, etc.

Imagine a future in which sensor patches can monitor body chemistry painlessly and connect to "the cloud". You may also imagine other cloud-connected devices. How could such technology be integrated into people's lives to help them *and* their caregivers better manage chronic conditions? Design an integrated "ecology".

Part 1 — Model the current state — due 4/4
Create a model of the condition and care—in terms of maintaining homeostasis. What does the person measure? e.g., blood glucose, blood pressure, weight, etc. How do they "manage" that variable? (lower or raise it?) What is the feedback loop?

Create a model of the person's care-giving network. Who supports them? When? How? Include family, friends, paid services, healthcare professionals, etc.

Create a journey map showing how the person manages the condition during a week. Include doses and timing of medications, food, exercise, interactions with caregivers.

Part 2 — Model the future state — due 4/11
Propose a product-service ecology to help the person *and* caregivers better manage their wellbeing. What elements are needed? How do they work together?
Create a diagram of the "ecology" showing how devices, apps, and people connect.

One element of the "ecology" should be a mobile app. Outline key user tasks, create a user conceptual model of the app, and wireframes for three key screens.

Part 3 — Prototype the future state — due 4/18
Create detailed mock-ups of key screens in the primary user task.
Annotate your mock-ups to show how the user interacts with the app.
Create a draft presentation introducing the problem, "ecology", and app.

Part 4 — Create a presentation — due 4/25 (posted on web site)
Refine your work from parts 1, 2, and 3 and create a complete presentation.
Be sure to include a cover, introduction, process, solution, and your name.

Format: 11 x 17 inches; landscape (horizontal format).
Bring prints to class for parts 1, 2, and 3; and post all on your web site.
###

Appendix

Counting Systems: Theme & Variations; Grid; Animation

Assignment Part 1

Create a series of 64 variations on a theme by counting from 0 to 63 in base 2.

Create a "base configuration" made up of 6 elements (e.g., triangles forming a hexagon).
Elements may be lines or shapes. (Base can be anything; doesn't have to be a hexagon.)
The "base configuration" should fit within a 1-inch square.

Create a silhouette of your base configuration, and fill it with a 10% cyan tint.
Place the silhouette behind your configuration (i.e., on a background layer).

Create an 8-unit by 8-unit tile field (i.e., a grid) repeating your configuration 64 times.
Leave a 1/8- to 1/4-inch margin between configurations.
Be sure to include the background silhouette.

Remove elements from each configuration to create the 64 possible variations.
Leave the silhouette showing behind.
Use base-2 counting to organize the variations.

Copy your tile field to a second sheet.
Rearrange the variations, grouping them by a different logic, (e.g., visually).

Be sure to add a title block to both sheets.
Format: 11 x 17 inches; landscape (horizontal)
Save as a PDF, upload to your web site, and bring a print of each sheet to class.

Assigmment Part 2

Create an animation based on counting from 0 to 63 base 2.

Use the theme and variation from Part 1.
Each variation will be one frame in the animation.

Animations may be made in many ways.
For this assignment, we will use the sequence from 0 to 63 as a "display list."
A display list controls what is drawn or shown.

The "scripts" are already written; you will edit a couple of them.
Please see the file Hexagon.zip, which includes the three files you will need.

Start by copying your six-element configuration; paste it in a new Illustrator file.
Use the art board tool to shrink the art board to fit snugly around your configuration.
Save your file in SVG format.

Set-up a text editor, such as Text Wrangler. (Text Edit and MS Word don't work.)
Use your text editor to open the SVG file; copy the "polygon" information.
(Note: If you used a rectangle tool, you will need to look for "rects".)
Use your text editor to open the index.html file.
Delete the 4th to last line, the last line that beings with "polygon".
Select the other six lines that begin with "polygon" and delete them.
In the same place, paste in your six lines of new polygon data.
Likewise update the "viewbox" data in index.html with your new data.
Save your file.

Open a modern browser window; drag the index file into the window.
Your animation should run.
If the polygons display out of order, re-arrange them in the index.html file.

Re-order your display list to create a second animation.

Use your text editor to open the main.css file.
You will see a string of binary numbers from 0 to 63.
Edit that list to create a new sequence.
Save your file.
Play it.

Put both animations on your web site.
If you have trouble embedding them, you can link to a new page.

###

Code Systems: Telegraph Device; Code Table; Model

Part 1

Build a working telegraph, capable of sending and receiving messages.
Basic components will be supplied in class.

The telegraph should include a "sounder" powered by an electro-magnet
with a means of quickly switching on and off a connection to a battery.

BE CAREFUL—when using the tools, with sharp edges, and with the magnet.

DO NOT place the electro-magnet near computers, phones, or other electronics.
It will destroy them.

Part 2

Find a partner from the class; together devise a new code (which is not Morse code).
Document your code on an 11 x 17 sheet of paper (horizontal format).
This will be your code table or code bock.

With your partner, practice sending and receiving messages using your code.
We will run a "test" of your coding skills during our next class.

Part 3

Create a diagram of your mental model of how a telegraph works.
Consider the actors, objects, processes, and mapping between layers of information.
Format: 11 x 17 inches; landscape (horizontal format).

Be sure to add a title and your name to both sheets.
Bring prints to class and post to your web site.

Please read Shannon and Weaver, "A Mathematical Theory of Communication."
http://www.dubberly.com/courses/design_theory_2016/03._a_Shannon.pdf
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Human Body as Dynamic Systems Diagram

Consider a person in terms of stocks and flows, sources and sinks, and lag.

Create a diagram depicting a person in terms of at least six stocks.

At least one stock should come from each of these categories:
physical, emotional, social and economic.

For each stock, indicate its immediate source and sink, average volume, likely range of volume, danger zones (if any) and likely flow rate.

For at least two stocks, indicate at least three prior steps in the source chain and at least three subsequent steps in the sink chain.
Consider whether source and sink chains might ever link.
Consider how stocks might affect one another.

Format: 11 x 17 inches; landscape (horizontal format).

Be sure to add a title and your name.
Bring prints to class and post to your web site.

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