I. STATUS OF ACTION ITEMS FROM PRIOR REVIEW (2008)

1. Increase the number of BS graduates by increasing the number of undergraduate students and improving quality and retention: Undergrad enrollments have rapidly risen from 327 in Fall 2007 to 1404 in Fall 2016 and continue to grow. The number of graduates also has steadily increased from 28 in AY2008-09 to 192 in AY2016-17. (Complete)

2. Strengthen the graduate program by improving the quality of Ph.D.-level research: Not only has the graduate program seen steady increases in enrollment, the quality of the students and their graduations and placements have shown excellent results. All of the graduates have gone on to excellent positions in academia, industry, and government. All Ph.D. students publish their research in excellent journals and conference proceedings and many of them have received awards for their research in conferences for best papers. (Continuing)

3. Improve research quality by promoting high-quality scholarship: We have recently hired 10 new faculty members. They are excellent researchers with strong publication records and industrial experiences. Many of them brought new research areas to GSU and created new synergy between them and existing faculty members. (In progress)

4. Increase department space: The department moved into new administrative space in the 25 Park Place Building in 2015, and with the recent hires, we are now getting additional office space for faculty and graduate students in 1 Park Place. However, rapid enrollment growth during the years since the previous review has created new space issues, with particular need for instructional labs and student research labs. (Continuing)

5. Achieve national prominence in bioinformatics research: CSC has made progress in achieving prominence in bioinformatics research since the last review. Faculty have brought in numerous NSF and NIH grants in the area of bioinformatics and have received the NSF Travel Award for the ISBRA series several times. We host/organize the International Symposium on Bioinformatics Research and Applications (ISBRA) each year as well as the International Journal of Bioinformatics Research and Applications (IJBRA) and the Wiley Book series on Bioinformatics. Our Ph.D. program is nationally competitive and ranks among the best in the Southeast, according to National Research Council data. The program also has a high rank in several categories at the PhDs.org website. (Continuing)

II. MAJOR FINDINGS IN CURRENT REVIEW

1. Instructional and Research Space Demands. Increasing enrollments and the need to provide students with hands-on inquiry-based instruction has led the department to convert many of its key undergraduate courses to an instructional model that includes a large lecture along with supporting break-out labs in student workstation (SWS) classrooms. As the model has been implemented over the past several years, the need for additional SWS labs has increased. However, the department currently controls just one computer lab (30 seats) for its 1400+ majors. Consequently, the unit’s current access to lab space has been inadequate and is impeding its ability to provide quality education to university students. As part of its self-study and other assessments, the department has determined that three dedicated instructional labs are needed for break-out sections of the lower division courses (1301, 1302, 2720), one systems lab for the 3000-level courses (3210, 3320), and several specialized teaching labs for the 4000-level courses (for example, mobile computing lab; robotics, sensors, and embedded systems lab; network security lab; and AR/VR/Multimedia lab). Research space is also
lacking, especially with growing faculty size. Additional space should be contiguous in order to allow for interactions and collaborations to flourish.

2. **Student-to-Faculty Ratio.** The external review committee noted that compared to computer science programs nationally, the student-to-faculty ratio of the GSU department is extraordinarily high, particularly at the undergraduate level. As of Fall 2017, the department will have 23 TT and 6 NTT faculty. With an expected undergraduate student enrollment of 1450, the student to faculty ratio will be 50:1. Factoring in the graduate student enrollments (which are on the rise with 180 students in Fall 2017 and expected to grow with the addition of new MS programs), the student-to-faculty ratio is only expected to worsen. Due to the lack of faculty, the department relies heavily on PhD students to teach undergraduate classes and is hampered in its development of new master’s programs that have high potential.

3. **Academic Programs.** With increasing societal needs for computer scientists, especially in emerging areas such as data science, machine learning, artificial intelligence, cybersecurity, and Internet of Things, there is an excellent opportunity for us to offer specialized master’s programs in these areas and as to enhance its BS to include course options in these areas.

4. **Staffing Demands.** With the growth in faculty and students, the department has experienced additional need for staff support in IT, administrative, and business areas. Models for addressing these growing needs are included in the action steps below.

5. **ABET Accreditation.** External reviewers encouraged us to pursue ABET accreditation for the BS program. Many of GSU’s peer and aspirational institutions have ABET accreditation for undergraduate CSC programs, and it is commonly expected by students and industry.

6. **Industry Relations.** While the technology industry in metro Atlanta is booming, with many companies opening large IT innovation centers, there has not been a systematic way to develop relationships with these companies. Forming strong ties with industry would be benefit both sides, as we can provide the workforce firms desperately need (e.g., internship positions, direct hires, corporate training). We can also provide faculty research expertise to companies at the cutting edge of technology, which can result in research contracts.

7. **Graduate Budget.** With continuous growth in enrollment in the undergraduate program, the need for additional GTAs keeps growing. The department now offers over 60 breakout sections of the introductory courses each semester. In addition, approximately 5 to 10 sections of 4000-level courses taught by PhD students are offered each semester, with an average of over 50 students per section. The graduate budget must be scaled up regularly in relation to enrollment growth to support all the GTAs needed to teach these sections.

**III. ACTION STEPS FOR THE COMING CYCLE**

1. **Engage an external consultant to assist with the development of a vision and strategic plan for computing research and degree programs.** The consultant will work with the program faculty to determine how best to position the department’s strengths in an ever-changing computing landscape.

2. **Engage an external consultant to determine market needs for new academic programs proposed below.** The consultant will perform market analysis and help the unit prioritize the new programs proposed in item 5 below, and help determine market pricing structures.

3. **Reorganize the unit to facilitate fulfilment of multiple goals:** In concert with the development of the strategic plan referenced in step 1 above, the department will seek to establish a School of Computing within Arts and Sciences. As part of the school model, the unit will develop research and academic areas of focus (e.g., Computer Science, Data Science, and Cyber-Physical Systems). As indicated below, new degree programs and/or
concentrations will be proposed in conjunction with the development of these areas. A division of Undergraduate Studies will also be considered to offer shared introductory courses. We seek to be a hub for computer science research and education in the southeast with a target enrollment of over 2,500 students (2,000 undergraduate and 500 graduate students) before the next APR cycle begins.

4. **Secure and develop instructional lab and student research/collaborative lab spaces:**
   a. Space for four specialized upper-division labs have been proposed with college support for the first floor of 25 Park Place. Efforts are underway to identify donor funding to renovate and build the space for these labs. Allocation of the space will be determined by the university. We expect these to be completed by AY 2018-19.
   b. The college is working with university administrators to identify space for two instructional labs for the lower-division courses. We expect these to be completed by AY 2018-19.
   c. If enrollment growth continues, additional teaching lab space will be needed by 2020-21. We have been growing by over 10% each year for the past several years, and national trends point to similar growths in the coming few years as well.

5. **Develop new academic programs in areas of strategic importance:**
   a. We are eliminating all existing BS concentrations and proposing two certificates in “Informatics” and “Cybersecurity” in AY 2017-18 (effective with the fall 2018 catalog).
   b. We will work with the college and university graduate offices to grow the new MS concentration in “Security and Privacy” through promotional efforts and recruitment.
   c. Several new degree programs are contemplated: BS/MS in Data Science, MS in Informatics (catering to students in life sciences, geosciences, humanities, and social sciences), and MS in Security/Privacy. These will be prioritized and rolled out during the next five years according to the external consultant’s recommendations (see step 2 above).

6. **Building Faculty and Research Excellence:**
   a. Two authorized Next Gen positions in Cybersecurity will be filled by Fall 2019.
   b. To staff the new degree programs, we will need at least two dedicated tenure-track teaching faculty (one teaching faculty per 30 graduate student cohort). We will pursue support for the positions through entrepreneurial efforts and external support. (The new undergraduate Major Eligibility Requirement should reduce the number of students pursuing but not completing the BS by 10-15%, improving the faculty to undergraduate student ratio.)

7. **Consider the value of pursuing ABET accreditation:** We will evaluate the merits of pursuing ABET accreditation for the BS. Analysis of pros/cons will be completed in 2018-19.

8. **Establish industry relations support infrastructure:** The department will establish an Industry Advisory Board (IAB) in AY 2017-18 to help guide the department.

9. **Intensify fundraising efforts:** The school will work with the college Development Office to increase fundraising, targeting local companies and alumni to support scholarships, laboratories, and distinguished speaker series. These efforts are already underway and will continue as unit and college priorities throughout this review cycle.

10. **Increase staff support:** If enrollments and offerings continue to grow, then three additional staff at the unit or college level will be needed in IT support, business matters, and industry relations/fundraising. We will pursue support through organizational effectiveness, entrepreneurial efforts and external support (e.g., a differential tuition model, if feasible, can provide funding support for unit personnel; donors and industry partnerships can provide support for unit operations and/or personnel.) Timelines will be determined as part of the department strategic plan referenced in step 1 above.
SIGNATURE PAGE:

Yi Pan, Chair, Department of Computer Science
Date: 11/29/17

Sara T. Rosen, Dean, College of Arts and Sciences
Date: 11/29/17

Risa Palm, Provost and Senior Vice President, Georgia State University
Date: 12-5-17