



Panel 2D: Off-Campus Collaborations

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Panelists: Ron Rorrer(UC Denver), Colleen Coxe (HMC), Ravi Thyagarajan (Texas A&M), Danny Teets (RIT student)

Description: Whether you are collaborating with someone across the state, across the country, or across the world, learn how to manage these rewarding, but challenging, partnerships.

Potential Questions/Themes

Theme 1: Building Effective Off-Campus Partnerships (ground up and nurturing)

1. How do successful off-campus capstone collaborations usually begin?
2. What makes a project suitable for student teams?
3. What information should be clarified before a project is accepted?
4. How can universities identify and maintain strong external partners?

Theme 2: Project Success/Benefits compared to internal/traditional projects

1. How do you define success in an off-campus capstone collaboration?
2. What outcomes matter most to the sponsor, students, faculty, and institution?
3. How can programs document community, industry, or educational impact?
4. What makes a partner want to return with another project?

Theme 3: Expectations between partners and the academics (the n-boss dilemma)

1. What should be included in the project scope at the beginning?
2. How do you balance sponsor expectations with student learning goals?
3. What are common mistakes in project scoping?
4. How should teams manage changes in scope during the semester or academic year?

Summary of notes(AI):

Key Outcomes

Panel discussion explored **off-campus and international capstone partnerships**, covering partnership development, success metrics, multi-stakeholder management, and practical implementation challenges. 12 Panelists represented diverse institutional contexts: Harvey Mudd's 63-year-old clinic program with global partnerships, Texas A&M's 420-student program with French university collaboration, University of Colorado Denver's emerging international projects, and RIT student experience with Engineers Without Borders in Guatemala. 345

Partnership Development Strategies

Starting partnerships:

- **Mutual benefit identification** is the foundation—companies seek talent pipelines and free labor while universities need authentic projects for students 4
- **Alumni networks** are the most effective source for international company connections and startup partnerships 67
- **Institutional support centers** like Texas A&M's Halliburton Global Engineering Center provide strategic coordination for international collaborations 89
- **Direct outreach to international companies** (not just universities) has proven more effective than academic-to-academic partnerships for project reliability 10

Geographic scope varies by institution:

- Colorado defines "international" as anything east of the Mississippi River or outside the country, reflecting regional context 11
- Texas A&M partners primarily with École Centrale de Lyon (France) for year-long collaborative projects 12
- Harvey Mudd shifted from university partnerships (Singapore, Israel, Iceland) to direct company partnerships post-pandemic 1013
- UC Denver collaborates with Swedish, Polish, and Ugandan universities through UC Colorado Springs connections 1415

Project Structure Models

International collaboration approaches:

- **Parallel independent projects:** Teams work on complementary but standalone components—if one fails, the other still succeeds (e.g., autonomous trash collection ground vehicle + drone mapping) 121617
- **Sequential handoff:** European partners complete design in fall semester, US teams continue in spring—creates dependency risks when parts don't arrive 81518
- **Co-location periods:** Strategic one-week visits during critical development phases (Christmas and Easter breaks) maximize face-to-face collaboration while managing costs 9

Off-campus local models:

- **Design on-campus, build off-campus:** Texas A&M's solar-powered climate control unit for migrant workers built at remote farm location; Telemedicine International shipping container clinics retrofitted with solar power 161920
- **Community-based projects:** STEM exhibits for Boys and Girls Club designed and tested on campus, then installed and maintained by students at partner sites 921

Financial Models and Support

Funding mechanisms:

- **Endowment support:** Harvey Mudd's \$1M endowment from grateful parents funds 1-3 global clinic projects annually, including international travel 2223
- **Departmental investment:** UC Denver allocates \$3,000-4,000 per traveling student, viewing it as strategic investment in program excitement and reputation 824

- **Tiered pricing for startups:** Harvey Mudd scales fees based on startup funding stage—unfunded alumni startups pay nothing, angel-funded startups cover expenses only 6
- **Pro bono community work:** Nonprofits and NGOs receive free project support when they align with pedagogical goals 23

Success Metrics and Benefits

Quantitative measures:

- **Net Promoter Score (NPS):** Harvey Mudd tracks "Would you recommend this program?" annually for comparative trending across departments and projects 25
- **Binary success question:** "Was your project a success?" to sponsors after grades submitted—acknowledges that proving something won't work is valuable 2526
- **Financial impact tracking:** Sponsor surveys measure tangible business outcomes from prototypes to patents 26

Student benefits:

- **Cultural and technical exchange:** Exposure to different engineering approaches and work cultures prepares students for multinational companies 2728
- **Enhanced motivation:** International and community projects generate higher student satisfaction and time investment than traditional industry projects 293031
- **Regulatory complexity exposure:** Medical device project requiring animal testing in Netherlands taught students unexpected political and regulatory frameworks 3032
- **First-generation student access:** International experience for students who otherwise couldn't afford study abroad creates department-wide excitement 1533

Multi-Stakeholder Management

The "end boss dilemma":

- Students face competing priorities: grades (professor), deliverables (sponsor), and personal project quality 3435
- **Grade independence:** Harvey Mudd collects sponsor feedback only after grades submitted to prevent influence 3637
- **Faculty pressure:** When sponsors express satisfaction at final presentations, faculty feel pressure toward grade inflation despite academic shortcomings 38
- **Expectation alignment:** Failure to align all stakeholders (multiple professors, international partners, sponsors) on deliverables causes evaluation conflicts 313940

Communication challenges:

- Swedish sponsor met weekly with team but never communicated concerns to faculty until after grades—identified as faculty failure to establish communication protocols 4041
- Different academic standards across institutions (e.g., some universities don't require written reports) create evaluation conflicts 39

Critical Implementation Challenges

Language and communication:

- **Engineering terminology bridges gaps:** Technical language creates common ground despite cultural differences; Google Translate helps but isn't sufficient alone 4243
- **English proficiency requirement:** Projects require at least one fluent English speaker on international partner side to be viable 4344
- **Strategic team composition:** Intentionally selecting Spanish-speaking students for Mexico projects dramatically improves outcomes 45

Validation and testing obstacles:

- **Off-campus validation risk:** When final testing must occur at sponsor facilities (e.g., oil wells, production lines), students become dependent on sponsor schedules that don't prioritize capstone timelines 4647
- **Grading fairness concerns:** Cannot penalize students for sponsor delays beyond their control, creating evaluation inequities compared to on-campus projects 47
- **Early planning imperative:** Must establish testing dates with sponsors upfront and potentially schedule earlier than needed to buffer against delays 47

Safety and ethics:

- **Professional standards enforcement:** Refusing to build pressure vessels for electrical engineering professor without ASME-certified design and welding, despite \$8M congressional funding 4849
- **"Give them what they need, not just what they want":** Engineers must identify unstated requirements around safety, ethics, and legality even when customers don't articulate them 485051

Project Selection Criteria

Technical feasibility:

- Proof-of-concept must be achievable on campus even if final validation occurs off-site 46
- Projects should have "glittering bits"—exciting elements that motivate students to care deeply about outcomes 2635
- Avoid excessive cohesion in international projects—24/7 handoffs across time zones are unrealistic for students 5253

Partner requirements:

- **Technical liaison essential:** Harvey Mudd requires external partners to provide technical guidance since faculty advisors coach rather than direct—nonprofits often lack this capacity 623
- **Non-critical path for startups:** Early-stage startup projects must address needs that won't derail the business if unsuccessful 6

Institutional Positioning

Strategic value beyond academics:

- **Competitive differentiation:** For schools struggling with industry funding (UC Denver vs. Colorado School of Mines, CU Boulder), international projects create program excitement that attracts students and alumni support 1533
- **Whole-cohort impact:** Students not participating in international projects benefit from institutional reputation and peer exposure to global work 533

- **Alumni engagement:** International and startup projects particularly resonate with alumni donors and create long-term relationships 611

Pending Confirmation

- Optimal balance between international, nonprofit, and industry-sponsored projects varies by institutional context and funding availability 1854
- Best practices for ensuring consistent communication protocols across multiple international stakeholders remain institution-specific 4041
- Standardized approaches to evaluating projects with off-campus validation dependencies need further development 4647

Action Items

- Faculty: Establish explicit communication protocols with international partners before project start, including regular check-ins independent of student meetings 4041
- Administrators: Explore alumni networks systematically for international company connections before pursuing university-to-university partnerships 710
- Faculty: For off-campus validation projects, negotiate and document testing schedules with sponsors upfront with built-in time buffers 47
- Institutions: Consider creating endowments or dedicated funding streams specifically for international capstone travel to ensure equitable access 2223

Raw Notes:

Theme 1:

RIT - Projects got emerged from faculty connections looking

HMC - Global clinical program - projects with Singapore, Israel and others. The pandemic push to collaborate internationally in a virtual environment. Collaborating with Uganda on computer systems. No study program allows the openness to do the international collaborations.

Ravi - MCHC program director. Variety of funded projects. Foreign collaborations in France with engineering school. Highly intertwined projects with enough separation to allow success on the parts of the projects.

Design on campus but prototype deployment off campus. Farm off campus in collaboration with Qatar. Requires extra involvement to make sure they work.

Ron - Sweden, Poland, Uganda, European do 1 semester model where they hand off or disappear. Institution 51% minority students. Scholarships to support students. It builds an excitement for even students that don't go.

Audience Q: Ravi - domestic off-campus. Biomedical related projects on clinic

Collen - NP ,

Inquiry - testing site

Strategic - Ron - as they come projects are serve. They offer an avenue for new collaborations. Ravi - Center for global collaboration. 2 weeks of eastern break to be collocated on campus. Capstone projects with community service focus. I.e. permanent STEM exhibit.

Colleen - Revenue goals restrict the participation. An endowment (1M) allows to support teams, 3 projects. NP can be run pro-bono. Challenge with NP/NGO have limited technical liaison. Faculty is limited to management more that SME. Start up model is another set of projects.

Them e2

Danny - On benefit of experiencing equipment that might be not be available on campus. The service portion on helping communities,

Ron - Cultural technical exchange. How other professors operate in other countries? How regular things are doing differently. Remove us from the bubble.

Ravi - second ron's take. Extra wow aspect, either travel or challenge. Allow students to propose projects that they are passionate about. The extra excitement of driving the projects increase the success rate of the experience.

Colleen - Animal testing in China, facing the challenge of understanding foreign policies. International regulations.

Inquiry - how you make the decision

Ron -Chair wise - reaching to universities but encourage to come from any direction. Top down is helpful because resources are discussed upfront

Ravi - Capstone as easy entry. Many foreign institutions are looking to connect and open up to other collaborations. Double degrees options.

Colleen - Recruit the same manner as regular capstone projects. Challenges on expectations and schedule. DTU(denmark Technical U) collaboration thru alumni on vertical turbine

Inquiry - Collaborartion vs cohesive projects. Shared goals but distinct deliverables/objectives. That each side can be responsible for their own work.

Inquiry: Challenges on language barrier. Be patient and takes extra time.

Metrics + Theme 3 - Expectations - n-bosses dillema.

Danny - Serving your purpose.

Colleen - Perception survey. Net promoter score = numerical score on would you recommend this program/project to someone eles. Program, department, and project level

Ravi - Student perception, anecdotal higher level of satisfaction.

Ron - intertwined with the challenges - report, presentation, product (client). q

Ravi - Do not build dependency on test to be only feasible at the off campus site.

Danny - About unrealistic expectations.

Colleen. Expectations set up from clients, layers with faculty and directors on ensuring expectations are being met. And that they are being communicated across all parties involved.

Ron - Give you boss what they want... in addition give them what they need. Eventhough that might not be clearly communicated.

Notes go here