Education and Curriculum Committee Summary with Excerpts from Final Report

Board of Visitors 2016

Introduction

Co Chairs:

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Committee Charge:

The Education and Curriculum Committee was charged with developing the academic and professional programs of study to be offered by the new school and the relationships of these programs to other campus schools. Specifically, the committee examined:

1) Undergraduate and graduate degree programs

2) Joint degree programs

3) 3 + 2 type programs

Membership:

Membership in the committee was composed of 25 faculty and staff members from the Department of Computer Science and the School of Information Science. Additional members of the two units attended meetings and participated in discussions as well according to their interest and availability. As a group, five meetings were held, initially serving to familiarize the members of the committee with the Computer Science, Information Science, and Library Science degrees and curricula. In addition break-out sessions were conducted to focus on specific topics.

Undergraduate Findings and recommendation:

Summary of Computer Science and Information Science Programs

The Computer Science program is a 40 credit program consisting of core CS courses and electives. In addition there is a three credit capstone requirement.

The Information Science program is a 30 credit program consisting of a set of course courses, electives and a capstone experience.

Both undergraduate programs have a set of general education requirements that require students to take a wide variety of courses.

Computer Science also has two interdisciplinary programs. First the Bioinformatics program is a partnership with the Department of Biological Sciences and the Computer Engineering program is a joint effort with the Swanson School of Engineering.

Undergraduate Education in the New School

Computer Science, Information Science, and Library Science all have a shared interest in the creation, collection, curation, management, and analysis of information. Each discipline lies upon a spectrum, ranging in one dimension from the theoretical to the practical, and in another dimension from the sciences to the humanities. All points in this space have been impacted by the technology they create and use. By gathering these disciplines together in one place, the combined expertise and resources will better serve our students, the Pittsburgh region, and the world.

Computer Science	Interdisciplinary Programs	Information Science
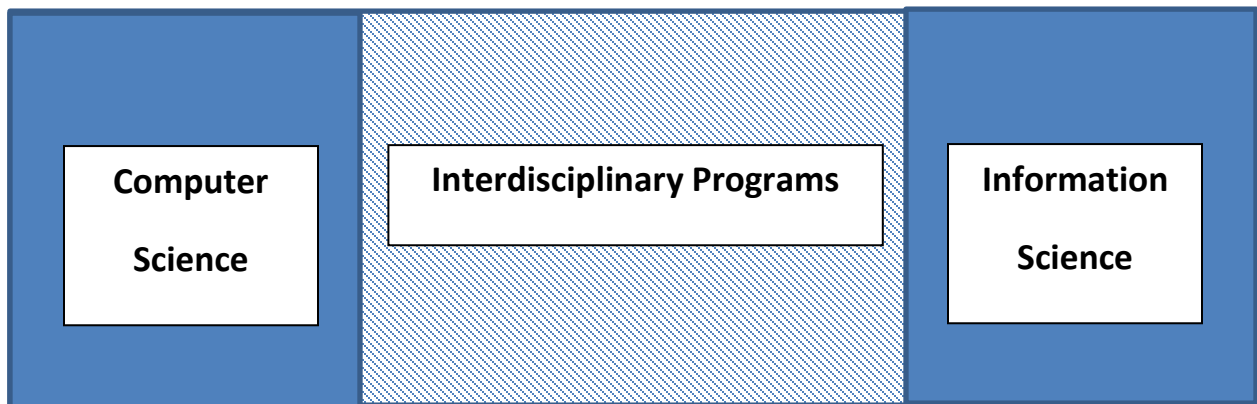
The structure of the new school will preserve the existing disciplines of Computer Science, and Information Science. However, there will be a concerted effort to examine opportunities to create new programs that build upon the strengths of both programs. For example, an opportunity to design a new undergraduate degree in software engineering would offer courses from both programs and tap the expertise of all contributing faculty members.

In addition interdisciplinary programs can include 3+2 type programs with other academic disciplines. For example, a number of programs can be created cooperatively with academic areas from the sciences and the humanities including Biology, Statistics, Economics and Art.

The new school will engage the university community at four distinct levels of education. We would serve:

1. All students via service courses that promote the computational thinking necessary to succeed in the modern world

> The current set of service courses offered by DCS and SIS do not adequately serve the demand for graduates with computational thinking skills. As part of the new school, this deficiency will be addressed. We propose a new course to provide the entire student body an introduction to computational thinking.

2. Non-computing majors who wish to formally extend their knowledge into the computational domain via certificate programs and minors

> Certificates that create a specific set of skills that allow students to explore computational thinking beyond a service course but less than a full major.

3. The majors of the new school

> BS for Computer Science and Information Science along with future degrees.

> The intersection of the two disciplines is in the area of software development. Many students seek a CS or IS degree to enter the workforce and produce software artifacts such as programs and interactive web services. Computer Science has an informal track that advises students how to select their electives, both in the major and outside it, to prepare for careers in the business of software. Information Science has a track in Application Development that teaches a similar set of skills to address the same need. With such a clear overlap in the end goals of two disparate educational programs, it would make sense to merge them together to elevate their status and improve their educational outcomes. To this end, we propose to create a new undergraduate program whose focus is on graduating students who intend to primarily work in the field of software development.

4. Students who seek to do interdisciplinary studies which combine computing with a non-computational domain

> Again, these are specialty type programs where there is a natural linkage between computing, information, people and a subject area.

Stanford has a CS+X program that allows students to combine, in an approved, curated way, the computer science foundations they need to tackle problems in areas such as Music, Linguistics, and a variety of foreign languages.

In order to have students experience the full value of the new school, we propose that the undergraduate programs of the new school be four years in duration, starting from direct admission to the program for incoming freshman. A four-year school will allow for the recruitment, curriculum development, training, and community building reflective of an internationally recognized, competitive, top computing and information school.

Specifically, if there was a four year program there could be a special, unique opportunity to create the new school First Year Experience. This first year experience would introduce students to the various fields in the computing world, offer first year living communities, provide social gatherings and offer classes to help students prepare for their journey. Currently, many students come to the major late and they are unsure of what path to take to graduate into a fulfilling career.

A hallmark of four year programs is their focus on academic advising. Starting with freshman and building a relationship with students offers unprecedented opportunities that two year programs cannot offer.

Graduate Education in the New School

The work on defining graduate education in the New School started with two brainstorm meeting. At the meeting, the committee agreed that existing core degree has to be retained at least for first five years after the establishment of the new the New School and should not be the focus for further discussion. Instead the work of the Committee should we focused on the new graduate education opportunities that are opened with the integration of Computer, Information, and Library Sciences as well as Telecommunication expertise in the single school and the new "center of gravity" position of the School within the University. As a result, the work of the committee has been focused on establishing a ground and defining the scope of interdisciplinary graduate study opportunities on various levels, PhD, new professional MS program, new specializations of existing programs, and new certificates. During the brainstorm and following discussion preferences were given to prospective degrees that can leverage areas of advanced research and education expertise existing within the new School and the University as a whole. To assess the general feasibility of offering new degrees, the committee also examined the variety of degrees offered in most comparable "integrated" schools and departments.

In a series of breakout meetings, the committee members generated a list of prospective interdisciplinary graduate education opportunities within the New School and in collaboration

between the New School and other units. For each of these prospective directions, the committee identified a group of potentially interested faculty within SIS and CSD and contacted them with a charge to meet, discuss options for the proposed degree(s) and, proceed to drafting a plan for the new degree of the committee proposal will be considered as attractive and promising by the target group of faculty. It was expected that the draft proposals for new degrees will be considered at the Committee meeting and, after a discussion, will be updated and submitted as a part of the new School plan.

Among the 13 directions of interest originally generated by the Committee, only seven generated sufficient interest from the faculty and moved to the next stage. The following list provides an overview of degree opportunities that are now being considered for the inclusion into the New School Plan

- Privacy and Security (prospective new degree)
- Data stewardship/management (prospective new degree or track)
- Cyber-Physical Systems (prospective new degree or track)
- Urban Informatics (prospective new degree or track)
- Big Data – Data Science (prospective new degree)
- Health Informatics / Clinical Informatics (prospective joint degree or track)
    - Ellen, Dmitry, Milos
- Computers and Education (Edu, LRDC)
    - Peter, Dmitry, Diane, Vladimir, Leanne
    - ITS, CS Education, Big data in education

Currently, the process of defining these new degrees are at different level of progress.

For several prospective degrees that are mostly focused on the expertise located in the New School, the proposals were prepared and most of them considered at the Committee meeting producing feedback for the final proposals.

Prepared and discussed at a Committee meeting:

- Cybersecurity
- Cyber-Physical Systems

Proposal Prepared, scheduled for discussion at the next meetings

- Urban Informatics (as a track for MSIS program with further plans for a new program)
- Data Stewardship (as a track for MLIS program with further plans for a new program)
- Data Science (as a new PhD program in collaboration with Statistics, IS, and CS)

For the last two areas that were planned as joint degree opportunities in collaboration respectively with School of Medicine (Department of Biomedical Informatics) and School of Education, we hold a sequence of meetings with faculties in these schools, agreed about the presence of interest to offer joint degrees from both sides, and discussed several prospective options. In both cases, we agreed than more detailed and specific talks should be continued when the New School is in place or at least sufficient details of its operation are clear. In the case of the School of Education, we also agreed that detailed talks could only be held once the new Dean is in place. Meanwhile, we planned a few small-scale joint initiatives that should facilitate further collaboration.

The consideration of prospective Graduate degrees will be completed this Fall with the discussion of the remaining degree proposal and the preparation of final proposals.

Summary

This is a very brief summary of the recommendations of the committee. The committee recognizes that it will take time to design and implement new academic programs. But, there are currently solid courses to build upon and a vision to create academic programs that are interdisciplinary, competitive and viable in today's workforce.