Panel 2B
Team Integration

Facilitator: Jay Goldberg (Marquette University)
Sidekick: Matthew Swenson (University of Idaho)
Scribe: Keith Stanfill (University of Tennessee, Knoxville)

Panelists:
Kathryn Danneman (Rensselaer Polytechnic Institute)
Courtney Pfluger (Northeastern University)
Don Pophal (Rochester Institute of Technology)

Description: Integrating students from different disciplines on capstone teams

Starting Questions:

1. When forming multidisciplinary teams, what do you do to increase the probability that the team will be highly functional?
2. Do you consider race, gender, ethnicity, etc. to try to create a balanced, diverse team, or do you only consider technical disciplines and skills?
3. How do you prevent multidisciplinary team members from separating from the team and working in isolation on their own part of the project?
4. For programs that are considering a transition to multidisciplinary teams, what would you consider to be the greatest benefit of doing so, and what pitfalls should instructors watch out for?
5. How has your industry experience informed your approach to creating and advising multidisciplinary student teams?
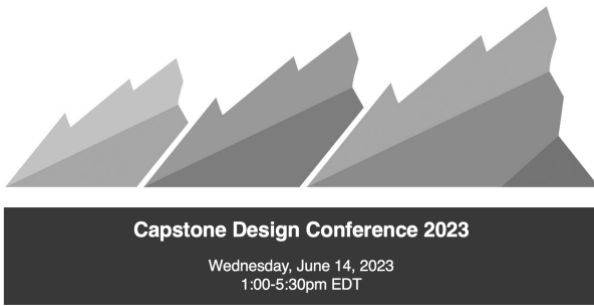

Notes:
KD Kathryn Danneman
CP Courtney Pfluger
DP Don Pophal
JG Jay Goldberg
MS Matthew Swenson

What does MD mean to you?
CP: sustainable energy projects in Brazil
KD: many engineering and management students on teams–large scale

**DP:** 100 projects--more than half sponsored by industry; ~400 students

1. When forming multidisciplinary teams, what do you do to increase the probability that the team will be highly functional?

   KD 1-semester program, 100-200 students, survey all students, content is specific to the discipline; service learning projects along with industry project

   CP first lecture on inclusivity, goals: discuss what the goals mean to them–different ways to include the concepts into their team charters; team expectations and then expectations for the course; team charter=community agreement=team contract; when will they meet, what defines quality work, one comment for each at a time, how they will contribute, time management, etc.
   Alternative to team role surveys: https://www.123test.com/team-roles-test/
   https://go1.predictiveindex.com/free?_ga=2.132940494.134885294.1610378629-1748987911.1610378629

   1. I give a lecture and do an activity to discuss teamwork and goals, effective team attributes defining (respect, fairness, commitment, transparency, and inclusion)- Round robin brainstorming where each team gets one word and discusses how it could be implemented as a team, then each person provides one suggestion and goes around so everyone is heard- put this on google doc so all teams see suggestions. The team uses these and has to define how they will implement these in their team charters

   2. Team charters include above, along with:

      1. Expectations – meeting times and how often, quality of work, contributions, time management,

      2. Goals for collaboration

      3. Consequences of not meeting expectations

   3. A team building activity is required homework the first week of class and explained what they did and what they learned written in their first memo assignment
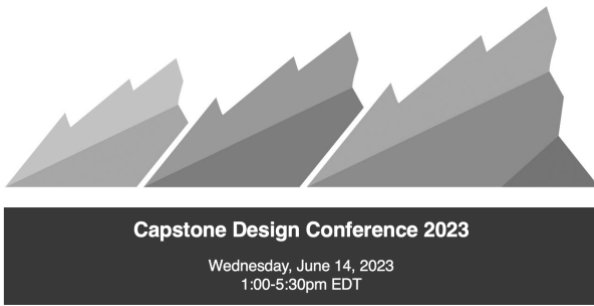
DP
- Work on team building activities, such as:
  - DISC Survey (Dominance/Influencer/Steadiness/Compliance)-- understand each other's profiles–teams are formed before first class; free version of the disc survey online; revisit survey to reinforce concepts
  - Require that the team hold a social event with their team (students only)
  - Continually discuss the habits of High Performing Teams
    - Communications
    - Trust but Verify
  - Use of Peer Reviews
  - Use of Best Practices
    - Daily Stand-up meetings
      - What was I supposed to do
      - What did I actually do
      - What 'Blockers' got in my way
    - Team Roles & Responsibilities (team charters)
      - Team appoints PM and other roles
      - Develop guidelines on how the team will operate
    - VOC/House of Quality/Scheduling/Risk Management/Test Plans

2. Do you consider race, gender, ethnicity, etc. to try to create a balanced, diverse team, or do you only consider technical disciplines and skills?

KD main focus is tech disc and skills, try to avoid discipline isolation; noticed international students were coalescing around nationality rather than needed skills; in industry you don't get to pick your team…

CP Students first filter by project ideas, then by discipline and expertise, project interest filter, inclusion filter last; try to not isolate by gender or other demographic

DP
- First consideration is on technical disciplines based on the work tasks at hand

- We have some ITAR constraints which limit team makeup
- Work to balance teams such that there is not only 1 female or one foreign student on the team if possible (we have had all female teams in the past).
- Students are surveyed to allow their preferences on project teams

3. How do you prevent multidisciplinary team members from separating from the team and working in isolation on their own part of the project?

KD some similarities, large course 6-8 member teams; faculty member and staff member assigned to each team; early on team activities (needs and requirements), questions do we have for chief engineer, each team member, and client; use post it notes for ideations and lets introverts contribute, project roundtables; student-led after first 3 weeks–rotate the meeting facilitators and scribe

CP team charter sets roles and responsibilities; weekly memos for individual and sub-group accountability; team leader insures at least one all-hands meeting each week; make sure the subgroups are not diving into a direction that impacts the whole team

I have a form to select project interest, along with stating what skills or experience they may have on that topic, and asking for demographics (voluntary)

I separate by project interest, then by demographics trying to ensure there is a mix of genders, race, and ethnicities, if possible. I rarely put a female by herself, if possible. Data is clear that mixing teams of varied genders, races, ethnicities, and cultures helps improve innovation and creative ideas, but care needs to be taken to ensure an inclusive and safe environment is built within the classroom and teams.

DP
- Use of Daily stand-up meetings (see above)
- During (8) presentations to clients, all team members must present to the client
- Require all students to be present during work time if possible (the second semester MSD II program is a challenge as students have conflicts with work time; require that they all meet as a complete team 2X/week with their Guide)
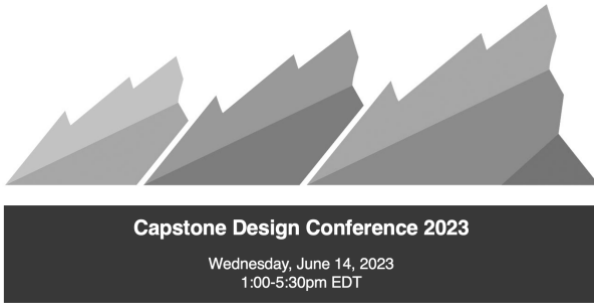
4. For programs that are considering a transition to multidisciplinary teams, what would you consider to be the greatest benefit of doing so, and what pitfalls should instructors watch out for?

KD Pro: engineering is truly MD; doesn't matter your degree–you have a problem to solve; Con: some disciplines have smaller enrollments–like IE vs ME–and still making sure no one is overlooked

CP agree with everyone; get more innovative ideas, in industry, you are working with other engineers, and chemists and biologists,... learn the lingo and symbols that represent the same concept, but different name; cons: siloing is challenging; use rubrics to help them learn how to talk with each other; siloing can happen with similar cultures–clustering around their cultural demographic–use more team building activities to break down these barriers

DP
- Students to learn to work within a team environment, many for the first time with other disciplines–interdependencies across schedules
- Students learn to share work across their disciplines
- Pitfalls may include that students within their discipline do not work well with students from another discipline as they do not understand their task–embarrassed to ask questions
  - Encourage students to share and learn from each other across disciplines

JG spend about 8 weeks having ID students work with his teams–transdisciplinary language; turf battle for the term *designer*; use the term *problem-solver* instead of designer; ID have skills engineers don't have and visa versa. Cons: sharing lectures; human factors in ~~biomedical~~ design

5. How has your industry experience informed your approach to creating and advising multidisciplinary student teams?

KD spent 30 years in research/consulting with private and non-profit institute; weekly meeting practices, the people part–not just the great document; everyone bring a different challenge and diverse team–this is your semester project–we're not doing
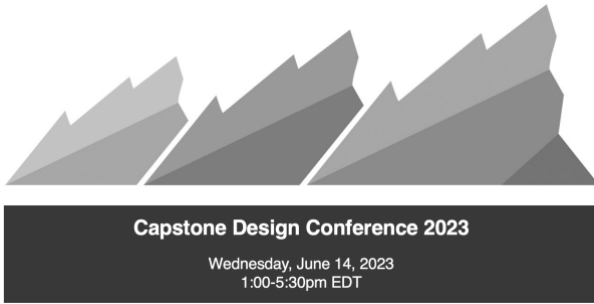
homework, we're doing deliverables; have one-v-one with instructors 2 times per semester

CP worked in biotech before going back to grad school; weekly memos to update your supervisors crucial, time management,

DP

- Team building is crucial–how to work and play well together is a great start. THis is how you win–the teams win the game
- With 24 years of industry experience as a Commercialization Manager on new products I never once worked with a team that was solely one discipline. Even outside of engineering, teams work with:
- Industrial Design
- Marketing
- Sales
  - Direct customer support (controlled)

How do you deal with students who indicate that the multidisciplinary project is not directly feeding into their discipline (managing expectations)?

DP ISE students often struggle with contributing beyond their discipline (like CAD modeling); ME students can do some electrical work, etc.

CP get the student comfortable with sharing that they are not being fully utilized; need to find ways to discover these issues from weekly memos, reflections.. These are opportunities to get the team to reflect and learn how to

KD it is less about the project and more about how you are contributing–good discussions for interviews

One of the biggest challenges we've had when working with interD teams, is their class schedules aren't aligned and they have difficulty finding time everyone on the team is free and able to meet. Even if we formed teams based on schedule for the first quarter, they may not continue to be aligned in the second quarter. Does anyone have any good ways to handle this? All disciplines of our students sign up for the same Capstone course, which is 8-10am M-F. Each department ensures no other senior-level courses are scheduled during that time. We expect all the students to work on Capstone during that time.

A question specific to disciplines (comp eng. and electrical eng.).
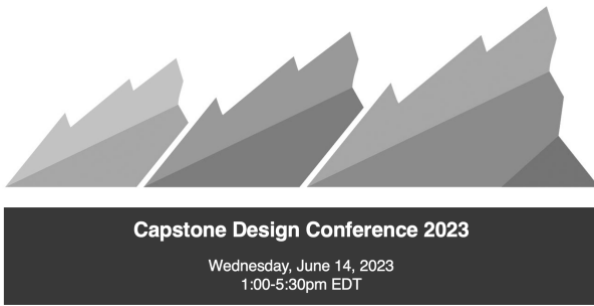
We find that with many projects, there's a shift in the quantity of work from the first to second semester. For example, electrical engineers are more heavily loaded during the design stage in the first semester up until their boards are fabricated and populated. In the second semester, the computer engineers are more heavily loaded as they're focusing on firmware, software integration within the product.

This shift can sometimes create some pushes/pulls in effort and - in some rare cases - results in friction between the disciplines. Have people seen similar behaviors/experiences and how would it be best to navigate such situations?

DP almost every electromechanical device has a software component–continually reinforce the project management and interdependencies; hardware designed in the first semester, the code is always written in the second semester

KD & CF actively seek other things you can do; try to simulate what you are modeling before you have exact data to do the full analysis

[EduSourced: Home](#)

**EduSourced**

https://www.edusourced.com

Just another software option for management. Taiga (taiga.io). Open sourced, cloud-option or local hosted. More directed towards the sprint based, agile process. Has a wiki system, git hooks, very customizable and free.

Notion for project management
A textbook that can be considered for capstone projects:
https://www.vitalsource.com/products/product-design-and-development-handbook-steven-w-trimble-v829441b?duration=180&utm_source=bing&utm_medium=cpc&utm_campaign=VST%20Tier%20Three%20ShoppingGoogle-US&msclkid=665747de8a0c1b22fa8823549cc70e36

Capstone Design Conference 2023
Wednesday, June 14, 2023
1:00-5:30pm EDT
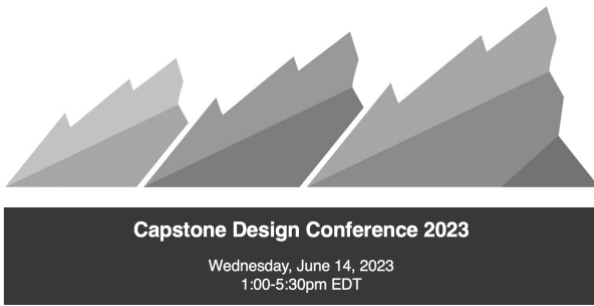
The team's first deliverable is to submit a photo of them having fun together (fun run, etc) onto the LMS

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How do you make sure that the internal constraints levied by one disciple are communicated to the other discipline. For example, EE circuit board dimensions determine ME enclosure design dimensions.

DP get the disciplines to talk amongst each other; capture all their work in a repository; do some informal design review; what doesn't fit and why; use EduSourced

EduSourced: Home

EduSourced
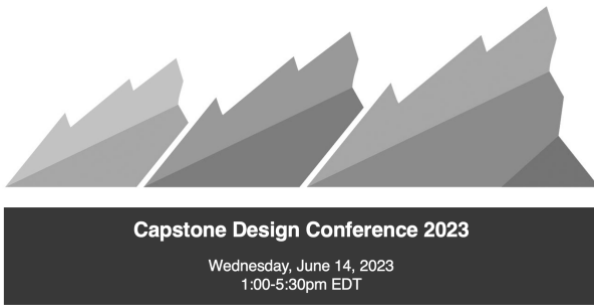https://www.edusourced.com

Other tools from Zoom Chat:
https://redmine.org/
https://taiga.io/
https://www.notion.so/

Capstone Design Conference 2023
Wednesday, June 14, 2023
1:00-5:30pm EDT

KD electronic design team space; faculty and staff have access; you can see everything that each student has posted They use Redmine
CJ

Teams can't find time to meet outside of class to meet
JG providing 6-8 lecture periods to meet during the semester

Overcoming public speaking fears: practice, practice, practice; start small, by yourself, present to one, start with cue cards; have the fearful one speak first
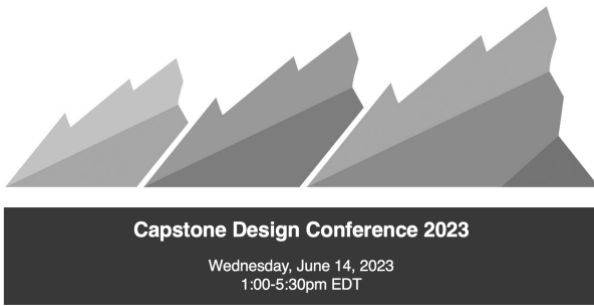
Team Charter template from CP

Team Charter

Purpose: Set team expectations, communication styles and timelines

You will make a Team Charter that sets expectations as a team and discusses communication between the team and mentor(s).

We have students submit a fun picture of them doing their activity.

Written Team Charter

- <u>Team Effectiveness</u>
  - What are your team's goals for the collaboration?
  - What are your team's expectations regarding meeting attendance (being on time, leaving early, missing meetings, etc.)?What constitutes an acceptable excuse for missing a meeting or a deadline? What types of excuses will not be considered acceptable?
  - What process will team members follow if they have an emergency and cannot attend a team meeting or complete their individual work promised to the team (deliverable)?
  - What are your team's expectations regarding the quality of team members' preparation for team meetings and the quality of the deliverables that members bring to the team?
  - What are your team's expectations regarding team members' ideas, interactions with the team, cooperation, attitudes, and anything else regarding team-member contributions?
  - What methods will be used to keep the team on track? How will your team ensure that members contribute as expected to the team and that the team performs as expected? How will your team reward members who do well and manage members whose performance is below expectations?

Panel 2B
Team Integration

- Mentor-Team Effectiveness
  - Introductions:
    - § Mentor's work and industry experiences;
    - § Team members co-op work experiences.
  - Mentors Role ... what can mentor contribute as a business mentor, what is beyond their expertise; how can team find resources to fill gaps and add value.
  - Communications protocols ... face-to-face meetings if possible, how do mentors/teams want to communicate ... phone, emails, face time, etc., frequency, agendas.
  - Develop a meeting/communications calendar to guide planned communications; other unscheduled contact rules
  - Expectations for mentor feedback for team deliverables.
    - § lead time needed if feedback desired before submission
    - § should see everything submitted before/after the fact.
    - § Teams with a Business Mentor AND a Technical Mentor- Need to discuss
- Project Plan
  - Must include a Gantt Chart for the whole semester (template is on Canvas)