Snapshot Style Poster Sessions for Large Class Feedback on Project Status in Engineering Capstone Courses

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Snapshot style poster sessions are just-in-time design feedback sessions where student teams prepare simple, pinned-up posters that show off in-progress status of their projects. In the author's experience, snapshot poster sessions can satisfactorily accommodate up to 30 project teams during a single class period. The intended audience is other students in the class, faculty advisors, professional staff, nearby clients, and interested students not enrolled in the class. Minimal additional preparation time is expected for mid-semester snapshot days. The idea is that project teams continue work on normal project activities for as long as possible, creating poster content in the final day before the session, reusing resources from personal logbooks and project binders. Snapshot poster sessions, scheduled several times throughout the course of a project, provide opportunities for multiple parties to provide formative assessment, share best practices, highlight common struggles, and punctuate common milestones for capstone design projects.

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Introduction

Snapshot style poster sessions are pseudo-impromptu sessions where student teams prepare simple posters that show off key features of their projects. The term snapshot represents both the capture of project state and the quick process of turning project artifacts into the snapshot poster contents. The idea is that students work on their projects for as long as possible, extracting poster content at the last second from existing and reusable resources, giving session attendees a snapshot view of their project status. The snapshot poster session is held during a single class period during which faculty, clients, other students and relevant external attendees provide feedback on each poster/project.

There are several course functions that snapshots (snapshot style poster sessions) can fulfill for students and instructors alike. For students, snapshots are an opportunity to gather project work into a coherent form and repeatedly practice communicating the technical specifics of the project to third parties. Students also get fresh ideas through feedback from fellow students, different instructors, other clients and interested parties. For instructors, snapshots serve as a forcing function for project advancement, an opportunity to get their student projects outside feedback (and hopefully new perspectives), and the chance to show off their students' work. Snapshots are intended to provide formative assessment rather than project evaluation, promoting horizontal communication and dissemination of best practices rather than judgment. Snapshot style poster sessions, scheduled several times throughout the course of a project, provide opportunities for multiple parties to provide real-time critique, disseminate best practices, and punctuate common milestones within capstone courses.

Literature Review

Snapshots complement other standard capstone reporting and feedback mechanisms (traditional poster sessions, design review presentations, technical presentations, and reports) by providing an avenue for getting class-wide, just-in-time feedback. In addition to the traditional reporting and project evaluation mechanisms, several tools and techniques exist that have similar roles and structure to snapshot posters.

Templates for Representation of Project Status

The Toyota A3 Form is a poster format intended to quickly present the key information surrounding a problem and a proposed solution. The information is presented such that members outside the presenting team can understand the problem quickly and accurately. The A3 form is named for A3 size paper. A3 forms include information on the importance of the problem, current state of the problem, objectives of addressing the problem, root cause analysis of the problem, solutions to address the problem, and a process for implementing the solutions[1].

Leipold and Landschoot[2] implemented use of the A3 format for technical presentations in a cornerstone

design course. Their goals were to provide a comprehensive technical presentation in which all team members were accountable, avoid possible 'death by PowerPoint' scenarios, and provide a more authentic design review process with respect to industry. Leipold and Landschoot cite design programs that use this method.

Managing Student Project Progress

Snapshot sessions raise visibility of project milestones that should be achieved by most teams at a specific time after project start-up. They are intended to enrich existing project management structures that are established between lead instructors and their design teams. Common examples of such structures include:

- Instructor/team/client meetings
- Weekly memos submitted to the client with action items completed in the previous week and action items to come in the next week
- Reports and presentations to the client
- Requirements of regular logbook entries
- Weekly portfolio check-ins
- Weekly check-in on progressively built final report or presentation
- Scheduled consultations with external advisors[3]

Morris et al.[4] describe a gated review process similar to a stage-gate process found in industry. Snapshots could easily be part of a gated process where snapshots poster content is tuned to match the gate requirements.

Organization of Snapshot Sessions

Content

Posters are made of 8.5 by 11 inch sheets of paper pinned to a piece of foam core. Items to feature in the poster are specified by the instructor, emphasizing design materials appropriate for the current stage of project development. Students are encouraged to work on project content for as long as possible, creating poster content in the final day before the snapshot session by using existing resources in their personal logbooks and team portfolio. The posters should be supplemented by any hardware or software displays that teams have created as the current state of development.

Timing

Faculty should consider the timing of the session relative to the project elements about which they would like students to receive feedback. Good snapshot opportunities coincide with project milestones such as problem definition (e.g. defining needs and specs, etc.), conceptual design (e.g. sketches created, design selected, etc.), and detailed design (e.g. detailed drawings, some prototyping, etc.). Multiple snapshots can be used during a project, but in the author's experience, more than two snapshots each term would be counterproductive. The snapshot is held during the course's regular meeting time and students are asked to be at their predefined presentation location with a prepared poster by the beginning of class.

Audience

In addition to course instructors and students, other faculty members, technical staff, college staff, graduate students, other undergraduate students, technical mentors, as well as current and former project clients are invited to attend. Attendees of various backgrounds and disciplines enrich the feedback received by the student groups. Student teams are directed to send a personal invitation to their client, while the other invitations are made by the course instructors. Snapshot events themselves were not conceived to be a forum for project evaluation. Instead, they are opportunities to provide a large volume of formative feedback to teams in a short period of time. We have found highly productive to have course instructors visit posters of teams for which they are they are not the advisor.

Students are expected to dress and act professionally. Furthermore, students in the course are instructed to take turns attending to their poster and use the remaining time to browse other displays, asking clarifying questions. In order to close the loop on the feedback they receive and lessons they observe, students are each required to make a logbook entry on the snapshot day. Ideally, these notes should be inventoried and discussed in the next advisor/team meeting.

Implementation at UI

At the University of Idaho, the instructional team uses four snapshots throughout the course of a two semester capstone experience (Figure 1). The snapshots coincide with the mid-term and end of each semester (called snapshot days 1-4). The course is interdisciplinary involving students from mechanical, electrical, computer, biological, and agricultural engineering as well as computer science. External clients with authentic projects are used whenever possible and are

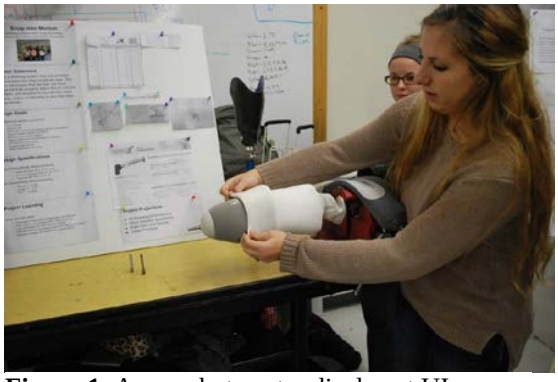

Figure 1. A snapshot poster display at UI.

staffed with students from appropriate disciplines. In preparation for each snapshot, each student group develops a poster with the specified content. The content required for each snapshot (shown in Tables 1-4 in the appendix) is timed to coincide with expected project progression. The first and third snapshot day expectations are more open-ended than the second and fourth to account for the variability of projects. The second and fourth snapshot expectations include a common set of end of semester deliverables that are ultimately used for grading.

Hardware (and/or software) is expected to be part of the display during the third and fourth snapshots, but may not be present for the first two. Posters displays are further supplemented by the team's project portfolio. The team's portfolio is a living record of the team's progress. It contains the deliverables, synthesized and organized into a common location for team use. Examples of items in the portfolio include meeting minutes, specifications, sketches, technical data sheets, etc. A well-built portfolio will save time in creating reports, presentations, and snapshot posters. A high quality portfolio is useful for the client and future design teams in addition to the current design team.

Implementation at RHIT

At Rose-Hulman Institute of Technology, the capstone instructional team in mechanical engineering started using snapshot poster sessions during the 2013-2014 academic year. The RHIT mechanical engineering capstone course is two quarters long and features industry based clients. The snapshot coincided with the completion and documentation of the initial problem definition. Students were given instructions for poster content that communicated this state (Table 5). At RHIT student design teams are assigned a professional mentor from the staff of engineers at Rose-Hulman Ventures. During the snapshot day, student teams are expected to identify and begin dialogue with those professional mentors that have experience in their project's domain.

Conclusions

It is important that capstone course activities are seen (by students) as contributing to the advancement of their projects, not unwanted distractions. Snapshots do meet this criterion with students directly observing and experiencing the benefits. Large-scale feedback to multiple teams can be achieved in a short period of time. Furthermore, peer pressure surrounding the public nature of the event can elicit project motivation. Snapshots have been found to add value to project management, product development, and professional development. While snapshot poster sessions are not the only tool that can be used to fulfill these functions, it is an effective, efficient, and engaging solution.

References

1. http://sloanreview.mit.edu/article/toyotas-secret-the-a3-report/ - cited on Dec. 31, 2013
2. Utilizing an A3 Report Format for a Technical Review at the end of a Cornerstone Design Course, Leipold, K. and Landschoot, T., Proceedings of the ASME 2009 International Design Engineering Technical Conferences & Computers and Information in Engineering Conference, IDETC/CIE 2009, August 30 - September 2, 2009, San Diego, California, USA, DETC2009-86309
3. The Mentor Initiative: A Framework for Industry Involvement in the Capstone, Tocco, J. and Mata, L., Proceedings of the 2012 Capstone Conference, Champaign-Urbana, IL, May 30 – June 1, 2012
4. A Gated Review Process for Administering a Capstone Senior Design Course, Morris, M., Post, S., and Reyer, J., Proceedings of the 2012 Capstone Conference, Champaign-Urbana, IL, May 30 – June 1, 2012

Appendix

Table 1. Expectations for snapshot day 1 at UI

- Portfolios should be updated to include a synthesis of your project learning and all other midpoint of first semester deliverables
- Bring any existing hardware/software, pictures from client interviews, diagrams, catalogs, etc.
- Make 8.5x11 printouts to create a poster that includes:
  - Team name, team members, sponsor
  - Problem statement
  - Documentation of project learning such as models, synthesis of notes on the people, products, technology relevant to the project
  - List of needs/specs/requirements
  - Any concept development to date
  - Display a plan for project completion (milestones & dates)

Table 2. Expectations for snapshot day 2 at UI

- Portfolios should be updated to include a synthesis of your project learning and conceptual design
- Project Learning - Team documentation and files explain the technology and scientific principles that support your concept design. Team members can effectively describe professional practices involved with your client relationship, design process, and project management.
- Concept Design - Your team has developed an idea for your final design. You have identified

and described the subsystems necessary to meet client needs/product specifications.
- Data and Prototypes - Your team has designed, built, and tested relevant prototypes and has assembled evidence (drawings, flowcharts, diagrams, calculations, prototypes and/or experiments) that your concept design will work. Show these.
- Bring any supporting hardware/software, CAD models, proof-of-concept prototypes, etc.
- Make 8.5x11 printouts to create a poster that includes:
    - Team name, team members, sponsor
    - Problem statement
    - Outline your major areas of project learning as well as your results
    - Visualization (sketches, drawings, diagrams)
    - Convincingly illustrate that the components of your design will work.
    - Prototyping results
    - Modeling and/or Experimentation
    - Communicate your vision of final product architecture.
    - List unresolved issues and your plan for attacking these.
    - Plan for project completion (milestones & dates)
- Supplement your poster with laptop show/tell, if appropriate

Table 3. Expectations for snapshot day 3 at UI

- Portfolios should be updated to include documentation of your detailed design
- Bring any in-progress hardware/software, drawing packages, pictures of fabrication activities, results from experimentation, etc.
- Make 8.5x11 printouts to create a poster that includes:
    - Team name, team members, sponsor
    - Problem statement
    - Initial effort at modeling possible failure modes in your project
    - Documentation of your detailed design (detailed drawings, renders, data sheets for purchased components, etc.)
    - Manufacturing process/results
    - Final test plans
    - List unresolved issues and your plan for attacking these.
    - Plan for project completion (milestones & dates)
- Supplement your poster with laptop show/tell, if appropriate

Table 4. Expectations for snapshot day 4 at UI

- Client Satisfaction – Your design will meet or exceed customer expectations. This includes providing quality evidence that proves that specifications are met.
- Oral Communication - Explain how your design works (including key knowledge about design, manufacturing, and testing) at the right level for each visitor. Be enthusiastic and communicate in an organized and clear fashion.
- Professionalism - Be a role model in supporting the goals of our engineering capstone program, welcoming visitors, and answering questions about our program.
- Portfolios should be updated to include all project documentation
- Bring final hardware/software, results from experimentation, pictures of installation, etc.
- Make 8.5x11 printouts to create a poster that includes:
    - Team name, team members, sponsor
    - Problem statement
    - Outline client needs/requirements
    - Final model of possible failure modes in your project
    - Illustrate final product architecture and its key subsystems/features.
    - Provide evidence that all design components work as intended (final test results)
- Supplement your poster with laptop show/tell, if appropriate

Table 5. Expectations for snapshot day at RHIT

- Problem Definition – Teams should have a completely documented set of exhibits that represent the needs, goals, targets, constraints and benchmarks. Teams should
- Make 8.5x11 printouts of Power Point slides and other documents to create a poster that includes:
    - Team name, team picture, sponsor
    - Problem statement
    - Five required tables of needs and specs, standards table, and the goals & constraints
    - Any concept development to date
    - Bring any hardware - products, experiments, etc.
    - Summarize lessons learned from your meeting with Ventures (if completed).
    - Display a plan for project completion (milestones & dates)