Chapter 6 HUMAN ASPECTS OF SOFTWARE ENGINEERING

Software is developed by people, used by people,and supports interaction among people. As such, human characteristics, behavior, and cooperation are central to practical software development.

6.1 CHARACTERISTICS OF A SOFTWARE ENGINEER

Erdogmus identifies seven traits that are present when an individual software engineer exhibits “superprofessional” behavior:

① **An effective software engineer has a sense of individual responsibility .**

② **An effective software engineer has an acute awareness of the needs of other members of his team, of the stakeholders,and the managers**

Chapter 6 HUMAN ASPECTS OF SOFTWARE ENGINEERING

③ An effective software engineer is brutally honest.

④ An effective software engineer exhibits resilience under pressure.

⑤ An effective software engineer has a heightened sense of fairness.

⑥ An effective software engineer exhibits attention to detail.

⑦ an effective software engineer is pragmatic.

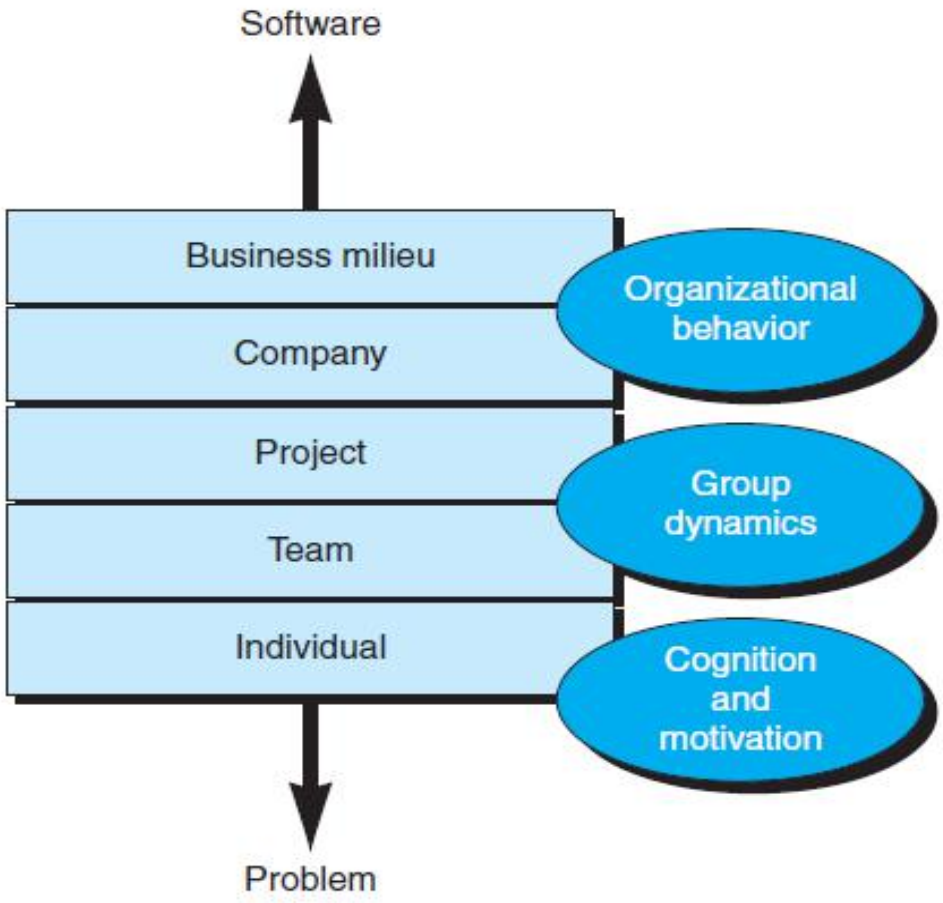
6.2 THE PSYCHOLOGY OF SOFTWARE ENGINEERING

Bill Curtis and Diane Walz suggest that the psychology of software engineering is a layered behavioral model for software development.

Chapter 6 HUMAN ASPECTS OF SOFTWARE ENGINEERING

FIGURE 6.1

A layers behavioral model for software engineering (adapted from [Cur90])



Chapter 6 HUMAN ASPECTS OF SOFTWARE ENGINEERING

6.3 THE SOFTWARE TEAM

A jelled team is a group of people so strongly knit that the whole is greater than the sum of the parts . . . .

Once a team begins to jell, the probability of success goes way up. The team can become unstoppable, a juggernaut for success . . . . They don't need to be managed in the traditional way, and they certainly don't need to be motivated. They've got momentum.

DeMarco and Lister contend that members of jelled teams are significantly more productive and more motivated than average. They share a common goal,a common culture, and in many cases, a "sense of eliteness" that makes them unique.

Chapter 6 HUMAN ASPECTS OF SOFTWARE ENGINEERING

6.3 THE SOFTWARE TEAM

A jelled team has attributes that are normally found in effective software teams, these attributes include:

- **a sense of purpose**
- **a sense of involvement**
- **a sense of trust**
- **a sense of improvement**

Not all teams are effective and not all teams jell. In fact, many teams suffer from what Jackman calls " team toxicity . Five factors foster a potentially toxic team environment:

(1) a frenzied work atmosphere,

(2) high frustration that causes friction among team members,

Chapter 6 HUMAN ASPECTS OF SOFTWARE ENGINEERING

6.3 THE SOFTWARE TEAM

(3) a "fragmentedor poorly coordinated" software process,

(4) an unclear definition of roles on the software team,

(5) "continuous and repeated exposure to failure."

In addition to the five toxins described, a software team often struggles with the differing human traits of its members, such as some team members are extroverts; others are introverts.

Chapter 6 HUMAN ASPECTS OF SOFTWARE ENGINEERING

6.4 TEAM STRUCTURES

The "best" team structure depends on the management style of your organization,the number of people who will populate the team and their skill levels, and the overall problem difficulty.

A number of project factors should be considered when planning the structure of software engineering teams:

(1) difficulty of the problem to be solved,

(2) "size" of the resultant program(s) in lines of code or function points,

(3) time that the team will stay together (team lifetime),

(4) degree to which the problem can be modularized,

Chapter 6 HUMAN ASPECTS OF SOFTWARE ENGINEERING

(5) required quality and reliability of the system to be built,

(6) rigidity of the delivery date,

(7) degree of sociability (communication) required for the project.

Constantine suggests four "organizational paradigms" for software engineering teams:

① A closed paradigm,

② A random paradigm,

③ An open paradigm,

④ A synchronous paradigm.

One of the earliest software team organizations was a closed paradigm structure originally called the chief programmer team,

Chapter 6 HUMAN ASPECTS OF SOFTWARE ENGINEERING

the nucleus of the team was composed of a senior engineer (the chief programmer),technical staff (normally two to five people),and a backup engineer.

6.5 AGILE TEAMS

Decade, agile software development has been suggested as an antidote to many of the problems that have plagued software project work.

6.5.1 The Generic Agile Team

The small, highly motivated project team, also called an agile team.

To make effective use of the competencies of each team member and to foster effective collaboration through a software project, agile teams are selforganizing.

Chapter 6 HUMAN ASPECTS OF SOFTWARE ENGINEERING

6.5.2 The XP Team

Define a set of five values that establish a foundation of team for all work performed as part of extreme programming (XP):

Communication,

Simplicity,

Feedback,

Courage,

Respect.

Each of these values is used as a driver for specific XP activities, actions, and tasks.

Chapter 6 HUMAN ASPECTS OF SOFTWARE ENGINEERING

6.6 THE IMPACT OF SOCIAL MEDIA

In some ways, social media can be as important as face-to-face communication. The value of social media grows as team size increases, and is magnified further when the team is geographically dispersed.

By a social network,software team can draw from the collective experience of team members, stakeholders,technologists, specialists, and other busines speople who have been invited to participate in the network (if the network is private) or to any interested party (if the network is public). And it can do this whenever an issue, a question,or a problem arises. There are a number of different forms of social media and each has a place in software engineering work:

Chapter 6 HUMAN ASPECTS OF SOFTWARE ENGINEERING

A blog,

Microblogs,

Targeted on-line forums,

Social networking sites,

social bookmarking sites.

6.7 SOFTWARE ENGINEERING USING THE CLOUD

Cloud computing provides a mechanism for access to all software engineering work products, artifacts, and project-related information. it has the potential to influence the manner in which software engineers organize their teams and has a profound impact on the human aspects of software engineering.

Chapter 6 HUMAN ASPECTS OF SOFTWARE ENGINEERING

6.8 COLLABORATION TOOLS

The software development environments (SDEs) of the last century have morphed into collaborative development environments (CDEs):

Tools are essential to collaboration among team members, enabling the facilitation,automation, and control of the entire development process. Adequate tool support is especially needed in global software engineering because distance aggravates coordination and control problems, directly or indirectly, through its negative effects on communication.

Many of the tools used in a CDE are no different from the tools that are used to assist in the software engineering,their servces include:

Chapter 6 HUMAN ASPECTS OF SOFTWARE ENGINEERING

6.8 COLLABORATION TOOLS

- A namespace that allows a project team to store all work products and other information in a manner that enhances security and privacy, allowing access only to authorized individuals.
- A calendar for coordinating meeting and other project events.
- Templates that enable team members to create work products that have a consistent look and structure.
- Metrics support that tracks each team member's contributions in a quantitative manner.
- Communication analysis that tracks communication across the team and isolates patterns that may imply problems or issues that need to be resolved.

Chapter 6 HUMAN ASPECTS OF SOFTWARE ENGINEERING

6.8 COLLABORATION TOOLS

• Artifact-clustering that organizes work products and other project artifacts in a manner that answers questions such as: " How might a team member's own work affect other people's work?"

6.9 GLOBAL TEAMS

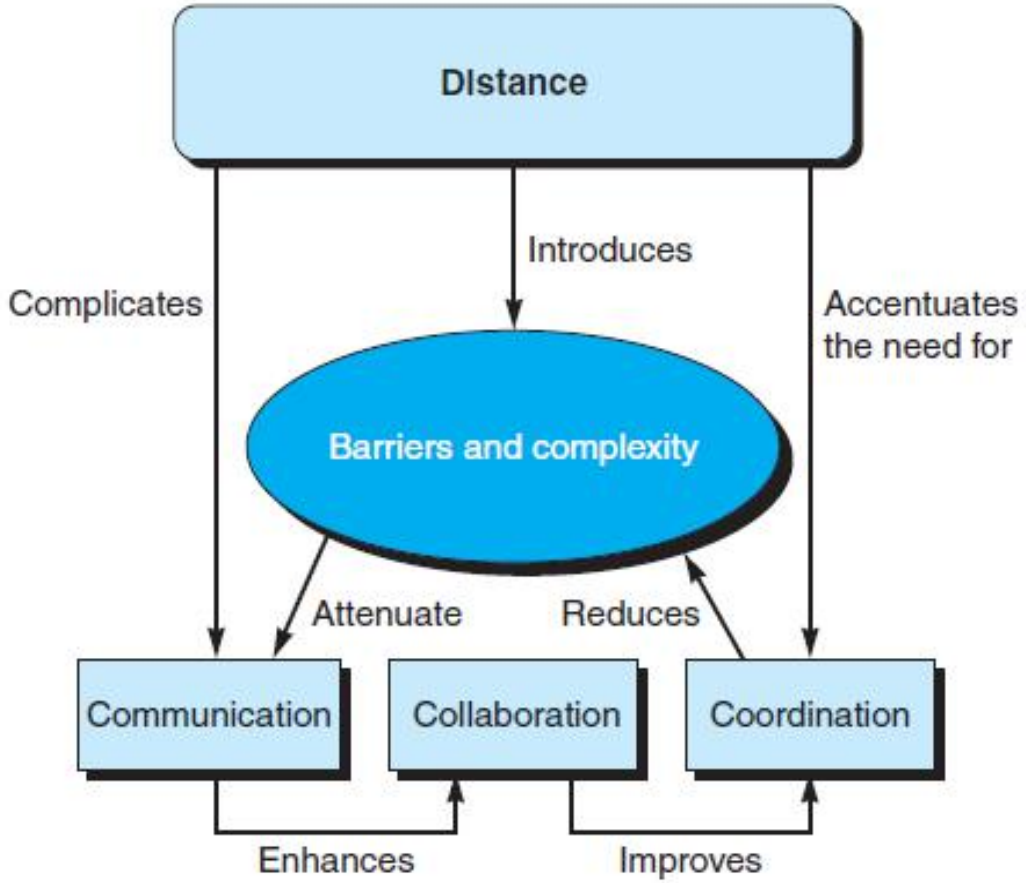
For the past few decades, an increasing number of major software products have been built by software teams that are often located in different countries.These global software development (GSD) teams have many of the characteristics of a conventional software team , but a GSD team has other unique challenges that include coordination, collaboration,communication, and specialized decision making.

Barriers and complexity that can be driven by cultural differences.

Chapter 6 HUMAN ASPECTS OF SOFTWARE ENGINEERING

FIGURE 6.2

Factors affecting a GSD team (adapted from [Cas06])



Chapter 7 PRINCIPLES THAT GUIDE PRACTICE

Software engineering practice is a broad array of principles, concepts, methods, and tools that you must consider as software is planned and developed. Principles that guide practice establish a foundation from which software engineering is conducted.

The software process provides everyone involved in the creation of a computer-based system or product with a road map for getting to a successful destination. Practice provides you with the detail you'll need to drive along the road. It tells you where the bridges, the roadblocks, and the forks are located. It helps you understand the concepts and principles that must be understood and followed to drive safely and rapidly. It instructs you on how to drive, where to slow down, and where to speed up. In the context of software engineering, practice is what you do day in and day out as software evolves from an idea to a reality.