Fall Design Review and Documentation

Why you do it

In industry, a design review is often a multi-day exercise to go over a design in great detail. Its purpose is primarily technical, but also to convince stakeholders, managers, colleagues, peers, bosses etc. that the project has value and that the team is on track for successfully meeting its goals. More specifically, design reviews serve to:

- Demonstrate that you are on track to meet your project deliverables
- Demonstrate that you have an effective design plan
- Receive technical feedback on your design plan
- Adjust the technical direction of the project based on progress to date and remaining risks

Design reviews in this course

In this course, the scope of a design review is necessarily smaller. It is a meeting of about 30 minutes in which the team will present its results and compare the results achieved against those committed to in the "Objectives for Cycle 2" section of the team's Product Development Worksheet. This usually means that the team should have some kind of "proof of concept" subsystem working by the Fall Design Review, but is highly dependent on the team's situation.

The Cycle 2 Objectives are those that the team commits to achieving by the end of the fall semester. These should mostly be "high priority", because achieving the objectives is high risk, or key to the system performance, or on the critical path. The technical content of the Cycle 2 Objectives are agreed upon by the team and the course faculty earlier in fall semester and may be iterated upon. These points are awarded based on the Fall Design Review presentation. Further points are awarded based on the quality of the Fall Design Review presentation, independent of whether the objectives were achieved. Thus, at the end of the Design Review presentation, the team will receive two grades: one for execution against technical objectives and one for presentation quality. Finally, a

documentation grade will be given, as discussed in the last section of this document.

Design review logistics

The main point of the design review is to demonstrate to the faculty (and possibly your client) that you have achieved your stated objectives. The structure of the design review assignment is similar to what one would encounter in industry. The meeting will take place in a conference room with a video screen or slide projector. The time allotment is nominally 30 minutes. Dress for the design review is business casual. Students may remain seated while they present or stand, as they prefer. Every student should present part of the review, and all students on the team should be prepared to answer questions about their portions of the project. The required attendees are: all student team members and course faculty (at least one, and optionally more if the team is interdisciplinary.) Optional attendees are: faculty mentors who have been advising the project, other faculty or staff who have interacted with the team, and clients. Teams should invite the optional attendees, particularly the clients. Teams should attempt to accommodate the schedules of the optional attendees if possible. It is permissible for external parties to attend the meeting via teleconference.

The team should bring multiple hard copies of the Cycle 2 Objectives sheet to the Design Review meeting. Faculty will note on the form whether the teams met their objectives and assign points accordingly.

Content of the Design Review

By the end of the fall semester, teams should have some sort of working “proof of concept” to demonstrate or the equivalent, depending on their circumstances. The details of the proof of concept are captured in the Cycle 2 Objectives as agreed upon by the team and the course faculty. In practice, the proof of concept should somehow represent the “core” of the system -- the key design ideas, the solution to the highest technical risk part of the system, etc. Bringing a simple prototype to the design review is highly encouraged.

During the presentation: the team should present a slide show and, optionally, video or demonstrations of the proof of concept device. The exact organization of the talk is up to the team. A suggested outline, including the main points that need to be covered during the design review, is below.

- **Introduction--** the team should briefly review the motivation and scope for the project, which should come directly from the project introduction pitch from cycle 1. Remind the attendees why the project is important and what benefits it will achieve when it is successfully completed.
- **Body** -- the team should cover all the items in the Cycle 2 Objectives. For each item the team should provide evidence (data, video, etc.) about whether the objectives were met. The majority of the meeting should be concerned with this section.
- **Next steps & conclusion** -- the team should review their plans for the next semester with the course faculty and other attendees. The team can discuss unexpected obstacles and upcoming challenges, including risk mitigation strategies. This is good opportunity to discuss "big picture" items, such as whether the team is on track to meet its Prototyping goals and a fully functional system in Spring Semester.

Presentation quality

The Design Review meeting is informal but should be run professionally. Presenters can expect to be asked questions at any point during their presentations. Students should answer questions honestly and forthrightly, not being afraid to admit that they don't know an answer. The team should avoid making slides that imply work has been done if in fact it hasn't. (E.g. don't say "results are inconclusive" if you haven't done any testing -- just state "we haven't tested it yet.")

In a wide-ranging technical meeting, it is easily possible for the meeting to get sidetracked onto a relatively minor technical discussion. This is a common occurrence in industry. It is the responsibility of the team to keep the meeting on track if this happens. There is only finite time for the meeting, and all the items on the agenda need to be covered.

The quality of the presentation will be judged by the faculty based on the following criteria (see rubric for details):

- Technical content -- thorough coverage of all necessary content, quality of demonstrations (if any)
- Organization and professionalism --logical order of presentation, appropriate tone, time management
- Quality of slides -- visual appeal, appropriate use of tables and graphs, clarity of material presented
- Oral presentation quality -- confidence & enthusiasm, sharing of responsibility, handling of Q&A, preparedness of team members to discuss their aspects of the project

Note that while the team will be assigned one grade for the presentation quality, if some member(s) of the team are significantly less prepared or effective in their presentation than the rest of the team, then the course professors may reflect this underperformance in the individual portions of each student's grade for the semester.

In summary, some key tips:

- *Invite your client (and try to coordinate with him/her prior to signing up for a slot)*
- *Have multiple (4) printed copies of your cycle 2 objectives*
- *Be clear about what you have accomplished*
- *Remember what you learned about presentation skills in cycle 1 (and your self-reviews)*

Documentation

Documentation for cycle two is less formal than in cycle 1, but no less important. It shouldn't be additional work, but a confirmation that you are recording your progress and updating your documents. The documents below are due on December 6th through Sakai. There are four elements to cycle 2 documentation, each explained in more detail below:

1. Cycle 2 presentation
2. Updated Spec sheet
3. Updated Design Foundation Document
4. Design Repository

Cycle 2 presentation. Please submit your draft of your slides for your presentation by December 6, in PDF format. You are welcome to update and submit your final copy of the slides after you have done your presentation. (Resubmissions will be allowed)

Updated Spec Sheet. At this point, many of your specs will have been changed from your initial attempt in cycle 1. Please update your specs given your current knowledge of the device and resubmit as a PDF by December 6th. (The spec sheet includes the HOQ, and can be found in product development worksheet).

Updated Design Foundation Document. Each team has received feedback on their DFD and should incorporate that feedback (along with their updated objectives) into a second revision. Please resubmit as a PDF by December 6th.

Design Repository. During the design process, the team generates valuable information that must be recorded and organized so that it can be presented in the final report. This is also helpful as the FDA requires a Design History File (DHF) which contains a history of your design efforts. Likewise, if you pursue a patent, this information will be critical to draft a strong patent.

Your design repository is a system to keep track of all of the information you are collecting and generating. We are impartial about the tools you use to do this, but

we want to see that your are keeping a careful record of your work. Tools used by previous teams include GitHub, Slack, Duke Box, OneDrive and Google Drive.

The content in your repository would include:

1) Functional decompositions
2) Sketches (or post-its) of design concepts
3) Photos/video of prototypes
4) Code
5) Lists of materials
6) A collection of relevant articles that have informed your design or documentation
7) Pugh Matrices that you used to make design decisions
8) Any research done to support your objectives

It's likely that a team might use multiple tools to organize their work. We ask that by December 6th you submit no more than a paragraph or two to Sakai (PDF) that describes how you have organized your design repository(s). Also, please give online access to Dr. Palmeri and Dr. Richardson (e.g. share the duke box folder, or google drive) so that we can see the content.

Adapted from Eric Richardson, Duke University and Gary Woods, Rice University