UI Computing Task Force-Update for Faculty Senate

Background
The rapid development of “big data” applications, never-ending information, and the need to address large complex issues has led universities to re-evaluate their curriculum and organizational structures to meet the needs of the twenty-first century. This new perspective is needed in order to address issues such as the impact of climate change and health care. In fact, pursuing any of the Grand Challenges of the National Academy of Engineering or Science depend on these developments in computing.

In response, universities have begun the creation of degree programs and some entire colleges of information. Examples of the former are provided below. Examples of the latter are the School of Information at the University of Washington, the School of Informatics and Computer Science at Indiana University, Bloomington, or the College of Computing and Informatics at the University of North Carolina, Charlotte. At the University of Idaho, the Computer Science program in the College of Engineering, focuses on the development of computing technologies in areas of security, databases, and software engineering, which has limited reach into the units that are primarily users of computing. There is also a growing awareness of the benefits of a basic level of technology and coding acumen for all university students. There may be a need for additional university offerings and a change in organizational structure. Additionally, there is growing interest in computing as it relates to managing big data, data analytics, data mining, e-commerce, visualization, cyber-security, high performance computing, digital humanities, human-computer interaction, and social media.

The University of Idaho leadership is interested in assessing these topics and deciding how to respond. A Task Force was assembled spring semester, 2015 to study these issues and make a recommendation on how to address them. The result of the Task Force could be to recommend strictly a research entity. It could be to recommend strictly an educational degree program(s). It could be both. But doing nothing is not a good option if the UI is going to be a relevant participant in Idaho’s future.

This task force is chartered with articulating a recommendation. In particular, the assignment can be broken in several broad questions:

1. What are the areas of computing that have student and/or research demand that we are not currently addressing well? ie, what are the opportunities?
2. How could we best administer this opportunity in the near term and in the long term? Describe the entity.
3. What “niche” would this entity occupy that would give it a competitive advantage and justify its existence?
4. What advantages would accrue from creating such an entity?
5. What are the disadvantages?

There may be other questions. The most importance guidance is to think broadly.

The final product is to be a set of recommendations with supporting documentation and summary of the steps taken to reach the conclusions. This work was to be completed by the end of spring semester but is still on-going.
**Status**
The Task Force has met several times, some with industry representatives, and also conducted a SWOT analysis April 29th facilitated by Dan Eveleth in the COBE. At the following Task Force meeting on May 7, the SWOT Analysis was reviewed and possible outcomes discussed. While there were many good ideas the Task Force was not sure how “disruptive” the university was prepared to be. It was determined that the next step needed to be a discussion with the Provost and Vice President for Research and Economic Development. This meeting took place on July 20th. He recommended that our next step should be to review this assignment with the Faculty Senate.

Undergraduate degree programs at the UI
- Business Information Systems
- Computer Science
- Virtual Technology and Design

Graduate degree programs at the UI
- Bioinformatics
- Computer Science
- Statistics
- Virtual Technology and Design

**Response**
The efforts of the Task Force are focusing on three ideas:
- Explore the need for an additional undergraduate degree program to address the needs described above, particularly in the areas of data science, data bases, and data analytics.
- Develop a formal interdisciplinary collaboration of faculty and staff to significantly enhance the capability of the University of Idaho to conduct research and education in the area of computing and information.
- Plan for the future as this collaboration could lead to a School or College of Computing and Information, or similar entity, conducting research and developing graduates with unique skill-sets to support emerging industries of the future. Building on existing faculty, staff, and infrastructure, this entity could start virtually but would require eventual reorganization of existing programs.

**Terminology**

**Bioinformatics and Computational Biology**
Bioinformatics and computational biology are new disciplines emerging from the application of mathematics, statistics, and computer science. They explain the vast quantities of biological data that modern molecular techniques have made available. The advent of high throughput data acquisition in the biological sciences, an example of which is the recent completion of a draft of the entire human and mouse genomes, has created far more data than can be analyzed with current techniques. In order to understand and use these data to improve human health, natural
and agricultural resource management, and to simply understand the natural world better—will require new techniques and tools. Moreover, industries dependent on that understanding, such as health, pharmaceuticals, agriculture, and forestry will require workers who understand this new knowledge.

**Computer Science**
Computer science is the systematic study of algorithmic processes that describe and transform information: their theory, analysis, design, efficiency, implementation, and application. It is a broad discipline with an ever-growing array of opportunities. The field of computer science encompasses many areas of specialization, such as: software development, systems development and hardware selection, studies of compatibility between hardware and software, programming language development and modification, information assurance, bioinformatics or perhaps a combination of these and any number of other diverse computer-oriented applications and concepts.

**Data Science**
Data Science is the extraction of knowledge from large volumes of data which is a continuation of the field data mining and predictive analytics, also known as knowledge discovery and data mining. Data can include emails, videos, photos, social media, and other user-generated content. Data science often requires sorting through a great amount of information and writing algorithms to extract insights from this data.

**Information Science**
Information Science is a field that includes policy, HCI/interaction design, network science, crowdsourcing, the sociology of organizations and innovation, critical and interpretive analysis of information systems, behavioral science approaches to information systems, applications and analysis of big data, information visualization, ubiquitous computing, the interface of economics and information, and information science approaches to societal challenges.

**Information Technology**
Information Technology is the study of how to harness the power of computers, software, and computer networks to create systems that help solve business problems and create a competitive advantage. Information technology professionals are responsible for information systems that provide timely and correct information, support efficient business processes, and promote effective communication.

**Informatics**
Informatics is a field that combines information, people, and technology. Informatics students drive innovation as they explore the intersection of technology and human values. Their passion for analyzing and solving problems is reflected in the creativity they bring to the design and creation of information systems, user interfaces, mobile technologies and social media. Informatics draws upon areas such as computer science, information science, sociology, psychology, design, and information management. As a result, graduates are well-rounded information and technology professionals with the ability to apply their knowledge to positively impact organizations, their communities and society.
Statistics
Statistics encompasses course work in designing and analyzing experiments, planning and interpreting surveys, and exploring relationships among variables observed on social, physical, and biological phenomena. The applied nature of the program allows the student to develop data analysis tools for such diverse areas as business and economics, crop and animal production, biological sciences, human behavior, education, engineering, and natural resource management. The statistics program thus supports major programs in other disciplines.

Virtual Technology and Design (VTD)
VTD is a design thinking program that incorporates simulation and visualization technologies within science driven scenarios. They are designers, storytellers, and researchers who create vivid, expansive, and dynamic virtual experiences that transform the way people across the globe work, learn, and play. VTD students are world-builders who use data-driven, interactive virtual worlds to innovate and think critically about complex problems.

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