Report to the IEEE Computer Society Board of Governors and the ACM Council.

Joint IEEE Computer Society and ACM Steering Committee for the Establishment of Software Engineering as a Profession.

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Background

In 1993 the IEEE Computer Society and the ACM established a Joint Steering Committee *lilt* for the Establishment of Software Engineering as a Profession.

In November of 1993 the joint steering committee made four initial recommendations: (1) adopt standard definitions, (2) define the required body of knowledge and recommended practices (in electrical engineering, for example, electromagnetic theory is part of the body of knowledge while the National Electrical Safety Code is a recommended practice.), (3) define ethical standards and (4) define curriculum and related matters for software engineering. These recommendations were based on the way established technical professions have traditionally been defined. The steering committee decided to accomplish these tasks via three tasks forces. At different times, there have been from one up to three task forces in operation as a result of this effort. The code of ethics and body of knowledge task forces have been active for several years and this report contains recommendations based on their results. The curriculum task force was only recently activated because its work depends on the other two.

Accomplishments

The purpose of the task force on the Body of Knowledge and Recommended Practices is to define the body of knowledge and practices at different levels of knowledge/skill needed at different points in the career of a Software Engineer. The approach recommended is to conduct a series of surveys to capture the categories of components of knowledge. The format of the surveys will allow us to analyze the common core of the profession as well as those areas that are particular to an industry segment. To test the approach, the task force organized several working meetings of volunteer experts to create the task statements for their area of expertise and conducted a pilot survey during November and December of 1996. We are publishing the analysis and recommendations <http://www.computer.org/tab/seprof/survey.htm on the pilot survey to solicit comments from practitioners and other interested parties.

The purpose of the task force on Software Engineering Ethics and Professional Practices is to document the ethical and professional responsibilities and obligations of software engineers. The task force developed a code for a sub-specialization within the constituencies of both of the professional societies. In an attempt to reflect the international character of both organizations and the profession itself, the composition of the task force is multinational in both citizenship and in membership in professional computing organizations. We have published the proposed draft Code of Ethics <http://www.computer.org/tab/seprof/code.htm for Software Engineers to solicit comments from practitioners and other interested parties. Next the proposed Code of Ethics was published in both Computer and the Communications of the ACM with a turn around ballot. Most items had at least a 95% approval rating. The code was also reviewed by ethics officers of various multi-nationals--Lockheed Martin, DEC, Northrop Grumman, etc. It was also reviewed by other professional computer organizations, such as the British Computer Society, the Australian Computer Society, and IFIP. The review process spread beyond our initial plan--companies like

TI and Hitachi asked and received permission to put it on their company bulletin boards for review and comment by their employees.

The purpose of the task force on Education is to develop education curriculum and accreditation criteria for software engineers. They are also to coordinate with related accreditation programs in pursue of their goals. This task force has defined a draft set of accreditation standards and begun working on curriculum.

Other deliverables of this steering committee have included public awareness presentations at several appropriate panel discussions at workshops, symposia and conferences, and position statement white papers.

In 1997 the Steering Committee was approached by the Engineering Licensing Committee of the Texas Board of Professional Engineers to assist it with the issue of software engineering licensing. Through the efforts of this committee and others, the board was informed of the scope of software engineering, the key issues associated with defining it as a profession, and the professional organizations that represent practicing software engineers. The Texas Licensing Committee will formally request that the ACM and the Computer Society jointly work with it to define a body of knowledge on which national engineering licensing examinations will be based.

Recommendations of this Steering Committee.

(a) We strongly encourage the IEEE Computer Society and the ACM to participate in efforts that continue the work began by this steering committee. Future work needs to be aligned with the confirmed needs of organizations or customers in education, licensure, standards development, and professional development. Furthermore, given that Software Engineering is an evolving discipline whose methods, principles and body of knowledge evolve over time, we believe that the determination of an appropriate body of knowledge, and the curriculum to support such body of knowledge, will evolve over time. This suggests that a permanent entity be formed to assure that there is ongoing communication and there are periodic revisions as necessary.

We recommend that the chair and vice-chair of the Joint Steering Committee be authorized to develop, in consultation with the other members of the Committee and the affected bodies of the two societies, a management structure for a joint, replacement activity that aligns more closely with existing functions within the two societies and is more responsive to the needs of industry, government and academia.

(b) The survey conducted to determine the body of knowledge validated the use of the methodology to find what a software engineer should know. This Steering Committee believes in this process to determine, and refine over time, the body of knowledge. However, we also recognize the value of determining what a software engineer does, and this was not covered in the initial survey. This task force believes that the ACM and the IEEE Computer Society have to be drivers of the professional aspects of Software Engineering.

We believe that the production of professional-quality surveys requires qualified professional support. Our experience with a volunteer-only group has been that the end products cannot be achieved with the needed timeliness and quality. Technical expert volunteers can provide contents but the quality is not uniform and the effort lacks continuity. We now appreciate the level of effort required and we note that other societies that have attempted to define bodies of knowledge have ultimately utilized professional staff because of these factors.

We recommend that a new group representing the appropriate elements of ACM and the Computer Society be formed to own the process and product of the survey and testing effort. We suggest that the responsibility be given, respectively, to appropriate ACM SIGs (such as SIGSOFT) and IEEE CS Technical Activities (such as TCSE and others).

(c) **The current draft of the Code of Ethics is ready for review in a formal consensus process. The review process should include balanced selection of representatives from software practitioners, educators, producers and users. The process should follow the principles of due process such as those used in standards development. Upon completion of the formal review it will be suitable for consideration by the appropriate bodies.**

We recommend that the appropriate committees of the ACM and the Computer Society be charged with conducting this formal review. We also recommend that the appropriate committees support future activity by the software engineering code of ethics task force to address ongoing issues that may arise in this area.

(d) The education task force has been active for about a year. They have prepared draft criteria for accreditation of software engineering programs. They have begun the curriculum guidelines. Their end product should tie in with the continuing education of Software Engineer professionals.

We recommend that the education task force continue, under the auspices of the two societies' respective education boards.

(e) We wish to recognize the leadership and contribution of L.F. Cabrera, the previous steering committee chair and of Mario Barbacci and Stuart Zweben, the original committee co-chairs.

Notes: (1) The Body of Knowledge task force has finished its activities.

(2) The Software Engineering Ethics and Practices is chaired by Donald Gotterbarn, and has as members of its executive committee Keith Miller and Simon Rogerson.