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Software Engineering Institute

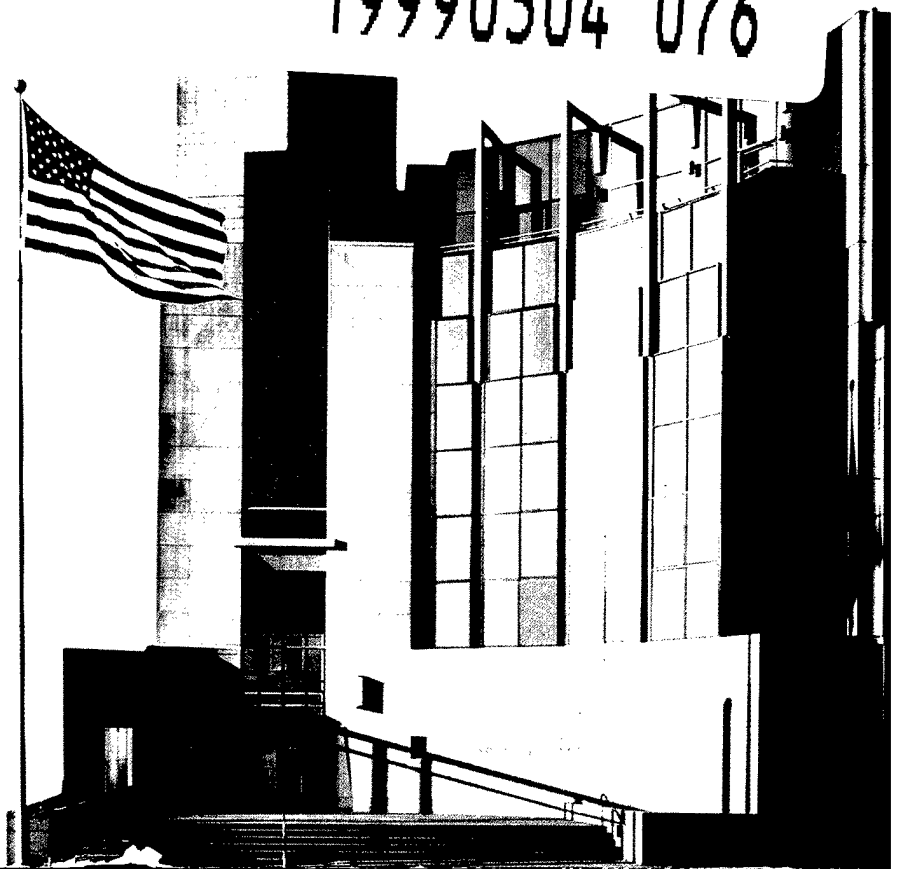
Directory of Industry and University Collaborations with a Focus on Software Engineering Education and Training, Version 7

Kathy Beckman,
Abacus Technology Corporation

February 1999

19990304 076

SPECIAL REPORT
CMU/SEI-99-SR-001



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Carnegie Mellon
Software Engineering Institute
Pittsburgh, PA 15213-3890

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Community Sector

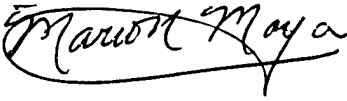
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SEI Joint Program Office
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Mario Moya, Maj, USAF
SEI Joint Program Office

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Abstract

This directory describes 23 formal collaborative efforts to promote software engineering education and training activities among industry organizations (including government) and universities in the United States, Canada, and Australia. These collaborations vary in their organizational structure and types of services offered. All attempt to bridge the gap between industry needs and academic software engineering education and training offerings. Readers can use this directory to find collaborations that match their software engineering and training needs and that are located in their geographic area.

1 Introduction

Universities and industry collaborate in many different ways. For purposes of this directory, an industry/university collaboration is a formal, joint effort by a university (or universities) and a business or government organization(s), where each party provides specified products and services to achieve common goals. Examples of collaboration included in this directory are described below:

- University collaborates with industry or government to develop and deliver courses (credit or non-credit) at an industry or government site.
- University and industry organization(s) collaborate to market and deliver public and/or customer-site software engineering training.
- University(ies) develop and deliver a certificate or degree program for an industry/government organization or group of organizations, guided by an Industry Advisory Board or equivalent.
- A university, or center, affiliated with a university, provides software engineering education and training activities (classes, seminars, forums, conferences) to members for an annual membership fee, guided by an Industry Advisory Board or equivalent.
- In collaboration with university and industry participants, a non-profit organization (e.g., a Software Process Improvement Network) organizes software engineering education and training activities.

There are many other industry/university interactions not considered collaborations for purposes of this directory. These include

- individual employee taking university courses reimbursed by the employer
- students doing “real-world” work for industry as their course projects
- industry funding summer internships for faculty or students
- university hiring adjunct faculty from industry or government organizations

This directory contains information on 23 formal collaborative efforts to promote software engineering education and training, usually within a specific geographic area. It allows the reader to locate an existing group with which to interact as a potential member, supporting university, or commercial provider of training services. The directory provides brief descriptions of currently identified collaborations, including their goals, organization, membership, software engineering education and training activities, and points of contact.

The groups described vary in their organizational structure and in the types of services they provide, but all groups have active university and industry representation. Some groups

merely share information and experience; others offer software engineering classes to members and non-members for a fee. Obtaining cost-effective education on timely software engineering topics, designed to specification and delivered locally, is often difficult for a single organization, but when organizations pool resources and share classroom seats, costs go down. A nearby university typically serves as the group facilitator and coordinates class offerings. These offerings may be for university credit, be part of a certificate program, or carry continuing education units (CEUs).

For a software organization, the directory points to geographically convenient collaborations. If none are available locally, the descriptions of existing collaborations may serve as a model for the formation of a local group. The more established groups and their identified points of contact can serve as models to emerging groups, providing examples of goals, organization structure, charters, fee arrangements, and other pertinent information.

For colleges and universities, the directory highlights a potential business opportunity and a way to become more involved in the local industrial and government community. The points of contact from universities are experts in techniques for organizing local efforts.

For training providers, the directory can serve as a pointer to potential new client bases.

A short bibliography points the reader to background material on software engineering curricula, coalitions in other countries, Software Process Improvement Networks (SPINs), and the Capability Maturity Model[®] (CMM[®]) for Software [Paulk 95], developed by the Software Engineering Institute (SEI), and its key process areas (KPAs). These topics are relevant to the discussion of the goals of the collaborations.

[®] Capability Maturity Model and CMM are registered in the U.S Patent and Trademark Office.

2 Geographical Data

The following lists the location of the university and industry collaborations described in this directory.

2.1 United States of America

California

California State University, Long Beach Systems & Software Engineering Forum for Training (page 12)

University of California, Santa Cruz (page 46)

University of Southern California Center for Software Engineering (page 52)

District of Columbia

American University (page 7)

Florida

Embry-Riddle Aeronautical University Software Center (page 20)

Florida Atlantic University (page 22)

University of South Florida (page 54)

Maryland

University of Maryland University College (page 49)

Nebraska

Applied Information Management (AIM) Institute (page 9)

New Jersey

Monmouth University (page 25)

New York

Computer Applications and Software Engineering (CASE) Center at Syracuse University
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Texas

Alliance for Higher Education (page 5)

Research Institute for Computing and Information Systems (RICIS) (page 29)

Software Quality Institute (page 35)

Texas Tech University (page 40)

University of Texas at Austin (page 57)

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Melbourne

Software Engineering Research Centre (SERC) (page 31)

2.3 Canada

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Software Productivity Centre (page 33)

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Consortium for Graduate Education in Software Engineering (ConGESE) (page 16)

Consortium for Software Engineering Research (CSER) (page 18)

Quebec

Quebec Master's Program in Software Engineering (page 27)

Saskatchewan

Software Technology Centre (page 37)

3 Information on Collaborative Efforts

Alliance for Higher Education Dallas, Texas (U.S.A.)

The Alliance for Higher Education creates partnerships between academic and corporate communities to respond to the educational demands of business, industry, and government and to facilitate cooperative activities. It began its mission in 1967 with The Association for Graduate Education and Research (TAGER) television network, which brings higher education to the workplace. The Dallas chapter of the Software Process Improvement Network (SPIN), in conjunction with the Association for Software Engineering Excellence (ASEE), is working to provide software engineering education over the TAGER network.

Organization

The Alliance for Higher Education is a not-for-profit, non-government agency. It is directed by a board of trustees. Presidents and chancellors of member academic institutions provide direction through the Council of Presidents.

Membership

There are three categories of membership:

1. Principal participants are colleges and universities, currently numbering about 30.
2. Associate participants are institutions, agencies, or companies that are substantial users of Alliance services.
3. Service subscribers participate in Alliance services.

All membership categories have a membership approval process. There is a fee structure for membership.

Software Engineering Education and Training Activities

Influenced by both the Dallas SPIN and SEI curriculum guidelines, Southern Methodist University, Texas Christian University, and The University of Texas at Arlington offer graduate courses in software engineering over the TAGER network. The Alliance produces a course catalog.

Point of Contact for Further Information

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[Last updated November 1997]

American University (AU)

Washington, D.C. (U.S.A.)

American University in Washington, DC, in cooperation with the Center for Systems Management (CSM) in San Jose, Calif., offers a Graduate Certificate Program in Systems and Project Management (SPM). This collaboration began in January 1996. The SPM Certificate program addresses current and emerging project and management issues related to the orderly and controlled analysis, design, development, implementation, operation, maintenance, and replacement of systems of all types. The courses involved are focused on those organizational functions and processes usually thought of as management (e.g., planning, organizing, controlling, training, budgeting, and business administration), supplemented with those functions that are traditionally considered as technological (e.g., process improvement, system economics, human factors, telecommunications, systems analysis and design, and legal and ethical issues). The concepts of process maturity and continuous process improvement have been infused into the entire curriculum.

The certificate curriculum is centered around four CSM-developed courses designed for software development and maintenance project managers and team members. The curriculum includes a selection of courses from the university's Department of Computer Science and Information Systems (CSIS), and the Kogod College of Business Administration. The program provides 15 graduate-level credits and a Certificate of Systems and Project Management for students who successfully complete the program. This includes three required and two elective courses of three credit hours each. All of the courses are taught by full-time or adjunct faculty of AU. Non-credit offerings with a certificate of completion are also available. In addition to the SPM certificate, the university offers graduate certificates in information systems, computer science, and information resource management. Special one- or two-day training sessions covering specialized aspects of the subjects listed above are also made available through this cooperative program. These are delivered by CSM/AU faculty members as special assignments. Such courses have been presented in Europe, in the Far East, and South America in the past year.

Organization

This cooperative venture is governed by a joint memorandum of understanding that defines the roles and relationships of the parties involved: two elements of American University (the College of Arts and Sciences, Department of Computer Science and Information Systems, and the Kogod College of Business Administration) and the Center for Systems Management. Under this agreement, all course offerings are arranged through the university, with CSM providing the CSM courses under contract. All instructors are full- or part-time university faculty. The program is managed by the Department of Computer Science and Information Systems.

Membership

American University is an independent, coeducational university with more than 11,000 students enrolled in undergraduate, master's, doctoral, and professional degree programs. The university provides many different types of adult and continuing education programs designed for the working professional. The Center for Systems Management, located in San Jose, California, is a training and mentoring organization of experienced project managers. CSM provides courses in project management, systems engineering, software process improvement, project business management, and integrated product teams to government agencies and project-dependent companies.

Participants in the Graduate Certificate Program are typically funded by their organizations. Organizations that have participated in the program include Lucent Corporation sites in New Jersey, Georgia, and Missouri, and the Defense Intelligence Agency in Washington, DC. Participation with AT&T in Virginia and with a training consortium of high-tech companies in Northern Virginia is currently being negotiated.

Software Engineering Education and Training Activities

The program is offered at client sites and on campus to individuals and to groups from corporations, government agencies, and other organizations. (For us, "distance learning" means delivery of live, platform training to any place in the world where we can assemble a class. Courses are typically presented in a compressed format (i.e., five full days of instruction for a three-credit course, all in one week or over three weekends). Admission to this program is limited to students who can present evidence of experience that demonstrates a foundation of basic knowledge of systems and project principles and practices. The experience may include course work or work experience obtained within the past seven-year period prior to admission to the program. One- or two-day training sessions are offered by CSM on request.

Point of Contact for Further Information

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Applied Information Management (AIM) Institute

Omaha, Nebraska (U.S.A.)

The AIM Institute is a membership organization promoting business growth related to information technology. The mission of the AIM Institute is to provide information technology leadership to the greater Nebraska community by focusing and coordinating the resources of its educational, government, and private business partners.

Organization

It is increasingly evident that the economic health of a firm, industry, state, region, or even an entire economy is dependent upon information technology strategies. In the coming era, networking and other information technologies that connect individuals and firms into local, regional, national, and international markets will be essential to sound economic growth and development.

Equally important is the development of an intellectual infrastructure to prepare the knowledge workers of tomorrow. More important than additional fiber optics is an understanding of access techniques and available opportunities.

The Omaha community, seeking insight into how to maintain and strengthen the city and state business environment, commissioned several studies during the 1989-1991 period. All of these studies documented the need to bring focus to the area's information infrastructure.

The Omaha business community, with the full cooperation of the educational and government sectors, decided to create an institute to help make Omaha "one of a handful of preeminent national information centers." Thus the AIM Institute was created to improve Omaha's already enviable position as a world communication leader.

The vision, agenda, and direction for each of the primary activities of AIM are developed and refined through continual interaction with business, technology, and academic leaders. Among the services provided by AIM are continuing education opportunities, support for academic curriculum development, employment services, facilitation of cooperative industry-university applied research, and assistance with new business development.

Membership

The AIM membership categories are corporate, educational, and other. The entire community profits as AIM members achieve common objectives. Corporate contribution is evolving into a benefit-based membership, providing direct value or service to the member, while strength-

ening the Nebraska information technology environment. Specific benefits to AIM members are

- discounts on continuing education
- access to relevant college accredited courses
- reduced out-of-state travel
- increased staff preparedness, improved staff retention
- student and faculty internship placement
- employee recruitment assistance
- participation in setting AIM direction
- support for post-secondary education

Corporate memberships are available, ranging from \$1,000 to \$25,000 annually. New members are always welcome. Funding is provided through annual memberships, grants, and fees from seminars. Opportunities for state, federal, and private funding are continuously explored.

Software Engineering Education and Training Activities

AIM supports education in information technology through the following activities:

- continuing education. This consists of seminars and training courses covering telecommunications, computer issues, business processes, and other topics. These programs maintain and improve the skill level of the workforce.
- curriculum development. This supports colleges in the development of curricula that address emerging communication and information technology issues to better prepare students for the workplace. Through forums for business and academia to exchange ideas, educators develop a greater understanding of business needs and firms gain insight from faculty.

Point of Contact for Further Information

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Applied Information Management (AIM) Institute

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[Last updated November 1997]

California State University, Long Beach Systems & Software Engineering Forum for Training

Long Beach, California (U.S.A.)

Formed in September 1993, the California State University, Long Beach (CSULB) Systems & Software Engineering Forum for Training (SSEFT) is a training partnership among companies in the Long Beach, Los Angeles County, and Orange County areas. CSULB SSEFT provides high-quality, cost-effective, needs-driven training in software engineering process improvement and management practices to employees of member companies. Membership in the consortium provides the opportunity to influence and guide the training curriculum.

A new initiative in 1999 will be to further incorporate systems-related issues into the courses offered. SEFT has recently changed its name to Systems & Software Engineering Forum for Training (SSEFT). The name change resulted from an Executive Board request to change the collaboration's mission, reflecting the changing needs of the members.

Organization

SSEFT has an advisory executive board and a technical committee that consists of representatives from member companies and CSULB. The Executive Board is the policy-making body, and the Technical Committee develops curricula and assists the board. SSEFT is administered by University College and Extension Services and has a charter and documented operating plan.

Membership

Members of SSEFT include The Boeing Company, Northrop Grumman Corporation, and TRW. Funding of SSEFT is largely supported by annual memberships. Membership fees are applied directly to the training that companies receive. Members have seats on the Executive Board and the Technical Committee, priority access to training at a reduced membership rate, and direct input into the selection of course topics, curriculum, and schedule.

Software Engineering Education and Training Activities

Following a thorough needs assessment, course topics and objectives are identified, and detailed course outlines are reviewed, modified, or written. Potential instructors are solicited to begin customizing the courses. SSEFT works with training providers, faculty from the Computer Engineering and Computer Science Department on campus, and instructional design professionals to design and develop curriculum.

Courses cover subject areas related to software process improvement, for example, computer-aided software engineering tools, software configuration management, software metrics, software risk management, software testing, and ISO (International Organization for Standardization) 9000. Courses are open to the public. University College and Extension Services has extensive mechanisms, such as videoconferencing and Web technology, for delivering distance education.

Point of Contact for Further Information

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Computer Applications and Software Engineering (CASE) Center at Syracuse University Syracuse, New York (U.S.A.)

The CASE Center at Syracuse University is one of New York State's original Centers for Advanced Technology (CATs). Initiated in 1983, the CAT program represents a creative partnership among universities, industry, and government designed to accelerate the development of commercially relevant technologies. Key goals are increased industrial productivity, a strengthened technological infrastructure, and more effective technology transfer, all helping to spur economic growth.

Organization

The CASE Center is managed by its director, Robert R. Birge, and its managing director, Eugene Woodcock. Faculty researchers, university administrators, and CASE staff assist the directors with industrial liaison, technology transfer, and outreach programs. More than 60 faculty members from a dozen academic departments and campus organizations are affiliated with the center. The CASE Center's research program emphasizes four major technical areas: high-performance distributed computing systems, information systems design, optical and molecular computing, and applied computing. Each area involves development and enhancement of computer software. Information systems design focuses specifically on developing tools and methods for improving the quality of software through such techniques as software metrics and formal methods, object-oriented methods, neural networks, associative processing, and parallel software. The center operates several specialized laboratories, including the Software Engineering Lab, Open Systems Cluster, and ATM Distributed Computing Lab, which support research, technology transfer, and advanced training activities. Research results are disseminated through conferences, workshops, seminars, demonstrations, and special events. Publications include technical reports, a newsletter, and informational materials.

Membership

In addition to federal grants and seed funding from the New York State Science and Technology Foundation, the CASE Center has received funding from over 120 companies, universities, and government organizations, the majority of them operating within New York. The center conducts joint research with industry and other outside sponsors. The center also provides technical consulting, access to computer facilities and special information systems, laboratory interactions, and specific technical services.

Software Engineering Education and Training Activities

The CASE Center offers a variety of educational opportunities for both college students and corporate personnel. Dozens of qualified graduate students are supported on research assistantships every year, and company employees enrolled in graduate degree programs frequently participate in collaborative research with CASE faculty. To introduce the most recent scientific advances to the commercial sector, the center regularly sponsors short courses, tutorials, and other technical sessions targeted to business and industry. Laboratories provide hands-on training and practical applications of theoretical concepts.

Point of Contact for Further Information

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[Last updated November 1997]

Consortium for Graduate Education in Software Engineering (ConGESE)

Ottawa, Ontario (Canada)

ConGESE provides education specially structured for software professionals in Ontario industries, leading to a master's degree in computer science, with an emphasis in software engineering. Each of six participating universities offers courses in this program. The courses are typically offered on site with cooperating industrial sponsors and are designed for the working professional, who might otherwise find it difficult to attend regular, on-campus graduate programs. ConGESE is responsible for maintaining the curriculum and administering the program and course delivery. Degree granting rights rest with the participating universities.

Organization

ConGESE is governed by a committee structure composed of an Executive Board, Academic Steering Committee, and Industry Steering Committee. Curriculum issues are handled by the Curriculum Committee. Additionally there is a Technology and Continuing Education Committee and a Promotion and Funding Committee. Committee responsibilities are shared across the participating universities and companies.

Membership

The universities participating in ConGESE are all those that grant PhD degrees in computer science in Ontario. The participating universities are listed below:

- Carleton University
- Queen's University
- University of Ottawa
- University of Toronto
- University of Western Ontario
- University of Waterloo

Industrial participation started with substantial support from the IBM Toronto Laboratory and Bell Northern Research Ltd. The ConGESE program is financially supported by the Information Technology Research Centre, an Ontario Centre of Excellence.

Software Engineering Education and Training Activities

The four areas listed below make up the technical core of software engineering courses:

1. requirements and specification
2. architecture and design
3. reuse and maintenance
4. verification and testing

The other areas listed below round out the coverage of software engineering:

- application classes and software technology support
- management of people, products, projects, and processes

Point of Contact for Further Information

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[Last updated November 1997]

Consortium for Software Engineering Research (CSER)

Ottawa, Ontario (Canada)

Formed in March 1996, the Consortium for Software Engineering Research (CSER) is a not-for-profit partnership between Canadian industrial and university members together with the National Research Council, Canada. The industry-directed research program will seek to improve and expand the methodologies, tools, and techniques used to construct, deploy, support, and evolve software; improve the quality of software; increase productivity; and manage costs. The following two benefits should be immediately realizable:

- a greater appreciation among the university community of key software engineering problems experienced by industry
- the context relevant to evaluating proposed solutions, including industrial strength tools, mega-line proprietary code bases, field feedback data, and constraints such as best solution by fixed date instead of best solution possible

Our hope is that this consortium will lead to more relevant and timely educational programs in software engineering at Canadian universities.

Organization

CSER is governed by a Board of Directors, which is composed of industry and academic representatives, with industrial voting majority. The research work is grouped into themes, which in turn are each led by a theme steering committee, again composed of researchers from industry, government, and academia. The initial research theme is "Empirical Evolution of Legacy Code to Modern Architectures." The membership is expected to grow to at least three themes by 1998. The interaction between theme projects and the promulgation of the research results will be stimulated by the creation of a demonstration center at the Institute for Information Technology of the National Research Council.

Membership

Current members of CSER include Centre for Advanced Studies IBM Canada (Toronto), Nortel Technology (Ottawa), Object Technology Inc. (Ottawa), Mitel Corporation (Ottawa), and Bell Canada (Montreal) working together with the researchers from University of Toronto, University of Victoria, University of Waterloo, Acadia University, University of Montreal, and University of Ottawa. The research is funded by direct contribution of industrial partners and grants from NSERC (Natural Sciences and Engineering Research Council), Canada's largest research-granting council.

Software Engineering Education and Training Activities

CSER does not offer courses. However, demonstrable evidence of its impact on educational activities in software engineering in the universities (e.g., case studies and influence on course material) is a condition of the funding.

Points of Contact for Further information

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[Last updated November 1997]

Embry-Riddle Aeronautical University

(ERAU) Software Center

Daytona Beach, Florida (U.S.A.)

The Embry-Riddle Aeronautical University Software Center is an umbrella organization encompassing software engineering education and research activities. The center serves as a research and learning laboratory, combining applied research in software engineering and advanced practices in software engineering education. The objectives of the center are to

- provide an experiential learning environment for software engineering students that prepares them for the industrial needs of their future employers
- conduct research that contributes to the advancement of software engineering practices

Organization

The center is an arm of the ERAU Computer Science Department. An Industry Advisory Board provides guidance to the department with regard to curriculum and research activities.

Membership

The center works in collaboration with the Software Engineering Institute (SEI) for its “doing quality work” initiative and with Motorola Paging Group to establish the practice of the Personal Software ProcessSM (PSPSM). Both efforts promote the PSP, which is aimed at helping software engineers perform their work better by following a defined individual process.

Software Engineering Education and Training Activities

The application domain of software engineering education at ERAU is aviation and aerospace. The department offers two degree programs: a bachelor’s degree in computer science with a strong emphasis on software engineering and a master’s degree in software engineering. The Master of Software Engineering Program includes a choice of one of two areas of specialization: real-time systems and software process. The PSP course is required in both areas of specialization. It teaches a new and more disciplined way to practice software engineering at an individual level.

During the 1995-96 academic year, the Computer Science Department experimented with a new approach to teaching its first two courses in the undergraduate curriculum. Called “Doing Quality Work,” the new approach is a joint effort between the computer science faculty and Watts Humphrey of the SEI. Practices of top software development organizations are integrated into the software engineering students’ earliest courses. In Computer Science I, 10

SM PSP and Personal Software Process are service marks of Carnegie Mellon University.

lectures (15 to 20 minutes each) on time management, scheduling, and planning are introduced. The students are required to keep a software engineer's notebook containing time logs and scheduling and planning documents. In the following term, 10 additional short sessions are introduced in Computer Science II. The additional sessions of both courses focus on software defect management.

A collaborative project is underway between the Motorola Paging Group and ERAU to insert PSP practices into the Motorola Paging Group's software development process. The elements of the cooperative effort are training, tracking, coaching, and community building. The purpose of the work is to demonstrate quantitatively the benefits of practicing the PSP in an industrial setting.

Point of Contact for Further Information

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[Last updated November 1997]

Florida Atlantic University (FAU)

Boca Raton, Florida (U.S.A.)

The Florida Atlantic University Computer Science and Engineering (CS&E) Department and members of its Industry Advisory Committee recognized a need to establish an extensive graduate education effort in software engineering. Through a combination of video presentations produced by the Software Engineering Institute (SEI) and FAU-produced live lectures, a series of six graduate-level software engineering courses was offered consecutively at six university and industry sites in southeast Florida during 1990 and 1991, and in a limited fashion until April 1993. The courses were fully funded by the participating industries. On January 16, 1992, 59 students were awarded certificates in software engineering for successfully completing at least 5 of the 6 courses. By the spring of 1993 term, over 250 students had taken at least one course. The article "Current Practices, Culture Changes, and Software Engineering Education" provides details on this extended program [Coulter 94].

Since this successful program, FAU has expanded its internal offerings through the statewide Florida Engineering Educational Delivery System (FEEDS). Through FEEDS, courses are offered remotely by videotape and live broadcast, and locally in standard lecture format, to subscribing sites and on-campus students. Beginning in 1995, the FAU CS&E Department approved and implemented a software engineering option within its existing master's programs. Many of the courses are offered through FEEDS.

Organization

The FAU CS&E Department formed the Industry Advisory Committee to help the department identify and meet the needs of the large computing-based industry in southeast Florida. During the advisory committee's initial meetings, the need for extensive graduate software engineering courses for employees quickly emerged as the top issue. While FAU offered software engineering courses as part of its graduate programs, it was not prepared to offer the variety and number of courses that were needed immediately without more financial assistance and faculty. FAU contracted with the SEI to obtain a set of video-based courses to be delivered by FAU faculty.

Membership

The following research and development firms having headquarters or major plants in southeast Florida and are members of the FAU CS&E Department Industry Advisory Committee: Allied Signal, CITRIX, Encore Computer Corporation, Harris, IBM, Motorola, Sensormatic, Siemens Telecom, and United Technologies.

Software Engineering Education and Training Activities

The courses taught between 1990 and 1993 in association with the SEI were Software Project Management, Software Verification and Validation, Software Design, Software Creation and Maintenance, Software Specification, and Software Systems.

During the 1997-98 academic year, FAU offered a number of courses to employees of companies including Harris, IBM, Motorola, Racal-Datacom, Siemens, Pratt and Whitney, Encore, Allied Signal, and Sensormatic. The courses offered were Software Engineering, Object-Oriented Software Design, Formal Specification Methods, Software Engineering Measurements, Real-Time Software, Systematic Software Reuse, and Software Process Improvement

FAU now offers a software engineering graduate specialty track in the MS degree program. Students must take at least two courses from each of the groups shown below, as well as additional course and thesis work.

Group 1: Fundamentals

- Object-Oriented Software Design
- Formal Aspects of Computer Science and Engineering
- Software Testing
- Software Requirements Engineering

Group 2: Development

- User Interface Design
- Computer-Aided Software Engineering
- Formal Methods
- Advanced Topics in Object-Oriented Design

Group 3: Quantitative and Experimental

- Software Engineering Measurements
- Software Reliability Engineering
- Model-Based Simulation
- Computer Performance Modeling

Point of Contact for Further Information

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Monmouth University, West Long Branch, NJ (U.S.A.)

CECOM Software Engineering Intern Program

Since 1987 the Software Engineering Center of the U.S. Army's Communications-Electronics Command (CECOM) at Fort Monmouth, NJ has conducted the CECOM Software Engineering Intern Program in conjunction with the Software Engineering Department of Monmouth University.

Organization

Headed by its director, Dennis Turner, the Software Engineering Center is responsible for supporting over 60% of the Army's software systems (battlefield as well as information systems). The Software Engineering Program at Monmouth University was one of the first such programs established in the United States. Headed by its chairperson, Jorge Diaz-Herrera, the Software Engineering Department at Monmouth University offers an MS in Software Engineering consisting of 36 credits including a team-based, 6-credit software engineering practicum (capstone project).

Membership

Not applicable

Software Engineering Education and Training Activities

The objective of the intern program is to prepare interns to perform at a proficient level in software engineering at Army installations through a combination of formal education and "hands-on" training in software development and management. The intern program spans approximately 27 months in which approximately 70% of their workweek is spent in on-the-job training (experience on real software development projects working under technical mentors) in the Software Engineering Center at Fort Monmouth, and 30% is spent on pursuing the MS in Software Engineering at Monmouth University. The university works closely with the Software Engineering Center to try to address special educational requirements associated with the development of battlefield systems. A cornerstone of the program is a 30-week capstone project focused on real problems for real Army customers. The 10-year collaboration between the CECOM Software Engineering Center and Monmouth University is described in [Powell 97].

Points of Contact for Further Information

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Quebec Master's Program in Software Engineering

Montreal, Canada

The Quebec software engineering program was designed based on the needs expressed by leading software industries in Quebec. This program leads to a master's degree in computer engineering or computer science, with emphasis in software engineering. Each of seven participating schools or universities offers courses in this program.

Organization

Each educational partner designates a professor specialized in software engineering to coordinate the program at his or her school. This professor represents the school on a Coordination Committee that determines the courses to be offered in the program, student admission requirements, and the criteria for granting degrees. The Coordination Committee establishes the membership of a Business and Industry Committee that advises on the applicability of the program to their working environments and guides the evolution of the program.

Membership

The educational partners participating in the master's program in software engineering in Quebec are listed below:

- L'Ecole Polytechnique de Montreal
- L'Ecole de Technologie Superieure
- L'Institut National de Recherche Scientifique
- L'Universite Concordia
- L'Universite Sherbrooke
- L'Universite du Quebec a Montreal
- L'Universite Laval

Software Engineering Education and Training Activities

To complete the program, the student must earn 45 credit units, equally distributed over

- a foundations module
- an area of specialization
- an integrated learning experience composed of courses, an optional case study, and a project requiring at least 27 hours per week (The courses focus on topics such as data representation, expert systems and artificial intelligence, system security, parallel systems, and object-oriented approaches.)

Point of Contact for Further Information

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Research Institute for Computing and Information Systems (RICIS)

Houston, Texas (U.S.A.)

The mission of RICIS is to provide a setting for interdisciplinary research coalitions to explore computing technology and corresponding implications for an information-driven civilization. RICIS provides the research evaluation and advocacy needed to build coalitions and partnerships to match new and promising technologies with challenging problems dealing with complex, computing-based systems for the benefit of the university, National Aeronautics and Space Administration (NASA), and the general public.

Emphasized research areas include software reuse, group decision support methodology, mission- and safety-critical systems, and medical imaging. New projects are being formed in digital libraries, environmental computing, and network information resources. Special emphasis is placed on design and execution of symposia, projects, and interchanges to facilitate technology transfer among RICIS participants.

Organization

The University of Houston at Clear Lake (UHCL) established RICIS in 1986 to encourage the NASA Johnson Space Center (JSC) and local industry to support research in computing and information systems. A cooperative agreement between UHCL and NASA/JSC provides for sharing of personnel and computing and educational facilities. The RICIS Program Office in the School of Natural and Applied Sciences manages funding from various sources, primarily from NASA under the cooperative agreement. The overall organization is that of collaborative projects within the broad research areas mentioned.

Membership

RICIS encourages faculty participation across UHCL schools: Natural and Applied Sciences, Business and Public Administration, Human Sciences and Humanities, and Education. A gateway concept expands the local expertise on targeted problems to include vendors, other universities, and other research organizations. Fees are charged only for direct participation in projects.

Software Engineering Education and Training Activities

Courses and special events are organized in conjunction with the UHCL Professional and Continuing Education unit. A Master of Software Engineering degree program and a Master of Computer Engineering degree program are offered. An undergraduate degree in computer systems engineering, a blend of software engineering and computer engineering, was ap-

proved by the Texas Higher Education Coordinating Board in 1996. This will provide students the opportunity to take a single track at the undergraduate level leading to a Master of Software Engineering or a Master of Computer Engineering.

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[Last updated November 1997]

Software Engineering Research Centre (SERC)

Melbourne, Australia

The Software Engineering Resource Centre was founded in mid-1994 by two major universities, Royal Melbourne Institute of Technology (RMIT) and the University of Melbourne, with core funding from Ericsson Australia (EPA). In the contract between the three stakeholders, the objectives include fundamental research into telecommunications-related software and the transfer of the research results to industry. The transfer mechanisms include reports, prototype products, and training.

Organization

The Centre is formally a joint research center between the two universities, with administrative support being provided by RMIT. The research and technical direction is provided by a Steering Committee chaired by the EPA director of development, with the dean of applied science, RMIT, and the dean of engineering, University of Melbourne, being the primary members.

The structure of the Steering Committee is set by the SERC contract, with these three designated representatives, plus four additional members invited by the three permanent members. Currently the four additional members are the director of SERC, two associate deans, and a senior development manager from EPA. The committee formally reviews the SERC work program twice a year, with a formal written report being submitted to the committee. The committee meets every two months to give ongoing supervision to SERC's projects, including the development of educational programs.

Membership

Not applicable

Software Engineering Education and Training Activities

A primary focus for the software engineering research of SERC is the functional programming paradigm, and the realization of this paradigm using the Ericsson-developed Erlang environment. This environment is now incorporated in the open telecommunications platform (OTP), the new standard for developments by Ericsson. As a result, SERC has the role of developing and delivering courses on OTP and Erlang both to Ericsson and to other groups that wish to work with Ericsson. The mandate covers Australia and New Zealand, and the courses are typically two to three days duration, depending on the background of the participants. The

courses include design techniques as well as programming techniques, reflecting the totally different paradigm that is followed.

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Software Productivity Centre Inc. (SPC)

Vancouver, British Columbia (Canada)

The Software Productivity Centre Inc. is a leader in process improvement for software developers. It provides practical solutions—in the form of products, training and consulting—to meet the challenges faced by today's software developers. Since 1992, the SPC has been improving the efficiency, predictability, and performance of software development teams.

Organization

Since its establishment in 1992, the SPC has grown to include over 110 member companies in Canada, the U.S., and internationally and has product sales around the world. The SPC currently employs 14 full-time staff and several contractors.

Software Engineering Education and Training Activities

SPC training focuses on technology-specific issues and software engineering practices for software developers. The SPC's public seminars are offered in Vancouver, British Columbia and Portland, Oregon. Recent instructors have included world-renowned experts and authors, such as Ed Yourdon, Steve McConnell, Karl Wieggers, Tim Lister, Scott Meyers, Bob Stahl, and Naomi Karten. In addition to its public seminar series, the SPC offers in-house training on software project estimation, project management, and other software development and process topics.

Membership

The SPC has corporate members from the Canadian and international software development community, representing over 5,000 software professionals.

Members receive the *SPC Update*, a quarterly newsletter that includes current industry issues, member profiles, details on upcoming SPC events, and information on software engineering trends throughout the world. Member companies are listed on the SPC's Web site and links are provided to members' Web sites. Members can also advertise their software development job openings for free on the SPC Web site and have access to free member seminars and the *SPC Update* online.

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Software Quality Institute (SQI)

Austin, Texas (U.S.A.)

The Software Quality Institute is a multidisciplinary partnership between the University of Texas at Austin (UT-Austin) and the software and information systems organizations in Texas. Its mission is to inform and educate software producers and software users at the local, state, and national levels about issues vital to the production and application of high-quality software. SQI draws upon the wealth of research and expertise available at UT-Austin in addition to a large pool of outstanding talent from industry and government. SQI is a unit within the College of Engineering at UT-Austin.

Organization

SQI is guided by an Advisory Group of 28 representatives from industry and government who ensure that SQI activities meet industry needs, including program development and curriculum selection. Subcommittees oversee other SQI activities, including publication of *Software Quality Matters*, a quarterly newsletter; Austin Software Executives' Group (ASEG), which brings key officers of small companies together to discuss business issues; the Austin Software Process Improvement Network (A-SPIN), which sponsors monthly meetings for developers and managers; SQI certificate programs on software project management and human interface design and development; the annual SQI Symposium; and other special conferences.

SQI is a resource recovery program that receives funding from registration fees. Training is offered through public programs, courses that are taught on site, and conferences. Programs currently underway include a 14-month Software Project Management Certificate Program, one- to three-day seminars, and the SQI Symposium on Software Reliability Engineering (April 1, 1997). A new certificate program will begin in the spring of 1997 entitled "Human Interface Design and Development."

Membership

Not applicable

Software Engineering Education and Training Activities

SQI programs are offered to professionals on a non-credit basis, and topics are selected according to assessments. Proposals are solicited from potential instructors. Subject areas include software project management, risk management, in-process inspections, testing, human-computer interfaces, process, configuration management, and related topics.

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[Last updated November 1997]

Software Technology Centre (STC)

Regina, Saskatchewan (Canada)

The Software Technology Centre is an industry-led, strategic alliance with post-secondary educational institutions and the Saskatchewan and Canadian governments. Established in December 1993, the STC is a not-for-profit corporation whose mission is to help the software community to be globally competitive, with the goal of stimulating the development of a strong private sector. To fulfill this mission and to meet the needs of members and stakeholders, the STC offers services in professional development, information collection and dissemination, strategic development, and software quality improvement. STC services complement, and do not compete with, industry.

The STC goal is to become a provincially recognized information technology center with international linkages. It acts as a catalyst to assist members and stakeholders in global competitiveness, to deliver quality services to meet customers' evolving needs, to advocate the value of information technology, and to transfer world-class, state-of-the-art information technology knowledge, including software engineering principles and practices, to other economic sectors.

The STC provides

- executive seminars on topics such as the implementation of process improvement, for example
- software management programs, with a focus on process improvement and modern methods of defining and managing software development projects
- emerging technology programs
- network communications programs

Organization

The STC is led by a Board of Directors, which is chaired and controlled by industry. Educational institutions and governments have seats on the board. Some notable STC founding members are Information Systems Management (ISM) Corporation (a subsidiary of IBM), CDSL Canada, Saskatchewan Telecommunications, and SED Systems. They are joined by about 30 other organizations, many of which are local, small- to medium-sized information technology firms. In addition to these individual member organizations, 2 other major associations have joined the STC: the Software Development Association of Saskatchewan, which has over 50 small firms as members, and the 2 Canadian Information Processing Society chapters in Saskatchewan, consisting of over 300 information technology practitioners. The STC has a strong educational base; the University of Regina and the University of Saskatchewan are full members.

The STC has formed a number of Canadian and international strategic alliances, which contribute significantly to its ability to serve the needs of its members:

- The Software Process Improvement and Capability Determination (SPICE) Program, of which the STC is a member, is under the auspices of the International Standards Organization. With participants from about 20 countries, SPICE focuses on making software process improvement methods more widely used. The STC will coordinate the SPICE trials in the Canadian Prairie region.
- The European Software Institute (ESI), with which the STC has a formal cooperation agreement, provides the STC with the means to learn from major software engineering programs in the European Union. The ESI, located in Bilbao, Spain, is the major software engineering center of the European Union.
- The Information Technology Association of Canada (ITAC), of which the STC is a regional affiliate, is the major national information technology association in Canada. The STC is the only member of the ITAC Board of Directors representing the Canadian Prairie region.

The centre consists of a small professional staff, which is routinely supplemented by contracted, private sector, and educational institution staff.

Membership

Annual membership fees entitle members to influence STC strategy directly, to receive discounts on services, and to benefit from synergy with other members. Members are always given priority access to services. Close, ongoing dialogue with members and clients is a key element in STC operations. These exchanges help the STC define its current and planned service offerings and ensure that the STC continually meets the emerging needs of the software and information technology community.

Software Engineering Education and Training Activities

STC professional development programs emphasize solutions to the unique needs of two major organizational groups: management information systems (MIS) in-house organizations in both the private and the public sector and small to medium enterprises that are primarily software developers and system providers. The STC chooses its courses using the guidance of an Advisory Committee drawn from the software community. Key programs to be offered in 1996 include courses on executive-level awareness, software engineering, object-oriented methodologies, databases, and client-server networks. The STC is committed to the effective development and use of distance training technologies and methodologies.

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[Last updated November 1997]

Texas Tech University

Lubbock, Texas (U.S.A.)

Beginning in 1990, Texas Tech University has had a Master's of Systems Engineering Program at its main campus in Lubbock, Texas. This program is intended for companies who wish to train existing employees as systems engineers.

Each of the eight classes that have had at least one year of the program have taken a software engineering course. The goal of this course is to give the student a perspective of software engineering that is required of a systems engineer.

Organization

The industrial employees have undergraduate backgrounds in either an engineering discipline or computer science. These students come to Texas Tech for two summers, for four weeks each summer (in two increments of two weeks each), and have intensive instruction of nine hours of graduate courses each summer. (The other 18 hours in the 36-hour credit program are achieved in various ways, usually by taking courses at Texas Tech or elsewhere during the fall and spring semesters.)

Funding comes from the industrial organizations (on a per-student basis), who also supply members for an Industry Advisory Board which provides input. The program itself is administered by faculty of the College of Engineering at Texas Tech.

Membership

From its inception, Texas Instruments and Raytheon E-Systems, both of Dallas, Texas, have sent a total of 12 new students per year to the systems engineering program. The divisions of both companies develop embedded systems, mostly for the U.S. Department of Defense. Both of these divisions have been rated at the Software Engineering Institute (SEI) Capability Maturity Model (CMM) Level 3 or higher. (In fact, one of recent students in the systems engineering program was in charge of the team that prepared materials for the last SEI/CMM evaluation of Raytheon E-Systems.)

Software Engineering Education and Training Activities

Titles of the courses offered are listed below:

- Ada and Object-Oriented Programming (for classes entering in 1990 and 1991)
- Software Engineering Systems (for classes entering in 1992-94)

- Principles of Software Development Systems (for classes entering in 1995-97)
- Special Topics in Computer Science (for 1998 class)

Currently, the last course is taught as a software engineering course dealing with theory more than practice. (That is, it is not a project course.) Among the subjects covered are a survey of software engineering topics (especially those subjects that are somewhat different than for other engineering fields), the Capability Maturity Model, and a detailed case study from one of the participating companies, focusing on both process and product issues.

The summer courses are not taken through distance education. However, several graduate-level software engineering distance education courses are offered by Texas Tech University as part of its interdisciplinary Master's of Engineering Program, and the systems engineering students have the option of taking such courses as part of their degree program, if approved by their advisor.

Additional information about the program is provided below:

- Prerequisites: BS in Engineering or Computer Science, work experience in those fields
- Delivery method: classroom
- Credits: 3 hours of graduate credit
- Degree requirements: required course for the Master of Systems Engineering degree
- Source of instructors: Texas Tech University
- Source of students: Texas Instruments (Dallas) and Raytheon E-Systems (Dallas)

Points of Contact for Further Information:

Entire Systems Engineering Program

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Software Engineering Component of Program

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The University of British Columbia (UBC)

Vancouver, British Columbia (Canada)

Introduced in September 1995, the Certificate in Software Engineering Program at The University of British Columbia is designed to serve the professional development needs of information systems and software professionals in British Columbia and beyond. The program was developed with the input of local and provincial industry, and includes partnerships in curriculum development and teaching expertise.

Organization

The growing need for professional development in the software engineering field led to the development of a proposal in September 1994 for a Certificate in Software Engineering. Consequently, Continuing Studies at UBC founded an Advisory Committee with representatives from the following relevant academic units and industry representatives:

- Centre for Integrated Computer Systems Research (UBC)
- Continuing Studies (UBC)
- Continuing and Distance Education for Engineering and Architecture (UBC)
- Department of Computer Science (UBC)
- Department of Electrical Engineering (UBC)
- Hughes Aircraft of Canada Ltd.
- Newnes Machines Limited
- Software Productivity Centre

With the guidance of the Advisory Committee, a needs and demand assessment was conducted, including interviews with local industry representatives, distribution of surveys to prospective students, and research into existing programs and curricula. The majority of courses for the program are new offerings, but some current offerings of the Software Productivity Centre have also been incorporated into the program. The program is administered by UBC Continuing Studies.

Membership

The Certificate in Software Engineering Program is offered in a format compatible with the needs of local industry and will eventually serve the needs of companies located outside the Vancouver area. The program is also open to individuals who are currently employed in the software industry as well as those who may be seeking a career change. Applicants to the program who do not have prior knowledge in programming, formal mathematical methods, and computer systems are required to complete prerequisite courses.

Software Engineering Education and Training Activities

The program requires a minimum of 102 hours from the following core courses:

- An Introduction to Software Engineering (6 hours)
- The Software Engineering Process (18 hours)
- Requirements Analysis and Specification (18 hours)
- Software Architecture and Iterative Development Process (12 hours)
- System/Software Testing (12 hours)
- Software Project Management (12 hours)
- Software Engineering Team Project (24 hours)

The program requires a minimum of 48 hours from the following elective courses:

- Software Quality Assurance (12 hours)
- Software Configuration Management (6 hours)
- Computer-Human Interface Design and Implementation (12 hours)
- Object-Oriented Methods (12 hours)
- Information Engineering and Database Systems (15 hours)
- Comparative Programming Languages (9 hours)
- Real-Time Systems (9 hours)

Points of Contact for Further Information

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University of California, Santa Cruz (UCSC)

Santa Cruz, California (U.S.A.)

The University of California, Santa Cruz is located within close proximity to Silicon Valley, one of the world's foremost centers of the computer industry. A growing local computer industry, centered in Santa Cruz and Scotts Valley, provide further opportunities for our students. The Departments of Computer Engineering and Computer Science, of the Jack Baskin School of Engineering at UCSC, and the local computer industry recognize a need to provide effective graduate education in the area of software engineering. Local industry provides the "real-world" problems, and university faculty members weave discussion of these problems into the graduate software engineering curriculum. Whenever possible, graduate student researchers, under the supervision of university faculty, are funded by industry to continue the work started by the class.

In addition, the University of California Santa Cruz Extension program in Santa Clara, offers many continuing education and certificate programs in the area of software engineering. A sample of their programs includes

- Certificate in UNIX and C Programming
- Certificate in Multimedia Engineering and Programming
- Certificate in Software Engineering
- Certificate in Object-Oriented Programming
- Professional Sequence Award in Microsoft Windows Programming
- Professional Sequence Award in Database Systems and Concepts

UC Extension offers many other related programs. Many of these programs include short courses which could serve the needs of software professionals who live outside this region.

Organization

Computer Engineering and Computer Science are academic departments offering both undergraduate and graduate degree programs. UC Santa Cruz Extension offers continuing education programs for professional development. Both the on-campus programs (through the Computer Engineering and the Computer Science Departments) and the UC Extension programs hire software engineering experts as lecturers in the programs to bring industrial perspective to the software engineering curriculum. In addition to teaching, these lecturers serve as liaisons between UCSC and the local computer industry. One example of this collaboration is that local software companies have supported graduate students to extend projects that were started in the graduate software engineering courses.

Membership

Each year, industry projects are sought for our software engineering courses. Sponsors are also solicited for the graduates of the class. Previous sponsors include IBM (Santa Teresa Laboratory) and the Santa Cruz Operation, Inc.

Software Engineering Education and Training Activities

Students can take software engineering courses by enrolling through UCSC Extension or as matriculated graduate students of UCSC.

Point of Contact for Further Information

For on-campus programs

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For programs run by UCSC Extension

Please visit their Web site at

<http://www.ucsc-extension.edu>

[Last updated November 1997]

University of Maryland University College College Park, Maryland (U.S.A.)

University of Maryland University College (UMUC), College Park, Md., in partnership with Affiliated Computer Services Government Solutions Group, Inc. (ACS GSG) (formerly Computer Data Systems, Inc.), Rockville, Md., offers a Capability Maturity Model (CMM) Level 2 Software Process Management training course. This one-week short course introduces software managers, software technical team leaders, and members of Software Engineering Process Groups to the CMM Level 2 software processes they need to apply to their software development and maintenance projects to improve their projects' maturity.

Organization

The partnership began in 1994 when ACS GSG contracted with UMUC to evaluate ACS GSG's training courses and certify its internal CMM Level 2 training program. In 1996, UMUC and ACS GSG signed a memorandum of understanding to market and deliver Capability Maturity Model (CMM) Level 2 software process management training in the state of Maryland, the mid-Atlantic region, and nationwide.

The partnership is administered by a Joint Administrative Group (JAG) with representatives from UMUC and ACS GSG. The JAG develops operating procedures, resolves issues, and acts as the Change Control Board for the program. Each partner has specific roles. UMUC is responsible for marketing and promotional activities, program logistics and facilities, student registration services, continuing education unit (CEU) certification, and assistance to ACS GSG in program design and review, instructor assignment, and course evaluation. ACS GSG is responsible for instructors, training materials, and 30 days of follow-on telephone assistance to all students who complete training. UMUC awards participants four CEUs upon course completion.

Membership

Through its Professional Development Office, the University of Maryland, University College (UMUC) offers customized credit and noncredit education and training programs to businesses, nonprofit organizations, and public agencies in a variety of fields, including technology, finance, management, and environmental and hazardous materials management. Founded in 1947, with headquarters in College Park, Maryland, UMUC is one of the world's preeminent institutions of higher education for adults in the workforce.

Affiliated Computer Services, Inc., is based in Dallas, Texas, with operations within North America, Central America, South America, Europe, and the Middle East. ACS provides a full range of business services including business process outsourcing, electronic commerce, technology outsourcing, professional services, and systems integration. ACS GSG serves government, defense, and commercial customers with broad-based professional and technical

services, including software development, software maintenance, and systems integration services. ACS GSG initiated its CMM-based software process improvement program in 1993 and has developed and delivered the CMM Level 2 Software Process Management training course to 500 software managers nationwide since 1994.

Individuals or their organizations fund their enrollment in the CMM Level 2 Software Process Management training course offered by UMUC and ACS GSG.

Software Engineering Education and Training Activities

Training is offered three times a year at University of Maryland University College facilities in College Park, Rockville, and Waldorf, Md. and can also be provided on customer sites. ACS GSG provides the course materials, which include a software project case study, workshop exercises, and CMM Level 2 process templates. The training course consists of seven modules:

- overview of software process improvement
- requirements management
- software project planning
- software project tracking and oversight
- software quality assurance
- software configuration management
- software subcontract management

The training approach is practical. All instructors are software engineering practitioners with experience in managing software development, maintenance, and integration projects on multiple platforms. Instructors share their experience in implementing CMM Level 2 key process areas in real-world settings. Throughout the week, instructors facilitate team workshops to help students apply process management skills immediately. Students leave training with a package of CMM-compliant Level 2 process templates they can tailor to their organization.

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The University of Southern California

Center for Software Engineering

Los Angeles, California (U.S.A.)

The University of Southern California (USC) Center for Software Engineering (CSE) was formed to develop mature software engineering organizations to meet the demand for complex software systems of the future. Its primary objective is to improve the long-range state of software engineering practice by catalyzing a new generation of software engineering courseware and delivery capabilities. Its 10-year strategy for achieving this objective involves a combination of sustained programs in software engineering education, research, and technology transition.¹

Organization

The USC CSE takes a multifaceted approach to improving the state of software engineering practice. It performs necessary gap-filling research in such areas as knowledge-based software engineering, environments, processes, architectures, and economics. In the fall of 1993, it initiated an MS in Computer Science with a software engineering specialization. It has plans to develop textbooks, videos, computer models, games, tools, exercises, and role-model artifacts for training the next generation of software engineers. The USC CSE has an affiliates' program with an active Affiliates Steering Committee. The CSE director is part of the USC Computer Science Department; the center principals include USC professors in electrical engineering and business, and professors at the USC Information Sciences Institute.

Membership

Industry and government affiliates are a key aspect of the CSE. Through payment of an annual membership fee, affiliates acquire a seat on the Affiliates Steering Committee. Center personnel provide an annual one-day visit to the affiliate organization, involving a professor and an agenda of the affiliate's choice. Affiliates participate in focused workshops, executive software seminars, an annual software engineering conference, and monthly Software Process Improvement Network (SPIN) meetings in collaboration with University of California, Irvine. Affiliates receive prototype tools for experimentation, technical reports, and exploratory videos and courseware. There are currently 29 affiliate organizations.

Software Engineering Education and Training Activities

While the center does not produce courses specifically for affiliates, member organizations benefit from annual one-day USC professor lectures and visits to the affiliate's organization.

¹ Prospectus for the USC CSE Affiliates Program, January 1996.

Periodic focused workshops provide the opportunity for technical interchange among professors, researchers, and practitioners. Most of the software engineering MS courses are offered on a regional interactive television network; some of the courses are also offered nationally by the National Technological University.

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[Last updated November 1997]

University of South Florida (USF)

Tampa, Florida (U.S.A.)

The University of South Florida Information Systems and Decision Sciences (IS/DS) Department and members of its Industry Advisory Board have recognized the critical need for skilled software engineers in the Tampa Bay area. In response, the IS/DS Department includes advanced courses on the following topics in its curriculum at both the undergraduate and graduate degree levels: information systems analysis and design, software architecture, database systems, and telecommunications. These courses are designed to present state-of-the-art theories, practices, and tools for the application of information technology to real problems in business and industry. The MS in Management Information Systems (MS/MIS) Program is especially focused on producing top-quality information systems professionals who can have an immediate impact in software development organizations.

Several exciting research projects are underway at USF with strong technology transfer and education connections in the Tampa Bay area:

- We support a strong program of research and education on cleanroom software engineering methods. Cleanroom is a theory-based, team-oriented process for on-schedule development and certification of ultra-high reliability software systems with improved productivity. Our system and software development courses highlight cleanroom theories and methods.
- We are constructing a data warehouse on community health indicators in cooperation with the USF College of Public Health. Data mining may lead to new insights for improving health outcomes throughout Florida. This research project has been awarded a Telecommunications and Information Infrastructure Assistance Program (TIIAP) grant from the Dept. of Commerce for 1998-2000.
- In cooperation with the SEI, we are evaluating an exciting new model of technology diffusion in industry. The Personal Software Process is being studied as an example of an important technology in the model. The results of this research will be presented as an SEI technical report.

Our goals are to provide effective education opportunities for students in information system and technology and an innovative technology transfer program for local industry via process consultation, tailored training, and demonstration projects.

Organization

The Institute for Information Systems Management (IISM) has been established as a partnership between business, industry, government, and higher education in the Tampa Bay area and the I-4 Corridor. Its mission is to establish a major center for research, education, and professional networking to help technical organizations succeed in the fast-moving information age. The institute presents numerous seminars, workshops, and discussion sessions on important issues in the information systems field. Applied research is funded on topics of in-

terest to its corporate affiliates. The IISM provides a vital link between the business/industrial community and the IS/DS program at the University of South Florida.

Membership

IISM members include the following firms:

- Arthur Andersen
- Andersen Consulting
- NationsBank
- United States Automobile Association (USAA)
- GTE Data Services
- Citicorp
- PricewaterhouseCoopers
- Bear Stearns
- Tropicana
- Great Western
- Time Warner Customer Service
- Florida Power

Software Engineering Education and Training Activities

Academic courses are offered at the University of South Florida on its main campus in Tampa and on its satellite campuses in St. Petersburg, Sarasota, and Lakeland. Degrees in Management Information Systems are offered at the BS, MS, MBA, and PhD levels. Many students are full-time employees from area corporations who are enrolled in part-time educational programs. The IS/DS Department and USF offer professional development courses on technical topics, such as UNIX system programming, Web publishing, JAVA and C++ programming, client-server computing, and industrial certification programs. Tailored industrial training and professional consultations are offered at sponsor sites.

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The University of Texas at Austin

Austin, Texas (U.S.A.)

The Option II MSE in Software Engineering at the University of Texas at Austin is a two-calendar-year program that is offered as a specially scheduled option by the Department of Electrical and Computer Engineering in the College of Engineering at the University of Texas at Austin. Introduced in January 1996, the program is designed to allow practicing professionals the opportunity to obtain an advanced degree while maintaining full-time employment.

Organization

A survey of software executives who sit on the Departmental Visiting Committee of the Department of Electrical and Computer Engineering at the University of Texas at Austin was conducted to determine curriculum content and format. The program is organized around four basic formats: two intensive software engineering seminars that meet for one week each year immediately preceding the start of the academic year; eight software engineering courses that meet once monthly (all day Friday and Saturday), with two courses a semester for four semesters; two summer courses that involve independent research projects; and the writing of a master's report. Candidates for this program should hold a BS in Electrical Engineering, Computer Engineering, Computer Science, or the equivalent.

Membership

Not applicable

Software Engineering Education and Training Activities

The goal of the curriculum is to teach material on software engineering, with an emphasis on the design and analysis of software systems and on the management of software projects. The University of Texas at Austin requires at least 33 credit hours for a master's degree with a report. The curriculum includes the following courses:

- Analysis and Architectures of Software Systems: Programming
- Fundamentals for Software Engineers
- Domain-Specific Software Architectures
- Advanced Topics I on Software Engineering
- Verification and Validation of Software
- Large Software/Hardware Communication Systems
- Programming Languages and Applications

- Methodologies for Hardware/Software Codesign
- Advanced Topics II on Software Engineering
- Systems Engineering Program Management and Evaluation
- Distributed Software Systems
- Master's Report

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[Last updated November 1997]

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REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188), Washington, DC 20503.

1. AGENCY USE ONLY (LEAVE BLANK)		2. REPORT DATE February 1999	3. REPORT TYPE AND DATES COVERED Final
4. TITLE AND SUBTITLE Directory of Industry and University Collaborations with a Focus on Software Engineering Education and Training			5. FUNDING NUMBERS C — F19628-95-C-0003
6. AUTHOR(S) Kathy Beckman, Abacus Technology Corporation			
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Software Engineering Institute Carnegie Mellon University Pittsburgh, PA 15213			8. PERFORMING ORGANIZATION REPORT NUMBER CMU/SEI-99-SR-001
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES) HQ ESC/DIB 5 Eglin Street Hanscom AFB, MA 01731-2116			10. SPONSORING/MONITORING AGENCY REPORT NUMBER
11. SUPPLEMENTARY NOTES			
12.A DISTRIBUTION/AVAILABILITY STATEMENT Unclassified/Unlimited, DTIC, NTIS			12.B DISTRIBUTION CODE
13. ABSTRACT (MAXIMUM 200 WORDS) This directory describes 23 formal collaborative efforts to promote software engineering education and training activities among industry organizations (including government) and universities in the United States, Canada, and Australia. These collaborations vary in their organizational structure and types of services offered. All attempt to bridge the gap between industry needs and academic software engineering education and training offerings. Readers can use this directory to find collaborations that match their software engineering and training needs and that are located in their geographic area.			
14. SUBJECT TERMS , Capability Maturity Model® (CMM®) for Software , Industry advisory board, Industry/university collaboration, software engineering education and training, software process improvement network (SPIN)			15. NUMBER OF PAGES 65
17. SECURITY CLASSIFICATION OF REPORT UNCLASSIFIED			16. PRICE CODE
18. SECURITY CLASSIFICATION OF THIS PAGE UNCLASSIFIED		19. SECURITY CLASSIFICATION OF ABSTRACT UNCLASSIFIED	20. LIMITATION OF ABSTRACT UL