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The Discipline of Software Engineering

The concept of software engineering was first identified in the early 1960's. It remained for many years as just one field of study within the broad area of computer science. By 1975, the IEEE Transactions of Software Engineering was established [3], but the focus of that journal was on research on software engineering concepts and tools. In 1979, what is now the International Conference on Software Engineering was established. In the 1980's the Software Engineering Institute [2] was established with goals to disseminate knowledge of software engineering and to promote education in software engineering. By the 1990's, several conferences on aspects of software engineering were established, in particular, the Conference on Software Engineering Education and Training (CSEE&T) [10]. Numerous graduate programs in software engineering had begun. Gradschools.com lists seven graduate programs of distance education for software engineering [4] and many more local programs for MSE degrees.

The discipline of software engineering encompasses the application of software

principles, tools, and methods to all aspects of the software life cycle. "Principles" include items as object-oriented structure, design patterns, and program assertions; "tools" include items such as design diagram editors, integrated development environments (editor/compiler/debugger/etc.), and test case managers; "methods" include items as programmer teams, software inspections, use of software and process standards. The events and items of the life of software include (but not linearly ordered): requirements, specifications,

planning, design, verification and validation, implementation, deployment, maintenance, reuse, documentation, measurement and evaluation, training, and personnel and process management. Guidance to these concepts can be found in the text by Pressman [7] and in the software engineering standards for style, management and content [6].

Software engineering is closely related to computer science, but quite distinct as a focus of education. Computer science has focus on the foundation science of computing, such as algorithms, computer languages, and mathematical models of software and processes. On the practical side, computer scientists build systems

software and tools. Software engineering certainly finds applications in building of systems software and tools, but it is not limited to such. It is applicable to many areas of engineering and enterprise computing.

Software engineering is indeed a kind of engineering, even though it does not deal with physical materials. Like other branches of engineering, software engineering:

1. uses formal models of domain and software structure
2. uses established techniques of design before implementation
3. uses established techniques for validation (systematic measurement and analysis of properties)
4. emphasizes the building of large systems by integration of standardized components
5. uses software tools to enhance human performance
6. studies the processes of software development as the basis for systematic management

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