



Computer Science Industry Advisory Board Meeting Minutes
October 10, 2008

Industry Members Present:

- Davis Almanza, IAB member representing Computers Unlimited
- Julie Evans, IAB member representing Synesis7
- Craig Spanning, IAB member representing Spraying Systems
- Phil Sherburne, IAB member representing Cisco

Montana Tech Representatives Present:

- Michele Van Dyne, C.S. Dept. Chair
- Frank Ackerman, C.S. Faculty
- Jeff Braun, C.S. Faculty
- Rick Joyce, C.S. Faculty
- Gary Mannix, C.S. Faculty
- Jim Rhodes, C.S. Faculty
- Celia Schahczenski, C.S. Faculty
- Tami Windham, C.S. Administrative Associate
- Tyler Dusek, C.S. Student
- Bryce Muller, C.S. Student
- Miles Pennell, C.S. Student

I. Introductions

Introduction of all attending the meeting were made. Michele Van Dyne introduced herself as the new department head and thanked the members for their input to the department.

II. Computer Science Department Update

- **Accreditation Results** – Michele accompanied by a PowerPoint presentation gave an overview of the accreditation results. Software Engineering has been accredited to September 30, 2011, which will be retroactive to October 1, 2006. This is a new accreditation and the program must request re-accreditation evaluation January 2010. Computer Science has been re-accredited to September 30, 2010 and must request re-accreditation report evaluation in January 2009. Some of the strengths of the program were: excellent student/faculty ration, students strong report that faculty are caring and easily accessible, students have good access to internships, graduates are in high demand and faculty are strongly committed to providing an excellent learning experience. ABET has three categories of flaws: deficiencies are fatal, weaknesses are things that need to be corrected and concerns are things that need to be monitored. We had no deficiencies; however, we did have some weaknesses and concerns. Weaknesses we had were: educational objectives are not being assessed adequately and assessments are not tied to changes, program outcomes are not being assessed adequately and assessments are not tied to changes and the Software Engineering program has not demonstrated students can perform software maintenance. The concerns the program had were: Inadequate faculty to offer necessary classes with sufficient frequency, faculty salaries are low and the program may not be able to attract and retain well qualified faculty and the assessment process has limited value in determining whether objective are met because there is no defined metric. Michele emphasized that she didn't think the process was made clear to the accreditation team. To address the weaknesses there were several areas that needed to be changed; the quantification of the alumni survey form and tying objectives directly to questions and responses on the survey form, refinement of assessment measures and still need to demonstrate that measures are tied to changes and Software Engineering II (SE3260) was revised to include

maintenance project. To address the concerns we have hired two visiting faculty and intend to do everything possible to make these positions tenure-track, administration is making an effort to bring salaries closer to CUPA standards and faculty defined metric as 70% of students will perform at 70% (C-level) or better on each outcome. Michele stressed over all the program didn't do too badly on accreditation. We had some weaknesses and concerns; we have addressed them all so there isn't a problem. The big thing the CS faculty need to hit is the assessment process and Michele emphasized she would like the IAB members to be thinking about some of the things that will be presented to them today and at the end of the day would like their comments about the assessment changes.

Questions, comments or suggestions:

- *Were there any weaknesses or concerns that were surprises?*
 - *The software engineering maintenance was a surprise.*
 - *Celia expressed she felt they all were a surprise. I thought we had a great process; they just never understood it which made me realize it was just too complicated; it wasn't clear.*
- **Assessment Results** – Michele gave an overview of the present assessment process accompanied by a picture illustrating the process. She informed the members that today faculty will be talking about different methods of assessment and changes they are recommending. Michele continued her presentation with a PowerPoint presentation describing a *Hazardous Waste Incineration* project she worked on and how she was going to relate this problem back to the assessment process. She explained the lesson learned from the project relating it back to the assessment process; collect the most direct data in the most direct manner, measure results close to the process and reduce time to provide tighter feedback control. Michele continued the discussion with an overview of the Computer Science department's part in curriculum assessment as it is now. The assessment exam questions may or may not be written by the same person teaching a given course so we may not be looking at the same things we think we should be. Feedback is qualitative, not based on quantitative data at present. The assessment exams are given from 3 months to 3 (or more) years after a student has taken a course. The educational objectives should be measured with a time difference, but feedback is qualitative and survey questions not tied explicitly to objectives. Michele proposed the following changes to the IAB members:

Proposed Changes

- ◆ Simplify collection and analysis of data
 - Use portions of assignments, exams and projects that students are already completing for courses
 - Reduce paper work burden, allows measurement of outcome at the time is presented, and person responsible for presenting outcome is also responsible for defining measurement
 - Report assessments as percentage meeting defined threshold
 - Simplify analysis
 - ◆ Increase the frequency of assessment evaluation
 - Annually instead of every two years
 - Provide change in response to feedback more frequently
- **Department Goals** – Michele gave an overview of the department goals emphasizing that the major goal is to increase enrollment. She informed members that they will see some numbers that will indicate why recruiting and retention need to be the CS department's major goal. Michele continued her presentation outlining the department's long term goals.

Long Term Goals

- Department Image
 - Website
 - Printed Materials
 - Newsletter
 - Streamline Overhead Tasks
 - Curriculum Enhancement
 - Course Outcome Review (and Oversight)
 - Course Additions – HCI Option, Computational Thinking Course for non-majors, with growth, possibly courses in image processing, computer graphics, machine learning, robotics, etc.
 - Software Engineering Differentiation – Make it clear the difference between CS & SE, curriculum and focus.
- **Enrollment Trends** – Rick presented data over the last nine years of the Computer Science and Software Engineering program enrollment. According to the combined data the enrollment was monotonically decreasing in the year 2000 and has been steadily decreasing. He emphasized that this has been a trend in other universities and is a systemic problem for Computer Science but most places have seen a bottoming out in the past two to three years. Rick informed members of a recruitment initiative to target female students for the incoming class. He also informed members that the retention rate for the program is 20 – 25 percent. Rick expressed the need for a higher layer of engagement and a high quality product in the Computer Science department to address the retention issue.

Questions, comments or suggestions:

- *Are these enrollment trends the norm campus wide?*
 - *This is not a norm campus wide*
 - *Are you doing exit interviews of students to see why they are not coming back?*
 - *Yes and no, we have a student doing an undergraduate research project on enrollment over the last 4 or 5 years.*
 - *What age of female student are you targeting?*
 - *Right now we are targeting seniors because we want to see some numbers for next fall. The age group we will be targeting is 8th through 11th.*
- **CSI & II: Course Equivalence in the MT University System** – Jeff gave an overview of the course equivalence in the MT University System emphasizing that this has been problem for the past 10 to 15 years. The Montana University System is looking at the transferability of courses between the different campuses. Students take a course at one school with 80% of the material being the same but are still denied the transfer of credit and the student is forced to retake the course. The legislature has funded a project to set up an online system to allow students to look at the course and see what the course will transfer to at other universities. The committee is looking at course outcomes for all the university systems. We are looking at courses that have a 70% to 80% overlap and call these courses equivalent. Jeff informed members after reviewing CSI & CSII our school was the only school teaching C++ while others were teaching Java. What the CS program did this fall was switch back to Java in CSI & CSII.

III. MT Tech Foundation/Net Community, Peggy McCoy, Director of Alumni Affairs, Alumni & Public Relations

Peggy McCoy, Director of Alumni Affairs, Alumni & Public Relations and a member of the Advancement Traveling Team welcomed the board members to campus. Peggy gave an overview of what the Advancement Traveling Team is and how the team could assist in helping the CS department develop their program. She informed members there is now an on-line directory that down loads alumni information to Razor Edge which is MT Tech's alumni database. Peggy stressed that the database is only as good as the information the alumni gives them. Peggy encouraged the CS faculty to

allow her department to assist them in reaching out to their alumni either with fundraising or just to get alumni reconnected to the institution.

IV. Industry Update

- **Thoughts on Growing Student Enrollment**

Phil – *I think you need to pitch a sale on three levels; you need to sale Butte, the school and the program. Then you need to think who are you selling too; the students and the parents.*

Rick - *We are aware we need to sale to both the parent and the student. We are offering scholarships (frequent flyer miles) to students and we are planning road trips to personally talk to students at the high schools.*

- **Industry Trends and Preferred Skills for New-Hires**

- **Phil Sherburne:** Cisco hired approximately 600 students out of college this year. The target is down for next year to 400 students. Cisco brings in people from 3 sources: schools, industries and acquisitions. We have a unique program because we don't hire for a specific job, we hire based on their talent, skill level and expertise. After they are hired they survey the company and then pick which organization they would like to work in. We basically set up mini job fairs within the company to sale our organization. Cisco is mainly west coast bias. The company gets 60% to 70% of their college hires from returning students that were internships. We try to get them in and get them excited. Last year Cisco offered internships to a few students at MT Tech and are hoping to continue doing this each year.
- **Davis Almanza:** Computers Unlimited hires most of its people from schools and some from industry. As far as retention Computer Unlimited does not have a problem; we keep people. We are constantly hiring. In the past Computer Unlimited would stay away from interns however, what we are seeing 60% of the people that get their foot in the door come back; they like what they see and return. Computers Unlimited is looking for the top notch student with a strong CS theoretical background and a good business background. We have a good hiring relationship with Rocky Mountain College but currently get most of our students from Bozeman – Montana State University.
- **Craig Spannring:** Spraying Systems doesn't hire a lot of people but they don't lose a lot of people. Spraying Systems is a small shop with five developers. A solid CS theoretical background is critical to the company.
- **Julie Evans:** Synesis7 does not hire a lot of people and requires a strong background in Java.

V. Welcome

Chancellor Frank Gilmore welcomed the board members to MT Tech and thanked the members for serving on the Industrial Advisory Board for the Computer Science and Software Engineering programs. Dr. Gilmore emphasized the importance of their advice and input to the department and how extremely important the program is to MT Tech. A message Dr. Gilmore wanted to leave with the members *"MT Tech is in good shape!" "We are not financially plush, but we are OK!"* The Board of Regents has permitted MT Tech to have a reserve in the amount of \$500,000.00 which can only be spent with approval of the regent. He informed the members that Tech started this year to relieve some of the compression that it's full professors have experienced stating that full professors were much below their targets than were assistant professors. Frank expressed his excitement concerning the new buildings go up around Tech and the renovation of Main Hall, it being the oldest building on campus and has never been renovated in 108 years. He emphasized that things are moving ahead and Tech is doing very well and Tech's students are doing very well. MT Tech requires all of its juniors to take the standardized MAPP test. According to the latest data the last group of students scored 97% or better compared to 118 other comprehensive

masters universities across the nation. He continued the discussion stating that compared to thirty doctoral I and doctoral II institutions across the nation the students performed at better than 92% over all. In Mathematics and Natural Sciences they are at 99% level and in Critical Thinking the students are at the 97% level. He also informed members that Tech students go out and perform at the same kind of level when they go to work. He emphasized that Tech graduates are still being sought because of their quality of work and that is because of the faculty. Frank spoke about the incoming freshman class this year which is the largest MT Tech has ever had. The students ACT scores were up a point from 23 to 24 which is the highest average of the campuses within the state. He also stated that MT Tech met its target number of students at 2,190. Frank emphasized that Tech is going to keep trying to bring students into the Computer Science and Software Engineering program and recruit specifically for these two programs. Frank stressed how pleased he and the administration were with the recent accreditation visit. Dr. Gilmore once again expressed his sincere appreciation to the IAB members.

VI. Written Skills Assessment

Celia presented some background on accreditation of the CS program. The program first became accredited in 1998 and that was for three years. The next accreditation visit the program received three deficiencies. The deficiencies were in written communication, oral communication and ethics. To overcome these deficiencies the first thing the CS faculty did was create a written assessment form. Each time the faculty has a writing assignment they use this form for feedback to the student. Celia emphasized that only certain assignments are targeted for assessment. What the CS faculty noticed after doing the assessment the first time was the student's grades appeared to be going down and that was because as freshman we did not have very high expectations. The faculty made a strong effort to try calibrating the forms. Celia stated that when we did the calibration we could see that some faculty graded things easier than other faculty. The faculty came to the consensus that the calibration does not work.

Questions, Comments or suggestions:

- Frank stressed that getting the students to write in depth is real difficult. *Students don't read anymore they get all of their information from radio or television. I have discovered that if I asked the student to give me an audio version to match the written version "BINGO" they got it.*
- *Davis - Ensure that you put expectations out in front and be consistent throughout the year.*
- *Michele expressed that we do need to emphasize writing but I am not an English teacher and I am not a speech teacher; I want to focus on what I can teach. We have experts in these areas; we should use the experts for these areas.*
- *Do the students need another course in writing assessment outside of the Computer Science department?*
- *During the 2010 Northwest Accreditation for Engineering programs and our revisit for Software Engineering this school needs to have assessments done outside of the Computer Science department and the assessment is handed to us. That is what needs to be done but there is not a movement to do this.*
- *We do have the MAPP test; that at least addresses writing skills for our students.*

VII. Oral Skills

Accompanied by a PowerPoint presentation Jim gave an overview of the Oral Skills Assessment process. Jim presented data from 45 evaluations collected from 8 classes during 2006-08 academic years. Presentations are evaluated on content, organization, and delivery. Each student is ranked from 1 (poor) to 4 (excellent) on each item. Optional comments are provided by evaluators. Results are then compiled and made available to students. Constraints observed: evaluation standards vary greatly from class to class and very limited data. Other observations: results consistent in all classes at each class level and cumulative results are most meaningful. General observations made: results are consistent among classes, items related to knowledge of the subject rated relatively high and items related to public speaking related relatively low.

Conclusion: Students generally convey knowledge of the topics they present, more training specific to reorganizing and delivering presentation is necessary if improvement is to occur and more presentation opportunities would improve performance in this area.

Courses include:

- Data Management (CS 2656)
- Software Engineering I (CS 3250)
- Software Engineering II (CS 3260)
- Operating Systems (CS 3406)
- Computer Architecture (CS 4406)
- Artificial Intelligence (CS 4556)
- Internship (CS 4916)
- Senior Seminar (CS 4946)

Questions, comments or suggestions:

- *Davis expressed he liked what the CS program is doing; you are providing the opportunity for students to speak publically. Should you be responsible for assessing the presentation? Yes, to give students feedback.*
- *Michele stressed – I am impressed with the students and the presentation that they give. I think we are doing a great job, but we are not professionals in this area. At least we are doing this in the CS program so that says something about our standards; this is what CS expects.*
- *CS student oral presentations are generally up to industry standards. They are organized, well prepared and show a clear picture.*

VIII. Client and Teamwork Related Skills Assessment

Frank discussed the Client and Teamwork Related Skills Assessment process accompanied by a PowerPoint presentation. He began by explaining that most of the work is done in teams. We don't have individual grades and a reflection paper is required at the end of the course. We grade the reflection paper similar to the other assessment forms. On the assessment form we try to assess the project as a whole. The form is also used for internships. Projects are run on a time bases. Students keep a project log; a minimum of 3 hours per week but 6 hours a student can get an "A". A good portion of their grade is the amount of hours a student put into the project.

Questions, comments or suggestions:

- *One thing a person cannot do well is estimate how much time a project is going to take to complete. How do you evaluate how well a student did on estimating his/her time on doing the project?*
- *To evaluate the student's time we could use the student's log. The student keeps a log by task; so a part of the score for the task could be how well the student estimated their time.*

IX. Development Process Skills Assessment

Rick gave an overview of the Development Process Skills Assessment stating that there is very little data. Rick questioned the important and the value of compiling the data. One conclusion found when calibrating the data was there is a lot of variance in the way people grade.

Question, comments or suggestions:

- *Frank expressed - I feel this is the most difficult one; the development process. I use the form but I weighted the scores so that if I feel something is not so important I give it a lower weight. We have and discussed this. It seems to me to be an in factual problem.*

X. General Skills Assessment

Michele accompanied by handouts gave an overview of the General Skills Assessment process. The general skills assessment is usually done by an exam. The assessment exams were given at the beginning of the fall term to sophomores, juniors and seniors. Another assessment exam was given to graduating seniors at the end of the year. At this time Michele introduced a new form for assessment purpose that was derived from the University of Kansas. Michele reviewed data concerning how the questions correlate with a course and an outcome. She emphasized that if we are defining our standards as 70% of our students will perform at 70% or better on each outcome; this number cannot be picked up from the exams.

Michele informed members that she could not relate this back to something ABET is going to like. She reviewed assessment data by course and again stressed she wasn't sure how to determine this data. Michele addressed the assessment form results by outcomes explaining this form we are defining all of the course outcomes, how they correspond to the ABET outcomes, the measurement we are going to use and the measure we are planning on attaining. If you look at the assessment form by outcome we are not meeting them all by 70%. Discussion continued with an explanation of the new assessment process that had been adopted by the CS faculty to overcome their deficiencies. Assessment exams are now given at the end of the semester, students are told to take the exam seriously because the exam is a part of their grade. All exam questions were gathered and keys were generated for those exams that were without keys from the question file. Finally, for each question not already marked, the course from which it was taken, and the program outcome to which is related, was marked on the key. A matrix corresponding to the course/outcome matrix used by the department was created with 2 entries per cell: 1) the number of times a question from a course/outcome combination was asked, and 2) the number of times that question was answered correctly. Results were tallied by program outcome and by course. It was also noted that this is a new process for the CS faculty; we just started in the spring. Michele continued the discussion informing members that Jeff submits to the seniors at the end of the year the EPS standardized test which replaces his final (assessment indicator below). Michele stressed "if we as faculty are working towards these outcomes and continually trying to improve and at the end we have an objective measure, I think we are doing pretty good!" The finale item presented to the members was the MAPP test which gives an objective measure for writing. Michele emphasized the one thing we are missing is the objective measure for the oral presentation skills.

Assessment Indicator	% Correct	Percentile
Programming Fundamentals	74%	95th
Discrete Structures and Algorithms	47%	85th
Systems: Arch/OS/Network/Dbase	45%	55th

Questions, comments or suggestions:

- Michele - Do we all agree that we can use the assessment form instead of the assessment exams?
- IAB Members - All in favor
- Michele - Can we do the assessment annually instead of every two years?
- IAB Members - All in favor

XI. Educational Objectives/Alumni Surveys

Jim Rhodes began his discussion with the Accreditation Review, Fall 2007. Data is collected from alumni and others to provide feedback, but the data is not clearly related to the objectives. The CS program is currently in the process of revising their alumni interview forms to allow them to collect data from their alumni on the attainment of their objectives. These instruments have not been finalized, implemented, nor have metrics been defined. As a result, the assessment process has limited value in determining whether objectives are attained.

Present status of alumni data collection and evaluation:

- Two data collection forms have been developed, revised and implemented
 - Graduates currently working in industry
 - Graduates pursuing an advanced degree
- Both forms are currently available online
- Confident of having complete participation of alumni by the end of the fall semester
 - Email
 - Phone Contact
- Assessment process will provide clear evidence that objectives have been obtained

Online forms

- <http://www.jcrhodes.net/MTTechAlum/Industry.htm>
- <http://www.jcrhodes.net/MTTechAlum/GradSchool.htm>
- Both forms will be moved to a Montana Tech server in the near future

Questions, comments or suggestions:

- *After further discussion concerning questions on the alumni questionnaire it was decided by faculty and IAB members to revisit the questions. Questions will be submitted to IAB members for review and comments before forms will be made available online to alumni.*

XII. Discussion

Michele asked IAB members what course they felt should be added to the fifth semester class. Members concurred the other course should be another database course.

- Web-base application
- Master database
- Unix
Lynx

X. Wrap-Up

Before wrapping up the meeting Michele asked IAB members if this was a good time of the year to hold the Computer Science Industry Advisory Board Meeting. Members all concurred it was a good time to hold the meeting. Michele thanked the members for their attendance and support to the Computer Science program.

Respectfully submitted,

Tami Windham

