Resources Facilitating International Capstone Experiences

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Preparing students for the "real world"

- Best to Learn by Doing
  - Summer internship
  - Apprenticeship
  - Co-op programs
  - Part-time employment
  - Senior Design/Capstone programs

Need to update programs to keep current

- Some examples from North Dakota State University
  - Building a software development processes that matched SEI CMMI level two
  - Updating those processes to be more Agile like
  - Requiring all projects to be industry sponsored with a technical lead from industry
  - Continually updating supporting tools (website per project, configuration management tools, problem tracking tools, etc.)
  - Improving grading methods
  - Improving templates – e.g. the Project Specification
  - Establishing formal presentations
  - Establishing a place on our website to showcase past projects
  - Improving surveys done with students and sponsors
  - Establishing formal means to deal with intellectual property

The Challenge

- Today it is very common for software systems to be built by teams located in more than one country.
  - e.g. Project team located in the Australia – Team lead resides in the US
- How then should students be trained for this kind of engagement?
  - Best to learn by doing
- Challenges
  - Most instructors do not have international business contacts that allow them to find project sponsors in other countries
  - A fear of having to invest a huge amount of time managing an international project

Getting started

- Two professors met over lunch
- Discovered they both taught a CS Capstone Projects course
- Already doing regional projects (for companies 250 miles away)
- Why not for a company in the other country?
- You find a local sponsor for one of my student teams and I will find one for your students
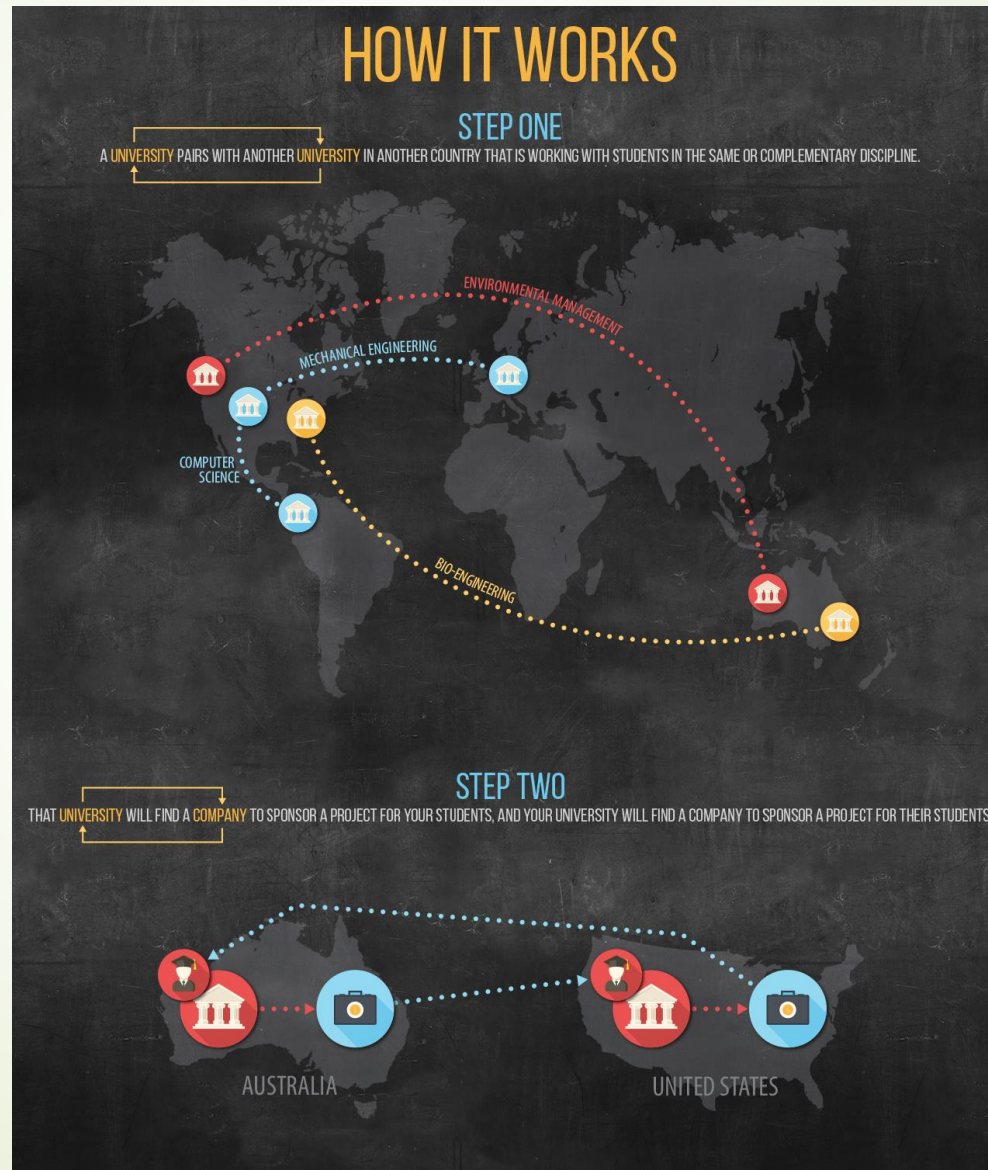
First Projects

- As Simple as that
  - No paperwork
  - No student travel
  - Projects done independent of each other
  - Projects done on the schedule of the university doing the work
  - Works just like when a multi-national company has the team lead in a different country than the development team
  - No significant increase in effort

Following steps

- The next year we added another international project

- Then through an Endeavour Executive Fellowship visited Australia and got more universities involved

- Interest grew from others to get involved

- Started helping to set up pairings between university professors

- Eventually set up an International Capstone Project Exchange to help interested people get involved in project exchanges
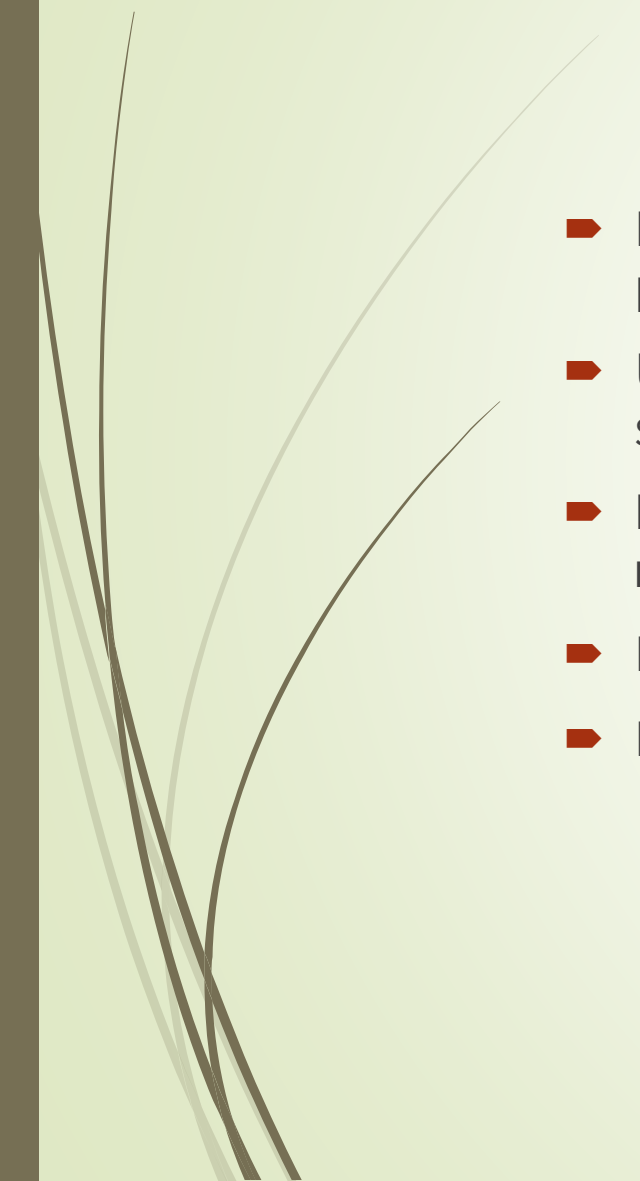
International Capstone Project Exchange – Basic Model

Alternate Models – beyond 1to 1 project exchanges

- Subcontract
  - One team subcontracts a piece of the project from the other team
- Exchange of Research Oriented Projects
  - Working with faculty rather than industry
- Joint Development
  - Work together as one team

Advantages of this model

- Professor can move to another university and keep the relationship with the paired professor

- Universities can establish long-term relationships with their paired industry sponsor

- If a sponsor has to drop out one year, the paired professor can find a replacement sponsor

- Potential for joint research between professors

- Potential to expand the work being sponsored into new areas

Grading Capstone/Senior Design Team Projects (1/2)

- Awarding an individual grade, that reflects the real contribution, is difficult in a group setting

- Academics use feedback/evaluations from following parties to calculate individual contributions:
  - Peers
  - Supervisors
  - Sponsor/s clients

- All of the above evaluations can be subjective in one way or another

- We have added '**an independent academic panel**' evaluation to the above mix.

Individual Marks Calculation Tool

Screenshot of the online implementation of the tool (not publicly available!)

- [1] Peer Evaluations

- [4] Supervisor Evolutions

- [5] Client Evaluation

- [6] Independent Academic Panel Evaluations

Formulas and calculations are given asan excel file at
http://icp.cs.ndsu.nodak.edu/about.html

ICPE Platform Walk-through

- A website has been set up to facilitate project exchanges
- http://icp.cs.ndsu.nodak.edu/
  - Register
  - Request Pairing
  - Get Paired

Current Status

- Projects have been done in the US, Germany, Sweden, Australia, Romania, Qatar, Brazil, and Colombia with others planned for next fall

- Many universities involved – 13 active exchanges with more planned for next fall

- Several disciplines currently doing exchanges – CS, EE, ME, Agricultural Engineering, International Marketing, Journalism

- An International Capstone Project Exchange has been set up

Conclusions and Future Considerations

- We presented two resources
  - International Capstone Project Exchange
  - Final Group Markings Calculator
- Experiences so far have been very positive
- Variations on the basic 1 to 1 project exchange have been developed

- Based on positive feedback we plan to
  - Extend the ICPE to more disciplines
  - Add the ability to have sponsors (who can potentially post projects)
  - Add more project tracking
  - Perform empirical studies of the benefits of these experiences for the students
  - Start marketing the ICPE

Questions?