Purdue University

Department of Computer Science
West Lafayette, IN

Strategic Plan 2010-2015

Final Version 5.0: May 3, 2010

"Computer science is a discipline that involves the understanding and design of computers and computational processes. In its most general form it is concerned with the understanding of information transfer and transformation. Particular interest is placed on making processes efficient and endowing them with some form of intelligence. The discipline ranges from theoretical studies of algorithms to practical problems of implementation in terms of computational hardware and software." *Computer Science Accreditation Board*.

A cross-departmental committee of faculty and students prepared an initial draft of the strategic plan. This draft was made available to Computer Science faculty for comments and subjected to discussions during faculty meetings. It was also made available to members of the departmental corporate partners program and selected alumni. The draft evolved into this final version as comments were incorporated. ---*Aditya Mathur, Head, Department of Computer Science.*

Implementation

A strategic plan needs an implementation plan that allows finer details to be specified and changes due to the environment reflected. Following are implementation details.

- The department will create a dashboard of all primary metrics. The dashboard will be updated twice during each academic year in January and July. The dashboard and the update process will be available for all faculty and staff to view and comment upon. All data on the dashboard will be anonymized.
- Allocation of resources from the university, when they become available, will be guided by the strategic plan.
- Decisions on faculty hiring, such as areas in which to hire and the hiring process, will be based on input received during annual faculty retreats and other meetings.
- Faculty input will serve as the primary basis for arriving at and implementing a plan on how to foster a collegial and cohesive atmosphere in the department. Such input will be solicited during annual retreats and faculty meetings.
- To ensure progress towards enhancement in diversity, we will, whenever feasible, involve underrepresented groups at all levels of departmental administration including and not limited to faculty hiring, graduate and undergraduate program administration, and research space assignment.
- The department will continually evaluate faculty and student needs for computing and administrative services and ensure that these are met.
- Faculty in each research area will be asked to determine the top-tier publication venues for that area.

Mission

The core mission of the Purdue Computer Science Department is excellence in the creation and dissemination of knowledge in Computer Science that fosters our students' intellectual and professional development and ultimately is responsive to societal needs. We aim to provide an environment where intellectual curiosity thrives, where novel and out-of-the-box thinking is prized and encouraged, and where the wonder and excitement of learning and discovery are at the center of our departmental culture.

Vision

Computer Science - Society - Impact

The Department of Computer Science will be known for its impact on society. It will actively foster a culture of discovery, learning, engagement, and personal growth that is inclusive of, and supports, all elements of Purdue University while respecting, enhancing, promoting, and celebrating the diversity of culture and views among its faculty, students, and staff.

Discovery: The faculty and students of the department will develop novel algorithms as well as techniques that aid in building software artifacts that are effective, efficient, reliable, and secure, and use the ever increasing available computing power. While ensuring high quality in scientific productivity, the department will strive to create innovative software and computing system prototypes that impact society by catalyzing novel products and services, and enabling significant advances in extant products and services. Investigations by individuals and multidisciplinary teams, using advanced algorithms, modeling, and simulation, will explain the underlying structure and the dynamics that govern the behavior of objects in diverse areas of human endeavor such as cellular biology, engineering design and manufacture, financial markets, and social networks. Such investigations will foster the creation of tools and techniques that aid in the design and manufacture of advanced devices in areas such as communications, robotics, transportation, and medicine.

Learning: The department will continually strive to provide students a broad educational experience secured on the dual pillars of fundamental knowledge and skill set. This education will enable its graduates to be leaders in society and to create novel algorithms, software, and software/hardware artifacts. It will establish linkages with all academic units at Purdue and the broader community through courses, multi-disciplinary specializations, and degree programs.

Engagement: The department will engage with K-12 schools, community colleges, alumni, industry, and government. This engagement will be accomplished through partnerships, such as the creation of pathways from Indiana's Community Colleges to Computer Science at Purdue, offering online courses, and establishing training programs for K-12 teachers.

Diversity[1]

We believe that a diverse body of faculty, staff, and students leads to a richness of ideas that gradually gets transformed, resulting in societal impact. Thus, an overarching goal of the Department of Computer Science is to promote diversity among its students, faculty, and staff. The department supports Purdue's vision of "… a learning environment immersed in a rich and dynamic culture of diversity, equality, and inclusion for all people…".

The department will strive to achieve this goal through active recruiting and mentoring of students, faculty, and staff so as to increase diversity of people and ideas.

Metrics:

- *Number of faculty from underrepresented[1] groups*
- *Number of undergraduate students from underrepresented groups*
- *Number of graduate students from underrepresented groups*
- *Number of faculty from underrepresented groups chairing various departmental committees*
- *Number of staff from underrepresented groups*

[1] Underrepresented groups: African Americans, American Indians, Hispanics, and Women.

Goals, Strategies, and Metrics[2]

A. Discovery

Goal 1: Increase national and international recognition of the department.

Strategies:

S11: Encourage, support, and recognize faculty who engage in novel research and leadership with a clear understanding of and aspiration for short- and long-term societal impact.

S12: Devise a metric-based reward and reallocation system that recognizes excellence in discovery, learning, and engagement.

Primary Metrics:

- Impact as measured using criteria from the NRC
- Research expenditure/FTE
- Number of students graduated/FTE with PhD and MS
- Number of faculty awards reflecting national and international recognitions, including memberships in prestigious organizations
- Number of artifacts with significant direct or indirect societal impact
- Numbered of endowed chairs and distinguished professorships
- Membership in program committees
- Membership in editorial boards,
- Keynote addresses delivered in conferences

S13: Set clear standards for hiring, tenure, and promotion of assistant and associate professors that focus on impact, leadership, and international recognition.

Primary Metric:

- All the above metrics (when applicable) for new hires, recently tenured and recently promoted faculty over the past three years, e.g., the average research expenditure of recently tenured and recently promoted faculty over the past three years

Secondary Metrics for S11 and S12:

- Number of faculty- and/or student-generated artifacts with significant influence on commercial products and start-up companies
- Number of graduates going to highly regarded Computer Science departments, research laboratories, and companies

---

[2] Where appropriate, we will use metrics as defined by the National Research Council .

- Number of publications in top-tier venues

S14: Further strengthen the department by taking advantage of opportunities to advance traditional areas of strength while expanding in emerging areas.

Metrics:

- All primary metrics for S11 and S12 applied to traditional and emerging areas.

Goal 2: Broaden the scope and involvement of faculty in interdisciplinary research.

Strategies:

S21: Facilitate the creation of new synergies, partnerships, and collaborations among faculty and students to pursue inter- and multi-disciplinary research.

S22: Encourage interdisciplinary hiring and promotion of faculty with a strong record of interdisciplinary research.

Primary Metrics:

- Number of research projects shared between CS and other departments
- Number of students from other departments co-advised by a CS faculty member
- Number of CS students co-advised by a faculty member in another department
- Number of faculty with courtesy and joint appointments in other departments
- Percentage of faculty contributing to the above metrics

Goal 3: Produce identifiable prototype systems that are used by industry and/or as research tools.

Strategy:

S31: Encourage faculty to engage in innovative systems development activities.

Metrics:

- Number of companies using the prototype system
- Number of researchers using the prototype system

B. Learning

Goal 1: Improve student quality and retention.

Strategies:

S11: Broaden and raise standards for admission to the undergraduate program.

Metrics:

- Average SAT score of incoming students
- Number of students from underrepresented groups

S12: Implement a flexible undergraduate curriculum that provides a high-quality, in-depth education focusing on fundamental concepts, tools, and techniques.

Metrics:

- Retention rate
- Number of students attending graduate school
- Profile of students dropping out of the program

S13: Encourage, support, and reward faculty who engage in high quality and innovative teaching and the development of interdisciplinary curricula.

Metrics:

- Number of teaching awards received
- Average instructor evaluations on student surveys
- Number of new courses developed
- Number of educational grants received

Goal 2: Offer undergraduate students the ability to go beyond coursework and explore additional possibilities in computer science.

Strategies:

S21: Encourage undergraduate students to enroll in optional independent study courses, senior design project courses, or research projects.

Metric:

- Number of students enrolled in independent study, senior design, and research projects.

S22: Encourage and reward faculty for providing students with alternate pathways for improved learning experiences.

Metric:

- Number of faculty offering independent study, senior design, and research projects.

S23: Improve and expand the honors program.

Metrics:

- Number of students obtaining NSF fellowships
- Number of courses with honors sections
- Number of faculty involved in honors research projects

Goal 3: Effective recruitment and timely graduation of diverse, high-quality graduate students with a focus on training Ph.D. students.

Strategies:

S31: Offer a broad, flexible, and quality graduate curriculum that provides breadth and allows students to match their individual strengths to the available areas of specialization in the department.

Metrics:

- Number of national and international recognitions received by graduate and undergraduate students
- Number of students graduating with a PhD or MS
- Time to graduation
- Quality of places that hire graduates and types of jobs (e.g., universities ranked higher than Purdue, corporate partners, engineering jobs)

S32: Establish a recruitment program that specifically targets institutions that have high potential of providing a diverse group of students including underrepresented groups.

Primary Metric:

- Number of female and under-represented minority students receiving MS and PhD degrees

Secondary Metrics:

- Number of US citizens and permanent residents in the graduate program
- Number of PhD students/FTE
- Number of MS students/FTE

S33: Develop an online masters program with support from Engineering Professional Education.

Metrics:

- Number of students enrolled in the professional MS program
- Quality of students measured by their undergraduate performance and performance in the program

S34: Set higher standards for quality and enrollment goals in the regular on-campus MS program.

Metrics:

- Number of students enrolled in the MS program who meet the quality standards
- Quality of students measured by their undergraduate performance and performance in the program

C. Engagement

Goal 1: Actively participate in and improve K-12 computer science education in Indiana and beyond.

Primary Strategies:

S11: Collaborate with Indiana and national boards of education to define and help implement computer science education in the K-12 system.

Metrics:

- Number of computing classes in K-12 schools in Indiana created with direct support from the department
- Number of programs aligned with ACM recommendations[3]
- Number of teachers and students impacted by K-12 programs

S12: Collaborate with the Purdue College of Education to enhance K-12 teacher preparedness.

Metrics:

- Number of Education majors participating in computer science programs
- Number of publications (co)authored by CS faculty, staff, and students in refereed venues for K-12 education

S13: Develop and deliver summer and in-service courses for K-12 teachers to learn new computing technologies and methods of instruction.

Metric:

- Number of K-12 teachers receiving training in computing by the department

Secondary Strategies:

S14: Involve faculty, students, and staff in educational visits to Indiana K-12 schools.

S15: Create a culture within the department where K-12 involvement and educational innovation are valued.

S16: Explore partnerships with Computer Science at other Indiana colleges and universities to reach K-12 audiences.

Secondary Metrics:

- Number of visits to Indiana K-12 schools made by CS faculty, students, and staff

---

[3] http://www.csta.acm.org/Curriculum/sub/CurrFiles/K-12ModelCurr2ndEd.pdf

- Number of grants made to CS faculty & staff for K-12 educational programs and development
- Evidence that involvement in K-12 education is a positive factor in professional advancement within the department
- Number of faculty with joint and adjunct appointments between Education and CS
- Percentage of high school students taking Advanced Placement classes in Computer Science.

Goal 2: Improve the societal impact of the faculty and department.

Primary Strategies:

S21: Encourage faculty to serve as Program Managers at NSF, DARPA, and other important national agencies and serve on nationally prominent advisory committees.

S22: Encourage faculty (and where appropriate, staff) to serve on state, national, and international government advisory boards and commissions, including standards bodies (e.g., NIST and the IETF).

S23: Encourage faculty (and where appropriate, staff) to serve as officers and board members in professional associations and societies.

Metrics:

- Number of faculty holding positions in external organizations
- Number of faculty with recognized involvement in Purdue engagement programs, such as TAP and GPRI

S24: Encourage faculty to create open source projects and other publicly available artifacts.

Metric:

- Number of open source projects created or contributed to by faculty

Secondary Strategies:

S25: Promote faculty, staff, and students for external recognitions and awards for notable service through their professional activities.

S26: Provide release time for individuals involved in external engagement positions.

S27: Include curricular opportunities and possibly academic credit for students to engage in professional service activities.

S28: Conduct events and establish resources for the general public on computing related topics of general interest.

S29: Create a culture within the department where societal impact and service are valued.

S30: Create a "problem of the week" campus activity.

S31: Create and maintain a knowledge transfer, entrepreneurial focus in partnerships with businesses.

Secondary Metrics:

- Number of faculty with external recognitions for engagement and service
- Number of events held for the general public, and/or podcasts uploaded, and/or websites developed, etc.
- Evidence that involvement in societal impact activities is a positive factor in professional advancement within the department
- Number of textbooks published
- Number of expository articles written
- Number of entrepreneurial initiatives

Goal 3: Enhance partnerships with alumni, industry, non-profits, and government.

Primary Strategies:

S31: Increase and promote the value of the corporate partners program to attract, retain, and involve more partners.

Metrics:

- Number and longevity of corporate partners
- Funds received from corporate partners

S32: Solicit feedback from industry, government, and non-profits on educational offerings and desirable skills.

Metrics:

- Number of solicitations made
- Number of replies
- Impact on educational program

S33: Collaborate with industry to motivate research ideas and help solve problems (e.g., by hosting industry visitors or by encouraging short-term faculty visits to industry).

Metrics:

- Number of sabbatical appointments (faculty at industry)
- Number of reverse sabbatical appointments (industry personnel on campus)

- Number of faculty/corporate exchange visits

S34: Appoint senior people from outside academia in formal roles such as adjunct faculty and distinguished practitioners, and involve them with faculty and students.

Metric:

- Number and level of involvement of external experts as adjuncts

S35: Maintain and enhance current college and university alumni programs.

Metrics:

- Funds received from alumni
- Number of gifts

Secondary Strategies:

S36: Solicit feedback from recent alumni regarding their preparation for the workforce.

S37: Establish and support certificate programs based on summer and distance education classes for external participants to gain new skills.

S38: Create a culture within the department where external engagement is valued.

Secondary Metrics:

- Number of research and educational grants from corporate partners
- Evidence that involvement in external partnerships is a positive factor in professional advancement within the department

<End of Final Version 5.0. May 3, 2010>