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July 12, 1999

**David P. Dobkin**  
**Phillip Y. Goldman '86 Professor**  
**and Chair**

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Dear Dick, Lee and Denice:

Attached please find a copy of the report of the External Advisory Committee for the CSE Department at UW. Speaking on behalf of the committee, we appreciated the time that you spent with us during our visit. Our report is written to the department. As such, we address both issues relating to the workings of the department as it goes forward and those having to do with its position in your university in the future.

Overall, we are very impressed with the department you have. This is an excellent department that continues to attract excellent students and faculty. At the same time, we have concerns about its precarious situation as it moves towards the future. The shortage of first rate scholars makes academic computer science a competitive environment. This is exacerbated by the excellent opportunities in industrial research labs and the lucrative opportunities provided by startups. It would be a shame for both the University and for the profession if the department were to assume any less of a leadership position in the future.

Our main recommendation to you is to make the commitments necessary to ensure that the CSE Department at Washington can continue to excel in this competitive climate. You need to continue to aggressively address issues having to do with salaries, new positions and funding for the department. The commitments you mentioned to us are a strong first step. But, you need to realize that further commitments will have to be made in future years.

The committee feels very strongly that a very pressing issue for the department in the next few years will be space. We encourage you to make it publicly known that creating the necessary space for the department quickly is the highest priority of the University of Washington. To do anything less will merely compound a decade of disasters regarding decent space for the department and will continue to erode the morale in the department.

The other members of the committee and I appreciate the efforts that you and the members of the department put into making this a successful meeting. I know that I speak for all of the members of the external advisory committee when I offer our services to help you as the department moves forward.

With best regards,

A handwritten signature in dark ink, appearing to read 'D. Dobkin', written in a cursive style.

David Dobkin  
Professor and Chair

CC: Ed Lasowska

Report of the External Advisory Committee  
Department of Computer Science and Engineering  
University of Washington  
June 8-9, 1999

David Dobkin (chair), Barbara Grosz, John Hopcroft, Prabhakar Raghavan, Jeff Ullman, Bill Wulf

## Overview

The Department of Computer Science and Engineering at the University of Washington is a great department and a department that we all admire. We encourage our best undergraduates to consider graduate studies there, and we expect to compete with the department when trying to hire the very best new assistant professors. These are the highest compliments that can be paid to any department. Certainly, by all measures of quality, this is one of the few leading CS departments in the country.

Ed Lazowska and the faculty deserve a great deal of credit for continuing to develop this as a very impressive department. In addition to building and maintaining a first-class research faculty, the department has undertaken many new initiatives in recent years. These initiatives aim to serve the university and to serve the people of the State of Washington.

Among those initiatives that reach out to the broader community are

- 1) Professional Master's Program
- 2) various programs in K- 12 and K-20 education
- 3) work with UW branch campuses at Bothell and Tacoma
- 4) work with the Washington software alliance and the Washington technology alliance

Among those that interact with the University of Washington are

- 1) helping to recreate the library school as the school of information
- 2) interactions with other units of the engineering school
- 3) interactions with other departments of the university including molecular biotechnology and the business school as well as the more traditional linkages to astronomy, electrical engineering and statistics.

In addition, the department has responded well to the needs of the local software industry and the department has aided in the creation of a number of startup companies.

The undergraduate and graduate students to whom we spoke view the department as an excellent environment in which to study. All are happy with the quality of their education and very appreciative of the attention that they receive from the departmental faculty. It is important to maintain this character as the department grows. Indeed, the grad students to whom we spoke raised concerns that it has already become harder to see faculty as the workload has increased. The capstone courses at the undergraduate level deserve special recognition as a valuable educational experience.

Within the local context, the department has done an excellent job of making its case to the administration at all levels of the university. The President, the Provost, and the Dean of Engineering all see the department as essential to the university's future.

There is no doubt that the department is a jewel in the crown of UW and a key to the future of the university.

The department has achieved a great deal with very few resources. The university has gotten very much - a first rate department - for very little investment. However, the strains of limited space and low salaries are beginning to take their toll in the department. Sieg Hall is literally falling apart. The department is squeezed into space that is undesirable and inadequate. Both the quality and quantity of space available to the department lag far behind that of any quality computer science programs of which we are aware. Faculty salaries lag far behind those of comparable institutions. Indeed, some excellent faculty could earn as much as a 50% raise by moving to one of our institutions and even more should they choose to move to industry (as DeRose and Salesin have done recently). The university administration is very aware of these problems; it must begin to address them quickly and aggressively.

Even with the resolution of these problems, the department will encounter a number of difficult issues as it looks towards its future. This department is not unique in this regard. Most of these issues are arising at all of our home institutions. Unfortunately, there are few general answers to any of the problems. Each must be solved in the specific situation of a department, taking into account the local environment. We offer here feedback from the discussions during our visit, but caution that there are no simple solutions. The department is encouraged to use our remarks as the starting point for further discussion. There are many ways to address these issues. Your challenge is to find the solution that works best for your faculty within the UW environment.

## **Recommendations**

The summary of our recommendations is as follows:

- 1) Keep striving to live up to the high ideals and standards you've set for yourselves -- building a world class department while maintaining a collegial environment. But, realize that doing so in the future might involve doing different things than you have done in the past,
- 2) Don't be afraid to take some risks as you grow in the future.
- 3) Continue to keep your administration involved as the department develops and grows.
- 4) Hold the administration to the commitments that they have made to you and repeated to us. In particular, we were told by the provost and dean that all of the requests that Ed Lazowska had made for salary relief and budget restoration would be met by July 1 to the tune of \$500K and future adjustments as needed. The president appeared willing to

make a public statement stating that the new CSE building is the university's top priority building. We believe that such an announcement is very important for the morale of an overworked and under-appreciated faculty.

5) The department must make it clear to the administration that satisfying its current requests are necessary but hardly sufficient in the long term. The administration can expect a similar set of requests in future years, as the need for new resources and salary correction are ongoing issues in computer science departments nationwide.

6) The department needs to worry about space for new faculty and students in the near term. In the 4 years before the new building can be occupied, the department may have to adopt uncomfortable short term solutions in order to have sufficient space. The University will need to help in this process, including fixing up space needed for the short term.

7) The department needs to deal with changing patterns in computer science research that can lead to research results being used to fuel startups as well as to support publication of ideas. There are potentially difficult conflict-of-interest issues that arise out of such a process. We find the proposals of the graduate students an excellent first step towards resolving such issues. It is important that the faculty be as open as possible as any new startups develop. One step in this direction would be to use the graduate student document we were given as the basis for discussions and formulation of policies.

8) The department should recognize that there are problems caused by students not being admitted to the major until their junior years. This results in unbalanced loads for students, who must take only prerequisites in their first 2 years and only CSE courses in their last 2 years. The stated reasons for this policy (to make possible transfers from community colleges) don't seem to apply for a department such as CSE that limits its number of majors. Students who transfer from community colleges seem typically to have to take first and second year courses before being admitted to the major, and thus they wind up taking more than two years to complete their degrees. Therefore, we encourage you to consider alternatives. One suggestion is to offer a data-structures course in the first 2 years as a further introduction to the major.

## **Issues raised**

We were asked by the department to address 4 specific issues that they agreed were important in the current stage of the department. We give our opinions on these issues in the paragraphs that follow. It is our overall belief that there are no general answers to most of the questions that were asked. Different solutions will work in different environments.

We encourage the department to work together to develop a short vision of where you want to be and what you want to do at least in the short term. This is particularly important given the number of absolutely wonderful initiatives going on in the department. Part of the process of developing a vision will be to determine if these are the right

initiatives for this department now. The department has done a great job of changing with the times -- essential as the role of the field grows and as the level of activity at top departments grows. This has been accomplished in part by building upon the 1994 strategic plan. This plan has stood the test of time, but it's 5 years old and there are lots of new faculty members, so it's time to dust it off, change it as appropriate, and reratify it, as a blueprint for going forward. The specific revised vision that you develop is not important. What is important is that all of the faculty are willing to commit to the vision.

*Issue #1 -- Directions in faculty hiring*

The hiring of faculty is perhaps the most important thing that any department does. You have done so extremely well over the past few years and your large number of openings will cause you to continue to be looking to hire many new faculty in each of the next several years. You will need to do so in a market that is increasingly competitive.

In making hiring decisions, we encourage you to choose areas of growth based on the strengths of your local environment. Be opportunistic without being scattered. In making hiring decisions, separate teaching need from research areas. Many faculty can teach courses in areas including core areas even though they do no research in those areas.

We encourage you to be outward thinking as you grow the department, not only when considering new hires in the department but also by supporting some of your current faculty as they move their research outward from core areas of computer science. In the former case, we encourage you to be very aggressive in the short term about making cross-disciplinary hires. Do so with buy in from the other department by including some of their faculty on the search committee. If possible, place part of the new hire in the other department. In all cases, make sure that the person fits into computer science (e.g. can teach at least the introductory courses). As part of your outward thinking, we urge you to help other departments to hire faculty in computational areas. You can do so by offering to serve on search committees for such positions.

In broadening your base, you might want to think of faculty fitting into either areas that "deliver cycles" or areas that deal with content. Using this distinction, there is an opportunity to explore the area of content management by building on your recent hires and the revitalized school of information sciences.

*Issue #2 -- Relations with Industry*

The changing nature of research in computer science gives rise to some very difficult issues. In particular, issues arising around startups and intellectual property must be addressed quickly and carefully.

We encourage you to start an ongoing seminar on the mechanisms of startups and the ethical issues that arise when considering startups. Insofar as possible, make as many details as possible of current and future startups public so that there are no surprises. We

realize that the fine line between publishable research and research leading to a startup is hard to recognize. This makes it more important to make efforts in this direction.

You will also need to deal with changes in the local culture so that students understand the differences between starting companies and writing papers and between publishing research results and protecting intellectual property.

It is important that you deal with potential conflict of interest issues. You cannot allow there ever to be a dual relationship between a faculty member and a grad student. A situation where a faculty member would be both advisor and business partner of a student must not be allowed to happen. Such situations develop gradually over a period of time. Therefore, it is necessary to be continually monitoring potential conflicts and to have processes in place to assure that students are not harmed by startup situations that might arise.

We found this to be an issue of great concern to the grad students who are most affected by it. For a variety of reasons, this issue has not been handled in as timely a fashion as it might have been in the past. We encourage you to resolve this issue quickly. The grad student memo on the subject is a wonderful place to start a discussion.

### ***Issue #3 -- Class size and faculty workload***

All students to whom we spoke were very pleased with the quality of their education. Everyone felt well served by your teaching programs. However, we sensed concerns from the faculty that the teaching burden has increased over time. There are ways to address this burden without affecting the quality of instruction.

We feel that there is no reason to limit enrollments to 40 students. Indeed, this is an arbitrary class size that is both too large and too small. Different courses have different teaching demands and would benefit from different class sizes. Also, different faculty have different talents when it comes to teaching courses with small, medium and large enrollments. Indeed, the workload in a course grows as a concave function of the enrollment. Hence, a faculty member teaching a course with 60 students and another (seminar) with 20 might enjoy his/her teaching assignments more than when teaching two courses of 40. We believe that in most cases once a course has 40 people, any intimacy of a small class is gone. So, assuming that the necessary help is available, there might as well be no limit on the enrollment. This approach will reduce the number of instructors needed for their current offerings, and allow the current faculty to teach more of the courses they apparently like --- high-level grad courses. These are the courses that you've been doing less of because of the burden of undergrad teaching.

Furthermore, there are structural things that you can do to help ease the job of your faculty. For example, larger courses can have head TA's who act as course coordinators. You might also want to hire staff members to aid in web design or to serve as course secretaries in order to offload some workload from the faculty.

We encourage you to be more more flexible about sharing courses among your programs. It is quite possible that courses in your professional masters program would also work in your PhD program or serve as courses for advanced undergrads. It is not necessary that all programs remain distinct in their course offerings.

We applaud the collegial culture of the department. Indeed, this is one of the things that makes the department unique. However, within the culture is an assumption of sameness that will have to change as the department grows. It is unrealistic to think that all faculty will teach courses of the same size. Rather, you want to involve all faculty in activities that best utilize their individual skills. This involves thinking of faculty doing equal work rather than identical work.

#### ***Issue #4 -- The graduate program***

The graduate program at UW has been a great success. Your PhD students are being attracted to the finest academic departments and the leading industrial research labs. By all accounts, you're doing an excellent job of training your students and placing them in leading positions.

We share your concerns about the quals and general exam. Among other concerns, students who are not likely to complete the PhD program can spend a long time in the program before learning that they won't finish. It also doesn't make sense for students who are already interviewing for jobs to be taking the generals exam.

One possible fix is to move the research project from the qual to the generals. This would make the quals an exam testing mastery of the material of computer science and the generals an exam testing a student's research ability and his/her ability to find an advisor who would act as the student's champion. If this (or any other) fix is adopted, we encourage you to set a firm deadline by which the general exam must be completed.

Whatever solution you select, it is crucial that you take steps to get students connected to advisors and projects early, even long before the general exam. At some of our institutions, We have found that the students, such as NSF fellows, who did not have the economic incentive to get connected, actually took longer on the average.