20 June 2017

TO:       Mark Hill, Chair, Department of Computer Sciences
FROM:     John Karl Scholz, Dean
RE:       Completion of Review of Computer Science Academic Programs:
           • BA/BS Computer Science
           • MS, Ph.D. in Computer Sciences

CC:     Marty Gustafson, Assistant Dean, Graduate School
        Elaine M. Klein, Associate Dean for Academic Planning, L&S
        Jocelyn Milner, Associate Provost and Director, Academic Planning & Institutional
        Research
        Eric Wilcots, Associate Dean for the Natural and Mathematical Sciences, L&S

On April 4, 2017, the L&S Academic Planning Council considered the various materials related
to the decennial review of academic programs offered by the Department of Computer Sciences,
including the baccalaureate major as well as the master’s and doctoral programs in CS. Associate
Dean Eric Wilcots led discussion of the self-study, review committee report, and the notations on
that report which you supplied. Overall, council members appreciated what appears to be a
thoughtful review, and found the review committee report to be particularly useful. We know
that engaging in constructive review is not a trivial endeavor, and hope that you and your
colleagues found value and good advice in this process.

In discussion, council members were extremely impressed by the efforts CS has taken to respond
to increasing student demand for the major and for CS courses, and the growth in enrollment that
puts the department on a par with other large L&S science departments. Though this growth
could be cause for concern, CS graduates continue to have excellent job placement in fields that
call upon the skills they learn, and high rates of acceptance into graduate schools. The major
appears well structured. The council praised the department’s goal of recruiting a more diverse
student body, and concurred with the review committee’s praise for the decision not to raise
admission criteria so as to reduce access to the major. The APC was impressed by the several
strategies in place to increase diversity and support a more diverse student body. Supporting a
broader array of pathways into the program via entry points (responding to the reality that
incoming students have had different opportunities to learn programming skills), creating a
“Wisconsin Emerging Scholars” program in CS to support peer tutoring and group learning,
connecting with a national organization supporting women in tech, and creating a “no prior
knowledge needed” post-baccalaureate certificate all reflect your department’s commitment to making CS accessible to a broad variety of interested students. We share your hope that these initiatives will help address the discipline’s ongoing challenge with racial and gender diversity. APC members also commended the department for rising to the challenge to provide essential service at a variety of levels to other areas of study that are becoming increasingly integrated into and dependent on skilled knowledge in your discipline.

At the same time, the APC was sympathetic to concern reported that meeting such demand conflicts with the faculty’s desire to provide students with rich, hands-on and team-based learning experiences. Balancing program and course access with the goal of providing these intensive learning experiences is a challenge. The redeployment of CS TAs to staff a learning center (vs. assigning TAs to individual courses) is an example of a creative way to stretch resources that seems likely not only to give students access to additional instruction, but also to provide an excellent training ground for graduate students who (regardless of their career plans) will likely be called upon to teach or train others. We encourage you to continue to think creatively about how best to support your goals, and acknowledge that the impact of non-pooled tuition programs bears watching, to ensure that these do not detract from the traditional programs.

Council members were pleased to see that CS has articulated learning outcomes for all of your programs, and these have been mapped onto courses in the CS curriculum. The current assessment plan is well structured and appears to be efficient, calling upon student work completed in courses (e.g., exam questions, student projects), evaluation of student work at “milestones” (e.g., qualifying and prelim exams, oral exams), as well as surveys of students and alumni. This plan has not yet been implemented; please remember that CS will nevertheless be expected to report assessment activity to the Provost’s Office (due November 1, 2017). Council members encouraged the department to move forward with implementing the plan, which seems to be viable and likely to provide you and your colleagues with evidence that can be used for program improvement. In addition, what you learn from assessment may offer insights into the impact the non-pooled programs have on the traditional programs, and on whether efforts to diversify the student body have an impact on the nature of learning in it. Efforts to assess learning will also be an important element in your next series of CS program reviews: the Capstone Certificate, “Computer Science for Professionals” is scheduled for review in 2018-19, and the MS-Computer Sciences, Option: Professional Program is scheduled for review in 2019-20.

The L&S APC unanimously approved a motion to consider the L&S portion of this program review complete, noting that the review committee offered good advice for each of the programs, and that the department should consider carefully which recommendations would elicit the best effects. The next step of the review process will involve discussion of the graduate programs by the Graduate Faculty Executive Committee and administrative review by the Provost’s Office, to which all review activity is reported. Academic program review affords us an opportunity to identify strengths as well as areas needing improvement: it is a process that keeps a great university great. Please accept my thanks for seriously and thoughtfully embracing this opportunity.
I. Introduction and charge

The Department of Computer Science (CS) Review Committee was composed of Kristin Eschenfelder (Chair, Library and Information Studies), Sebastian Heinz (Astronomy), Sunduz Keles (Statistics), John Pfotenhauer (GFEC representative and Mechanical Engineering), Ananth Seshadri (Economics), Benedek Valko (Mathematics). The committee was charged with review of the CS campus (pooled) bachelors, masters and PhD programs.

Given the size of the program and the review team, three members of the team focused primarily on undergraduate issues (Eschenfelder, Keles, Valko) and three focused primarily on graduate issues (Heinz, Pfotenhauer, Seshadri).

From mid-January to early February 2017, we conducted nine meetings within CS including: (1) A meeting with the Chair Mark Hill, the Department Manager Susan Gallagher and Michael Swift the Associate Chair, (2) an open meeting with volunteer faculty (@7 faculty attended including 1 faculty associate), (3) a meeting with undergraduate advisors Nikki Lemmon and Madeline Juillard, (4) a meeting with undergraduate curriculum planners Associate Chair Mike Swift and Curriculum Committee Chair Mike Gleicher (5) an open meeting with undergraduate students (@13 students attended including 4 women), (6) a meeting with graduate curriculum managers Mike Swift Associate Chair and Mike Gleicher Curriculum Committee Chair, and (7) a meeting with TA management personnel Associate Chair Mike Swift, and Jonathan Henkel, (8) a meeting with graduate admissions and advising personnel including Graduate Advising Chair Eric Bach, Graduate Program Coordinator Angela Thorp, Graduate Admissions Co-Chair Jerry Zhu, and Mike Swift Associate Chair, and (9) an open meeting with graduate students (@10 attended).

We would like to thank Sue Gallagher, Nikki Lemmon and Angela Thorpe for their work in helping us to arrange meetings, especially their work in recruiting students to meet with us.

II. Undergraduate program

A. Undergraduate student body composition, diversity, enrollment

The CS undergraduate program has experienced significant growth in the last ten years. The number of CS majors increased 4-fold and enrollment rates for CS courses exhibit more rapid growth than the rest of the campus. This is consistent with exploding interest in CS across the country and can be attributed in part to the increase in availability of computer science related jobs. Another partial, and perhaps more likely explanation for this surge is the recent changes that reduced entry requirements for the CS major. Faculty explained that they regularly discussed the question of whether continued growth in enrollment was sustainable. CS has chosen not to raise the entry requirements due to a desire to keep the major accessible for all students.
With increasing enrollments, the computing background of students entering the program has become more diverse, and this generates challenges in supporting students with low computing backgrounds. In response to this, the department has changed the sequence of introductory courses to create a welcoming learning environment for students with little to no programming background so that the students with no programming background can gain necessary competencies before progressing. Students with more experience would not have to take these courses. In addition, the department is planning separate sections of some courses for students with low computing backgrounds in order to minimize intimidation and create a more welcoming learning environment. Further, CS has modified some introductory classes so that instead of a small number of high stakes major projects graded at the end of the semester, the classes include more and earlier lower stakes projects for which students can get rapid feedback. Finally CS established a learning center that provides support for students with programming homework. Student focus group participants were enthusiastic about the changes. They complained that currently CS 302 is too difficult and that it deterred potential majors or certificate students. While students believe 301 will be good preparation for 302, they feared that since 301 doesn’t count toward the major, it will not be as effective as it could be in recruiting majors. Students were enthusiastic about the CS learning center, and agreed that it alleviated stress and increased access to help in coding classes. Recent CS analysis showed that in the new courses the drop rate for their new introductory classes fell from 30 to 19%, and the drop was uniform across groups (women, targeted minorities, first generation).

Lack of racial and gender diversity is an ongoing challenge for CS as a field. The department has experienced some success in increasing gender diversity, but still struggles with successfully increasing the number of undergraduate students of color from targeted groups. The department has increased the percentage of female students from 6% to 17% over the last 10 years. The undergraduate certificate is a strong draw and 31% of the students in the certificate program are female. The percentage of targeted minorities in the program has remained largely constant at 4% despite initiatives by the department to improve. Student focus group members reported that the introductory courses were unwelcoming and that “imposter syndrome” is an issue in diversity goals as women and students of color tend to have less computing experience than other students. Women students reported that internships increased their confidence with CS, but noted that internships do not count toward the major.

The department has taken several concrete steps to improve gender and ethnic diversity. In particular, the department developed the Wisconsin Emerging Scholar-Computer Sciences (WES-CS) 1 credit class that can be taken in conjunction with CS 302 and is aimed increasing women and targeted minority’s success by providing a learning enhancement community. Enrollment in this course has grown. The students felt like this program was very useful, especially when taken concurrently with CS 302, but raised concerns that the program was not advertised well enough and did not have enough available seats. CS also developed CS 402 in which CS students introduce programming to K-12 students via after school or weekend clubs. Finally, the department has started working with a consultant from the National Center for Women in IT to improve female participation and has developed an action plan to improve the diversity of the student population including increasing diverse images in marketing, further advertising the certificate and developing joint majors with target departments.
The committee commends the department for making proactive changes to its curriculum to better support the diverse background of its students, and encourages it to keep trying different methods to increase the diversity of the CS major student body.

**B. Undergraduate time to degree and program requirements**

Time to degree in the undergraduate program is 4.4 years, which is higher than the campus average and AAU averages. Although long waitlists for some courses are potential contributors to this observation, another possible explanation is transfers. Many engineering students who switch to CS majors (or add double majors) have significant catch up work to do to complete the required course sequence. This is also true for students who transfer to UW in their junior year as many technical colleges do not have equivalents to the required CS classes.

CS drop/fail rates are higher, and its average GPA lower, than campus averages. CS analysis compared one year of drop/fail rates for CS courses with other campus departments. Although the CS rates were higher than the campus average, they were comparable with similar sized courses in Mathematics for the comparison year. Longitudinal analysis of comparative drop/add rates would be helpful. CS is taking action to address drop/fail rates including modification of the introductory courses, and argues that these changes are correlated with a decrease in drop/fail rates from 30 to 19 percent. CS advisors also reported that removing seniors from the data pool further reduces drop/fail rates. CS advisors note that the lower GPA may stem from CS being the second choice major of business and engineering students who do not make minimum GPA requirements to continue in their first choice major.

The student focus group emphasized that course availability is a serious concern and students acknowledged that they regularly overenrolled in CS courses out of fear they would not get enough CS credits, leading to very large waitlists. Students complained that 500-level courses get filled up by graduate students and do not offer enough seats for undergraduates. Students seem to feel like there are not enough courses on contemporary and applied topics, such as cloud computing. Students complained about courses advertised as being taught by faculty when they were in fact taught by a graduate student. This resentment was amplified by a recent event where a popular faculty member, who was listed as the instructor for a campus course, ended up teaching in the 131 program at EPIC instead of teaching on campus. They also complained about several popular courses that were only taught by one (or few) faculty members, making access to the course difficult.

The stress caused by the sudden influx of students has led to changes in the curriculum that the faculty accept without enthusiasm. Faculty report that there is less creative problem solving in courses and much less interaction with students. Students have reduced access to office hours. The TAs can spend less time uncovering and correcting design issues like coding errors and must rely more on multiple choice assessments.

The department had very few DARS exceptions over the last ten years. One issue is a topics course (638) that does not count toward the major. CS advisors reported plans to create a topics course that counts for the major to alleviate this problem.
Uneven class sizes are a potential concern. For some courses, the section sizes vary between mid 50s to upper 200s. Naturally, large sections get more TAs; however, the department does not aim to balance out the section sizes, except for capping the size for student instructors. The department however recognizes impact of uneven class sizes on faculty and trying to come up ways of compensation for faculty who regularly teach large sections.

Capacity issues are complicated by the fact that it is difficult to recruit CS instructors in south-central Wisconsin. The department has struggled to fill current academic staff positions as qualified candidates have many high paying career options. The department may consider using online courses and developing relationships with remote instructors who have more incentive to work with UW.

C. Undergraduate advising/handbook/policies

In 2015, CS switched from faculty advisors (a subset of faculty served) to academic staff advisors (although drop-in faculty advising is still available). Currently they have two department advisors. Because of the large number of CS students the current advising system emphasizes throughput. It relies on group information sessions, an online declaration process, and monitoring of peer advising that occurs via social media. The department advisors are available for in person meetings, although this is mostly used by students who are switching into the CS major. Advisors currently focus their one on one efforts to students on academic probation.

Advisors believe the simplicity and flexibility of the current major requirements allow most 4 years CS majors to progress through the program without individual advising. The rules and requirements of the major are very clear, and students often do not need additional advising when they get in. The student focus group confirmed that students do not believe they need additional academic advising assistance as the CS websites provides detailed information and peer advising information sources are widely used. The committee was struck by the high amount of peer advising going on among the students. Students hold regular presentations on the undergraduate catalogue, and they have Facebook and Reddit groups. Although peer advising is natural in all undergraduate programs, it can also lead to misinformation. As noted, the advisors monitor the social media for misinformation, but it may be hard to keep up with all the unofficial information.

D. Undergraduate placement

Most of the career advising is done via the Letters & Science Career Services and the Engineering Career Services. Student feedback about these services was overwhelmingly positive; however students noted that some aspects of the CS job process are unique to the field (e.g., interviewing for CS jobs), and suggested that it would be good to have some CS specific web resources. That being said, students said it would be “more important to spend resources on classes than on career services.”

The department organizes an annual CS job fair where students can meet with potential employers which students valued highly. A significant percentage of CS undergraduate students
are able to find employment after graduation.

One complaint from the students was the short time line in which companies offer positions to UW students after a completed internship. Students explained that they were only allowed a two week period to make a decision on the so-called “return offer,” which puts them at a disadvantage compared to students from other universities who have more time to decide. The students encouraged the CS department to renegotiate the parameters to allow them more time.

E. Undergraduate program assessment

The department has recently developed program level learning outcomes and described an assessment plan based on surveys, course evaluations and evaluation of sample problem sets and projects from capstone courses. The first round of assessments of the learning outcomes is expected in the fall semester of 2017.

In addition to the planned assessment activities, CS regularly assesses itself with data mining, regularly analyzing undergraduate program data to inform decision making or evaluate curricular experiments. The committee comments CS for its use of data to increase the success of the undergraduate program (e.g., the recent redesign of the 302-367 sequence into a three semester sequence.)

Suggestion: they should continue with the data mining, even if it does not fit into the framework of the program level learning assessment. It is extremely important to monitor the effect of the growing size of the majors on the quality of the program.

F. Undergraduate program recommendations

- Further explore how CS could use upper level undergraduate students in tutoring/teaching/peer advising.
- Consider counting internship toward the major to attract more women and targeted minority majors.
- Consider offering more courses on contemporary and applied topics.
- Suggested further data analysis: Look into time to degree data in more detail to identify predictors of longer time to degree (e.g., transfers, addition of double major, international status). Continue data analysis of size of program and student performance, especially low performing students and drop rates.
- Capacity: Consider using the summer semester to alleviate the enrollment pressure in the fall/spring semester. Consider online courses and recruiting excellent instructors with online teaching skills from outside of Madison to increase the number of courses.
- Improve advertisement and outreach of some of programs that will diversify student body (e.g., certificate, CS 402 & WES-CS).
- Increase professional advising capacity especially related to (a) recruitment and retention of target populations and (b) outreach to at risk populations.
- Continue to develop rewards for faculty teaching large courses.
- Consider renegotiation of two week return offer period to give students more time to
consider job options.

III. Graduate program

The CS graduate program offers both Master’s and Ph.D. degrees to about 60 incoming graduate students annually. The program enjoys a 98% placement rate in industry and academia. Driven by the high caliber and competitive research programs of the CS faculty, the graduate program offers students a world-class graduate education in CS. It is consistently highly ranked compared to peer institutions, and the program is currently ranked 11th in the US News and World Report ranking. As one of the oldest CS departments in the world, it carries a world-class reputation and is rightfully regarded as a research powerhouse befitting an R1 institution, attracting many excellent graduate applicants.

It is important to explain that CS does not identify incoming graduate students dichotomously as either M.S. or Ph.D. students. Students are encouraged to move between the two degree programs as their professional goals evolve. Given the strong career opportunities of M.S. students, within CS the M.S. is a valued terminal degree, rather than a second choice for those unable to complete a Ph.D.

A. Graduate student body by composition/diversity/enrollments

The graduate program has roughly doubled in size since 2007, partly due to the addition of the professional MS degree (40 students per year). CS has approximately 60 total incoming graduate students per year. The number of Ph.D. students has remained roughly constant over this time period. The addition of the additional professional Masters students has consequences for class sizes and availability.

With approximately 1700 applications, the CS department has the largest graduate applicant pool of any L&S department. CS has seen a significant increase in the pool of campus graduate program applicants, mirroring the general increase in demand for CS degrees at peer institutions. Over the past decade, the demographic composition of this pool has shifted significantly. Approximately ¾ of applicants are now international, with most of those applications coming from China and India, and with the total number of domestic applications staying roughly constant. This has increased the burden of the admissions process on the department, which now considers applications from US-, Chinese-, Indian-, and all remaining international students in four separate sub-committees to maintain some parity among these different groups and to ensure knowledge about programs in each geographical area.

Both faculty and graduate students expressed concern that the quality of the graduate applicant pool may be declining. Students and faculty report that the program no longer receives many applicants from the top universities in India. On the other hand, it appears that the UW CS graduate program generally continues to gain commitments from the strongest students that apply because the acceptance rate of students offered fellowships appears to be constant, indicating that the program does not lose more top ranked students to peer institutions than it did in the past.

The application-, admissions-, and enrollment data reveal significant deficiencies in diversity,
both in terms of targeted minorities (1% of the student population) and gender balance (15% of all graduate students are women, down from 20% in the 2006-2010 time frame). The department identifies this as a major challenge. As a STEM department in L&S, CS is not atypical in this respect, and CS departments at peer institutions also suffer from similar deficiencies in diversity. The department has taken some steps towards addressing in particular the challenge of attracting students from underrepresented groups, such as applying for AOF fellowships for incoming students, sending posters to conferences for minorities in STEM fields, offering a learning center and peer mentoring programs. The fact that the balance has gotten worse in recent years suggests that recent efforts are insufficient to rectify the problem. CS reports the fraction of women among master’s students has fallen to under 15% and among Ph.D. students has fallen under 10%. It also appears that the department has suffered several departures of women in recent years, further exasperating the gender issue.

The large size of the CS graduate applicant pool presents a logistical challenge. The department has addressed this challenge by exporting data from Graduate School systems to an in-house software solution that provides needed functionality to filter and query the large number of applications. Ongoing changes to GWIS on an annual basis have made it increasingly difficult for CS staff to maintain interoperability between the two systems to facilitate data export. The CS admissions staff has determined that GWIS in its current form is not able to handle the demands of the unique high-volume CS admissions data. It is paramount that the Graduate School either provide an implementation of GWIS that allows the department to handle the large amounts of data or to guarantee a stable API that does not require large amounts of staff time to maintain compatibility between GWIS and CS in-house software.

**B. Graduate time to degree**

Incoming graduate students are not identified as MS or Ph.D. students and move between degree programs, making degree success metrics slightly ambiguous. The average time to degree in the Ph.D. program is 6.0 years, comparable to the peer average. The average time to degree for MS students is 4.2 semesters.

Due to the increase in cohort sizes, there is increasing competition for enrollment in courses. The graduate students who met with the committee felt that it was difficult to get into classes. Most students eventually get to take their preferred courses, but not in the semester of their choosing.

Graduate students report regularly enrolling in more courses than they intend to take, and subsequently drop their less preferred courses. This over enrollment practice is driven by concerns about satisfying minimum enrollment limits, especially among international students. The over enrollment practice creates large wait lists (especially for shared undergraduate classes) and significant enrollment management problems for CS. CS is experimenting with various strategies to manage enrollment. A recent policy that will be tested this spring will limit the number of courses in which each student may initially enroll in order to force students to only enroll for their top choices. Students are concerned that the policy will make it more difficulty to enroll in their desired courses and sufficient courses.
**C. Graduate funding**
The CS department does an admirable job of distributing appropriate funding to those who are admitted. Offer letters to those students admitted to the graduate program in CS are sent all at one time (228 offers this year), and are comprised of four different types of offers:
- Fellowship offers
- TA position with $8K supplement
- TA position with $4K supplement
- Unfunded

The department utilizes the fellowship support from the Graduate School, along with their own internal funds for the fellowship and TA offers. The first three types of offers represent the ‘guaranteed funding’ offers. 95% of the students receiving guaranteed funding offers receive a TA appointment in their first year. All TA appointments are at the 50% level. The TA support supplement (funded by CS) is included to bring the TA offers more in line with support offered by peer institutions. The graduate students noted that the RA support level for incoming students at UW-Madison is typically ~ $10K less than at other institutions.

TA’s are assigned specific responsibilities through a process that makes assignments based on both TA self-identified skills/interest, and faculty needs for courses. The assignment method is equitable and works well. TA responsibilities are primarily associated with grading due to the large design component in typical class assignments, and the significant time required for assessing such assignments. The ‘grading’ responsibility also requires lots of one-on-one office hour time. RA appointments for subsequent years are negotiated on a one-by-one basis between the students and faculty with research project openings.

Despite the pressure faculty feel from the increase in demand for CS, the committee did not see evidence of TA complaints about being overworked. The department has resorted to greater use of graders as well as undergraduate student assistants to manage student help.

**D. Graduate advising/handbook/policies**
The CS Graduate Advising Committee (GAC) handles all advising activities for the graduate students. GAC is composed of four faculty and one full time staff graduate advisor. New students meet with the GAC during the first two weeks of their first semester (priority given to TAs). All other students meet at least once per semester for issues such as course selection, degree requirements, etc. The GAC members also maintain regular office hours. Both students and the GAC members comment that the on-line CS Graduate Guidebook does a good job of providing all necessary details, but that the one-on-one meetings are also helpful – especially for the growing number of international students. Along with other information, the guidebook contains details for a grievance procedure, but students and GAC members report these are rarely necessary.

Students comment that the Ph.D. minor requirement is universally disliked, primarily due to the large number of courses required, but also because there is inadequate advising regarding the minor.
E. Graduate placement
The success with which CS students are able to find employment is outstanding and is a department strength -- high quality graduates obtain competitive jobs at top companies, research labs and universities. Of the MS graduates between 2013 and 2015, 70% found full time employment after graduation, and 28% planned to continue in a graduate or professional program. Between 2012 and 2015, 83% of the PhD graduates made employment commitments post-graduation, 61% were in the private sector and 34% in education. Fifteen percent reported accepting a tenure track position.

F. Graduate program assessment
The CS department has robust internal practices for collecting and analyzing data. They have developed a full assessment plan for their graduate program that includes a mix of surveys with current students and alumni, as well as direct analysis of student work, and that is based on articulated learning goals specific to each degree. CS also regularly mines course enrollment data. In terms of topics to assess, the department is mindful of (a) the growth in class sizes, (b) the need for the curriculum to address new emerging topics, and (c) that the communication skills of the graduate students could be improved.

G. Graduate program other
The CS department has experienced rapid growth at both the undergraduate and graduate levels. While demand for their courses has steadily risen, department resources have increased only modestly, and largely through faculty associates. Despite these challenges, the CS department has done an admirable job of accepting the “new normal” of large course sizes. Faculty report that the strain is felt more when teaching at the undergraduate level since faculty are more passionate teaching at the graduate level than in the undergraduate program.

The professional MS program has had positive and negative effects on campus CS graduate programs. The adverse consequences are overworked faculty and staff, and more limited time for faculty research. There is not much evidence of adverse consequences on graduate advising. The regular MS students are no more demanding in terms of time spent with faculty than the professional MS students. On the positive side, there is recognition of the new resources created which will help expand the number of faculty and faculty associates available for all students. Faculty also report that the professional MS students have different life experiences that add to the richness of the classroom.

Graduate students attending the focus group complained shortages of faculty as well as course offerings. Their perception is that many professors have left without being replaced. They raised concerns that the lack of faculty in key emerging areas of computer science, such as computer security and machine learning, have resulted in a lack of research opportunities as well as a lack of course offerings.

H. Graduate program recommendations
- The committee suggests several possible steps towards changing the gender balance in the graduate program including adopting a department code of conduct, increasing the
number of women and minority faculty to model a diverse and supportive learning environment, and prioritizing retaining existing women faculty.

- Graduate School system implementers should work with CS to either provide an implementation of GWIS that allows the department to handle the large amounts of data or to guarantee a stable API that does not require large amounts of staff time to maintain compatibility between GWIS and CS in-house software.

- Enrollment management – the committee encourages CS to keep working on techniques to stem the practice of course over-enrollment among graduate and undergraduate students.
Ph.D. Data (Fall 2016)

Applicants, Admits and New Enrollments

This visualization was created by the Graduate School. Questions should be directed to Peter Kinsley, peter.kinsley@wisc.edu.
MS Data (Fall 2016)

Applicants, Admits and New Enrollments

- Division: All
- School/College: All
- Degree Level: All
- Academic Major: Computer Sciences MS
- Named Option: All
- Gender: All
- Diversity: All

This visualization was created by the Graduate School. Questions should be directed to Peter Kinsley, peter.kinsley@wisc.edu.
Ph.D. Data (Fall 2016)
MS Data – All MS (Fall 2016)
MS Data – Professional Program (Fall 2016)

This visualization was created by the Graduate School. Questions should be directed to Peter Kinsley, peter.kinsley@wisc.edu.
Ph.D. and M.S. by Gender (Fall 2016)
Ph.D. Data (Fall 2016)

Students with an Appointment of 33% or Higher

This visualization was created by the Graduate School. Questions should be directed to Peter Kinsley, peter.kinsley@wisc.edu.
MS Data (Fall 2016)

Students with an Appointment of 33% or Higher

This visualization was created by the Graduate School. Questions should be directed to Peter Kinsley, peter.kinsley@wisc.edu
Ph.D. Data (Fall 2016)

PhD Time-to-Degree Metrics, Peer Comparison

This visualization was created by Academic Planning and Institutional Research (APIR), Office of the Provost, UW-Madison. Questions should be directed to Sara Lazenby, sara.lazenby@wisc.edu.
Ph.D. Data (Fall 2016)

Distribution of Elapsed Years to Degree (Fall 2006 - Fall 2016)

- Degree Level
  - Doctorate

- Division
  - All

- School/College
  - All

- Academic Major
  - Computer Sciences PHD

- Gender
  - All

- Diversity
  - All

- Elapsed Years
  - Less than 5 years: 12.9%
  - 5-8 years: 20.3%
  - 6-7 years: 36.4%
  - 7-8 years: 15.7%
  - 8-9 years: 9.7%
  - 9-10 years: 2.3%
  - More than 10 years: 2.0%

This visualization was created by the Graduate School. Questions should be directed to Peter Kinsley, peter.kinsley@wisc.edu.
Completion rate (Fall 2016)
PhD Retention/Completion Rates, Peer Comparison

UW-Madison Retention/Completion Rates (Computer Sciences)

Association of American Universities Peer Program Retention/Completion Rates (Computer Sciences)

This Visualization was created by Academic Planning and Institutional Research (APIR), Office of the Provost, UW-Madison. Questions should be directed to Sara Lazenby, sara.lazenby@wisc.edu.