Proposal for the Merger of the Departments of Computer Science (CS) and Information and Software Engineering (ISE) of the Volgenau School of Information Technology and Engineering

March 5, 2007

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1. Introduction

The CS-ISE Transition Oversight Committee prepared this document with input from the faculty of the CS and ISE departments and from other departments in the School. This document is based on the document prepared by the Integration Review Committee (IRC) and is further expanded to provide a more complete view of the merged department. The name of the merged department will be Department of Computer Science.

The merged department will continue to offer the same programs that existed before. However, these programs will be enriched by the participation of faculty members from CS and ISE.

2. Background

The Volgenau School of Information Technology and Engineering at GMU has two related departments that perform research and teaching activities in the computing discipline: the Computer Science (CS) and the Information and Software Engineering (ISE) departments. Most ISE faculty members have Ph.D. degrees in Computer Science and publish in the same venues as the CS faculty members. There was a single department 20 years ago that evolved into the current two departments. CS has 20 tenured/tenure-track faculty members and 5 full-time instructors and ISE has 16 tenure/tenure-track faculty members. The CS faculty main areas of expertise include a) Artificial Intelligence and Knowledge Management; b) Vision, Biometrics, Graphics, and Robotics; and c) Systems. The ISE department research interests concentrate mainly in a) Software Engineering; b) Data Bases, Information Retrieval, and Data Mining; and c) Security. While these are the main concentrations, there are faculty members in each department who are active in at least one of the main areas of the other department. For example, CS has security, software engineering, and data mining experts. ISE has knowledge management and systems experts.

The CS department offers undergraduate and graduate degree programs and ISE offers graduate programs. Both departments offer a variety of graduate certificates, a joint Ph.D. degree in Computer Science, and participate in the Ph.D. in Information Technology. The web sites for CS and ISE are at: www.cs.gmu.edu and www.ise.gmu.edu.

The Dean of the School, Lloyd Griffiths, asked its Associate Dean for Research and Graduate Studies, Danny Menascé, to create and lead a process to analyze the potential benefits and drawbacks of merging CS and ISE. The overriding concerns were: enrollments reductions in these two departments—a national
trend—and the possibility to leverage the strengths of these two departments to create a new unit with significant national reputation.

3. The Process

As part of the analysis process, a committee was formed, called the CS-ISE Integration Review Committee (IRC) composed of two external members and five members internal to our school. The external members were:

- Dr. Bob Kahn, Chairman, CEO and President of the Corporation for National Research Initiatives (CNRI), recipient of the Presidential Medal of Freedom, and of ACM’s Turing Award, among others.
- Prof. Anita Jones, Professor of Computer Science at the University of Virginia, former Director of Defense Research and Engineering at the US Department of Defense, and former chair of UVA’s CS department.

The internal members were:

- Professor Hassan Gomaa, Chair and Professor in the Information and Software Engineering Department.
- Prof. Andre Manitius, Chair and Professor in the Electrical and Computer Engineering Department.
- Prof. Daniel Menasce (ex-officio), Associate Dean for Research and Graduate Studies and Professor of Computer Studies.
- Professor Ravi Sandhu, Professor of Information and Software Engineering.
- Professor Arun Sood, Professor of Computer Science and chair of the Department of Computer Science at the time the IRC met.
- Professor Harry Wechsler, Professor of Computer Science.

The IRC met during the Fall 2005 and elicited input from the faculty of CS and ISE by several means: 1) a questionnaire early on in the process to assess the initial level of support for the idea, 2) invitation to any faculty member to approach the IRC in person or by e-mail, 3) a joint CS-ISE faculty meeting, held in November 18, 2005, in which a preliminary version of a merger document, previously circulated, was discussed, 4) participation of Associate Dean Menasce in CS and ISE faculty meetings to clarify issues, answer questions, and obtain feedback.

Based on the feedback obtained in the joint meeting, the IRC produced a final document that was used as the basis for a secret vote on the merger, held on
December 15, 2005, by both faculties. Each faculty member could vote for the merger, against, or abstain. The result of the vote is shown in the following table.

<table>
<thead>
<tr>
<th></th>
<th>CS</th>
<th>ISE</th>
<th>% Of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>In favor</td>
<td>14</td>
<td>12</td>
<td>63%</td>
</tr>
<tr>
<td>Against</td>
<td>10</td>
<td>3</td>
<td>32%</td>
</tr>
<tr>
<td>Abstain</td>
<td>1</td>
<td>1</td>
<td>5%</td>
</tr>
<tr>
<td></td>
<td>25</td>
<td>16</td>
<td>100%</td>
</tr>
</tbody>
</table>

The result of the vote was communicated to Dean Griffiths who sent a memo to all CS and ISE faculty members on February 10, 2006, stating that after carefully reviewing the findings of the IRC as well as the extensive discussions that took place within the departments on this topic, he concluded that the school should begin a transition process toward a merger of the CS and ISE departments. He asked for the two departments to work towards working on all aspects of the merger.

During the Fall 2005, Associate Dean Menasce contacted several large Computer Science departments to obtain input shared with the IRC about governance issues.

A transition oversight committee, co-chaired by the chairs of CS and ISE, Profs. Sanjeev Setia and Hassan Gomaa, was created in the Spring 2006 with representation from both departments. Three other transition committees were also created: Graduate Curriculum Transition Committee, Undergraduate Curriculum Transition Committee, and Space and Infrastructure Committee. The agenda and minutes of these committees are posted on a web site and the faculties of the CS and ISE departments are invited to attend the meetings of all of these committees. A joint CS-ISE meeting was held on September 15, 2006 during which the various committees reported on their activities. At that meeting, each department made a presentation on the structure of its various degree programs.

4. Highlights of the New Merged Department

4.1 Benefits and Vision of the Merged Department

The top three benefits of the merger are:

- A combined department would be recognized as one of the top CS departments in the state and gain national reputation. Improved visibility, internal and external, will potentially lead to additional
resources and opportunities. Thus, the merger will lead to a stronger department.

- A combined department would significantly improve and diversify curriculum across the board and would potentially foster interdisciplinary research both within the department and outside it.
- The Ph.D. programs in the combined department would benefit from a diversity of research areas and from having better graduate students.

The vision for the merged department is:

- All existing programs will be continued and taken to new heights. It is expected that the BS in CS, a core program in the merged department, will be expanded by the possibility of additional offerings in new areas, which could lead to increased enrollments.
- Attract more and better students at all levels.
- Provide a comprehensive and diverse set of academic programs.

### 4.2 Faculty and Areas of Research

The merged department will have 40 faculty members including 36 tenure/tenure-track and four full-time instructors (as of the time of the writing of this proposal). This list is the union of the existing faculty in both departments. The areas of expertise covered by the faculty of the merged department include:

- Algorithms
- Biometrics
- Computer Graphics, Computational Geometry, and Physics-based Modeling
- Computer Vision and Image Processing
- Databases and Data Mining
- Distance Education
- Evolutionary Computation and Machine Learning
- Information System Security
- Knowledge Engineering
- Software Engineering
- Organizational Informatics
- Programming Languages and Compilers
- Robotics
This list of faculty members of the merged department is:

Ammann, Paul
Associate Professor, Ph.D., University of Virginia, 1988.

Aydan, Hakan
Assistant Professor, Ph. D., University of Pittsburgh, Pittsburgh, 2001
Interests: Real-Time Systems, Power-aware Computing, Fault Tolerance

Barbara, Daniel
Professor, Ph.D., Princeton University
Interests: Data Mining and Data Warehousing.

Brodsky, Alex
Associate Professor, Ph.D., Hebrew University 1991
Interests: Decision Guidance Systems and Adaptive Enterprise Optimization; Constraints in Databases, Constraint Databases and Programming; Constraints, Inference Channels and Information Sharing in Secure Information Systems

Carver, Richard
Associate Professor, Ph.D., North Carolina State University, 1989
Interests: Concurrent Programming and Computer-Based Education

Chen, Jim X.
Associate Professor, Ph.D., University of Central Florida, 1995
Interests: Computer Graphics, Visualization, Simulation, Virtual Reality, Networks, Distributed Interactive Simulation, Networked Virtual Environment

Chen, Songqing
Assistant Professor, Ph.D., College of William and Mary, 2004
Interests: distributed systems and operating systems

De Jong, Kenneth A.
Professor, Ph.D., University of Michigan, 1975
Interests: genetic algorithms, evolutionary computation, machine learning, adaptive systems

Domeniconi, Carlotta
Assistant Professor, Ph.D. University of California Riverside, 2002
Interests: Machine Learning, Pattern Classification, Data Mining, Neural Networks.

Duric, Zoran
Associate Professor, Ph.D. University of Maryland, 1995
Interests: Computer Vision, Video Image Processing, Human-Computer Interaction, Vision Based Control, Physics Based Modeling
Gomaa, Hassan
Professor, Ph.D., Imperial College, London, 1976
Interests: Software Engineering, real-time and distributed software design, software product line architectures, software performance engineering, software agents.

Jiang, Xuxian
Assistant Professor, Ph.D., Purdue University, 2006
Interests: System and Network Security, Virtualization Technology, and Distributed Computing

Kerschberg, Larry
Professor, Ph.D., Case Western Reserve University, 1969

Košcká, Jana
Associate Professor, Ph.D. University of Pennsylvania, 1996
Interests: Computer Vision, Robotics, Image Based Rendering, Image Processing, Autonomous Mobile Agents, Hybrid Systems

Lien, Jyh-Ming
Assistant Professor (Joining in Spring 2007)
Interests: Computational Geometry, Multiagent Systems, Motion Planning, Computer Graphics

Lin, Jessica
Assistant Professor, Ph.D., University of California at Riverside, 2005
Interests: Data mining, machine learning, time series visualization, streaming data and anomaly detection.

Luke, Sean
Associate Professor, Ph.D. University of Maryland, College Park, 2000
Interests: Evolutionary Computation, Multiagent Systems, Distributed Knowledge Representation, Robotics, and Virtual Biology

Maddox, Tamara
Instructor, J.D., College of William and Mary, 1991
Interests: Intellectual Property, Artificial Intelligence, Computer Law and Ethics

Maney, Tucker
Instructor, D.A. (Education), George Mason University
Interests: conversational case-based reasoning systems

McFunkin, Martha
Instructor, J.D. George Washington University, M.A., George Mason University
Interests: robotics, net programming, middleware

Menascé, Daniel A.
Professor, Ph.D., UCLA, 1978, ACM Fellow, Senior Member IEEE, Member IFIP WG 7.3
Interests: Autonomic Computing, E-commerce, Scalability and Reliability of Web Services and E-commerce Sites, Analytic Performance Modeling, Software Performance Engineering, Distributed Systems

Motro, Ami
Professor, Ph.D., University of Pennsylvania, 1981
Interests: User interfaces to databases, Uncertainty Management in Information Systems, Integrity and Security of Databases, Multiple Database Environments.

Nordstrom, David
Instructor, Ph.D. University of California (Berkeley), 1976
Interests: Computer Security, Programming Languages

Offutt, Jeff
Professor, Ph.D., Georgia Tech, 1988

Pullen, J. Mark
Professor, D.Sc., George Washington University, 1981, IEEE Fellow, ACM Fellow
Interests: Networks and distributed applications, distributed education and training

Richards, Dana
Associate Professor, Ph.D., University of Illinois, 1984
Interests: Comparisons of protein sequences, Steiner tree algorithms, Information dissemination in networks, Parallel algorithms for median filters

Sandhu, Ravi
Professor, Ph.D., Rutgers University, 1983
Interests: Security Models, Database Security, Network and Distributed System Security

Setia, Sanjeev
Associate Professor, Ph.D., University of Maryland, 1993

Sibley, Edgard H.
University Professor, Sc.D., MIT, 1967, Eminent Scholar
Interests: Information Systems Policy, Organizational Informatics.
Simon, Robert
Associate Professor, Ph.D., University of Pittsburgh, 1996
Interests: Computer Networks, Distributed Multimedia and Real-time Systems, Computer-Supported Cooperative Work, Performance Modeling and Simulation, Multimedia Databases and Video-on-Demand Systems

Sood, Arun
Professor, Ph.D., Carnegie Mellon University, 1971
Interests: image processing, parallel computing

Sousa, Joao P.
Assistant Professor, Ph.D., Carnegie Mellon University, 2005
Interests: Software Architecture, Artificial Intelligence, Self-aware/adaptive Systems and Human Factors for Ubiquitous computing.

Tecuci, Gheorghe
Professor, Ph.D., University of Paris-South, 1988, Ph.D., Polytechnic Institute of Bucharest, 1988
Interests: Artificial Intelligence, intelligent agents, machine learning, knowledge acquisition and problem solving, knowledge engineering, applications of artificial intelligence.

Wang, Pearl
Associate Professor, Ph.D., University of Wisconsin, 1983
Interests: parallel and distributed computing

Wang, Xinyuan (Frank)
Assistant Professor, Ph.D., North Carolina State University, 2004
Interests: Network Security, Intrusion Source Tracing, Active Intrusion Response.

Wechsler, Harry
Professor, Ph.D., University of California, Irvine, 1975, IEEE Fellow, IAPR Fellow
Interests: biometrics, computer vision, data mining, HCI, intelligent systems, machine learning

White, Elizabeth
Associate Professor, Ph.D., University of Maryland, 1995
Interests: software architecture, middleware, distributed computing, interoperability, dynamic reconfiguration

Whittle, Jon
Associate Professor, Ph.D., University of Edinburgh, 1999
Interests: Software engineering, software modeling and domain-specific methods for software engineering

Wijesekera, Duminda
Associate Professor, Ph.D. in Logic, Cornell University, 1990, Ph.D. in Computer Science, University of Minnesota, 1998
Interests: Security, multimedia, networks, control and signalling (telecom, railway and SCADA, defensive missiles), web and Logic in computer science.

Zhong, Yutao
Assistant Professor, Ph.D., University of Rochester, 2005
Interests: program analysis and optimization, compilers.

Two faculty members retired recently from the CS department and are listed as Emeriti faculty. They are:

Hamburger, Henry
Professor (Emeritus), Ph.D., University of Michigan, 1971
Interests: intelligent tutoring systems

Rine, David
Professor (Emeritus), Ph.D., University of Iowa, 1970
Interests: software engineering, software maintenance and reuse, object technology

One faculty member retired recently from the ISE department and is also listed as Emeritus faculty.

Baum, Richard
Professor (Emeritus), Ph.D., University of Michigan, 1969

4.3 Governance and Organizational Model

A Chair, who in turn may appoint Associate and Assistant Chairs to manage specific functions, will manage the new department. The department will have a Graduate Studies committee and an Undergraduate Studies committee.

Each degree program will have a Program Committee chaired by a Program Coordinator. Some of these committees may be combined for efficiency.

The Ph.D. Program Committee will oversee the Ph.D. in CS degree as well as the specializations in Software Engineering, Information Security and Assurance, and Information Systems of the Ph.D. in IT degree.

The Graduate Studies committee includes the coordinators of the MS in CS, MS in SWE, MS in ISA, MS in IS, and Ph.D. committees in addition to at least two and at most four faculty members appointed by the chair of the department.
4.4 Degree Programs

The merged department will offer the following degree programs, which were already offered before.

- **Undergraduate Programs**
  - BS in Computer Science
  - BS in Applied Computer Science

- **Master of Science Programs**
  - MS in Computer Science
  - MS in Information Systems
  - MS in Software Engineering
  - MS in Information Security and Assurance

- **Graduate Certificate and Post Bachelor Programs**
  - Graduate Certificate in Biometrics
  - Graduate Certificate in Computer Networking
  - Graduate Certificate in Database Management
  - Graduate Certificate in Data Mining
  - Graduate Certificate in E-Commerce
  - Graduate Certificate in Information Engineering
  - Graduate Certificate in Information Security & Assurance
  - Graduate Certificate in Intelligent Agents
  - Graduate Certificate in Software Engineering
  - Graduate Certificate in Web-based Software Engineering
  - Post Bachelor in Computer Science

- **Doctoral Programs**
  - PhD in Computer Science
  - Tracks in the PhD in IT:
    - Information Systems
    - Software Engineering
    - Information Security Assurance

The MS in Information Security and Assurance and the MS in Computer Science were recently re-designed in order to take into account courses offered by both departments. Grad Council already approved these changes in the Fall 2006. For all other programs, we refer the reader to the current catalog version. As with any existing department, smaller course modifications and revisions will take place regularly. As a consequence of the merger, the following changes may occur and are being analyzed by the newly created joint Undergraduate Studies Committee and Graduate Studies Committee:

- **Removal of duplicated courses.** CS and ISE offer similar courses in the areas of networking, operating systems, and databases.
- **Consolidation of senior level undergraduate with corresponding graduate level courses.** The committees are looking into the possibility of cross-listing
these courses as graduate and undergraduate (e.g., CS 471/571) given that they cover very similar content at about the same level of difficulty. This is already being done in many universities.

- **New course offerings at the undergraduate level.** Faculty members from the ISE department will be teaching undergraduate courses in the new department’s undergraduate programs. New courses, in areas not widely covered by the CS department, will be introduced at the undergraduate level. Some examples are Security, Data Mining, and a richer offering of Software Engineering courses. This will make the BS in CS more attractive and is expected to increase enrollments.

The Ph.D. in CS program went through a serious revision by the Ph.D. in CS committee that now has an equal representation from CS and ISE and from many areas of expertise. The changes were approved unanimously at a recent joint meeting of the CS and ISE departments. Issues addressed in the revision include admission requirements, admission process, program structure, and recruitment of quality students. The merger will present to the outside world a much stronger department covering a wide-range of areas that are typically covered by the best departments in the country. This, coupled with an effort to offer funding to the majority of accepted students, will help us to recruit better students. Grad Council approved the changes to the Ph.D. in CS in the Fall 2006.

Programs are maintained (i.e., proposed modifications to the curriculum and to degree requirements) by their Program Committees. All changes are referred by the Program Committee to the appropriate Graduate or Undergraduate Studies Committee and then to the entire department faculty for approval.

### 4.5 Teaching Load

The merged department will adopt a uniform teaching load for tenured/tenure-track faculty, which says that everyone must teach four courses per AY including at least one undergraduate course and at most two advanced/low enrollment graduate courses.

### 4.6 Promotion and Tenure

Promotion and tenure will be governed by the faculty handbook that requires a vote of the entire tenured faculty or of the tenured full professors as appropriate. The following *grandfather clause* will be adopted: faculty members of the CS and ISE departments who are to be considered for tenure and/or for promotion will have the choice of being first evaluated by a subcommittee consisting of members of their department of origin if they were hired on or before the Fall 2005 semester. The final vote has to be carried out by the entire faculty according
to the faculty handbook. However, it is expected that the entire faculty will respect the vote of the department of origin. This provision will expire at the end of the summer of 2011.

4.7 Hiring of New Faculty

The hiring process will be governed by the faculty handbook, which requires faculty appointments to any local academic unit require the concurrence of that unit's faculty. The department will determine by consensus areas of hiring priority to the department. These will be discussed and approved by the Dean. A departmental search committee will be formed with most of the members from the areas being advertised in the priority list. All faculty members of the department will be invited to provide input during the search process. Final ranking and offer decisions within the department will be made with full participation of all faculty members.

5. Relationship With Other Departments

Departments in the school are represented in various committees at the school-level: P&T, Grad Studies, Undergraduate Studies, and Research Council. The proposal is to initially maintain the same level of representation model for all existing school-level committee.