

Report from Allen School of Computer Science & Engineering Review

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Overview.

Our review team visited with the Allen School of Computer Science and Engineering at the University of Washington on October 24-25, 2022. Committee members reviewed an extremely thoughtful and detailed self-study produced by the Allen School in advance of our visit, which provided data and analyses that serve as an important foundation for this report. Our team met with Allen School leadership, tenure-track and teaching faculty, graduate and undergraduate students, staff external collaborators, UW-internal collaborators and partners, and representatives from UW academic leadership. We appreciated the warm hospitality, openness, and clear dedication to the review process and to excellence shown by everyone.

Since the Department of Computer Science and Engineering's last program review in 2010, and due in no small part to the creation of the Allen School for Computer Science and Engineering in 2017, the landscape of computer science and engineering has transformed at UW. While already an excellent program 12 years ago, Computer Science and Engineering has seen dramatic growth and continued improvement since 2010. The number of faculty has vastly increased, as have the numbers of PhD students and undergraduates enrolled in degree programs in the Allen School. The overall research stature of the Allen School has continued to rise, and we believe that it is positioned as a top-5 program in the field (though *US News &*

World Report's rankings have yet to catch up). Furthermore, the quality of the Allen School's educational programs is unparalleled. The Allen School's culture is welcoming and supportive of faculty, students, and staff. There are extensive and highly successful initiatives in place to promote diversity, equity, and inclusion within the School. These many accomplishments are the consequence of excellent leadership within the Allen School, as well as strong support from University of Washington, the state legislature, and the technology sector in Seattle.

In light of these considerations, the review committee is enthusiastic about the Allen School's accomplishments during the past 12 years, and recommends without hesitation that it be granted continuing status with a next review in 10 years.

Summary Recommendations.

From data and evidence gathered during this review, **we recommend that the university:**

- 1) Grant the Allen School continuing status, with a next review in 10 years.
- 2) Continue to recognize that the Allen School is in many ways unique relative to other academic units at UW, and consider whether it should operate with greater autonomy from the College of Engineering, for the benefit of UW, its students, and local and statewide stakeholders.

We recommend that the Allen School:

- 3) Continue to grow the undergraduate program, while enhancing opportunities for undergraduate research and directly including a diversity component in the curriculum.
- 4) Continue the spirit of partnership across units of the UW ecosystem, to ensure that "a rising tide lifts all boats".

We elaborate on these four recommendations below.

Recommendation 1. For the university to grant the Allen School continuing status, with a next review in 10 years.

Computer science is a core piece of 21st century intellectual life, and central to a modern 21st century university. The Allen School embraces this philosophy and strives to make basic training in computer science and computer engineering broadly available.

The Allen School's educational programs are of highest quality and have contributed to the Allen School's top ranking among computer science programs in the country. The leadership and culture within the department are excellent, recruitment and retention of members of groups that are historically excluded from computing are laudable (at the faculty, graduate, and

undergraduate levels), and research innovation and connections to other units at UW and to the technology sector outside of UW are extraordinary.

For these reasons, we enthusiastically recommend that UW grant the Allen School continuing status, with a next review in 10 years.

Recommendation 2. For the university to continue to recognize that the Allen School is, in many ways, unique relative to other academic units at UW, and to consider whether it should operate with greater autonomy from the College of Engineering, for the benefit of UW, its students, and local and statewide stakeholders.

The Allen School's *size* and *extent of donor relationships and cross-university ties* set it apart from other units at UW and within the College of Engineering. It employs hundreds of faculty, staff, post-doctoral researchers, and students. Furthermore, it has direct connections to major Seattle-area donors that have enabled it to fund the construction of two world-class, state-of-the-art buildings with modest state support, along with endowed chairs/professorships and many other initiatives. Mirroring national trends, the Allen School has numerous ties/relationships/opportunities across the university in research and teaching that are more college-like than school/department-like.

The Allen School's size leads to challenges and opportunities not faced by smaller academic units. For instance, the Allen School must continually hire large numbers of staff, in light of its continued growth and inevitable staff attrition. As a result, complications in hiring due to UW bureaucracy (at the College of Engineering level or elsewhere) have a disparate impact on the Allen School. Because of the Allen School's size, it may be able to perform more of these functions "in-house". This could be a win-win for both the Allen School and the College of Engineering / University.

We note that the Allen School's outstanding relationships with donors has enabled the Allen School to self-fund a large part of its initiatives, rather than relying solely on state/university support.

There is an ongoing national trend among computing- and information-related units to move towards independent or semi-independent status. Five of the top ten programs in computing (according to *US News*) – and three of the top four, with which the Allen School most directly competes (MIT, Berkeley, and Carnegie Mellon) – are independent schools or colleges led by Deans. The Computing Research Association published a 2019 white paper on "[Creating Institutional Homes for Computing: Transforming a Department into a School or College](#)." The Allen School has expressed concern that it is not a part of national conversations and national perceptions regarding universities' response to the evolving role of computing.

We recommend that the university convene a task force to consider the pros and cons -- for UW, its programs and students, local and state-wide stakeholders, the College of Engineering and the Allen School -- of increased autonomy for the Allen School. This task force could consider a variety of ways that the Allen School could evolve, e.g., a new collaboration with other academic units to create a new “College of Computing”, to include not only the Allen School but also other departments engaged in research and education in computing. There are no well-established, cookie-cutter solutions here; each computing program that has evolved to a more independent school or college has done so in its own, local context. *A guiding principle should be to maximize the positive impact of the Allen School across the UW, while minimizing any harm to specific units such as the College of Engineering and the College of Arts and Sciences.* Regardless of the findings of this task force, we encourage UW to recognize that the Allen School’s situation is unique relative to other academic units at UW, and to continue to partner with the Allen School to achieve its goals and the goals of the University.

Recommendation 3. For the Allen School to continue to grow the undergraduate program, while enhancing opportunities for undergraduate research and directly including a diversity component in the curriculum.

The undergraduate program in the Allen School has grown dramatically over the past 12 years. Undergraduate students are drawn from a combination of “direct to major” admissions, transfer admissions, and admissions for students currently enrolled within the university. Despite massive growth, the admissions rate remains staggeringly low, indicating the potential to greatly increase the cohort size of undergraduates, thereby providing a high-quality, potentially life-transforming educational opportunity to more students within the state. An increased program size also delivers economic benefits to the state of Washington, given the very high demand for UW graduates with degrees in computer science and computer engineering. It would be very difficult to significantly scale the size of the CSE undergraduate program at current staffing levels. But there are plans for moderate resource increases (faculty, staff, graduate and undergraduate Tas, and more). Additional moderate increases in program size may be feasible, albeit with possible changes and modest compromises in the CSE undergraduate student experience, by investigating approaches taken by other high-quality, research-intensive CSE programs in public flagship universities (e.g., UIUC, UC Berkeley, UCSD, and UT Austin) that have proportionally higher student enrollments.

Undergraduates enrolled in the Computer Science and Computer Engineering degrees in the Allen School receive an excellent education, have very good job prospects after graduation, and benefit from high-quality advising from the Allen School’s undergraduate advising staff. Moreover, efforts to recruit a diverse population of undergraduate students, and to retain

those students, have been highly successful; the STARS and STARTUP programs are particularly notable. We applaud these efforts and ongoing plans to build on these successes. We also recommend that the Allen School explicitly address “diversity in computing” in its core undergraduate curriculum, whether by integrating this topic into multiple classes, or by having a single required class devoted to the topic.

At present there are very limited opportunities for undergraduates to engage in research with Allen School faculty. As the undergraduate program continues to grow, we encourage it to increase pathways for undergraduate students to engage in research. Given the high undergrad-to-faculty ratio, some creativity will be required. For instance, the Allen School could consider a model in which a PhD student mentors a small team of undergraduate researchers (with less hands-on mentoring from the PhD student’s research advisor). We understand that there is an ongoing discussion in the Allen School about starting an NSF REU program.

Recommendation 4. Continue the spirit of partnership across units of the UW ecosystem, to ensure that “a rising tide lifts all boats”.

There is no doubt that the Allen School’s contributions to UW have been incredibly valuable and are highly appreciated. It is a valued partner in interdisciplinary research and education programs and initiatives. The self-study and a session during our visit noted a truly impressive record of partnership and collaboration, including large-scale interdisciplinary initiatives such as the e-Science Institute, Design Use Build (DUB), Change, the Tech Policy Lab, the Center for Research and Education on Accessible Technology and Experiences (CREATE), the Global Innovation Exchange (GIX), Computational Health, justice-focused K-12 CS education, Computing for the Environment; and the Technology, People, and Computing Innovation Initiative. Furthermore, the Allen School’s research stature elevates UW overall, and some Allen School donors have become important donors to the university at large. *Thus, it is clear that the rising tide of the Allen School has lifted UW as a whole.*

Because of the breadth of the Allen School’s interdisciplinary initiatives, many overlap with other academic units at UW with interest and expertise in a particular area. The committee could only meet with a few of the Allen’s School’s many collaborators both within and outside of the university, but in every one of these meetings, we heard uniform high praise for them as a partner. Nevertheless, we believe that the Allen School must be careful to both survey the UW landscape before beginning a new initiative and bring relevant units on board *ab initio*. This is particularly important given the Allen School’s size: while we acknowledge that it has enough

in-house expertise in a number of areas that it could in some cases create new initiatives without drawing on outside units (or by drawing only on a select set of outside units), this could omit meaningful contributors from the larger UW community. As computing increasingly touches all parts of a large university, a challenge that CSE, and UW more generally, will face is identifying and engaging the right, full set of collaborators in launching and growing any new joint initiative.

The growth of the Allen School, as with any other academic unit, also has ripple effects on partner units across campus (e.g., through increased undergraduate student course enrollments in these partner units). UW should analyze and consider the resource needs of all units impacted by Allen School growth, as well as the resource needs of the Allen School to accommodate the increasing popularity of CSE courses with non-majors.

Summary. Since the last program review of the Department of Computer Science and Engineering in 2010, CSE (now the Allen School for Computer Science and Engineering) has seen dramatic growth, and has reached new heights in its truly world-class research and educational programs. The Allen School's culture is welcoming and supportive of faculty, students, and staff. There are extensive and highly successful initiatives in place to promote diversity, equity, and inclusion within the School. There is a proven record of outstanding and innovative partnerships across campus and with Seattle's technology sector. The Allen School's continued growth, innovation in its programs, and in partnerships across campus will provide myriad opportunities for the School, for the entire University of Washington community, and for the citizens of Washington.

Appendix: Additional Suggestions for the Allen School.

"What is your assessment of our faculty mentoring and retention?"

Overall, faculty reported feeling highly supported by the department. However, some junior faculty mentioned that, while they feel highly supported by their department, they wish that certain departmental policies (related to, e.g., parental leave, teaching assignments, etc.) were provided in writing. While a smaller unit may, in some instances, be able to avoid written

policies, the review committee feels that having policies in writing is important for ensuring equity and fairness as units grow.

“What is your assessment of our climate in terms of diversity, equity, inclusion, and access?”

There is a strong appreciation for the many DEIA efforts that have been undertaken by the department, as well as for the school’s future plans/directions in these areas. More generally, PhD students report a very positive climate within the department. However, some PhD students mentioned concerns that there are limited consequences for faculty members who are problematic advisors, and insufficient protections in place for their future grad students. While we recognize that this is a hard problem to solve for any unit, we encourage the Allen School to require training for faculty members whose advising skills require improvement. Concerns were also voiced by graduate students that important parts of UW’s CSE culture and social “glue” (e.g., activities such as skit night) that were curtailed during the pandemic have not been restarted.

“How can we achieve even greater synergy with Seattle’s technology industry and research sector?”

The local technology industry and the Allen School have benefited immensely from each other’s growth. It is clear that local tech companies, as well as the world’s largest tech employers, highly value Allen School graduates, at the undergrad, MS, and PhD levels. Furthermore, there is an ever-increasing demand for students with Allen School training (despite the very recent downturn in hiring in the tech sector).

The Allen School has directly benefited from partnerships with industry: it has received private funding for two new buildings; it has a huge number of endowed chairs/professorships; and many of its faculty hold partial industry appointments. Collaborative research and joint appointments with industry are a competitive advantage of UW CSE but they also carry risk, as it is neither possible nor advisable to run a department in which all or most faculty are on partial leave. We encourage the Allen School to continue to maintain high expectations for faculty who are on leave in terms of departmental and university involvement, and student mentoring.

“What are the budgetary/financial constraints and opportunities toward fulfilling the Allen School’s mission?”

We believe that there should be an independent analysis by the Office of Planning and Budget to detail the financial consequences of continued growth, and possibly increased autonomy, for the Allen School. This analysis should include the costs in other units, such as A&S, to support this growth.

Furthermore, there is an opportunity for the Allen School to grow its degree offerings, through a new full-time fee-based MS program with daytime courses (as opposed to the existing BS/MS program, which is available only to currently enrolled undergraduate students, and the PMP program, which is a part-time program with courses offered in the evenings). There are pros and cons of such an undertaking, and incentives for launching such a program should be identified. For example, it may be worth considering whether an additional full-time fee-based MS program could help fund some of the School's other ventures.