

Chapter 3

Attributes and Goals for a Mature Profession

3.1 Introduction

A mature profession promotes high standards for professional practice and supports the rapid dissemination of new knowledge. The SEI (Carnegie Mellon University Software Engineering Institute) recently completed a feasibility study to determine what it means to have a mature Software Engineering profession. Our analysis of mature professions led to a framework that is composed of two levels we call the practitioner level and the infrastructure level. At the practitioner level there are three components: professionals, knowledge, and professional practice. At the infrastructure level we found eight components: initial professional education, accreditation, skills development, professional development, certification, licensing, code of ethics, and professional society. Most of these components are present in mature professions and are under the active stewardship of appropriate formal organizations and volunteer groups.

The growth of a mature Software Engineering profession will contribute to substantially improved professional practice and lead to higher quality software systems. To assess the maturity of Software Engineering as a profession we assess the maturity of each of the components at the professional and infrastructure levels and discuss goals for each. Although our assessment shows that Software Engineering is not very mature, understanding the complex and dynamic interactions among the components gives insight into key leverage points that can be worked on to expedite the formation of a mature profession.

Section 2 of this chapter examines published definitions of the term “profession”; Section 3 describes the two layer model for professions; Section 4 introduces measures for the maturity of infrastructure level components and applies these measures to Software Engineering. Our conclusion is that much of the necessary infrastructure for a mature Software Engineering profession does not exist or is not yet very visible.

3.2 Definition of a “Profession”

The term *profession* has many different interpretations and meanings within the computing community. We begin by examining published definitions of this term. Webster’s Ninth New Collegiate Dictionary [Webster83] says:

“profession . . . 4 a: a calling requiring specialized knowledge and often long and intensive academic preparation **b:** a principal calling, vocation, or employment **c:** the whole body of persons engaged in a calling.”

It also gives these definitions of the related terms *professional* and *professionalism*:

“professional . . . 1 a: of, relating to, or characteristic of a profession
b: engaged in one of the learned professions **c:** characterized by or conforming to the technical or ethical standards of a profession . . .
professionalism . . . 1: the conduct, aims, or qualities that characterize or mark a profession or a professional person . . .”

The International Encyclopedia of Social Sciences [Sills68] states that the core criteria for a *profession* are:

1. a requirement of formal training accompanied by some institutional mode of validating both the adequacy of the training and the competence of trained individuals
2. a requirement that skills in some form of the use of the training must be developed
3. some means of making certain that such competence will be put to socially responsible uses

The United States Code of Federal Regulations [29 CFR Sec. 541.3] defines an employee “employed in a professional capacity” as one

1. Whose primary duty consists of the performance of:
 - (a) Work requiring knowledge of an advanced type in a field of science or learning customarily acquired by a prolonged course of specialized intellectual instruction and study, as distinguished from a general academic education and from an apprenticeship, and from training in the performance of routine mental, manual, or physical processes, or
 - (b) Work that is original and creative in character in a recognized field of artistic endeavour (as opposed to work which can be produced by a person endowed with general manual or intellectual ability and training), and the result of which depends primarily on the invention, imagination, or talent of the employee, . . .
2. Whose work requires the consistent exercise of discretion and judgment in its performance; and
3. Whose work is predominately intellectual and varied in character (as opposed to routine mental, manual, mechanical, or physical work) and is of such character that the output produced or the result accomplished cannot be standardized in relation to a given period of time; . . .

3.3 Model of a “Profession”

These definitions suggest that at the highest level a profession has people involved in a collection of activities. We use *professionals* to denote that set of people and *professional practice* to denote that set of activities.