CHAPTER 10: MANAGEMENT, LEADERSHIP, & ETHICS

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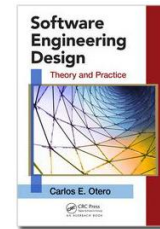
SESSION III: LEADERSHIP AND ETHICS

Software Engineering Design: Theory and Practice
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SESSION'S AGENDA

➢ Leading the Design Effort
  ✓ Personality Traits and Leadership
  ✓ Personality Dimension
  ✓ Traits of Effective Leaders
  ✓ Ethical Leadership
  ✓ Power

➢ Key Leadership Skills
  ✓ Communication
  ✓ Networking
  ✓ Motivation
  ✓ Negotiation

➢ Ethics in Software Design
  ✓ Public and Product Principles
  ✓ Judgment Principle
  ✓ Management Principle

LEADING THE DESIGN EFFORT

➢ Leadership plays a key role in the success or failure of complex projects.

  ✓ Therefore, it is necessary to cover important concepts related to leadership in the design effort.

➢ The field of leadership is one that has been researched by academicians and practitioners for many years.

  ✓ There is an extensive body of knowledge and literature related to this field.

➢ This session highlights key leadership concepts that are relevant to our study of software designs.

  ✓ A significant part of the material covered in this section was gathered from [1]; therefore, the author refers the readers to this work for more detailed explanations of leadership concepts.

LEADING THE DESIGN EFFORT
- PERSONALITY TRAITS AND LEADERSHIP -

➢ *Traits* are personal characteristics that help to describe a person. For example:

  ✓ Highly sociable trait: This trait is present in someone that has the ability to communicate well with others and start friendly conversations with unknown people

  ✓ Achievement trait: This trait is present in someone that works hard and tends to go the extra mile to complete assigned tasks

➢ The combination of traits that a person has defines that person's *personality*

  ✓ Personality significantly affects our decisions.

    ▪ For example, a highly sociable person with an achievement trait is expected to make decisions such as volunteering to make presentations to clients.

  ✓ Given that a good decision-making ability is a major part of being an effective leader, it is important to understand the relationship between traits, personality, decision-making, and leadership.

LEADING THE DESIGN EFFORT
- PERSONALITY DIMENSIONS -

➢ Researchers have identified five personality dimensions to categorize groups of traits.

    ✓ The objective is to be able to classify someone's personality into one of these dimensions.

    ✓ The five dimensions are:

- *agreeableness*,
- *surgency*,
- *adjustment*,
- *conscientiousness*, and
- *openness to experience*.

    NOTE: Although called by different names by various researchers, we will refer to [1] and call them the *Big Five Model of Personality*.

    ✓ Let's describe each of the five personality dimensions…

LEADING THE DESIGN EFFORT
- PERSONALITY DIMENSIONS -

➢ The *agreeableness dimension* contains traits that are related to getting along with people.
  ✓ Individuals that are strong in agreeableness are friendly, sociable, and compassionate.

➢ The *surgency dimension* corresponds to personalities that are dominant (i.e., want to be in control), enjoy competition, and are willing to confront others, among other things.
  ✓ Individuals who are weak in surgency are typically followers.

➢ The *adjustment dimension* is related to emotional stability.
  ✓ Individuals who are strong in this dimension are considered stable people who are in control of themselves, positive minded, and react well under pressure.
  ✓ Those that are weak in adjustment are considered unstable, and typically are characterized by being negative and perform poorly under pressure.

➢ The *conscientiousness dimension* contains traits related to achievement.
  ✓ Individuals that are strong in this dimension are those that are willing to work extra hours and make sacrifices to reach the assigned objectives.

➢ The *openness to experience dimension* is related to individuals that are flexible to change, open minded, and attempt enjoy trying new things.

LEADING THE DESIGN EFFORT
- PERSONALITY DIMENSIONS -

➢ Understanding these dimensions is important because researchers have found varying degrees of correlations between leadership and each of the five personality dimensions.

    ✓ For example, [2] analyzed over 70 prior studies to determine correlations between the five personality dimensions and leadership.

    ✓ Results showed that the surgency dimension was the highest with a 0.31 correlation.

        ▪ This means that traits corresponding to surgency can be used, to some extent, to describe leadership.

        ▪ The second highest was conscientiousness with a 0.28 correlation, followed by openness to experience with 0.24, and agreeableness with 0.08.

LEADING THE DESIGN EFFORT
- TRAITS OF EFFECTIVE LEADERS -

➢ An approach to studying personality dimensions is to investigate common individual traits that effective leaders possess, without grouping traits into personality dimensions.

➢ Some of the most important traits are:

Principle	Description (Trait's characteristics in a person)
Dominance	This trait describes a person that wants to be a manager and takes control. Successful leaders with this trait are not overly bossy and avoid the bullying style.
High energy	This trait describes a positive-minded person that works hard to achieve objectives, and is good at taking initiative.
Integrity	This trait describes a person that is highly ethical and trustworthy.
Flexibility	This trait describes a person that can adapt well to new and different situations.
Self-confidence	This trait describes a person who trusts his/her judgment, initiatives, intelligence, and ideas. This is not to be confused with arrogance.
Stability	This trait describes a person that is able to control emotions and act well under pressure.
Intelligence	This trait describes a person that possesses a high cognitive ability to solve problems and make decisions.
Sensitivity to others	This trait describes a person that focuses on the feelings of others and strongly considers them.

LEADING THE DESIGN EFFORT
- ETHICAL LEADERSHIP -

➢ Ethics can be defined as a set of moral principles that facilitates the process to distinguish between right and wrong behavior.

➢ Ethical behavior positively correlates with leadership effectiveness [3].
  ✓ It is well known that one of the best ways to *lead is by example*.
  ✓ An ethical leader sets the tone for employees to conduct themselves ethically.
  ✓ Being an ethical leader can be very challenging due to the risk of rejection or loss associated with ethical decisions.
    ▪ To overcome this challenge:
      – Focus on a higher purpose while going through the decision process that involves moral behavior.
      – Find support from other ethical people (e.g., friends, family, or co-workers).

  ✓ Most companies have their own internal documents that describe expected ethical behavior from employees.
    ▪ It is very important for leaders to conform to these guidelines, and discuss them with employees.

LEADING THE DESIGN EFFORT
- POWER -

➢ The potential influence that leaders have over others is called *power*.

➢ "Potential" means that it is actually the perception of power, and not the power itself, that influences followers.

➢ The two main sources of power are *position power* and *personal power*.
   ✓ Position power is related to hierarchical position levels (higher levels = higher power)
      ▪ Example: The president of a software company has more potential power than any other employee in the company because of position power.

   ✓ Position power allows managers to influence employees in order to reach planned objectives.
      ▪ *Reward Power* is a type of position power.
         – Managers can influence employees with something of value to them (e.g., performance evaluations).
      ▪ *Coercive power* is another type of position power
         – Managers can influence others by the idea of punishment and withholding of rewards.
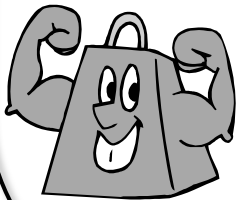
LEADING THE DESIGN EFFORT
- POWER -

✓ *Personal power* relates to the potential influence that a person's behavior has to influence others.

- Being positive, assertive, and hard worker are some of the characteristics that increase personal power.

✓ There are various types of personal power.

- The *expert power* is based influencing others on a leader's skill and knowledge.
  - For example, being an expert in developing architectural designs will influence others to follow the expert.
  - The expert power of an individual gets stronger as people with similar expertise levels become fewer.

- The *connection power* refers to the ability of a person to influence others because of the person's relationships with influential people.

KEY LEADERSHIP SKILLS
- COMMUNICATION -

➢ Good communication skills are essential for effective leadership.

    ✓ A high % of a managers' time is spent in communications.

➢ Leaders can influence and establish productive relationships with others through communication.

➢ Truly effective communication occurs when the information passed is equally and fully understood by all parties.

    ✓ Advise:

- Plan in advance the message that needs to be conveyed.
- The goal of the message needs to be clearly understood.
- Think about the best timing to convey the message, how will the message be delivered (e.g., oral, written), and where (e.g., company's auditorium, employee's office, etc.)

KEY LEADERSHIP SKILLS
- COMMUNICATION -

➤ Effective *oral communication* can be challenging (and often takes much practice).

    ✓ Have a process in place so that focus can be placed in the individual elements of the process.

    ✓ Five-step process for effectively sending oral messages [1]:

        ▪ (1) Develop a rapport.
            – Try establishing a good relationship with the receiving party; begin small conversations related to the message.

        ▪ (2) Clearly state the objective of the message.

        ▪ (3) Actually transmit the message effectively.

        ▪ (4) Perceive the receivers' understanding of the message.
            – It is important that the message was well understood; otherwise its objectives were not achieved.
            – This can be accomplished by asking direct questions, or reading the receiver's expressions.

        ▪ (5) Get a commitment from the receiver.
            – Only if the goal is to influence the receiver to accomplish a task (e.g., design document)
            – The leader must be convinced that the receiver is capable of completing the task by its deadline.

KEY LEADERSHIP SKILLS
- COMMUNICATION -

➢ Another type of communication is *written communication*.
  ✓ This type of communication is now more important than ever, and it is mainly attributed to the e-mail technology.

➢ The key elements for effective written communication are content and structure.
  ✓ The message must be structured in such a way that the information it intends to transmit (i.e., content) is clearly described, and the flow of information is smooth and easy to follow.

➢ It is critical for the communicator to clearly understand the intended objective of the message before writing it. Some advise:
  ✓ Make an outline with the main points that need to be transmitted.
  ✓ Avoid including unnecessary information. Messages must be kept short, simple and to the point.

➢ Writing is a skill! It takes effort and practice to become good at it.
  ✓ Have others review your work so that you can learn from their feedback.

KEY LEADERSHIP SKILLS
- NETWORKING -

➢ Networking can be defined as a skill that focuses on building relationships with others through effective communications.

➢ Communications and networking skills are closely related to each other.

➢ Networking is particularly important for leadership because it facilitates the process of meeting objectives.

➢ As with any skill, networking can be improved with practice.

KEY LEADERSHIP SKILLS
- MOTIVATION -

➢ There exists a positive correlation between employees' motivation levels and their productivity.

  ✓ A leader must motivate others to work hard to achieve particular project goals.

➢ The *hierarchy of needs theory* is a motivational theory that describes five types of needs through which employees are motivated.

Type of Need	Activities to Meet the Needs
Physiological	• Adequate salaries • Allowance of breaks • Adequate working conditions
Safety	• Safe working conditions • Salary increases (considering inflation) • Fringe benefits
Social	• Social activities that conform to individual behavior • Team building retreats • Team sports • Lunch gatherings
Esteem	• Raises based on performance • Awards • Public recognition • Participation in decision-making
Self-Actualization	• Skill development activities • Promotions • Increase control of an employee's task

KEY LEADERSHIP SKILLS
- NEGOTIATION -

➢ Negotiation skills are important part of any management job.

➢ Research studies have resulted in various sets of guidelines that can help to improve a person's negotiation skills.
  ✓ One such set of guidelines is called *principled negotiation*

➢ *Principled negotiation* is composed of four guidelines.
  ✓ (1) *Separate the people from the problem.*
    ▪ This principle helps to keep the focus on the problem at hand rather than on interpersonal issues.
  ✓ (2) *Focus on interests rather than positions.*
    ▪ This principle helps to keep the focus of the negotiation on the interests of people rather than their positions.
  ✓ (3) *Generate options before trying to reach an agreement.*
    ▪ This principle promotes creativity and reminds the negotiating parties to brainstorm to find various potential solutions that can be brought to the negotiation.
  ✓ (4) *Insist on using objective criteria.*
    ▪ This principle promotes decision-making based on reasonable standards rather than on subjective ones.

ETHICS IN SOFTWARE DESIGN

➢ Engineers must abide to the highest possible standards when developing software systems

- ✓ Helps to make the software engineering profession beneficial and highly respected.
- ✓ Engineers have the responsibility to public welfare, including health and safety.

➢ Various *principles of ethics* collectively ensure that professionals in the software engineering field adhere to high-levels of ethical conduct.

➢ The IEEE-CS/ACM organizations developed a *Software Engineering Code of Ethics (SECE)* [4] as the standard set of ethical guidelines that engineers must adhere to.

ETHICS IN SOFTWARE DESIGN

➢ Principles of Ethics in Software Engineering [4]

Principle	Description
Public	Software engineers shall act consistently with the public interest.
Client and Employer	Software engineers shall act in a manner that is in the best interests of their client and employer consistent with the public interest.
Product	Software engineers shall ensure that their products and related modifications meet the highest professional standards possible.
Judgment	Software engineers shall maintain integrity and independence in their professional judgment.
Management	Software engineering managers and leaders shall subscribe to and promote an ethical approach to the management of software development and maintenance.
Profession	Software engineers shall advance the integrity and reputation of the profession consistent with the public interest.
Colleagues	Software engineers shall be fair to and supportive of their colleagues.
Self	Software engineers shall participate in lifelong learning regarding the practice of their profession and shall promote an ethical approach to the practice of the profession.

ETHICS IN SOFTWARE DESIGN
- PUBLIC AND PRODUCT PRINCIPLES -

➢ The *public principle* state that software engineering professionals must:
- ✓ Take responsibility for their own work
- ✓ Ensure that their work positively affects the public good
- ✓ Strive for high quality within acceptable cost and schedule thresholds

No.	Guideline Description
1.01	Engineers must accept full responsibility for their own work.
1.02	Moderate the interests of the software engineer, the employer, the client and the users with the public good.
1.03	Approve software only if they have a well-founded belief that it is safe, meets specifications, passes tests, and does not diminish quality of life, diminish privacy or harm the environment. The ultimate effect of the work should be to the public good.
1.04	Disclose to appropriate persons or authorities any actual or potential danger to the user, the public, or the environment, that they reasonably believe to be associated with software or related documents.
1.05	Cooperate in efforts to address matters of grave public concern caused by software, its installation, maintenance, support or documentation.
1.06	Be fair and avoid deception in all statements, particularly public ones, concerning software or related documents, methods and tools.
1.07	Consider issues of physical disabilities, allocation of resources, economic disadvantage and other factors that can diminish access to the benefits of software.
1.08	Be encouraged to volunteer professional skills to good causes and contribute to public education concerning the discipline.

ETHICS IN SOFTWARE DESIGN
- PUBLIC AND PRODUCT PRINCIPLES -

➢ Guidelines related to the *product principle*

No.	Guideline Description
3.01	Strive for high quality, acceptable cost and a reasonable schedule, ensuring significant tradeoffs are clear to and accepted by the employer and the client, and are available for consideration by the user and the public.
3.02	Ensure proper and achievable goals and objectives for any project on which they work or propose.
3.03	Identify, define and address ethical, economic, cultural, legal and environmental issues related to work projects.
3.04	Ensure that they are qualified for any project on which they work or propose to work by an appropriate combination of education and training, and experience.
3.05	Ensure an appropriate method is used for any project on which they work or propose to work.
3.06	Work to follow professional standards, when available, that are most appropriate for the task at hand, departing from these only when ethically or technically justified.
3.07	Strive to fully understand the specifications for software on which they work.
3.08	Ensure that specifications for software on which they work have been well documented, satisfy the users requirements and have the appropriate approvals.
3.09	Ensure realistic quantitative estimates of cost, scheduling, personnel, quality and outcomes on any project on which they work or propose to work and provide an uncertainty assessment of these estimates.
3.10	Ensure adequate testing, debugging, and review of software and related documents on which they work.
3.11	Ensure adequate documentation, including significant problems discovered and solutions adopted, for any project on which they work.
3.12	Work to develop software and related documents that respect the privacy of those who will be affected by that software.
3.13	Be careful to use only accurate data derived by ethical and lawful means, and use it only in ways properly authorized.
3.14	Maintain the integrity of data, being sensitive to outdated or flawed occurrences.
3.15	Treat all forms of software maintenance with the same professionalism as new development.

ETHICS IN SOFTWARE DESIGN
- JUDGMENT PRINCIPLE -

➢ The *judgment principle* deals with maintaining integrity in professional judgment.
  - ✓ Integrity and moral values of a person plays a major role when making judgment calls.

➢ Guidelines related to this principle are:

No.	Guideline Description
4.01	Temper all technical judgments by the need to support and maintain human values.
4.02	Only endorse documents either prepared under their supervision or within their areas of competence and with which they are in agreement.
4.03	Maintain professional objectivity with respect to any software or related documents they are asked to evaluate.
4.04	Not engage in deceptive financial practices such as bribery, double billing, or other improper financial practices.
4.05	Disclose to all concerned parties those conflicts of interest that cannot reasonably be avoided or escaped.
4.06	Refuse to participate, as members or advisors, in a private, governmental or professional body concerned with software related issues, in which they, their employers or their clients have undisclosed potential conflicts of interest.

ETHICS IN SOFTWARE DESIGN
- MANAGEMENT PRINCIPLE -

➢ Guidelines related to the *management principle*

No.	Guideline Description
5.01	Ensure good management for any project on which they work, including effective procedures for promotion of quality and reduction of risk.
5.02	Ensure that software engineers are informed of standards before being held to them.
5.03	Ensure that software engineers know the employer's policies and procedures for protecting passwords, files and information that is confidential to the employer or confidential to others.
5.04	Assign work only after taking into account appropriate contributions of education and experience tempered with a desire to further that education and experience.
5.05	Ensure realistic quantitative estimates of cost, scheduling, personnel, quality and outcomes on any project on which they work or propose to work, and provide an uncertainty assessment of these estimates.
5.06	Attract potential software engineers only by full and accurate description of the conditions of employment.
5.07	Offer fair and just remuneration.
5.08	Not unjustly prevent someone from taking a position for which that person is suitably qualified.
5.09	Ensure that there is a fair agreement concerning ownership of any software, processes, research, writing, or other intellectual property to which a software engineer has contributed.
5.10	Provide for due process in hearing charges of violation of an employer's policy or of this Code.
5.11	Not ask a software engineer to do anything inconsistent with this Code.
5.12	Not punish anyone for expressing ethical concerns about a project.

SUMMARY

➢ In this session, we presented:

- ✓ Key concepts to leading the design effort
  - ▪ Personality Traits and Leadership
  - ▪ Personality Dimension
  - ▪ Traits of Effective Leaders
  - ▪ Ethical Leadership
  - ▪ Power
- ✓ Key leadership skills
  - ▪ Communication
  - ▪ Networking
  - ▪ Motivation
  - ▪ Negotiation

- ✓ Key principles of ethics in software design
  - ▪ Public and Product Principles
  - ▪ Judgment Principle
  - ▪ Management Principle

QUESTIONS?

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[1] Lussier, Robert, and Christopher Achua. *Leadership: Theory, Application, & Skill Development.* 4th. Cengage Learning, 2010.

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