

20CS2024

Ethics in Information Technology



Syllabus

Module 1: Overview of Professional ethics

Professional Ethics – Big Picture View - Organizational Culture and Climate- Senses of ‘Engineering Ethics’- Leadership theories: Transactional, Transformational, charismatic leadership, situational leadership – Participative style of management- Engineers as Managers – Concept of Continuous improvement- PDCA Cycle- Suggestion Schemes and Quality circles

Module 2: Cyber-crimes and Cyber Laws

Ethics for IT Workers and IT Users-IT Professionals-IT professional malpractice-IT , IT Act cyber laws - Information Technology Act, 2000 (“IT Act”) – Digital Signature – Confidentiality, Integrity and Authenticity (CIA)

Module 3: Intellectual Property Rights

Key Issues-Intellectual Property – Software Copy Rights- Patents- Patentable Software related Products- IPR Procedures- Patent Application, Publication, examination, awarding

Module 4: Software Development and Information Technology

Strategies to Engineer Quality Software-Key Issues in Software Development- The impact of IT on the Standard of Living and Productivity -Industry 4.0 standards and applications in areas like Food, Water, Energy and Health care

Module 5: Social networking, ethics of information technology organizations

Social Networking Web Site - Business Applications of Online Social Networking-Social Networking Ethical Issues Online Virtual Worlds- Key ethical issues for Organizations-Outsourcing-Whistle Blowing-Green Computing-ICT Industry Code for Conduct.

Module 6: Standards for Information Security Management

Information Security Management Systems (ISMS) – ISO 27001 – Framing Security Policy of Organization- Committees- Security Forum, Core Committee, Custodian and Users, Business Continuity Process Team & Procedure- Information Security Auditing Process, IT Security Incidents.

Course Objectives:

Enable the student to

1. Acquire knowledge about professional ethics and understand Organizational culture and climate
2. Understand the impact of IT Profession, software development Cyber laws and regulations in society
3. Familiarize with standards, policies, procedures and controls for Information Security Management.

Course Outcomes:

- The student will be able to
 1. understand professional ethics and organizational culture conduct in information technology.
 2. choose various leadership styles and the suitability for the specific organization
 3. identify the possible Computer crimes and the rules and regulations for protection.
 4. describe the various types of IPR and the procedures for obtaining IPR
 5. explain the various types of Social Networking and issues
 6. relate to the different national and international organizational models with intellectual ability.

Books for reference

- **Text Books:**

1. George Reynolds, "Ethics in Information Technology", CENGAGE Learning Fourth Edition, 2012. ISBN: 9788131518755, 8131518752

- **Reference Books:**

1. Richard A. Spinello, "Case Studies in Information Technology Ethics", Prentice Hall, Second Edition, 2003. ISBN: 978-0130991508.
2. Sara Base, "A Gift of Fire: social, legal, and ethical issues for computing and the Internet", Prentice Hall, Second Edition, 2008, ISBN: 978-0132492676
3. IT Act <https://indiacode.nic.in/bitstream/123456789/1999/3/A2000-21.pdf>
4. IPR in India Laws and Procedures: <https://www.india-briefing.com/news/intellectual-property-rights-india-laws-procedures-registration-14312.html/>
5. Industry 4.0 the Fourth Industrial Revolution <https://www.i-scoop.eu/industry-4-0/>
6. ISMS Policy Oil India. https://oilweb.oilindia.in/policy/Information_Security_Policy_2013.pdf

Module 1: Overview of Professional ethics

- Professional Ethics - Big Picture View
- Organizational Culture and Climate
- Senses of 'Engineering Ethics'
- Leadership theories: Transactional, Transformational, charismatic leadership, situational leadership
- Participative style of management- Engineers as Managers
- Concept of Continuous improvement- PDCA Cycle
- Suggestion Schemes and Quality circles

Professional Ethics - Big Picture View

- A **set of rules** expressed in statements are formed by every society which **establishes the boundaries** of generally accepted behavior. These rules are about **how people should behave**, and **the individual rules** fit together to form the **moral code** by which a society lives.
- The term **morality** refers to **social conventions about right and wrong** that are so widely shared that they become the basis for an established consensus.
- **Morality** may vary by:
 - Age
 - Cultural group
 - Ethnic background
 - Religion
 - Life experiences
 - Education
 - Gender

Ethics

- **Ethics** is a **set of beliefs** about **right and wrong behavior** within a society.
- **Ethical behavior** conforms to generally accepted **universal norms**.
- **Ethical behavior** can vary dramatically. For example, attitudes toward software piracy—a form of copyright infringement that involves making copies of software or enabling others to access software to which they are not granted.
- Countries with the **highest rate of piracy**: Zimbabwe (92%), Georgia (91%), Bangladesh (90%), Libya (90%), and Moldova (90%).
- Countries with the **lowest rate of piracy**: The United States (19%), Luxembourg (20%), Japan (21%), and New Zealand (22%).
- A **virtue** is a habit that inclines people to do what is acceptable. e.g. : Fairness, generosity, and loyalty
- **Vice** is a habit of unacceptable behavior. E.g.: vanity, greed, envy, and anger.
- People's virtues and vices help define their **personal value system**.

Integrity - importance

- Cornerstone of ethical behavior – **Integrity**
- A person who acts with **integrity** acts in accordance with a personal code of principles.
- **Consistency** can be difficult to achieve, particularly when you are in a situation that conflicts with your moral standards.
- Another form of **inconsistency** emerges if you apply moral standards differently according to the situation or people involved. If you are **consistent** and act with **integrity**, you apply the same moral standards in all situations.
- **Morals** are one's personal beliefs about right and wrong,
- **Ethics** describes standards or codes of behavior expected of an individual by a group (nation, organization, profession) to which an individual belongs.
- **Law** is a system of rules that tells us what we can and cannot do. Laws are enforced by a set of institutions.
- **Legal acts** are acts that conform to the law. **Moral acts** conform to what an individual believes to be the right thing to do.

Professional Ethics – Ethics in business world

Corporate Social Responsibility (CSR)

- **Corporate social responsibility (CSR)** is the concept that an organization should act ethically by taking responsibility for the impact of its actions on the environment, the community, and the welfare of its employees.
- Setting **CSR goals** encourages an organization to achieve **higher moral and ethical standards**.
e.g.: **CISCO** - has set and achieved a number of CSR goals for itself, and is recognized as a highly ethical company.
- **Supply chain sustainability** - a component of CSR
 - that focuses on **developing** and **maintaining** a supply chain that meets the needs of the present without compromising the ability of future generations to meet their needs.
 - **takes into account** such issues as fair labor practices, energy and resource conservation, human rights, and community responsibility.
- Each organization must decide if CSR is a priority and specify the CSR goals. Some CSR goals can lead to increased profits, making it easy for senior company management and stakeholders to support the organization's goals.
- If striving to meet a specific CSR goal leads to a decrease in profits, senior management may be challenged to modify or drop that CSR goal entirely.

Why fostering Corporate Social Responsibility and Good Business Ethics is important

- **5 reasons for pursuing CSR goals** and for **promoting a work environment** in which employees are encouraged to act ethically when making business decisions:

Gaining the goodwill of the community

Creating an organization that operates consistently

Promoting good business practices

Protecting the organization & the employees from legal action

Avoiding unfavorable publicity

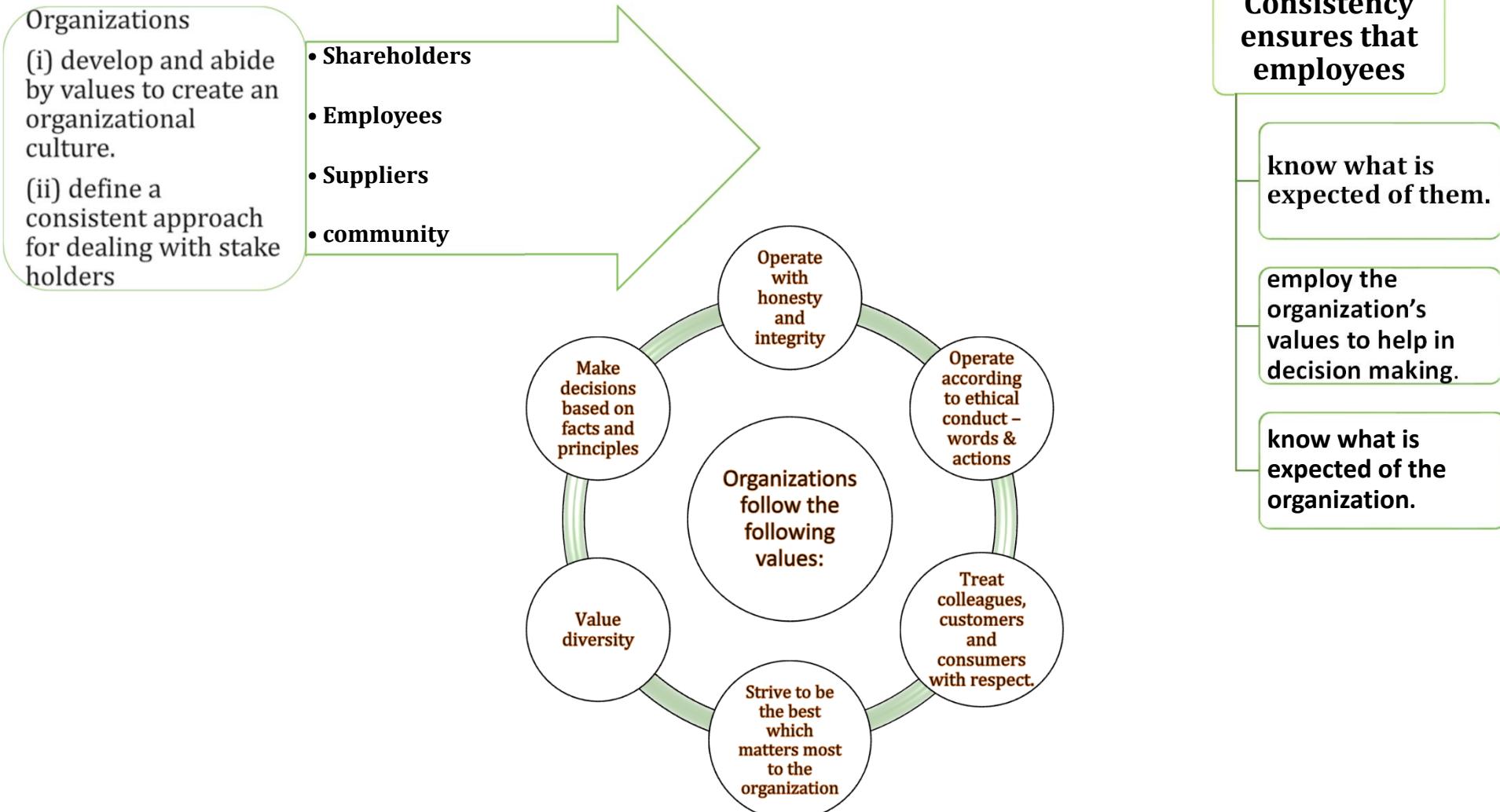
Gaining the goodwill of the community



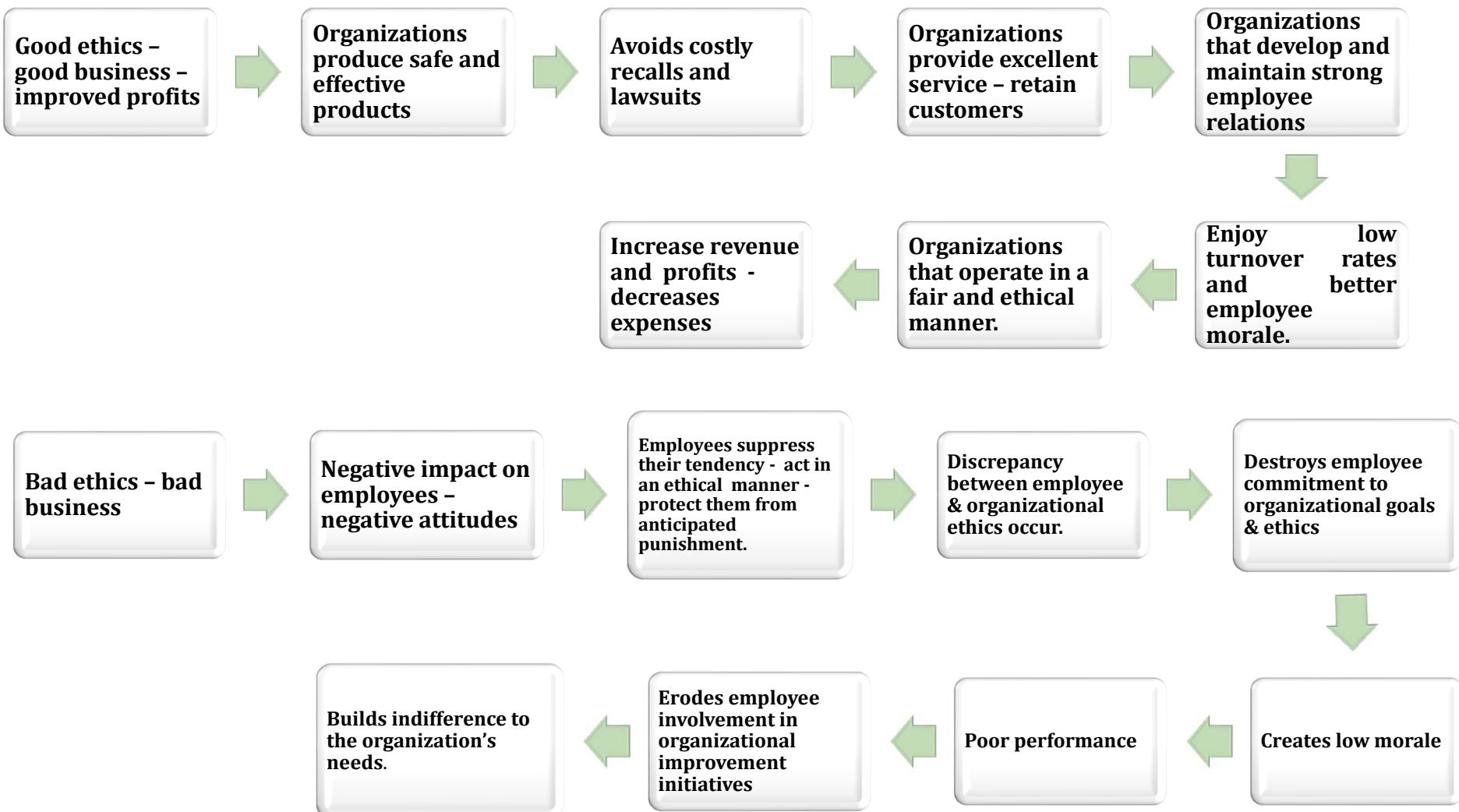
• **Philanthropy** is one way in which an organization can demonstrate its values in action and make a positive connection with its stakeholders.

• A **stakeholder** is someone who stands to gain or lose, depending on how a situation is resolved.

Creating an organization that operates consistently



Fostering Good Business Practices



Protecting the Organization and Its Employees from Legal Action

- **U.S. Supreme Court** established that an **employer** can be **held responsible** for the **acts of its employees** even if the employees act in a manner contrary to corporate policy and their employer's directions. The principle established is called **respondeat superior** (let the master answer).
- A coalition of several legal organizations should “be able to escape criminal liability if they have acted as responsible corporate citizens, making strong efforts to prevent and detect misconduct in the workplace” - to establish effective ethics and compliance programs.
- Some people argue that officers of companies should not be given light sentences if their ethics programs fail to deter criminal activity within their firms.

Avoiding unfavorable publicity

Public reputation of a company strongly influences:

value of its stock

how consumers regard its products & services

degree of oversight it receives from government agencies

amount of support & cooperation it receives from business partners

- Organizations are motivated to build a strong ethics program to avoid negative publicity.
- If an organization is perceived as operating ethically, customers, business partners, shareholders, consumer advocates, financial institutions, and regulatory bodies will usually regard it more favorably.

Improving Corporate Ethics

Characteristics of a successful ethics program:

Employees are willing to seek advice about ethics issues

Employees feel prepared to handle situations that could lead to misconduct

Employees are rewarded for their ethical behavior

Organization does not reward success obtained through questionable means

Employees feel positive about their organization.

Appointing a Corporate Ethics Officer



Ethical Standards Set by Board of Directors

- The **board of directors** is responsible for the **careful and responsible management of an organization**.
- **Board's primary objective** is to **oversee the organization's business activities and management** for the benefit of all stakeholders, including shareholders, employees, customers, suppliers, and the community - **a for-profit organization**.
- In a **nonprofit organization**, the board reports to a different set of stakeholders—in particular, the local community that the nonprofit serves.



Establishing a Corporate Code of Ethics



Sarbanes-Oxley Act of 2002

Sarbanes-Oxley Act of 2002

Enacted in response to **public outrage over several major accounting scandals**

Section 404 requires that the CEO and CFO sign any SEC filing to attest to its accuracy

Section 406 requires public companies to disclose whether or not they have a code of ethics and if any waivers to that code have been granted

- The **penalties for false attestation** - 20 years in prison and significant monetary fines for senior executives.

Intel's code of conduct

Conducts business with honesty & integrity

Follows the letter & spirit of law

Treats each other fairly

Acts in the best interests of Intel & avoid conflict of interests.

Protects the organization's assets & reputation.

Conducting Social Audits

- An organization reviews how well it is meeting its ethical and social responsibility goals.
- communicates its new goals for the upcoming year.
- shares the audit information with employees, shareholders, investors, market analysts, customers, suppliers, government agencies, and the communities in which the organization operates.

Requiring Employees to Take Ethics Training

- Personal convictions improved through education.
- Comprehensive ethics education program encourages employees to act responsibly and ethically.
- Often presented in small workshop formats
- Employees apply code of ethics to hypothetical but realistic case studies
- Demonstration of recent company decisions based on principles from the code of ethics
- Critical that training increase the percentage of employees who report incidents of misconduct
- Employees must:
- Learn effective ways of reporting incidents
- Be reassured their feedback will be acted on without retaliation

Ethical Criteria in Employee Appraisals

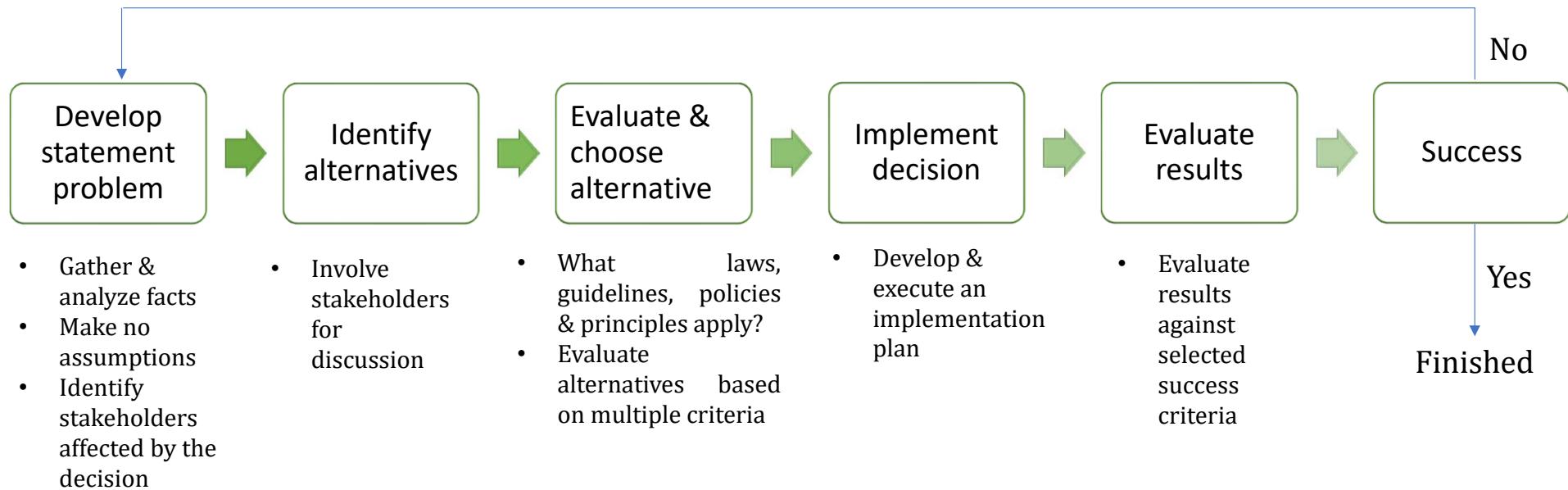
- Managers can help employees to meet performance expectations by monitoring employee behavior and providing feedback; increasingly, managers are including ethical conduct as part of an employee's performance appraisal.

Ethical criteria				
Treating others fairly & with respect	Operating effectively in a multicultural environment	Accepting personal accountability for meeting business needs	Continually developing themselves & others	Operating honestly with stakeholders

Creating an Ethical Work Environment

- Most of the employees want to perform their jobs successfully and ethically, but good employees sometimes make bad ethical choices.
- Employees in highly competitive workplaces often feel pressure from aggressive competitors, cutthroat suppliers, unrealistic budgets, unforgiving quotas, tight deadlines, and bonus incentives.
- Employees may also be encouraged to do “whatever it takes” to get the job done.

ETHICAL CONSIDERATIONS IN DECISION MAKING



Develop a Problem Statement

- A **problem statement** is a clear, concise description of the issue that needs to be addressed.
- A good problem statement answers the following questions:
 - (i) What do people observe that causes them to think there is a problem?
 - (ii) Who is directly affected by the problem?
 - (iii) Is anyone else affected?
 - (iv) How often does the problem occur?
 - (v) What is the impact of the problem?
 - (vi) How serious is the problem?
- Development of a problem statement is the most critical step in the decision-making process.
- Without a clear statement of the problem or the decision to be made, it is useless to proceed.
- If the problem is defined incorrectly, the decision will not solve the problem.
- Gather and analyze facts to develop a good problem statement.
- Seek information and opinions from a variety of people to broaden your frame of reference.
- Be extremely careful not to make assumptions about the situation.
- Simple situations can turn into complex controversies because no one takes the time to gather the facts.
- Part of developing a good problem statement involves identifying the stakeholders and their positions on the issue. Identifying the stakeholders helps you understand the impact of your decision and could help you make a better decision.

Examples – Problem statement

- **Good problem statement:** Our product supply organization is continually running out of stock of finished products, creating an out-of-stock situation on over 15 percent of our customer orders, resulting in over \$300,000 in lost sales per month.

- **Poor problem statement:** We need to implement a new inventory control system.

(This is a possible solution, not a problem statement.)

We have a problem with finished product inventory.

(This is not specific enough.)

Identify, Evaluate & Choose an alternative

- During this stage of decision making, it is ideal to enlist the help of others, including stakeholders, to identify several alternative solutions to the problem.
- Brainstorming with others will increase your chances of identifying a broad range of alternatives and determining the best solution.
- Once a set of alternatives has been identified, the group must evaluate them based on numerous criteria, such as effectiveness at addressing the issue, the extent of risk associated with each alternative, cost, and time to implement.
- Evaluate by weighing laws, guidelines, and principles - Consider likely consequences of each alternative.
- Alternative selected must:
 - (i) Be **ethically** and **legally defensible**
 - (ii) Be **consistent** with **policies and code of ethics**
 - (iii) Take into **account impact on others**
 - (iv) Provide a **good solution to problem**

Approaches to Ethical Decision Making

Virtue ethics approach

- This approach best reflects moral virtues in yourself & community.

Utilitarian approach

- This approach produces the greatest excess of benefits over harm.

Fairness approach

- This approach treats everyone the same & shows no favoritism or discrimination.

Common good approach

- This approach advances the common good.

Virtue Ethics Approach

Virtue ethics approach

- This approach best reflects **moral virtues** in yourself & community.
- focuses on **concern** (how you should behave and think about relationships) with daily life in a community.
- People are **guided by their virtues** to reach the “right” decision.
- more effective than following a set of principles & rules.
- **Problem:**
 - (i) Does not provide guide for action
 - (ii) Virtue cannot be worked out objectively - depends on circumstances

Utilitarian Approach

Utilitarian approach

- This approach produces the **greatest excess of benefits** over harm.
 - **Chooses action that has best overall consequences**
 - Finds the **greatest good by balancing all interests**
 - Fits **concept of value in economics and the use of cost-benefit analysis**
- Problems:**
- (i) Measuring and comparing values is often difficult
 - (ii) Predicting resulting benefits and harm is difficult

Fairness approach

Fairness approach

- This approach **treats everyone the same** & shows no favoritism or discrimination.
- Focuses on **fair distribution of benefits/burdens**
- Guiding principle is to treat all people the same
Problems
 - Decisions can be influenced by personal bias
 - Others may consider the decision unfair

Common good approach

Common good approach

- This approach advances the common good.
- Work together for common set of values and goals
- Implement systems that benefit all people.

Problems:

- (i) Consensus is difficult
- (ii) good often requires some groups to bear greater costs than others—
e.g.: home owners pay property taxes to support public schools, but apartment dwellers do not.

Implement the Decision & Evaluate the results

- Once an alternative is selected, it should be implemented in an efficient, effective, and timely manner.
- The bigger the change, the greater the resistance to it. Communication is the key to help people accept a change.
- A transition plan must be defined to explain to people how they will move from the old way of doing things to the new way. It is essential that the transition be seen as relatively easy and pain free.
- After the solution to the problem has been implemented, monitor the results to see if the desired effect was achieved, and observe its impact on the organization and the various stakeholders.
- This evaluation may indicate that further refinements are needed. If so, return to the develop a problem statement step, refine the problem statement as necessary, and work through the process again.

ETHICS IN INFORMATION TECHNOLOGY

- Public concern about the ethical use of information technology includes:
 - E-mail and Internet access monitoring
 - Downloading in violation of copyright laws
 - Unsolicited e-mail (spam)
 - Hackers and identify theft
 - Students and plagiarism
 - Cookies and spyware
- The general public does not understand the critical importance of ethics as applied to IT.
- Important decisions are often left to technical experts.
- General business managers must assume greater responsibility for these decisions by:
 - (i) Making decisions based on technical savvy, business know-how, and a sense of ethics.
 - (ii) Creating an environment where ethical dilemmas can be discussed openly, objectively, and constructively.

ETHICS IN INFORMATION TECHNOLOGY

- **Summary**
- To educate people about the tremendous impact of ethical issues in the successful and secure use of information technology.
- To motivate people to recognize these issues when making business decisions.
- To provide tools, approaches, and useful insights for making ethical decisions.

Organizational culture & climate

Introduction

- Humans are **social beings** and **society** plays a major role in shaping the **culture of human beings**. Once a person joins an organization, the individual is bound by the culture of that organization.
- **Organizational culture** is the practice of **shaping human behavior** in order to facilitate **smooth interaction** between the **employees** that enhances the **effectiveness of the organization**.
- The culture of an organization is influenced by the **culture of the nation**. Multinational companies that establish branches in various foreign locations have to adhere to the native cultures in order to utilize local human resources.

Introduction

- At the same time, organizations can also influence people to work according to their own organizational culture.
- Thus building organizational culture is both **proactive and reactive**.

What is Organizational Culture?

- **Culture** as generally understood implies a **set of code of conduct** which regulates human life.
- Thus culture is a set of many factors like value, beliefs, ideas, perceptions, preferences, concept of morality, code of conduct and expected ways of behavior of people of the society.

Characteristics of Organizational Climate

- It is a **common ideology** of employees in an organization.
- Organizations are **distinguished based** on the organizational culture.
- Organizational culture is **a set of unwritten rules** of conduct that guide the actions of the employees.
- It influences the **effectiveness** of the **organization** and the **employees' efficiency**.
- New employees learn the culture of the organization as they continue to work in the organization.

Characteristics of Organizational Culture

Stability

The degree to which organizational activities maintain a status quo with respect to growth.

Team Orientation

The degree to which work activities are organized around teams rather than individual.

Outcome Orientation

The degree to which the management focuses on results or outcomes rather than on the techniques and processes used to achieve these outcomes.

People Orientation

The degree to which the management decisions take into consideration the effect of outcomes on people within the organization.

Attention to detail

The degree to which employees are expected to exhibit precision, analysis and attention to detail.

Aggressiveness

The degree to which people are aggressive and competitive rather than easygoing.

Innovation and Risk Taking

The degree to which employees are encouraged to be innovative and take risks.

Factors in the Organizational Culture

- Performance Standards
- Performance Evaluations
- Expectations of various people
- Interpersonal relations
- Interpersonal Trust
- Communications among employees
- Leadership Support
- Participation
- Mutually shared trust
- Socialization
- Customer Support
- Mutually shared purpose
- Social Responsibility
- Quality of Work environment
- CRM - Customer Relationship Management, etc.

Significance of Organizational Culture

- **Organizational culture** determines the way **employees** in the organization **perform various roles**.
- While a **strong and positive organizational culture** may not necessarily ensure an **organization's success**, a **weak organizational culture** will surely **kill it**.
- If properly nurtured, a **strong organizational culture** promotes a **positive performance** in the **employees**.

Bonding

- An employee's willingness to perform in an organization depends on the **internal environment** and **good interpersonal relationships** that are determined by the organizational culture.
- Organizational culture creates a **strong sense of bonding** between the **organization** and its **employees**.

Sense of identity

- Employees **identify themselves** with the organization based on the culture.

Attitude development

- Employees joining an organization from various organizational cultures develop a **positive work attitude** towards the organization, if the culture of the organization is such that it has a positive attitude towards its employees.

Organizational Culture & Climate

- The terms **organizational culture** and **organizational climate** are used **synonymously** and **interchangeably** even though there are clear distinctions between these two aspects. **Climate at work place** can be either **physical climate** (like the temperature or humidity) or the **psychological climate** created in the minds of employees (like belongingness).
- Differences between organizational culture & organizational climate

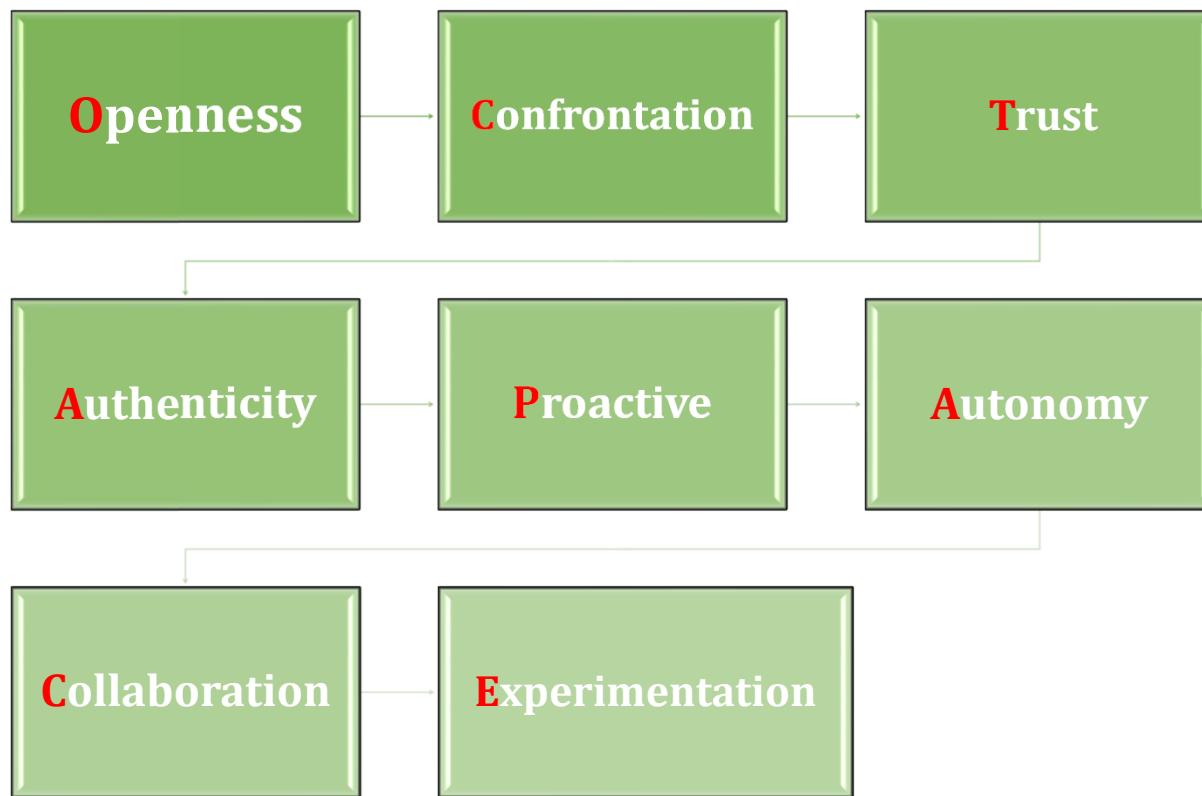
Variable	Organisational climate	Organisational culture
Concept	Employees' perception of the organisation	The unwritten code of conduct that guides the actions of most of the employees
Measurement	The employees' perception of the organisation at a certain point of time	The employees' perception of the organisation over a longer period of time
Indicators	Job specifications, role analysis and descriptions, organisational structure, communication chain, leadership style, performance evaluation, and innovations	Philosophies, ideologies, values, assumptions, beliefs, expectations, attitudes and norms
Creation	Created in a short span of time by changing the factors that influence it	Created by changing the attitudes of employee. It requires a long time

OCTAPACE CULTURE of an Organization

- Organizational Culture is the **collective behavior of humans** who are part of an organization and the meanings that the people attach to their actions.
- Organizational culture is composed of several characteristics that range in priority from high to low. **Every organization has a distinct value** for each of these characteristics, which, when combined, defines the organization's unique culture. Members of organizations make judgments on the value their organization places on these characteristics and then **adjust their behavior** to match this perceived set of values.
- Every organization develops and maintains a **unique culture**, which provides **guidelines and boundaries** for the behavior of the members of the organization.
- **OCTAPACE CULTURE** includes ethics, values, beliefs, attitudes, norms, ethos, climate, environment and culture.
- A **culture with OCTAPACE values** has the greater chance of achieving **high involvement and satisfaction, team work, growth and free flow of communication** within the organization. The most important aspect of organizational culture are the **values it practices**.

Elements which make up an organization's culture

- **Eight values** examined to develop the profile of an organizational culture that is called **OCTAPACE** that stands for:



OCTAPACE Culture of an organization

O - Openness:

It signifies the **transparent environment** in the organization like

- freedom to communicate
- share and interact without hesitation
- receiving feedback from customers
- giving ideas and suggestions to team members etc.,.
- **OUTCOME:** It helps to improve implementation of systems and innovation & free interaction among team mates , leaders and top authority and clarity in setting objectives and common goals.

C - Confrontation:

The term signifies the **actual problems** which the teams face in the **day to day work**.

- It implies to face the problem and find the best solutions to get over it rather than stepping back to escaping the problems.
 - Facing the problems and challenges boldly and not shying away is the main theme of Confrontation.
 - If an organization encourages people to recognize a problem, bring it to people concerned, explore with them and search possible ways of dealing with it.
- OUTCOME:** Improved problem solving and clarity and team discussions to resolve problems

OCTAPACE Culture of an organization

T - Trust:

- The trust factor come with openness which includes maintaining the **confidentiality of information** shared by the organization as well as others .
- If the level of **trust is low**, the various dimensions of HRD are likely to be seen with suspicion and therefore the credibility of the system may go down.
- **Outcome:** Higher empathy, timely support, reduced stress and reduction and simplification of forms and procedures.

A - Authenticity:

- Authenticity is the congruence between what one feels and says.
- It is the **value underlying trust**.
- **Authenticity** is reflected in the narrowest gap between the **stated values** and the **actual behavior**.
- This value is important for the **development of a culture of mutuality**.
- **OUTCOME:** Sharing of feelings freely to improve interpersonal communication and reduced distortion in communication.

OCTAPACE Culture of an organization

P - Pro- Active:

- Proactive means **anticipating issues in advance**.
- Its measures - **taking initiative, preplanning and taking preventive action**.
- Organizations must be proactive in terms of their planning.
- **OUTCOME:** Taking and planning actions at immediate concerns.

A – Autonomy:

- Autonomy is the willingness to use power without fear and helping others to do same.
- Autonomy is using and giving freedom to plan and act in one's own sphere.
- Organizations must avoid **autocratic type** of environment
- Give chance to teams to use their powers in a positive way.

OUTCOME: Develops mutual relationships, reduce reference made to senior people.

OCTAPACE Culture of an organization

C - Collaboration:

- involves working together in a team for a common cause.
- Individuals solve their problems by sharing their concerns with one another prepare strategies
- work out plan of action and implement the plan of action together.
- **OUTCOME:** Timely work, improved communication, resource sharing

E – Experimentation:

- It Involves using and encouraging innovative approaches to solve problems.
- It is the value which emphasizes the importance given to innovating and trying out new ways of dealing with problems in the organization.
- **OUTCOME:** Development of new product, methods, and procedures

Senses of Engineering Ethics

Dealing with an Ethical Problem

- **Recognizing** a problem or its need.
- **Gathering information** and **defining the problem** to be solved or goal to be achieved.
- **Generating alternative solutions** or methods to achieve the goal.
- **Evaluate benefits** and costs of alternate solutions.
- **Decision making** & optimization.
- **Implementing** the best solution.

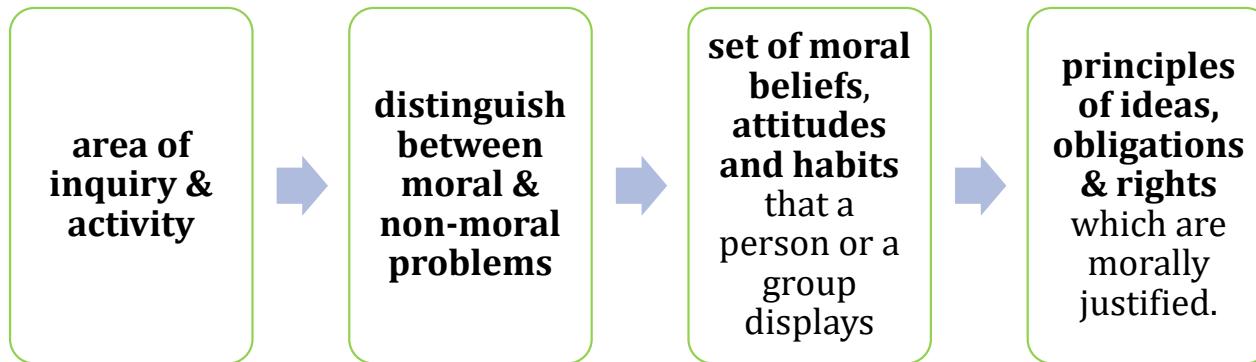
Senses of engineering ethics

- set of specific moral problems and issues related to engineering.
- based on justified moral principles.
- activity of understanding moral problems.
- set of belief and attitude for a group displays concerning morality.



Four Senses – Engineering ethics

- It is an **area of inquiry & activity**.
- It enables to **distinguish between moral & non-moral problems**.
- It refers to a particular **set of moral beliefs, attitudes and habits** that a person or a group displays.
- It refers to the **principles of ideas, obligations & rights** which are morally justified.



Types

- Two different senses of engineering ethics:
Normative and the Descriptive senses.
- The **normative sense** includes:
 - (a) **Knowing moral values**, finding **accurate solutions** to **moral problems** and **justifying moral judgments** in engineering practices,
 - (b) **Study of decisions, policies, and values** that are **morally desirable** in the **engineering practice and research**.
 - (c) Using **codes of ethics and standards** and applying them in their transactions by engineers.
- The **descriptive sense** refers to what **specific individual or group of engineers believe an act**, without justifying their beliefs or actions.

VARIETY OF MORAL ISSUES

Reasons for people including the employer and employees, behaving

unethically may be classified into three categories:

- Resource Crunch - individual diversity, dissent, and input to decision-making
- Opportunity
- Attitude

Resource crunch

- **Poor attitude of the employees** set in due to:
 - **Low morale of the employees** due to dissatisfaction & downsizing.
 - **Absence of grievance redressal mechanism**
 - **Lack of promotions** or career development policies or denied promotions
 - **Lack of transparency**
 - **Absence of recognition & reward system**
 - **Poor working environment**
- Giving ethics training for all, recognizing ethical conduct in work place, including ethics in performance appraisal and encouraging open discussion on ethical issues – **promote positive attitudes among the employees.**
- To get **firm and positive effect, ethical standards** must be **set** and **adopted** by the senior management with input from all personnel.

Opportunity

- **Double standards or behaviour** of the **employers** towards the **employees** and the **public**.
- **Management projecting their own interests** more than that of their employees. Some organizations over emphasize short-term gains and results at the expense of themselves & others.
- **Emphasis on results & gains** at the expense of the employees.
- **Management by objectives**, without focus on empowerment & improvement of the infrastructure.

Attitude

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- To get firm and positive effect, ethical standards must be set and adopted by the senior management with input from all personnel.

- Giving **ethics training** for all, recognizing **ethical conduct** in work place, including **ethics in performance appraisal**, and encouraging **open discussion** on ethical issues.

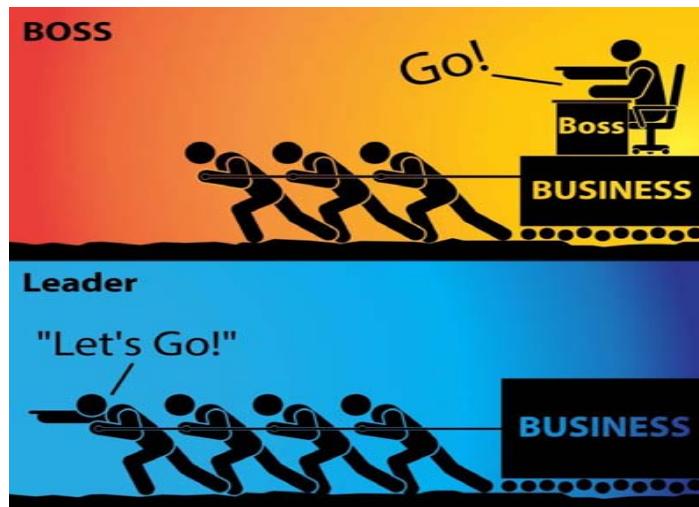
Difference between Moral & Ethics :

Moral

Refers only to personal behavior.
Refers to any aspect of human action.
Social conventions about right or wrong conduct.

Ethics

Involves defining, analyzing, evaluating and resolving moral problems and developing moral criteria to guide human behavior.
Critical reflection on what one does and why one does it.
Refers only to professional behavior



Leadership



Who is a Leader?

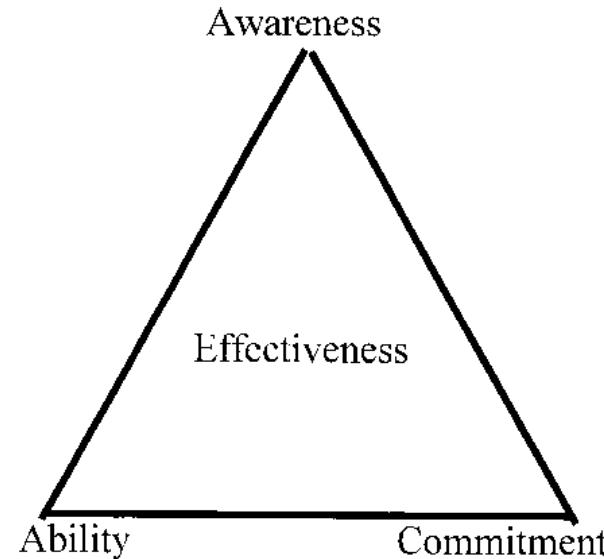
- A leader is one who inspires, motivates and leads people to accomplish organizational goals.
- Leadership is all about influencing a group of people.



Interpersonal effectiveness

Leadership is a direct function of three elements of interpersonal effectiveness:

- Awareness
- Ability
- Commitment



Awareness

- **Awareness** is a state of consciousness.
- It is the ability to recognize yourself, others, events and situations in real time.
- It is the ability to assess the impact of actions on situations and others, and be critically self-reflective.
- It is a development process that is a function of **experience, communication, self discovery and feedback**.

Ability

- **Ability to learn** and **understand technical issues** - basis of our careers.
- **Ability to lead** is a function of influence:
 - (i) **Ability to communicate**
 - (ii) **Ability to resolve conflicts**
 - (iii) **Ability to solve problems** and **make decisions**
- As a member of a team, we influence others in a **collaborative effort** to find better ideas or solve problems.

Commitment

- For leaders, the “one thing” that leads to maturity is the fully aware recognition that one’s decisions make a difference, both positively and negatively, in the lives of others, and that any attempt to solve a problem might have a decided negative impact on some, while helping others.
- In no-win scenarios, one must still make a hard decision.

Leadership Attributes



Leadership Attributes



Role Model

- Live values; lead by example
- Demonstrate integrity; support people
- Be charismatic & energized; keep learning

Inspirer

- Create an inspiring vision; set directions
- Direct emotions; energize people
- Encourage risk-taking & experimentation

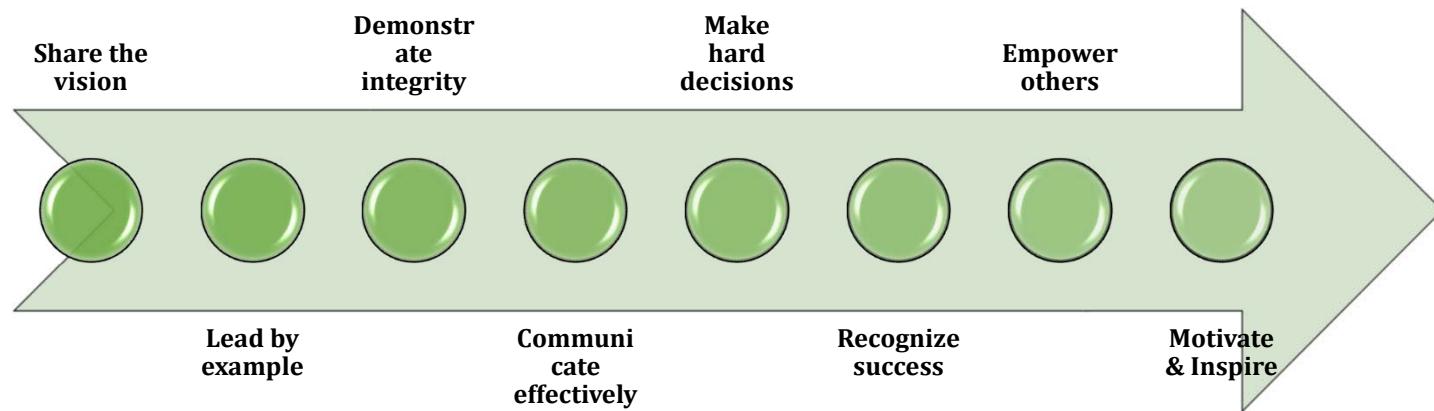
Enabler

- Help people grow; empower others
- Build teams & collaborative relationships
- Leverage diversity; build synergies

Achiever

- Focus on results; be persistent
- Discover and pursue opportunities
- Lead change; learn from feedback

Characteristics of an effective leader



Share the vision

- A leader with a vision has a **clear idea** of where they want to go, how to get there, and what success looks like.
- Be sure to **articulate your vision** clearly and passionately, ensuring your team understands how their efforts contribute to higher-level goals.
- Working toward your vision with **persistence, tenacity, and enthusiasm** will inspire others to do the same.

Lead by example

- As a leader, the best way to build creditability and gain the respect of others is to **set the right examples**.
- **Demonstrate the behavior** that you want people to follow.
- If you **demand a lot of your team**, you should also be willing to **set high standards** for yourself.
- **Aligning your words and actions** will help **build trust** and make your team more inclined to follow your example.

Demonstrate integrity

- A **leader with integrity** draws on the values to **guide the decisions, behavior and dealings with others.**
- **Clear convictions** about what is **right and wrong** and are respected for being **genuine, principled, ethical and consistent.**
- A **strong sense of character**, **keep their promises**, and **communicate openly, honestly and directly with others.**
- **Displaying integrity** through the daily actions will see you rewarded with **loyalty, confidence, and respect from your employees.**

Communicate effectively

- The **ability to communicate effectively, concisely, and tactfully** is a crucial leadership skill.
- Communication involves more than just **listening attentively** to others and **responding appropriately**.
- It also includes **sharing valuable information**, asking intelligent questions, **soliciting input and new ideas**, **clarifying misunderstandings**, and **being clear about what you want**.
- The best leaders also communicate to **inspire and energize the staff**.

Make hard decisions

- To be an effective leader, the **ability to make fast, difficult decisions** with limited information is critical.
- When **facing a tough decision**, start by determining what you are trying to achieve.
- Consider the **likely consequences of your decision** and any **available alternatives**.
- Make your **final decision with conviction**, take responsibility for it, and **follow it through**.
- Being a **resolute and confident decision-maker** will allow you to **capitalize on opportunities** and earn the respect of your team.

Recognize success

- **Frequently and consistently recognizing achievement** is one of the most powerful habits of inspiring leaders.
- To **inspire employees to give their best**, they need to know that their **work will be valued and appreciated**.
- Find ways to **celebrate your team's achievements**, even if it's through a simple “well done”.
- Besides boosting morale, it will also **strengthen their motivation** to continue giving their best.

Empower others

- **Great leaders** understand that for people to give their best, they must have a **sense of ownership over their work** and believe that what they're doing is meaningful.
- **Communicate clear goals and deadlines to your team**, and then give them the **autonomy and authority** to decide how the work gets done.
- **Challenge** them with **high expectations** and encourage them to be **creative** and **show innovation**.

Motivate and inspire

- The **best leaders** drive their team forward with **passion, enthusiasm, inspiration and motivation.**
- **Invest time** in the people you lead to determine their **strengths, needs and priorities.**
- Making them **feel valuable**, this will help you understand the best way to motivate them.
- Continually **reinforce how their efforts make a difference** and **encourage the development of their potential** with meaningful goals and challenges.

Types of Leadership styles

- **Transactional** - Leader-Follower Relationships
- **Transformational** - that can inspire positive changes in those who follow.
- **charismatic leadership** - The quality of a leader that makes many people want to follow
- **situational leadership** - the most effective leaders are those that are able to adapt their style to the situation



Charismatic Leadership Theory

Followers make attributions of heroic or extraordinary leadership abilities when they observe certain behaviors.

Charismatic leaders:

1. Have a vision.
2. Are willing to take personal risks to achieve the vision.
3. Are sensitive to follower needs.
4. Exhibit behaviors that are out of the ordinary.

SITUATIONAL LEADERSHIP

Adopting a leadership style according to the maturity levels of subordinates.



Buzzle.com

Leadership Styles

Types of Leadership styles

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Transactional Leadership

- Leader-follower relationship - Focus on the leader and the follower
- Classical management
- Transaction
 - Work for pay
 - Work for psychological benefits (status, recognition or esteem)
- Requires appropriate role behavior
- Requires clear goals and appropriate instructions

Transactional Leadership

- Transactional leadership focuses on the task.
- Puts leaders and followers on opposite sides.
- Flow of power and reward depending on follower performance.
 - High task performance=power and rewards to the follower.
 - Low task performance=Leader exercises legitimate and coercive power.
- Promotes “game-playing”

Transformational Leadership

- Transforms the **environment** and the **people** in it.
- Focuses on building an **appropriate context** and on **enhancing the relationships of people** within the system.



Qualities of a Transformational Leader

- Inspires
- Challenges
- Engages
- Develops
- Aligns



Transforming the culture

- People can be trusted.
- Everyone has a contribution to make.
- Complex problems should be handled at the lowest level.
- Norms are flexible adapting to changing environment.
- Superiors are coaches, mentors, models.

Transforming the leader's behaviour

- **Identifying and articulating a vision**-Behavior on the part of the leader aimed at identifying new opportunities for his or her unit/division/company, and developing, articulating, and inspiring others with his or her vision of the future.
- **Providing an appropriate model**-Behavior on the part of the leader that sets an example for employees to follow that is consistent with the values the leader espouses.
- **Fostering the acceptance of group goals**-Behavior on the part of the leader aimed at promoting cooperation among employees and getting them to work together toward a common goal.
- **High performance expectations**-Behavior that demonstrates the leader's expectations for excellence, quality, and/or high performance on the part of followers.
- **Providing individualized support**-Behavior on the part of the leader that indicates that he/she respects followers and is concerned about their personal feelings and needs.
- **Intellectual stimulation**-Behavior on the part of the leader that challenges followers to re-examine some of their assumptions about their work and rethink how it can be performed.

Charismatic Leadership

- The quality of a leader that makes many people want to follow.
- Charismatic leadership involves the use of power.

Charismatic Leadership

How do charismatic leaders influence followers?



Power

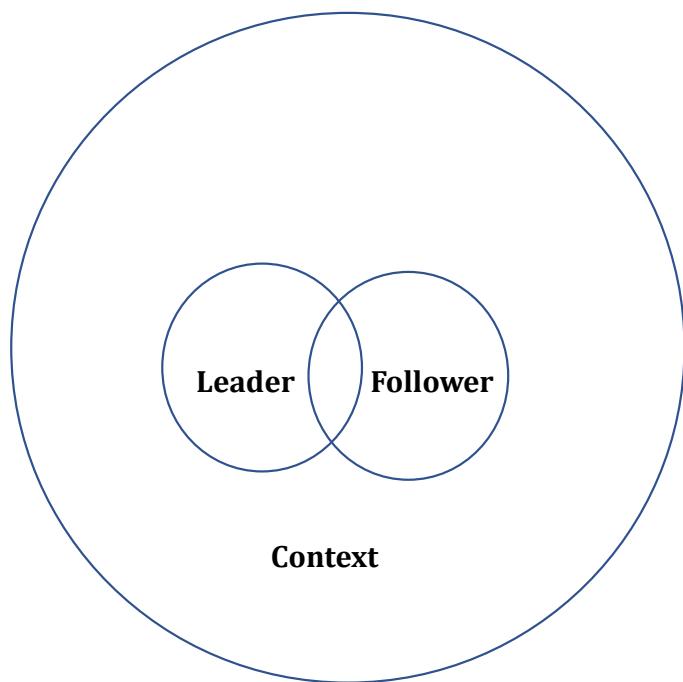
- The ability to influence people to do things.
- Five types of power
 - Coercive – based on punishment
 - Reward – Based on rewards
 - Legitimate –Based on a role
 - Expert – Based on needed knowledge
 - Referent – based on charisma

Use of power by leaders

- Socialized Charisma
 - Power for social good
- Personalized charisma
 - Power for personal benefit
- Office holder Charisma
 - Combines legitimate power with task needs
- Personal charisma
 - Use referent power to lead

Leadership from a systemic and sociological perspective

- Leaders and followers form a **social system of relationships**.
- Interact within a context.



Charismatic Leadership Characteristics

- Charismatic leaders high in
 - Dominance
 - Self confidence
 - Need for influence
 - Belief in own values

Charismatic Leadership Behaviours

- **Goal Articulation**

A transcendent goal inspires a movement.

- **Personal Image Building**

Behaviors that create impression of competence/success

Prove his competence to the followers

- **Leader role modeling of value system**

Gandhi models self sacrificing behavior of non violence

- **Leader motive arousal behaviour**

Message inspires needs in the followers that are needed to complete the task.

- **Leader communication** of high performance expectations of, and confidence in, followers

Follower Behaviours

- Characteristics and behaviors of the charismatic leader encourage behaviors in the followers
- Trust, loyalty, unquestioning acceptance, obedience to the leader
- Emulation of leader's value system
- Acceptance by followers of challenging goals
- Enhanced self esteem and performance expectations by the followers

Halpert's dimensions

- Charisma combines power with task orientation
 - Referent Power
 - Expert Power
 - Job or task involvement

Situational Leadership

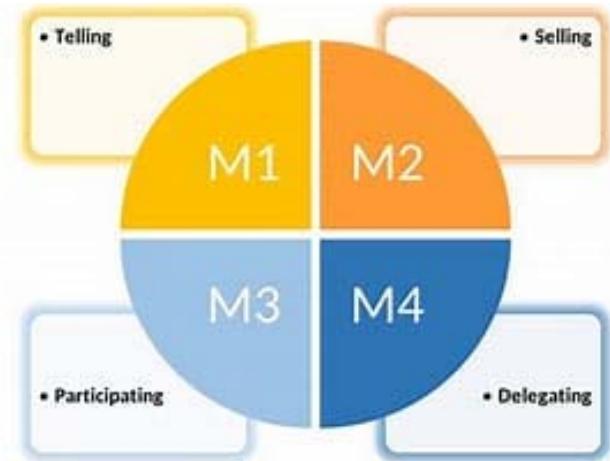
- **Situational leadership theory** is a strategy that designates a leadership style to a given situation based on a number of factors.
- Situational leaders adapt their leadership styles according to the **competency and commitment level of employees**.
- Situational leadership is a flexible style designed to maximize employee potential while meeting corporate deadlines or milestones.
- Situational leaders strive to:
 - **Drive results** by answering the what and the how of a project
 - **Develop people** and appropriate workgroups
 - **Establish relationships** and motivate employees
 - **Recognize** when to adapt leadership styles over time

- IT WAS DEVELOPED IN THE LATE 1960's BY DR. Ken Blanchard and DR. Paul Hersey.
- IT FOCUSES ON LEADERSHIP IN SITUATIONS.
- OTHER NAME IS LIFE CYCLE THEORY OF LEADERSHIP.
- DIFFERENT SITUATIONS DEMAND DIFFERENT KINDS OF LEADERSHIP.

Four situational leadership styles

The four situational leadership styles developed by Blanchard and Hershey are:

- Telling and directing (M1)
- Selling and coaching (M2)
- Participating and supporting (M3)
- Delegating (M4)



- **Telling and directing (M1):**

- In this style of leadership, the leader provides **support, specific guidance and close supervision**.
- Telling and directing leaders make **decisions and direct actions** through communication and interaction.
- These leaders are closely involved and use a **top-down approach**, meaning employees follow the directions that have been given to them.

- **Selling and coaching (M2):**

- Considered the **explaining and persuading style**, selling and coaching leaders accept input from group members and encourage them to submit their own ideas and suggestions.
- These leaders effectively sell their concept to the group and aim to **recruit their cooperation through debate and collaboration**, although the final decision belongs to the leader.

- **Participating and supporting (M3):**
 - Participating and supporting leaders offer less direction and leave the decisions to others.
 - Although they may oversee operations, **participating leaders trust the group or member's ability and expect them to make the appropriate choices.**

- **Delegating (M4):**
 - These leaders tend to limit participation and leave most of the responsibilities to the group.
 - Delegating leaders may be consulted now and then, but they primarily **pass decision-making and project direction to the group members.**

Participative Management



PARTICIPATIVE MANAGEMENT

Participative (or participatory) management, otherwise known as employee involvement or participative decision making,

encourages the involvement of stakeholders at all levels of an organization in the analysis of problems, development of strategies, and implementation of solutions.

Employees are invited to share in the decision-making process of the firm by participating in activities such as setting goals, determining work schedules, and making suggestions.

**FOUR PROCESSES INFLUENCE PARTICIPATION.
THESE PROCESSES CREATE EMPLOYEE INVOLVEMENT
AS THEY ARE PUSHED DOWN TO THE LOWEST LEVELS
IN AN ORGANIZATION.**

THSE FOUR PROCESSES INCLUDE:

- ❖ **Information sharing**
- ❖ **Training**
- ❖ **Employee decision making**
- ❖ **Rewards**

FEATURES OF PARTICIPATIVE MANAGEMENT

- **Ethical Dimensions**
- **Proper Channel of Communication**
- **Empowers Employees**
- **Recognition of Human Dignity**
- **Psychological Satisfaction to Employees**

How participative leaders operate



BENEFITS OF PARTICIPATIVE MANAGEMENT AS FOLLOWS:

- **Innovation and increased efficiency**
- **Timeliness**
- **Employee satisfaction and Motivation**
- **Product quality**
- **Less supervision requirements**
- **Better grievance redressal**
- **Hiring Flexibility**



ADVANTAGES OF PARTICIPATIVE MANAGEMENT

- **Increase in Productivity**
- **Job Satisfaction**
- **Motivation**
- **Improved Quality**
- **Reduced Costs:**

DISADVANTAGES OF PARTICIPATIVE MANAGEMENT

- **Decision making slows down**
- **Security Issue**

REQUIREMENTS OF PARTICIPATIVE MANAGEMENT

The participative management to work, several issues must be resolved and several requirements must be met they are...

- First, managers must be willing to relinquish some control to their workers; managers must feel secure in their position in order for participation to be successful.

- The success of participative management depends on careful planning and a slow, phased approach.
- Changing employees' ideas about management takes time, as does any successful attempt at a total cultural change from a democratic or autocratic style of management to a participative style.



CONCERNS

- Participative management is not a magic cure for all that ails an organization. Managers should carefully weigh the pros and the cons before implementing this style of management.
- Managers must realize that changes will not take effect overnight and will require consistency and patience before employees will begin to see that management is serious about employee involvement.



CONCLUSION

Participative Management is a universally recognized concept but still most organizations hesitate to adopt it. Through this style of management contain both the parties, employer and employees, are satisfied. It brings management and employees closer and thus, should be adopted open heartedly.

Concept of Continuous Improvement

Introduction

- Continuous improvement system takes a step by step approach based on proven methods.
- Continuous Improvement is both a mindset and a tool.
- Opportunities for continuous improvement are all around, everyday.
- Take your learning here and apply it to your area of influence.

What is Continuous Improvement?

- Method of making **small, incremental improvements** to contribute to **increased competitiveness, productivity, teamwork, employee engagement, and reduced costs.**



- It's a series of asking, "How can we optimize the current process?"
- Continuous Improvement is the on-going effort to improve products, services and processes by making small, incremental improvements within a business.
- It is based on the belief that these incremental changes will add up to major improvements over time..."

Mindset

What Kind of Mindset Do You Have?



I can learn anything I want to.
When I'm frustrated, I persevere.
I want to challenge myself.
When I fail, I learn.
Tell me I try hard.
If you succeed, I'm inspired.
My effort and attitude determine everything.



I'm either good at it, or I'm not.
When I'm frustrated, I give up.
I don't like to be challenged.
When I fail, I'm no good.
Tell me I'm smart.
If you succeed, I feel threatened.
My abilities determine everything.

Created by Reid Wilson @wayfaringpath CC BY-NC-ND Icon from themindset.com

Continuous Improvement Mindset

- Shift thinking in order to see the issue more deeply
- Together ask, “How can the process be improved”
- Get input and feedback
- Set measurable objectives to optimize process and cost
- The more visual a process, the easier to identify status and problems
- Identify non value-adding work (waste) to optimize the process

CI Mindsets Lead to a CI Culture

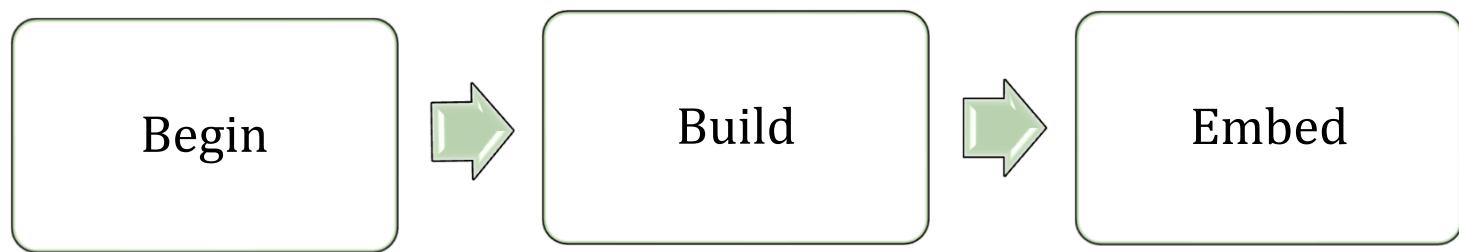
- Actively shape change
- Dedicated team member
- Positive attitude
- Positive influence
- Take responsibility
- Communication

Be an example of the behavior and attitude
you wish to cultivate in others

Proven Success of CI in Industry



Stages of a CI Program



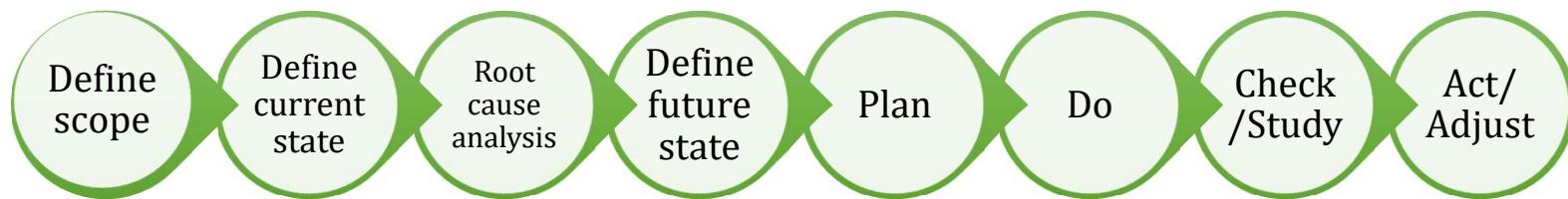
- **Begin:**
 - primary need is to “**demonstrate change**” (proof of concept)
 - **Start small** - focus on one or two specific areas or issues
 - Begin **establishing infrastructure** required to maintain the program
 - **External consultants** often used at this stage
 - Helpful to have **one or two lean experts** and **two to three change agents**
 - Focus on **designing the program, training and coaching, and developing technical knowledge**

- Build:
 - Companies often **stall** in this stage because the CI infrastructure is in adequate
 - Focus is **broadened**
 - **Change agents** become **experts** who now train the next group of agents
 - As **internal support grows** and **strengthens**, the need for **outside support** is **reduced**

- Embed:
 - Every **value stream** has undergone **lean transformation**
 - CI becomes the **norm**
 - Rather than being pushed upon them, coaching is “pulled by **line operators** and **managers** who request it to help them **meet targets**”

CI Process

- CI Process involves **building a team** and following eight well-defined steps -



- Steps designed to standardize work and improve operational efficiency
- Because the steps are based on the scientific method, following the steps leads to improvements **every time**.

Collecting CIs

- When considering a process or area for improvement, ask:
 - How many people does this specific process affect?
 - How much time do people spend working within the constraints of the current process?
 - What would we gain if we spent time working to improve this process? (Gains should be measurable, as in dollars, hours or other value metrics that are quantifiable.)
 - What other teams / processes would be impacted by changes to the current process, and how? Would those impacts serve as impediments? Is the amount of effort justified by the anticipated value of forming a new process?
- Process deviations
- Key performance indicators (KPIs)
- Customer complaints
- Deviations from specifications/standards
- Downtimes
- Rework
- Employee ideas and suggestions

Building a Team

Why teamwork?

- Best practice
- To develop an organizational capability for continuous improvement through employee engagement
- To ensure solutions are fully realized and sustainable

Doesn't teamwork take longer?

- “If you want to go fast, go alone. If you want to go far, go together.” – African Proverb
- The time lost in developing improvement is gained back many times over due to increased process efficiency
- It’s not time lost, but time *invested*

Leading a Team

- Volunteer employees who have undergone advanced CI Leader training
- Goal is to **engage**, not **dictate**
- Leaders focus not on **solving the problem**, but **leading the team through the process** so *they* can solve the problem:
 - “Never tell people **HOW** to do things. Tell them **WHAT** to do, and they will surprise you with their ingenuity.”

Team Members

- **How many people on a team?**
 - Five people per team is best practice
 - Smaller teams may not have fully realized solutions
 - Larger teams may become bogged down in too many opinions

- **Who should be on the team?**

1) CI leader

- Helps ensure process is followed

2) 3 process experts

- Intimately understand the process and problems

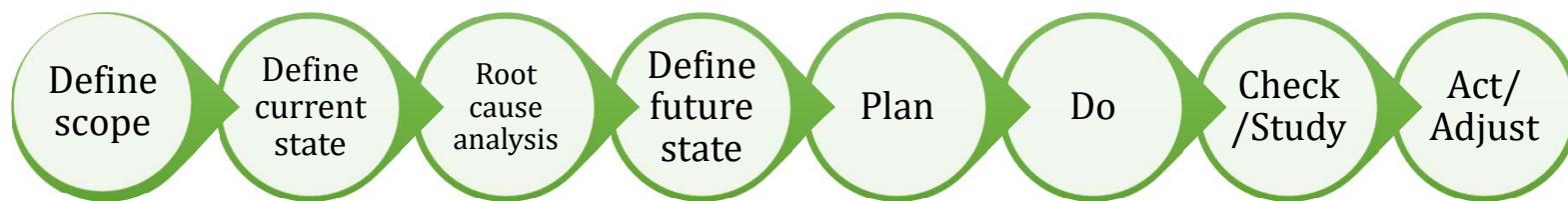
3) 'Ringer'

- Someone with 'no horse in the race'
- Outside perspectives lead to unexpected solutions

Continuous Improvement Steps

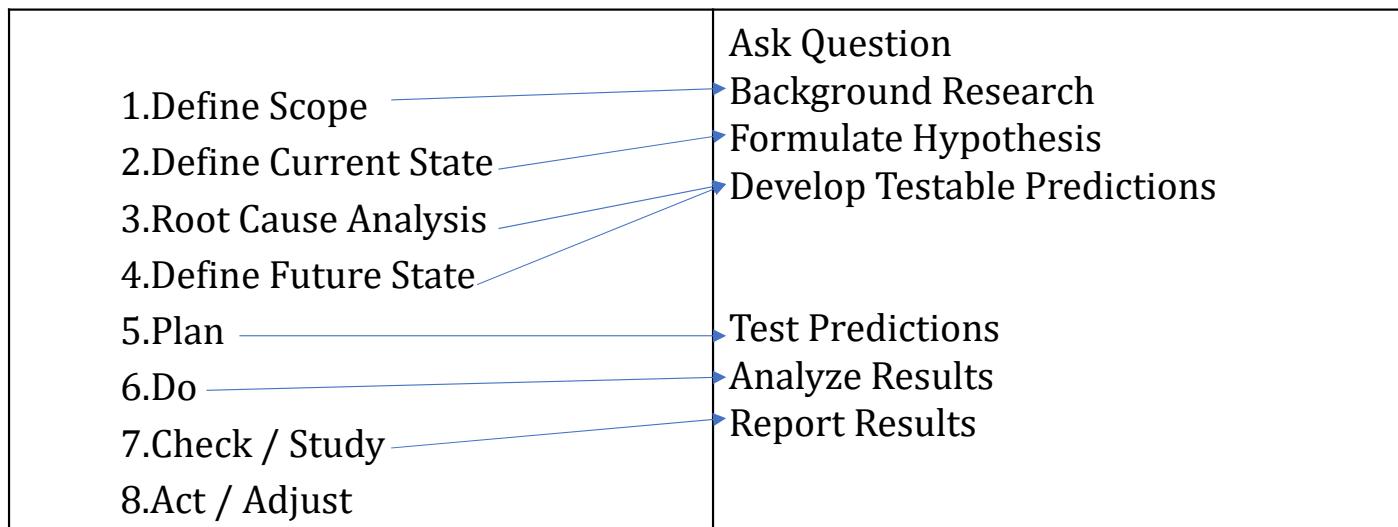
- Continuous improvement leaders guide a CI team through the eight step problem solving process using the

Plan-Do-Check-Act method



Continuous Improvement Steps

Steps based on the scientific method



Define Scope



- Narrow down the continuous improvement opportunity into a manageable size
- Keep the scope within the resources of the team
 - Example: don't attempt to implement a new building construction project in another city
- Keep the boundaries within the resources of the team
 - Too narrow: may limit root cause problem solving
 - Too wide: will not be able to solve every problem with one solution
- Scope must be just wide enough to solve the problem and just narrow enough to focus the CI effort
- Focus is key to a successful outcome

Define Current State

- What do you see now? How is the situation currently handled?
 - Do this at “the place,” called the Gemba
 - Don’t take anyone’s word for it: Go and See
 - Notice the interactions of people in the area
 - Spend as much time as necessary to understand the current state
- Do not rush this step!
 - We must first uncover the process to uncover the problems
 - We must fully understand the problems before the best solution can emerge
- Creating flow charts and maps help identify problem areas
- Notice any waste
 - “Waste is anything that adds cost but not value.”



Define Current State: Identifying Waste

Defects

- Efforts caused by rework, scrap, and incorrect information

Overproduction

- Production that is more than needed or before it is needed

Waiting

- Wasted time waiting for the next step in a process

Non-Utilized Talent

- Underutilizing people's talents, skills, & knowledge

Transportation

- Unnecessary movements of products & materials

Inventory

- Excess products and materials not being processed

Motion

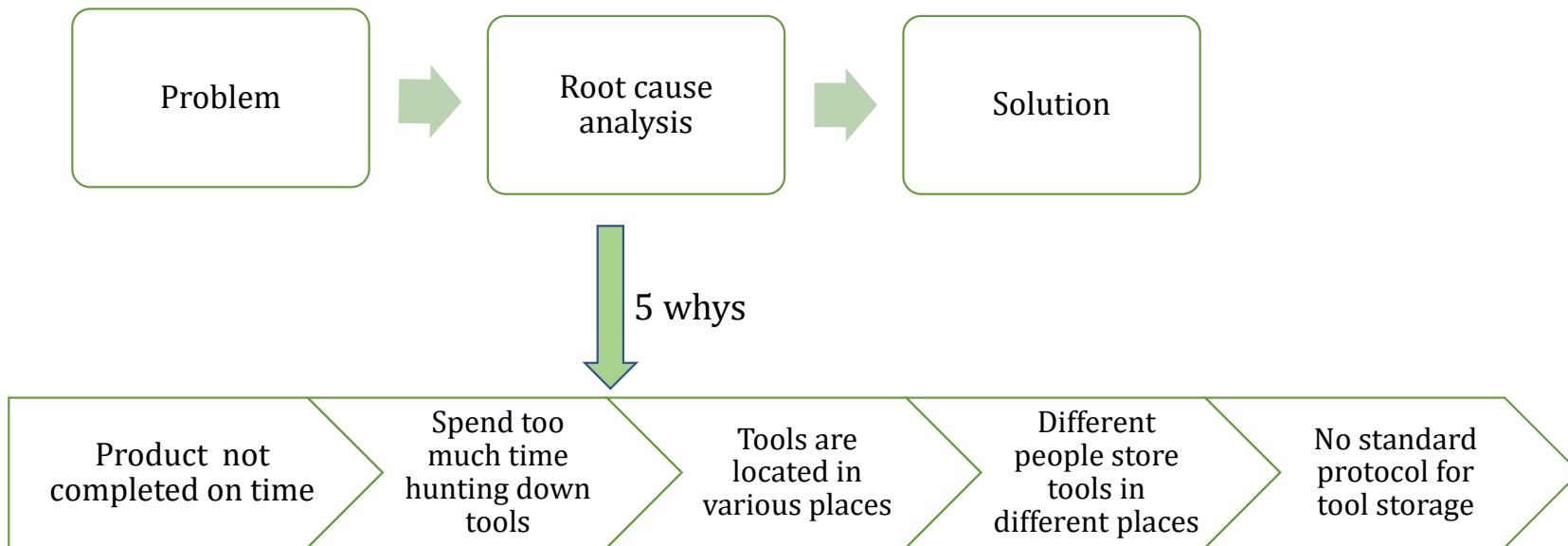
- Unnecessary movements by people

Extra-Processing

- More work or higher quality than is required by customer

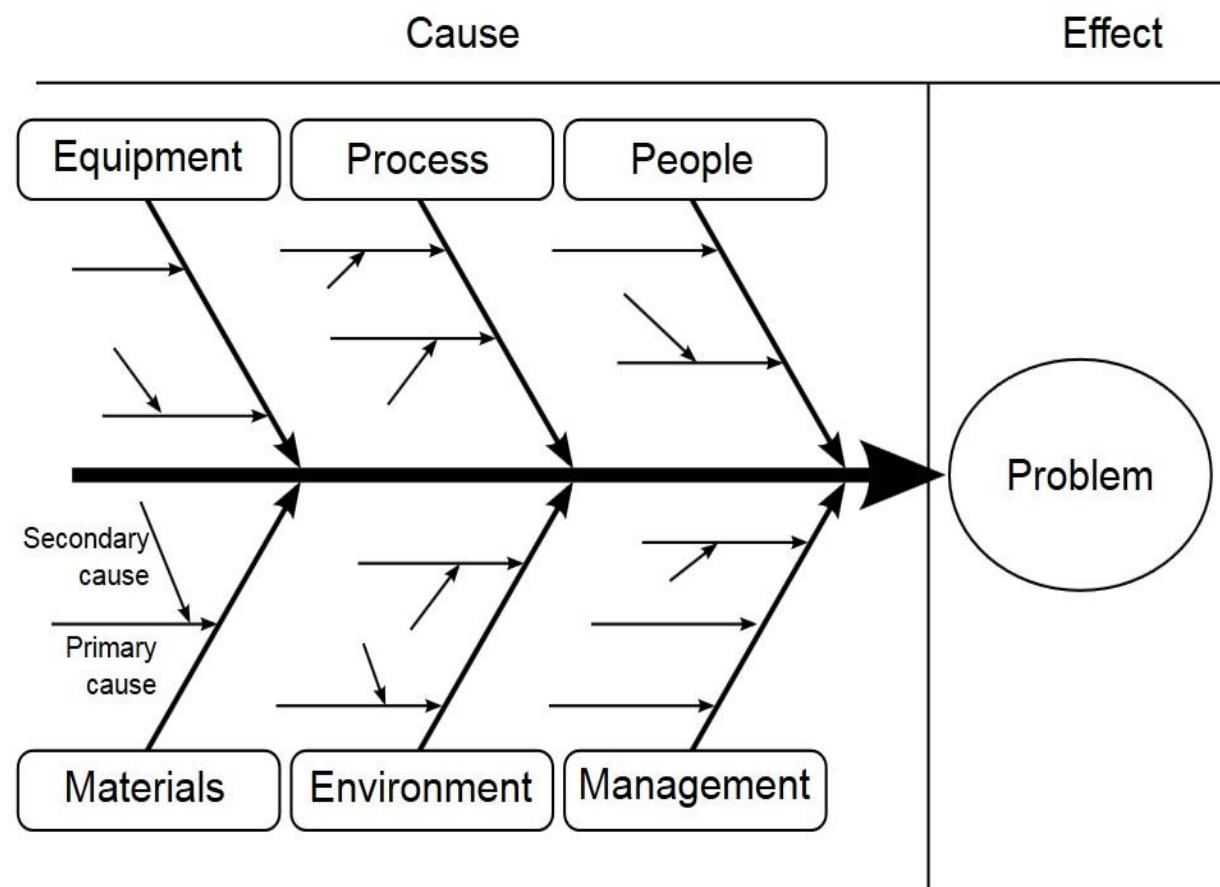
Root Cause Analysis

- Root cause analysis (RCA) is a systematic process for **identifying “root causes” of problems or events and an approach** for responding to them.

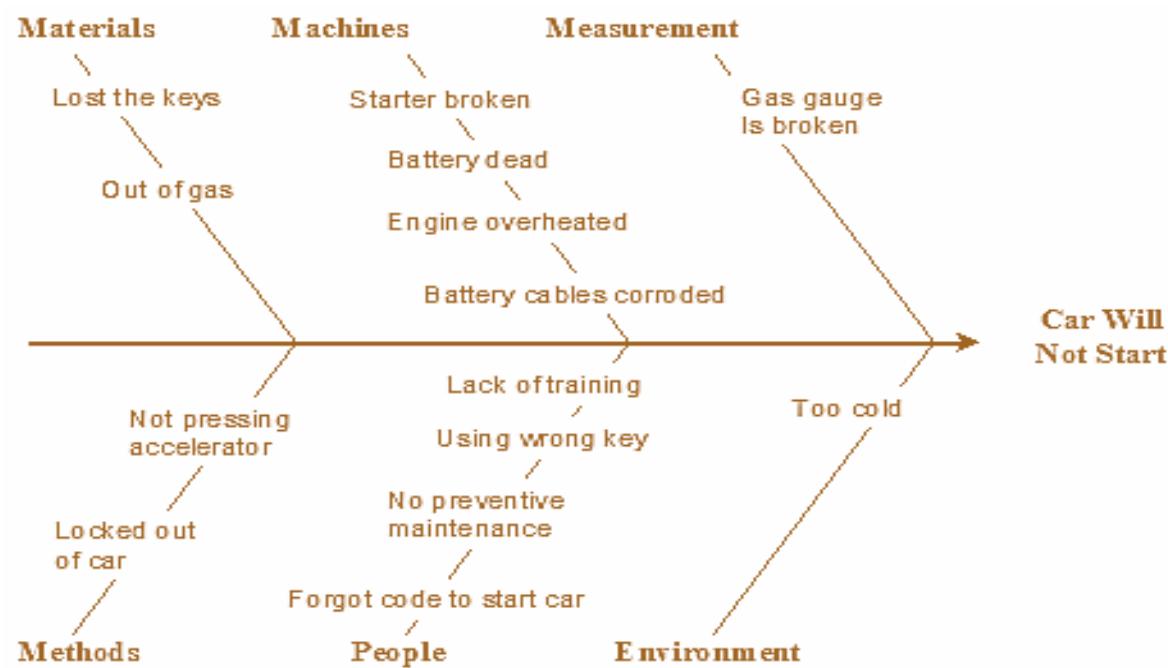


Root Cause Analysis: Fishbone Diagram

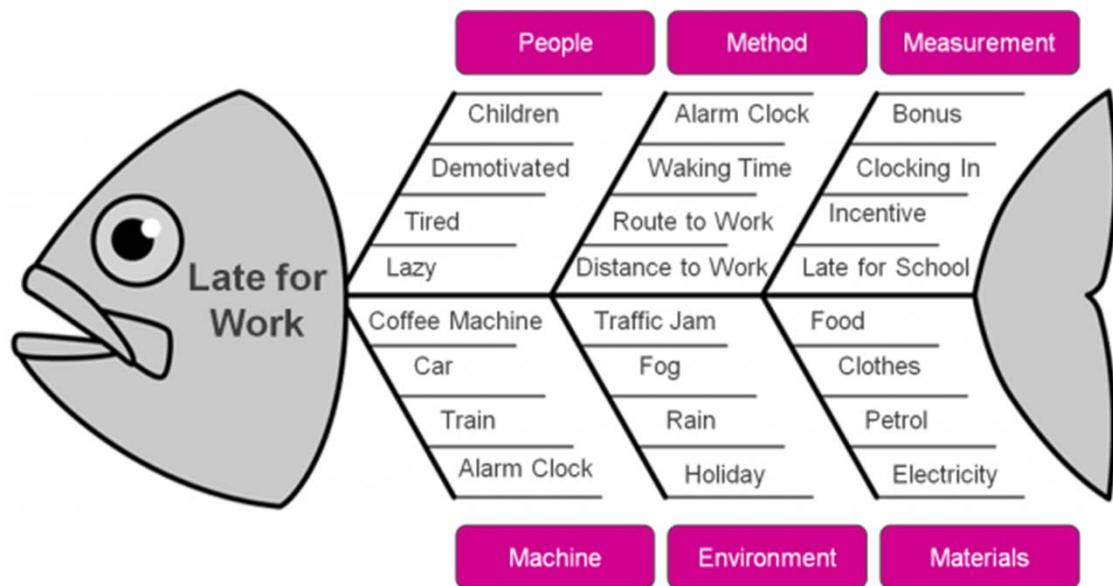
- Used for complex problems that likely have more than one root cause.
- All potential causes categorized in 6 groups:
 - Machine (Equipment)
 - Man (People)
 - Material
 - Method (Process)
 - Measurement (Management)
 - Environment
- Process experts are helpful during analysis.



Example



Example



Develop Future State

- Brainstorm ideas
 - What will the situation look like after the solution is implemented?
 - Think about how the area would look, feel, sound, if the problem was solved
- Determine any solution requirements
- Use the root cause analysis
- Eliminate waste
- Define measurements:
 - How will you know the solution worked?
 - Improvement is determined by data, not anecdotes

Plan

- **Cultivate an implementation plan:**
 - What must be done to achieve the future state?
 - Who is responsible?
 - When will it be completed?
 - What is the effect on the company when the solution is implemented?
 - Is there any risk associated with this solution?
 - How will you know the solution was effective?
 - Is a budget required? Capital approval?
 - What training will be required?
- **Implement the improvement**
- **Test the improvement**
 - Experiment
 - Learn

Do

- Implement the solution
- Define responsibility and timelines for implementation of the parts of the improvement
 - Action Item Cards

CI #	Due Date
Action Item	

A small green recycling symbol is located in the bottom right corner of the card.

Check / Study

- Confirm the improvement was effective
- ‘Check’ phase is where most Continuous Improvement efforts fail
 - Was the solution effective? Did it work?
 - Did the measurements improve as expected?
 - Was something missed in the continuous improvement process?
 - Should the Plan be adjusted?

Act / Adjust

- Adjust the solution if needed
- Expand the learning and improvement to other areas
- Key points:
 - What didn't work?
 - Could the solution have been better?
 - Should another continuous improvement be initiated based on the results?
- Team identifies any opportunities to expand the improvement
- Share the improvement with the leaders in identified areas
- Start additional Continuous Improvement Projects

PDCA cycle

PDCA steps

- **Step 1: (Hypothesis) "Plan"**
- Identify problem
- Investigate root cause
- Select appropriate countermeasures

Step 2: (Try) "Do"

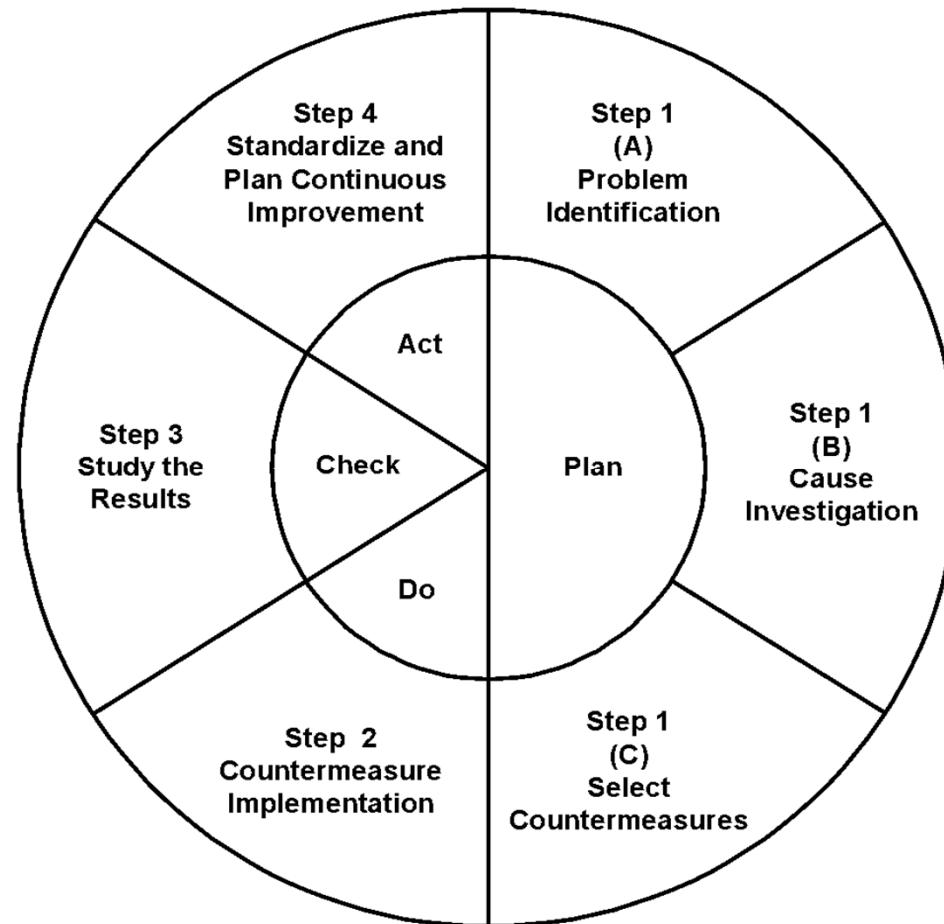
- Implement countermeasures

Step 3: (Reflect) "Check"

- Study the Results

Step 4: (Adjust/) "Act"

- Standardize and Plan Continuous Improvement



Step 1A: “*Plan*” Problem Identification

- 1. Determine the problem area***
- 2. Define the standard***
- 3. Define the current situation***
- 4. Determine the inconsistency***
- 5. Select a measurable goal***
- 6. State the problem in a “Problem Statement” form in order to brainstorm potential causes***

Step 1B: “*Plan*” Cause Investigation

1. Brainstorm potential causes of the problem

2. Collect and analyze data related to the problem

3. Challenge the data with facts

4. Select most likely causes

5. Establish a cause/effect relationship

6. Determine root/driver cause

Step 1C: “*Plan*” Select countermeasures

- 1. Brainstorm for countermeasures to address root cause***
- 2. Select proper countermeasure based upon criteria***
- 3. Coordinate/gain approval of leadership to implement countermeasure***

Step 2: “Do” Implement Countermeasures

- 1. Develop a plan to implement the countermeasure(s) selected***
- 2. Are they temporary?***
- 3. Assign tasks***
- 4. Communicate the plan***
- 5. Execute pilot Implementation Plan with timelines and establish a tracking method***

Step 3: “*Check*” Study the Results

- 1. Monitor progress of pilot Implementation Plan***
- 2. Gather/analyze additional data if necessary***
- 3. Modify implementation plan if necessary, based upon results***
- 4. Monitor results of the specific countermeasure(s) that addressed the root cause***

Step 4: “*Adjust / Act*”

Standardize and improve

- 1. Evaluate the results***
- 2. Standardize the effective countermeasure(s) to prevent recurrence***
- 3. Share success with other affected areas***
- 4. Plan on-going monitoring of the solution***
- 5. Start the PDCA process again to refine the countermeasure or if the results are uneven***
- 6. Continue with other improvement opportunities***

PDCA & Its Tools:

Tools for Step 1A: Problem Identification

Tools to clarify information for problem identification:

- Check sheet
- Line graph
- Pareto Chart
- Flowchart
- Affinity diagram

Tools for Step 1B: Cause Investigation

Tools to identify the most likely causes of the problem:

- Cause and Effect (Fishbone) diagram
- Affinity diagram
- Interrelationship diagram

Tools for Step 1C: Select Countermeasures

Tools to select countermeasures:

- Criteria matrix
- Force field analysis

Tools for Step 2: Implement Countermeasures

Tools to implement countermeasures:

- Implementation Plan / Gantt chart
- Action Plans
- Flowchart

Tools for Step 3: “*Check*” Study the Results

Tools for determining effectiveness of countermeasures:

- Data collection
- Check sheet
- Line graph
- Histogram
- Pareto
- Flowchart

Tools for Step 4: “Adjust / Act” Standardize

Tools for planning and implementing standardized processes:

- SOPs
- Visual Controls
- Force field analysis
- Criteria matrix
- Radar chart
- Flow chart

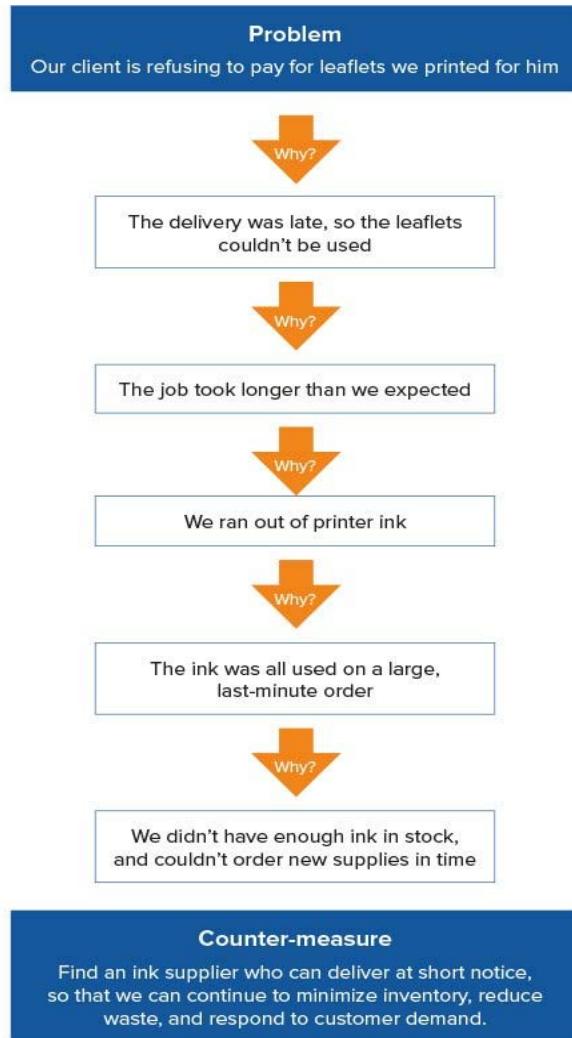
Tools for Problem Solving

- **5W-1H**
- **Cause and effect diagram (Fishbone Diagram)**
- **Pareto chart**
- **Flowchart**

5-Why + (1-How) Analysis

- *The 5 'Whys' and 1 'How'*
- *Define the problem*
- What fails?
- Where does the failure occur?
- When does it occur?
- How does it occur
- *Then ask 'why' five times until root cause(s) are identified or ignorance is reached*
- *Once the root cause(s) is identified, ask, 'How do I correct it?'*

Example



Cause and effect diagram (Fishbone Diagram)

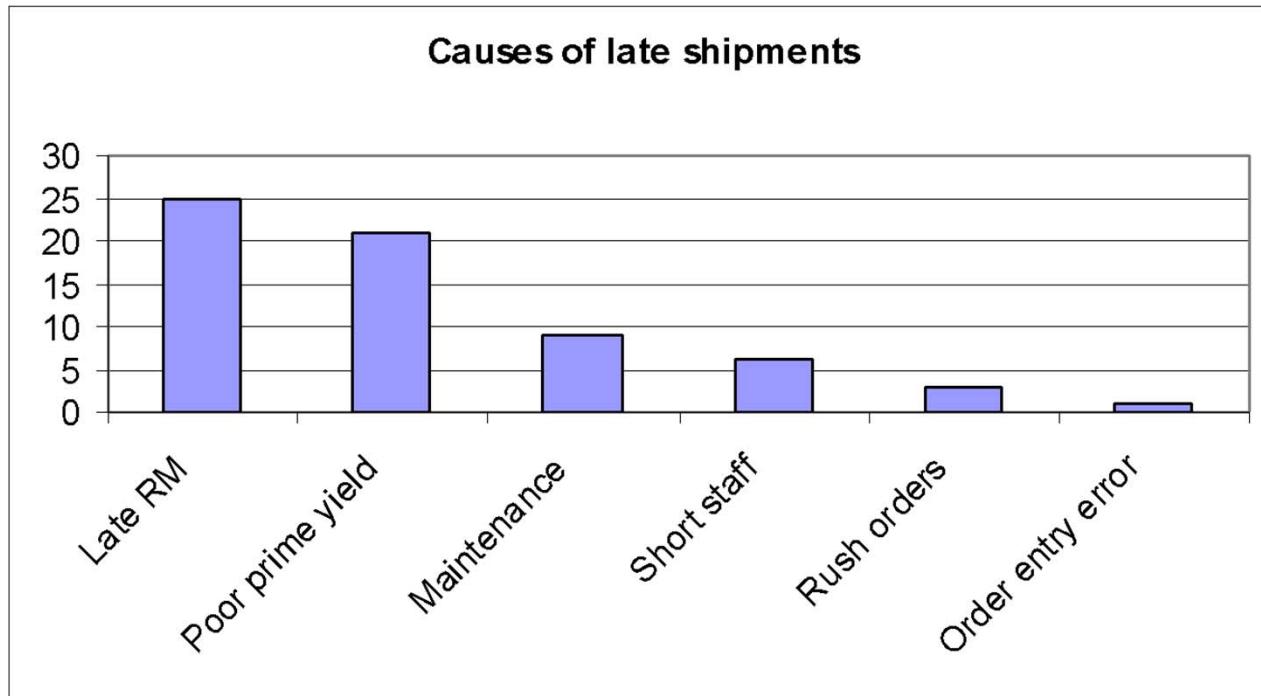
- Refer the previous notes...

Creating a Fishbone Diagram

- *Step 1: Clarify the characteristics of the problem and write a title*
- *Step 2: Write in the effect characteristics and draw the spine*
- *Step 3: Clarify the factors affecting the characteristics*
- *Step 4: Check for omitted factors*
- *Step 5: Identify factors that strongly affect the characteristic*
- *Step 6: Write in related information*

Pareto Charts

- *Used to show relative frequency or magnitude of events or issues, to identify the most important.*



Creating a Pareto Chart

Step 1: Decide which items to study and collect data

- Content categories
- Cause categories
- Select the data collection time period

Step 2: Tabulate data and calculate the cumulative number

- Arrange items in order
- Use of “Other” category

Step 3: Draw the vertical and horizontal axes

Step 4: Display the data as a bar graph

Step 5: Drawing a cumulative curve

Step 6: Create a percentage scale on a vertical axis on the right side

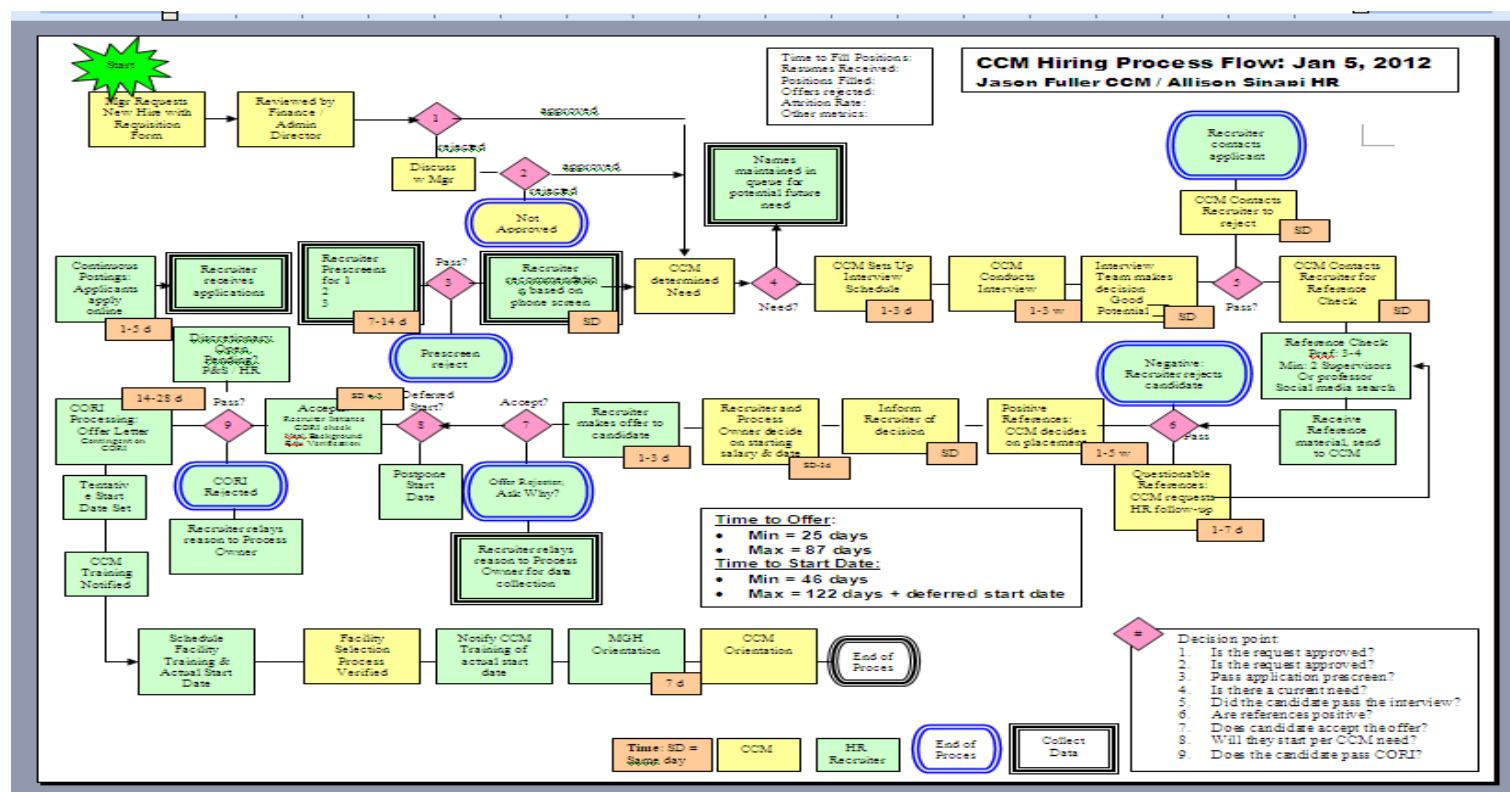
Step 7: Label the diagram

Step 8: Examine the diagram

Flowchart

Purpose:

- *A graphical description of the steps in a task or process.*
 - *“See” duplication, complexity waste & bottlenecks*



Quality Circle

Quality?

- **Quality** is about meeting the **needs and expectations of customers**"
- Key aspects of quality for the customer include:
 - **Good design** – looks and style
 - **Good functionality** – it does the job well
 - **Reliable** – acceptable level of breakdowns/ failure
 - **Consistency** in performance
 - **Durable** – lasts as long as it should
 - **Good after sales service**
 - **Value for money**

Circle?

- Nov 1930 : Mahatma Gandhi-First Round Table Conference in London
- All members in Quality Circle enjoy equal rights
- Leader is just to merely maintain orderly proceedings
- No interruptions while other member is speaking
- No counter or criticism

Genesis

- Defeat of Japan in 2nd World war
- Socio- Economics reconstruction
- Severe constraints of high population density, lack of natural resources, compulsorily dependent on import of fuel, food, energy and raw materials required for industries.
- Solution was only to 'Export'
- For Export, you need superior quality
- Superior Quality comes through high technological investment
- Superior Quality also comes through small but continuous ways of improved working

Quality Circle

- QC is a form of **participative management**.
- QC is **Human Resource Development** technique.
- QC is **Problem solving technique**.

Scope of QC

- **QCs are applicable**, where there is **scope for group based solutions** of work related problems
- Scope of QCs is not limited to industry or manufacturing firms only but are relevant for any other organizations, schools, hospitals, Universities, Banks, Research Institutes, Govt. Office, Homes etc..
- Not limited to the narrow definition of Quality Check but is **concerned with Total Customer Satisfaction.**

Definition

- **Quality Circle** is a small group of 6 to 12 employees doing **similar work** who voluntarily meet together on a **regular basis to identify improvements** in their respective work areas using various techniques for **analyzing and solving work related problems** coming in the way of **achieving and sustaining excellence** leading to **mutual upliftment of employees** as well as the **organization**.
- **QC** is a way of **capturing the creative and innovative power that lies within the work force**.
- **Voluntary** groups of employees who work on **similar tasks or share an area of responsibility**.
- They agree to meet on a **regular basis** to discuss & solve problems related to work.
- They operate on the principle that **employee participation** in decision-making and problem-solving improves the quality of work.

Basic Assumptions

- Employees want to do **good job**.
- Employees want to be recognized as **intelligent** and **interested** and like to participate in problem solving.
- Employees want to be better **informed** about **organizational goals and problems**.
- Employees want **recognition, responsibility and a feeling of self esteem**.

Human Beings are basically human beings where ever they are.

Objectives Achieved

- a) **Change in Attitude:** From "I don't care" to "I do care"

Continuous improvement in quality of work life through humanization of work.

- b) **Self Development:** Bring out 'Hidden Potential' of people (People get to learn additional skills)

- c) **Development of Team Spirit:** Eliminate inter departmental conflicts.

- d) **Improved Organizational Culture:** Positive working environment. Total involvement of people at all levels.

- e) **Higher motivational level.**

Advantages

- Boosts organizational morale
- Inspires effective team work
- Promotes involvement to address issues
- Creates problem solving capability
- Promotes personal & leadership development
- Improves communication gap within the organization
- Brings cost reduction
- Better motivation among employees
- Changes from negative environment to the positive one

Basic Problem Solving Technique

- Brain Storming.
- Pareto Diagrams.
- Cause and Effect Analysis.
- Data Collection.
- Data Analysis. The tools used for data analysis are:
 - Tables
 - Bar charts
 - Histograms
 - Circle graphs
 - Line graphs
 - Control charts

Basic steps in QC



Which is the best solution?

- Which does not **involve cost** or has **the least cost implications**?
- Which can be executed **without dependency** on other unit or agency?
- Which can be executed in the **shortest possible duration**?
- Which can make **use of some waste product** or existing data?
- Which can **fit in the existing rules & policies of the organization**?

Organizational Hierarchy

- Top Management
- Steering Committee
- Facilitator
- Leader
- Members
- Recorder

Role of QC Facilitators

Co-ordinate the work of multiple QC's through leaders.

Serve as a **resource to QC's.**

Arrange for expertise from other groups/agencies.

Keep QCs on **track and enthusiastic.**

Arrange for **training of QC members.**

Provide feedback to the Management and also QC's.

Maintain **budgets and keep cost records.**

Help QC's to make **presentation** before the management

Role of QC Leaders

Keep the meeting focused, positive and ensure participation by all members.

Help in collecting data related to problems.

Transmit QC suggestions to facilitator.

Present solutions/suggestions to management.

Maintain relevant records of meetings.

Ensure implementation of solutions by the group.

Keeping the circles informed about status of previously submitted suggestions.

Guiding members in group process, use of tools, techniques for generating ideas/ solutions

Role of QC Members

Focus at all times on organizational problems/ objectives related to the work.

Do not press for inclusion of personal problems.

Demonstrate mutual respect- no criticism.

Offer views, opinions and ideas freely and voluntarily in problem solving.

Attend meeting regularly

Contribute to finding solutions to problems & implementing solutions.

Attend training with a receptive attitude to acquire skills to contribute to the problem solving activities of the QC

How to introduce QC?

- **Expose middle level executives** to the concept and ask them to **identify area** under their purview where they think the climate is conducive to start QC.
- **Explain the concept to the employees** in such identified areas and invite them to volunteer as members of QC.
- **Nominate Senior officers as facilitator** for each area.
- **Form a steering committee for directing, establishing the objectives, policies, activities and composition** of QCs. It may consist of a Chief Executive as the chairman and the Departmental Heads as members along with facilitators from each area
- **Recognize results & spread**

How meetings are conducted?

- QC meeting are fixed preferably for **one hour but every week**.
- In the first meeting, **Problem identification** session is held.
- **Leader** asks every **member** to **state one problem** at a time and goes on sequentially.
- **Recorder** writes it and reads to confirm, if the **problem statement is recorded correctly**.
- **Each member** has to **state unique problem** faced in the work area.
- Second & third rounds are held in the similar manner.
- May be 20 or more unique problems are recorded.

How meetings are conducted?

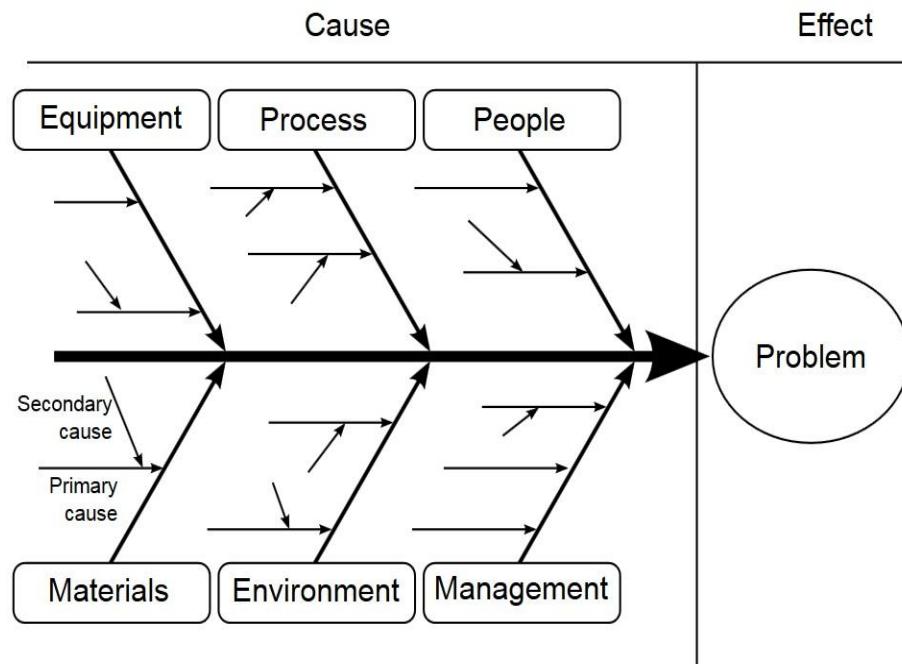
- In **next meeting, order of priority** is decided based on urgency, quick & ease of execution and cost benefit analysis.
- **Problem Titles & Priority Numbers** are freezed.
- **Top priority problem** is taken up for solution
- **Leader** asks members (one by one sequentially) to suggest **unique solution** to the problem.
- **Recorder** writes it and reads to **confirm correctness**
- Each **member has to state unique solution** within a reasonable time, say 3 minutes. No cross talks or suggestions by other in between.
- Second & third rounds are held in the similar manner
- May be 20 or more unique solutions are recorded

How meetings are conducted?

- **Analysis of each solution** is taken up with opportunity to each member to speak on pros & cons
- **Solutions** are arranged in the order of **priority**
- **Data is collected and detailed analysis** is carried out for the **top priority solution**.
- **Data is collected & detailed analysis** is carried out for **next order solutions** as alternative solutions
- **Final action plan** is discussed based on certain criteria.
- **Presentation** is prepared & made before the management for approval
- After execution, data is collected again & compared with the initial one to confirm success

Ishikawa Diagram

- ISHIKAWA DIAGRAM referred to as cause-and effect diagram, tree diagram, or fishbone diagram.
- Display factors, which affect a particular quality characteristic, outcome or problem. Typically result of a brainstorming.
- The main goal represented by the trunk of the diagram, and primary factor represented as branches.



Limitations

- The overall productivity may decrease initially.
- A large investment of time and money may be required.
- The chance of errors increases initially.
- Over-expectation of some employees, who are too excited initially, may turn to disappointment and drop out.
- Quality Circles may threaten traditional authority structure.
- Employees, who are habituated to depend on their supervisors for direction and who have lost their initiative, feel uncomfortable with Quality Circles.
- After QC implementation, a period of confusion may arise. This is because people experiment with new ideas, new skills and new roles.
- Changes in system and control may become necessary.