



Panel 1C: Capstone 101

Facilitator: Elizabeth DeBartolo (RIT)

Panelists: Robert Hart (UT Dallas), Jordan Levy (CapSource), Susannah Howe (Smith)

Description: New to Capstone? New program? Feeling overwhelmed? This popular panel has veteran instructors, ideas, and tools to get you started.

Potential Questions

- How do you approach finding industry partners?
- How do you know if the project is going to be a good fit?
- How do you best prep industry mentors for the experience?
- How do you build student teams? How do you best prep students for the experience?
- How do you kick off projects?
- How do you manage many different projects at once? How do you keep all the projects on track?
- What are some of the biggest hurdles to wrestle with as you move through projects?
- Do capstones need to be a full semester (or two!?) (or more?)
- How do you measure if individual students and/or their teams are successful?
- How do you grade capstone participants? How much does industry feedback play into grades? How do you incorporate industry feedback?
- What are examples of students that performed very well; what are examples of students that have not?
- What's your best advice for your first cohort of projects?

Notes from Session:

- Resource: Decennial Capstone Surveys show benchmark data for capstone courses nationally
 - see <https://capstonedesigncommunity.org/capstone-surveys> for archive (2015 is most recent)
 - Susannah Howe (Smith) will be doing next one in 2025
- Participant advice to open:
 - Find “effective” practices for you and your school/teams, there is no “best” practice that works for everyone
 - You don't need to implement everything you heard during the conference, focus on fundamentals then add “nice to have” features in the upcoming years



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- Topic: Projects/sponsors:
 - Not all sponsors will return for another year, even if the projects they did in previous years were very successful
 - Have a clear project description at the beginning
 - Think of projects like an onion
 - what's the core and then what are the added pieces that would make it fuller?
 - focus on the core, extra is nice but not necessary
 - Project intake templates are helpful [contact any of the panelists to request templates]
 - Faculty should manage expectations with sponsor on student participation
 - Have scoped out milestones to guide project from beginning
 - Tell sponsors that they should be able to give the students their requirements for the project
 - Student Proposed Projects – Have to be careful since students may not get the client experience. One approach is to enlist an alum as the client (not the student).
 - Look to campus resources - career services and foundation relations for possible sponsor connections
- Q: How to scaffold without telling the students what needs to get done?
 - Give students flexibility to ask questions to sponsor
 - Milestones w/ suggested deliverables (be flexible in deadlines if they are not relevant to their project anymore or if they needed to rescope/iterate on previous step)
- Q: How to keep track of meetings with clients/team/mentor?
 - Coach clients at the beginning with expectations of how often to meet (weekly or at least every three weeks)
 - Weekly progress report that goes to everyone (instructor, client)
 - Can include questions for instructor/coach/client liaison
 - Instructor meet with client during the semester once or twice to see how the projects are going (more often if necessary for that team)
- Q: How to handle difficult faculty mentors?
 - Try to get them involved with finding a project/industry sponsor, so they get excitement and agency over the project
 - More challenging if required – need to incentivize them
 - Awards for best mentors
 - Mentor survey w/ feedback sent to them midterm and end (temperature checks)
 - Provide training on how to mentor (training session at beginning of the semester)
 - Pair faculty with someone more seasoned, or pair with alumni
- Q: Capstone courses are different from other courses students have taken - how do you communicate that in the beginning?
 - Explain expectations (if small program, try to meet with students individually)



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- Be transparent when things get difficult, say it is because they have not done it before (open ended client connected project)
- Set tone early – not a lab course to do in spare time, this is a big opportunity to work with a client, hone skills, can lead to other opportunities. Need to take the project seriously. Let know that this is going to be messy and frustrating - you won't be insulated from that.
- Emphasize this is something to add to resume and add as a reference
- Q: Is the “mentor” also the “client” or are they separate roles?
 - Having mentor and client the same is more like research based model
 - Better to have a mentor separate if you have a faculty client. Could have PhD student/postdoc be a mentor if necessary from the faculty client's lab
 - Mentor - can talk about anything (issues with client and team). Instructor can be mentor.
 - Client - discuss project deliverables / information
- Topic: Setting up projects
 - Lead time during summers - check to see if there is any machinery/parts/datasets needed before the semester starts
 - Meeting with sponsors / give form with questions to gauge interest and interaction - can show red flags before the semester starts
 - Ask questions during initial meetings
 - Do you have a technical background?
 - Do you have experience managing teams?
 - What data/resources are needed for this project? (note: things like medical data can be difficult to access, so best to be aware up front)
 - Have backup clients for projects
 - Entrepreneurs can be difficult clients since they are working towards a prototype on a tight deadline and may not be a good person to work with an undergrad team. Don't want to work with a project that is part of a critical path.
 - Ask which backgrounds are relevant for the project (not as a requirement, this could limit interdisciplinary teams)
- Q: Do you assign students to a project or let students pick their own project?
 - Answers: varied approaches. Most typical is for students to get some choice in project selection, but often instructor does final assignment
 - There are automated tools (in platforms like CapSource, CATME, and others) to help with team formation
- Topic: Design courses for all students - also non-industry engineers
 - Highlight transferable skills
 - Leverage alums from different paths (grad school, industry, etc.) to come back to talk about their experience and how capstone helped them
 - Junior Design can be helpful preparation
 - One semester



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- Team teamwork and project management structure
- Can work with external clients, or set up one project that all teams work on (the instructor is the client)

- Topic: Course structure
 - Have final report and presentation
 - Deliverables along the way - different teams will meet these deliverables at varied times.
 - Chat with industry to see what is useful to you as an outcome
 - Q: Do all the teams get the same deliverables? Or do the deliverables vary team to team?
 - A: responses vary across programs, but typically all teams have same required assignments, but the content/form may vary depending on the project
 - Design reviews along the way (3-4 per year is common) - topic depends on the team status

- Closing Q for Panel: What advice would you give your past self?
 - Use helpful technology
 - Don't do all ideas at once (think board game with expansion packs – make sure core board game is excellent before adding on)
 - Collaboration is helpful - find someone to bounce ideas off of
 - Find a mentor at this conference!