January 14, 2015

Response to Summary of Recommendations and Timetable
Faculty of Computer Science

The faculty of Computer Science is grateful for the great effort and thoughtfulness that the committee members have invested in their evaluation and in the report. As reflected in our responses below, we agree with virtually all the assessments and recommendations of the committee, and we plan to work earnestly towards improvement. Indeed, during the last year we have already started addressing many of the issues pointed out by the committee, in some cases with measurable success. We are confident that the future steps we shall take, guided by the recommendations of the committee, will add significant strength to our faculty. Our detailed response follows.

Short term [~ within 1 year]:

1. The Institute together with Computer Science must articulate a set of guiding principles for entrepreneurship and intellectual property in the area of information technology.

We completely agree with the committee that this long-standing important issue must be resolved as soon as possible, and that this should be done by a joint committee of the Institute and the CS Faculty.

2. The Institute and the Computer Science Faculty must develop a plan to ensure that undergraduate students consistently receive adequate feedback on exercises and assignments.

We appreciate the immense importance of feedback to the process of teaching and learning. Fulfilling minimal requirements in these aspects requires a significant budget increase, because the existing budget is fully exhausted by current teaching activities. We are in the process of drafting a concrete plan. The plan will focus on budgeting items that include more complete homework checking, workshops on homework solutions, and tests on homework questions.

3. The Institute and the Computer Science Faculty must undertake a systematic effort to understand undergraduate attrition, including keeping better track of the number of students who drop out of Computer Science across the length of the program, where they go, and their reasons for dropping out of the program.

The department will conduct a statistical analysis of attrition in recent years to gain insight into this process. Our current estimation is that the vast majority of students who dropped out did so due to low achievements. In the event that our study shows that there is a significant number of dropouts who are not low achievers, we will contact such persons and learn the reasons for their leaving.

As for attrition due to low performance:

1. We will analyze the admission data to examine whether a change in the admission criteria is necessary.
2. We will enhance control over attrition due to poor performance. In particular, we would like to terminate as early as possible the studies of students who have no reasonable chance of success – preferably at the end of the first year of studies. We have already amassed a great deal of data and are working on a deep analysis using statistical tools to identify future dropouts in the early stages.
3. As for those students who have the capacity to succeed, our aim is to provide improved assistance in order to help them overcome obstacles. To this end, this year we have begun a process of mentoring students during their first semester. The mentors are more senior, strong students. We aim to expand the process, to identify students with potential difficulties, and allocate mentors to them at an early stage.

4. The Institute and the Computer Science Faculty must undertake a systematic effort to understand whether, as our observations suggest, the actual undergraduate time-to-degree is substantially longer than the nominal time.

We will perform a deep statistical study of the reasons for long time-to-degree. We will analyze data of grades, percentage of failures in courses, and the rate of accumulation of credits per semester. Additionally, we will employ questionnaires to students in order to identify other factors (such as work in high-tech companies during the school year).

5. The Computer Science Faculty should consider whether restricting the number of times a course can be taken will shorten the time for graduation.

This will be part of our statistical study outlined above.

6. The Computer Science Faculty must develop a plan to increase the number of PhD students.

Most of our current PhD students were previously MSc students in our faculty, who either transferred to a direct PhD track or enrolled after completing their MSc. Therefore, one effective way for increasing the number of PhD students is to first increase the number of MSc students. We have already taken some measures to this effect, and the number of new MSc students this semester has doubled compared to the last few years.

We also plan to take additional measures for recruiting new MSc and PhD students:
- We are in the process of creating a new additional administrative position for supporting graduate students, as well as advertising and recruiting new students.
- Starting this March, we will hold an open house day for prospective graduate students jointly with the Technion EE department. The hope is that this joint effort will serve as a force multiplier, allowing us to attract a bigger number of candidates with more effective advertising and a richer open house schedule.

7. The Computer Science Faculty should develop a plan to establish a formal research track for undergraduate students.

We plan to develop such a plan, together with the Institute.

8. The Computer Science Faculty should review the choice of programming language in Introduction to Computer Science, in light of recent advances in pedagogy and practice, as well as the recent recommendations of the 2013 ACM/IEEE Computing Curricula.

The Curriculum Committee of the Computer Science Faculty is now considering a change of programming language in Introduction to Computer Science. This change will have implications for our entire program which will be considered. We are already working on this.

9. Within a year, the Faculty must institute an honors committee to promote nominations of academic staff members for recognition.

A senior faculty member will be appointed for this purpose, along with dedicated administrative support.

10. The Faculty must ensure adequate supervision of teaching and course syllabi taught by non-permanent academic staff to ensure quality of teaching and coherence between courses.

Each course currently has a faculty member as an academic supervisor. We will re-emphasize the role of the supervisor to visit in class and check that adequate teaching according to the syllabus is conducted. Also, we will add this item to our semi-annual meetings with the student representatives, seeking student input on these issues.

11. The Computer Science Faculty must establish a mechanism for effective matching of MSc students with advisors.

We already have a mechanism for matching MSc students with advisors. The vice dean for graduate studies routinely collects information from faculty members about the type of graduate students they are looking for and the research projects they have to offer. The matching service is also being routinely advertised to graduate students, who come to the vice dean's office hours for consultation. Based on feedback we receive from MSc students, this matching service has been quite effective. Nevertheless, we will seek ways to improve it. In particular, the new administrative position mentioned in item 6 above is expected to include support for this matching process.

12. The Computer Science Faculty should develop a plan to attract PhD students with MSc degrees from other institutions.

See item 6 above. We will make more effort to actively advertise our PhD program in other universities and to attract more PhD candidate to our open house days. This year we already have significant success in attracting MSc students from other universities, including several new foreign students from abroad.

13. The Computer Science Faculty must establish a mechanism to monitor and ensure graduate student progress.

The Technion graduate school closely oversees progress of graduate students and has strictly enforced timelines for submitting research proposals, successfully completing graduate courses, and taking PhD candidacy exams and final thesis exams. A rather unique feature of our department is that most of the graduate students receive full graduate fellowships. Such students have a strong financial incentive to comply with the timeline, as the fellowship is automatically withheld when a deadline is not met or after a fixed number of months (depending on the track of studies). Another existing mechanism for monitoring progress is a research progress grade, which advisors need to give each semester.

On top of these Institute-enforced mechanisms, the departmental graduate secretary and the vice dean for graduate studies routinely follow the progress of graduate students and advise those who have trouble meeting the requirements or need any special assistance.

14. The Computer Science Faculty should reassess its policy of allowing courses to be taken multiple times.

The Institute rules allow taking a course for grade improvement during the year following the first time a passing grade is achieved. We must adhere to these regulations, but we do not permit exceptions, whereby students retake the course more than a year later. We will consider appealing to the Institute to adopt a less permissive policy, e.g., to limit the number of courses which can be taken for grade improvement.

15. The Computer Science Faculty should consider hiring more TAs, including undergraduate TAs.

We agree and will comply with these recommendations subject to budget constraints.

16. The Computer Science Faculty should set in place a process to define and reflect on the attainment of outcomes in a planned, periodic manner.

During this year we will get together in a faculty retreat for an in-depth discussion of our curriculum and teaching. Towards this event, we will collect data on student achievement, time to completion of studies, and outcomes. During and after the event, the process recommended by the committee will be defined.

Intermediate term [~ within 2-3 years]:
The academic staff must make a systematic and persistent effort to compete for European funding.

It should be noted that our faculty is by far the most successful in the Technion in obtaining the prestigious ERC grants. To further encourage and boost our success, the faculty will provide significant administrative support for grant proposal and management. We have already begun this year with a commitment that every new faculty member henceforth will be personally supported in these matters by an experienced administrator for the first two years free of charge. This starts before

the faculty member arrives, so that new faculty members may come already with at least one grant. We will also consider incentives for submitting proposals – to European and other sources, though it should be noted that the Institute already provides such incentives.

Medium Term [~ within 3-4 years]:
1. The Institute should create a task force to develop a strategic plan for the advancement of information technology research and education across the Technion.

The faculty will be more than happy to participate and cooperate in this endeavor.

2. The Computer Science Faculty should work with its industrial advisory board to rethink the mechanisms and goals of the industrial affiliates program and to increase direct involvement with the alumni relations program.

We are rather proud of our Industrial Affiliates Program, and we believe that our relations with the Israeli industry are highly productive. However, we are always seeking ways to improve and will discuss this in our next annual meeting with the Advisory Board, which will take a new form this year.

Regarding relations with alumni, we certainly agree. This spring we shall hold a major (first-ever) event for our MSc and PhD alumni of all time. We also plan for this year round-table meetings between of alumni and undergraduate students. We will learn from these activities and others how to boost our alumni relations significantly.

3. The Institute must develop IP, entrepreneurship, and conflict-of-interest policies consistent with their agreed-upon guiding principles, and these policies should be articulated and clearly conveyed to the Computer Science Faculty staff and students.

We definitely agree that the current state of affairs in this respect is unacceptable. This is a long-standing problem that is hurting both the faculty members and the Technion and it must be resolved by the Institute in close collaboration with the faculty.

4. The Institute must develop guiding principles for budgeting Computer Science as an experimental discipline.

This is indeed a crucial step in the development of the faculty, and it is consistent with its strategic plans and the strengths that the faculty has been developing for over two decades.

5. The Computer Science Faculty must execute its plan to ensure that undergraduate students receive adequate feedback on exercises and assignments.

We will do so.

6. The Computer Science Faculty must execute its plan to increase the number of PhD students.

We will do so.

7. The Computer Science Faculty must execute its plan to establish a formal research track for undergraduate students.

We will proceed as planned in the first year.