CSU ISTeC IAC Spring 2004 Meeting

Friday, April 23, 2004

Minutes

Hosted by Todd Hansell, ValleyLab, Boulder
Continental breakfast at 8:30 a.m.
Meeting from 9:00 a.m. to 12:00 noon
Lunch at 12:00 noon to 1 p.m.

Attendees:
Shelly Swanback, Accenture
Tracy Fendley, Agilent Technologies
Rusty Searle, Agilent Technologies
Carol Hunziker, Ball Aerospace and Technologies Corporation
Donald P. Dulchinos, CableLabs
Dave O'Callaghan, Cisco Systems
Dennis D. (Denny) Georg, Decisions
David Frydendall, Hewlett-Packard Company
Brad Adams, Hitachi Digital Systems
Victor Walker, IBM
Mark Buchheister, Intel
Jerry Edsal, Intel
Ron Remy, Lockheed Martin Space Systems
Duncan Halstead, LSI Logic
Todd Hansell, ValleyLabs
Craig Bladow, Woodward Electronic Controls

ISTeC Attendees:
Tony Frank, Executive Committee, Vice President for Research and Information Technology
Dale Grit, Executive Committee, Computer Science
Tony Maciejewski, Department Head, Electrical and Computer Engineering
John Plotnicki, Department Chair, Computer Information Systems
Sanjay Rajopadhye, Research Advisory Committee Chair, Computer Science
Pete Seel, Education Advisory Committee Co-Chair, Journalism and Technical Communications
H.J. Siegel, Director, Electrical and Computer Engineering
Scott Webb, Executive Committee, University Development and Communications
Alexy Lastovetsky, University College Dublin, Ireland (visitor)
MaryAnn Stroub, Administrative Assistant

1. **Welcome comments** – Tony Frank, CSU VPRIT

2. **Introduction of ISTeC Executive Committee members and other attendees from CSU** – H. J. Siegel, CSU ISTeC Director

3. **Introduction of ISTeC IAC members** – H. J. Siegel, CSU ISTeC Director

4. **IAC's View of the Future of IS&T Education –** Dale Grit, CSU CS Department

The following text was sent to all attendees as food for thought prior to the meeting and discussion. Information from the meeting follows.

The Future of IS&T Education at CSU

ISTeC would like to involve the Industrial Advisory Council in a discussion concerning the preparation of undergraduate IS&T majors.

Four of the key IS&T-related departments at CSU are:
Computer Information Systems
Computer Science
Electrical and Computer Engineering
Journalism and Technical Communication

In preparation for this discussion, we will distribute copies of the current degree requirements for these majors.

Preparation of IS&T Students

ISTeC would like your collective input on how these departments should be preparing their graduates for the current (and future) job market.

Suppose your company/group could design the "optimal" Bachelor degree program for your incoming employees. What courses would be included and why?

Suppose your company/group could design the "optimal" Masters degree program for your incoming or existing employees. What courses would be included and why?

Suppose your company/group could design the "optimal" Ph.D. degree program for your incoming or existing employees. What courses would be included and why?

This can be approached from two angles:

Training: What particular skill sets should a graduate have? How long will these skills be relevant?

Education: What core knowledge should a graduate have? What basics will prepare them for continuing their training and education as their jobs evolve during their careers?

Impact of Outsourcing

We've been hearing a lot recently about the outsourcing to IS&T jobs overseas. What training/education will make our graduates relevant in the job market (i.e., resistant to the outsourcing problem) when they graduate in two to four years?

Diversity in IS&T Education

Another issue is how to produce a more diverse set of graduates. Women and minorities are traditionally under-represented in IS&T. There are two basic aspects to this issue: **Recruitment and Retention**. What steps can be taken in both of these arenas to improve the current situation?

Inclusion of IS&T in the CSU Core Curriculum

Another issue that may arise at CSU in the next couple of years is to redesign the required core curriculum. This is the core that will be required of all undergraduates.

- Should ISTeC push for a computer/IS&T/technology literacy component in this core? If so, what material should this course(s) contain?
- What type of coursework and/or subject matter should be included as a base for such a curriculum?
- What would make them an "IS&T-intelligent" citizen to be able to discuss technical issues in general?
- What would help them deal with technology that they might encounter in their workplace?
- Should there be a different version of this requirement for "science/engineering-oriented" undergraduates?
- What type of coursework and/or subject matter should be included as a base?
- What would provide a basis for maintaining technological competence in their employment?
- Do you see any general technology trends over the next ten years that would require a change in how we prepare our graduates?

Input on the FIT Model
from the ISTeC Industrial Advisory Committee

The problem statement -- Anecdotal evidence suggests that CSU students are graduating with deficiencies in their knowledge of fundamental Information Technology (IT) concepts and related skills. Based on a survey of 2,000 first-year students, we have detailed evidence that students arrive at Colorado State University with these deficiencies (see Kaminski et al, 2003). Without formal remediation while at CSU or integration of IT concepts and skills into their course work, students will depart with these same deficiencies.

At the April 23rd IAC meeting the FIT model was outlined to the attendees and their feedback was solicited on ideas for teaching these fundamental IT concepts and skills to students at CSU.

The FIT model -- From ***Being Fluent with Information Technology*** (1999) Computer Science and Telecommunications Board -- National Research Council.
The entire content of the report is online at http://books.nap.edu/html/beingfluent/

The Components of Fluency with Information Technology
Category 1 -- Intellectual Capabilities

1. Engage in sustained reasoning.
2. Manage complexity.
3. Test a solution.
4. Manage problems in faulty solutions.
5. Organize and navigate information structures and evaluate information.
6. Collaborate.
7. Communicate to other audiences.
8. Expect the unexpected.
9. Anticipate changing technologies.
10. Think about information technology abstractly.

Category 2 -- Information Technology Concepts

1. Computers
2. Information systems
3. Networks
4. Digital representation of information
5. Information organization
6. Modeling and abstraction
7. Algorithmic thinking and programming
8. Universality (i.e., any computational task can be performed by any computer, however, computers differ by how quickly they solve a problem.)
9. Limitations of information technology
10. Societal impact of information and information technology

Category 3 -- Information Technology Skills

1. Setting up a personal computer

2. Using basic operating system features
3. Using a word processor to create a text document
4. Using a graphics and/or artwork package to create illustrations, slides, or other image-based expressions of ideas
5. Connecting a computer to a network
6. Using the Internet to find information and resources
7. Using a computer to communicate with others
8. Using a spreadsheet to model simple processes or financial tables
9. Using a database system to set up and access useful information
10. Using instructional materials to learn how to use new applications or features

Feedback on implementation of the FIT model at CSU:

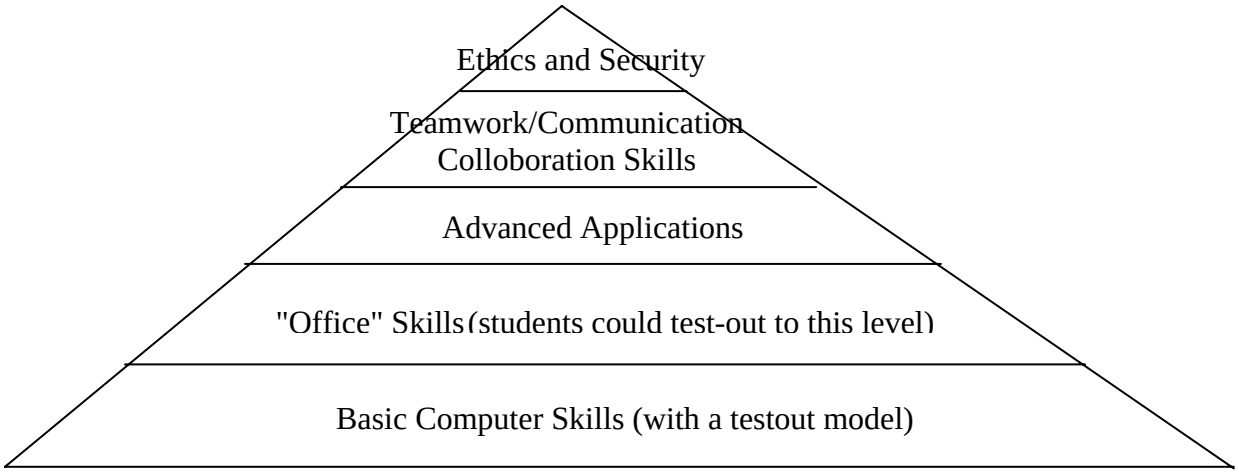
In regard to Category 1 -- intellectual knowledge/skills:
Embed these intellectual capabilities in as many undergraduate courses as possible, especially **with a focus on problem-solving** with both practical and abstract tests and case studies.

In regard to Category 2 -- fundamental IT concepts:
(These are the fundamental concepts taught in CS 110, CS 115, and BD 150, as well as through courses included in the Interdisciplinary Studies Program in Information Science and Technology.)
The key question is -- should all CSU students be required to take a core IT course similar to CS 110, CS 115, or BD 150?

In regard to Category 3 -- basic IT skills:
Comments from the group –

- "These are now **'commodity skills'** that everyone must have."
- "Use the **'math mods' model** used at CSU -- have students test-out of these requirements."
- The mods could be used to test-out of the basics, but intermediate and advanced skills (e.g., programming and media production) would be taught through coursework.
- These evaluations should be **performance-based tests**, as students tend to overestimate their actual level of proficiency with these basic skills.

IAC member Dave O'Callaghan proposed the following model:



This suggested model that provides a hierarchy of increasingly more demanding knowledge and skills as students progress up the pyramid. **Many non-IT students will never move beyond the second "Office skills" level -- so how do we integrate the higher-level knowledge/skills in coursework across the curriculum?**

Other topics:
Look at the **"change-management" process in the university** -- what are organizational barriers to implementing curricular revisions given the present management structure?
Committee wants feedback in the fall meeting on progress in implementing suggested curriculum improvements.

Other comments related specifically to the IT curriculum (the top of Dave's pyramid above and the subject of Dale Grit's talk at the meeting):

Several comments were made about the importance of **organizational communication and teamwork:**

- **Written, spoken, and computer-mediated communication skills** are essential for success.
- Related issues such as **communication security, ethics, and appropriateness** (when to teleconference or not) should also be included in the curriculum.

Teamwork:

- Teams in many businesses now function on a global basis, so **knowledge of cultural differences and e-communication/collaboration tools** is important.
- CSU should investigate **international and inter-university collaboration** -- two-way, team-taught, with usage of communication technology. This would provide needed experience in working with **virtual teams at a distance.**
- **Problem-solving skills are key** in strategic thinking, decision making, and designing "creative architectures."
- Concept -- **present senior design projects to business partners for evaluation purposes** using video conferencing.
- Students should have **multidisciplinary focus** -- they should learn **languages and methods of another discipline** (with a comment that CIS does a good job of this now).

- Make students "uncomfortable" by making them **work in multidisciplinary teams.**
- Students should also understand **basic business fundamentals such as ROI and capital investment.**
- **Consulting is a key skill** to teach all students, especially those with an IT focus.

References

Computer Science and Telecommunications Board. (1999). *Being Fluent with Information Technology*. Washington: National Research Council.

Kaminski, K., Seel, P., & Cullen, K. (2003). Technology literate students? Results from a survey. *Educause Quarterly*, *26* (3), 34-40.

Session summary by
Pete Seel, ISTeC Education Advisory Committee
pete.seel@colostate.edu
970-491-2030

5. **Highlighted CSU IS&T department** – Tony Maciejewski, CSU ECE Head, Department: Electrical and Computer Engineering. (briefing attached in pdf format)

6. **Recent and Planned ISTeC activities** – H. J. Siegel, CSU ISTeC Director
   Professor Siegel reviewed his briefing on the CIT Grid Computing Equipment Grant (briefing attached in pdf format)

7. Professor Siegel, solicited volunteers to host the Fall 2004 meeting

8. Adjournment