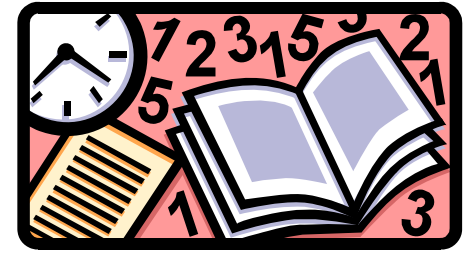# Course Background

Dr. Sam C. M. Hui
Department of Mechanical Engineering
The University of Hong Kong
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Dec 2013

Background

- Educational Objectives:
  - To master the fundamental concepts of engineering management necessary to bridge the gap between the management and technology
  - To provide the students with an opportunity to enhance their understanding with hands-on-skill to problem solving for decision making in different technical operations
  - To introduce managerial models that implement qualitative as well as quantitative analysis to assist the students to improve their ability and skills to analyze decision making problems
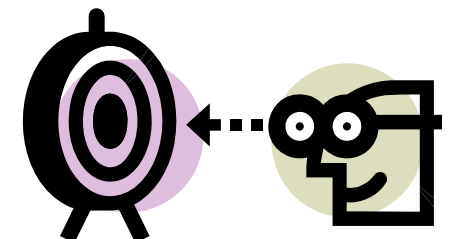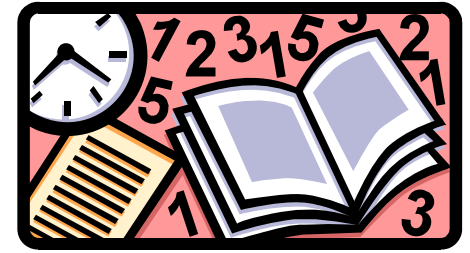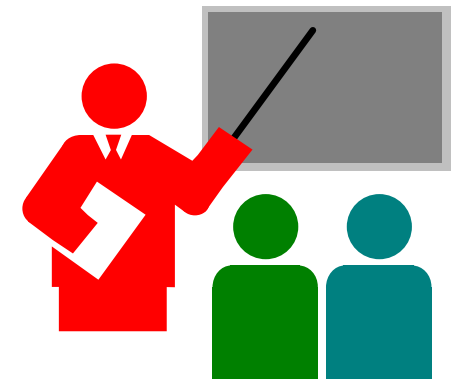
Background

- <u>Learning Outcomes</u>:
  - Able to apply knowledge of mathematics, science, and engineering appropriate to engineering and technology management
  - Able to identify, formulate and solve engineering problems
  - Able to use the techniques, skills, and modern engineering tools necessary for engineering practice appropriate to engineering and technology management

- <u>Assessment</u>:
  - Examination (80%) [3 hours]
  - Continuous Assessment (20%)
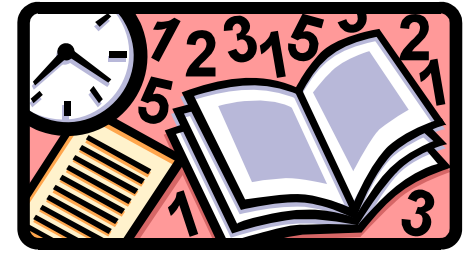
Background

- Prerequisite:
  - None
- Related courses:
  - BBSE3009 Project Management and Engineering Economics
  - Industrial training
- Course Website:
  - http://me.hku.hk/bse/MECH3010/
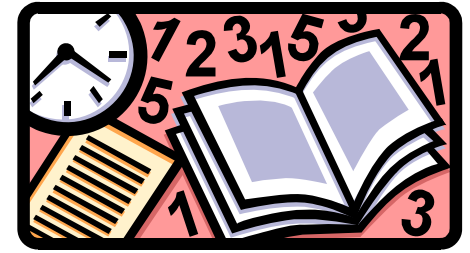
Background

- Study topics of MECH3010:
  - Introduction
  - Planning and Forecasting
  - Decision Theory and Decision Trees
  - Organizing and Staffing
  - Leadership and Motivation
  - Controlling

  Dr. Sam Hui

  - Research and Development
  - Engineering Design
  - Production Activities, Operations and Marketing
  - Inventory Control
  - Linear Programming
  - Queuing Theory

  Dr. Benjamin Ho

Background

- Useful references:
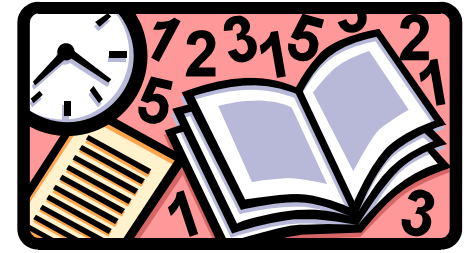   - Morse, L. C. and Babcock, D. L., 2014. *Managing Engineering and Technology*, 6th ed., Prentice-Hall, Pearson Higher Education, Inc., Upper Saddle River, NJ.
    - Chang, C. M., 2005. *Engineering Management: Challenges in the New Millennium*, Pearson Prentice Hall, Upper Saddle River, NJ.
    - Render, B., Stair Jr. R. M. and Hanna, M. E., 2012. *Quantitative Analysis for Management*, 11th ed., Prentice-Hall, Pearson Higher Education, Inc., Upper Saddle River, NJ.
- Online learning Website:
    - Business 101: Principles of Management
        - http://education-portal.com/academy/course/principles-of-management-course.html

Managing Engineering and Technology

- **Management Functions**
  - Planning
    - Decision Making
  - Organizing
  - Controlling
  - Leading

- **Managing Technology**
  - Research
  - Design
  - Planning Production
  - Managing Production
  - Marketing
  - Project Managment

- **Personal Technology**
  - Ethics
  - Career
  - Diversity
  - Time Management
  - Global

(Source: Morse, L. C. and Babcock, D. L., 2010. *Managing Engineering and Technology*, 5th ed.)

Non-technical skills for engineers

Non-technical skills and knowledge areas that an engineer should acquire

- Communication
- Systems thinking
- Project management
- Teamwork
- Environment
- Professionalism
- Economics
- Finance
- Entrepreneurial
- Law / contracts
- Marketing
- Problem defining
- Information
- Quality Control
- ?????????
- People issues
- Problem solving

Organizing

Planning

Leading

Controlling
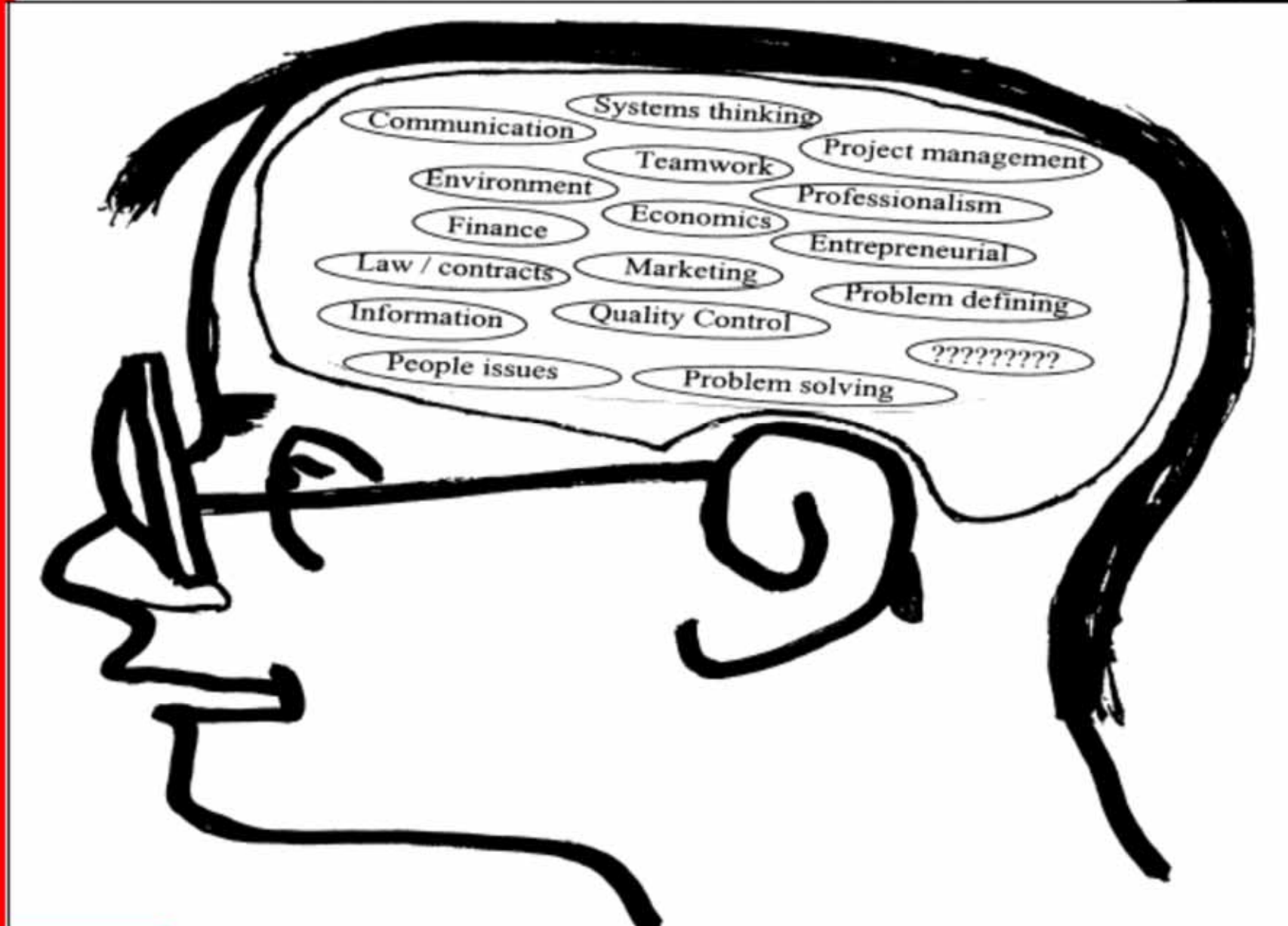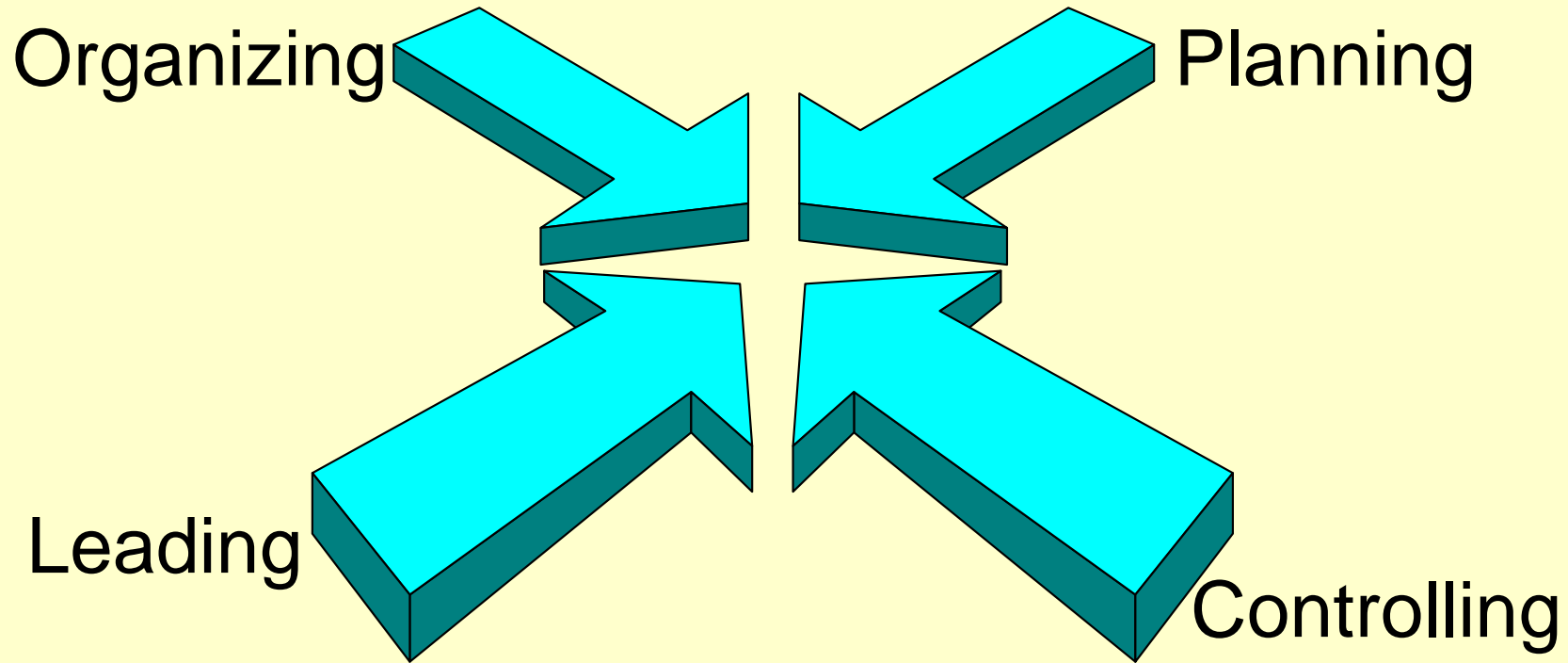
Introduction

Dr. Sam C. M. Hui

Department of Mechanical Engineering

The University of Hong Kong

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Dec 2013

Contents

- Engineering
- Principles of Management
- Management Roles and Skills
- Management Styles
- Engineering Management
- You and Your Career

Engineering

- "Engineering is the profession in which a knowledge of the mathematical and natural sciences gained by study, experience, and practice is applied with judgment to develop ways to utilize, economically, the materials and forces of nature for the benefits of mankind" -- Accreditation Board for Engineering and Technology (ABET), USA

- Engineer: A person applying his mathematical and science knowledge properly
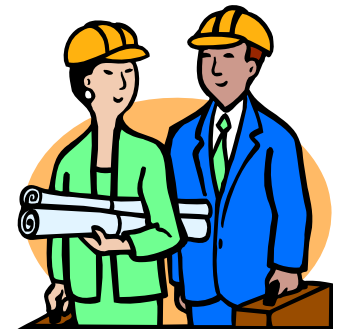
Engineering

- The word "**Engineering**" comes from "**Ingenuity**"
- It has been pretty well agreed that the words '*ingenuity*' and '*engineering*' in English and '*ingéniosité*' and '*ingénierie*' in French are linked to the same Latin word-root and that the verb '*to engineer*' means '*to be ingenious*.' So the kinds of things engineers have done have been generally ingenious. And the word '*engine*' means '*an ingenious and useful device*.'

Systems Engineering History
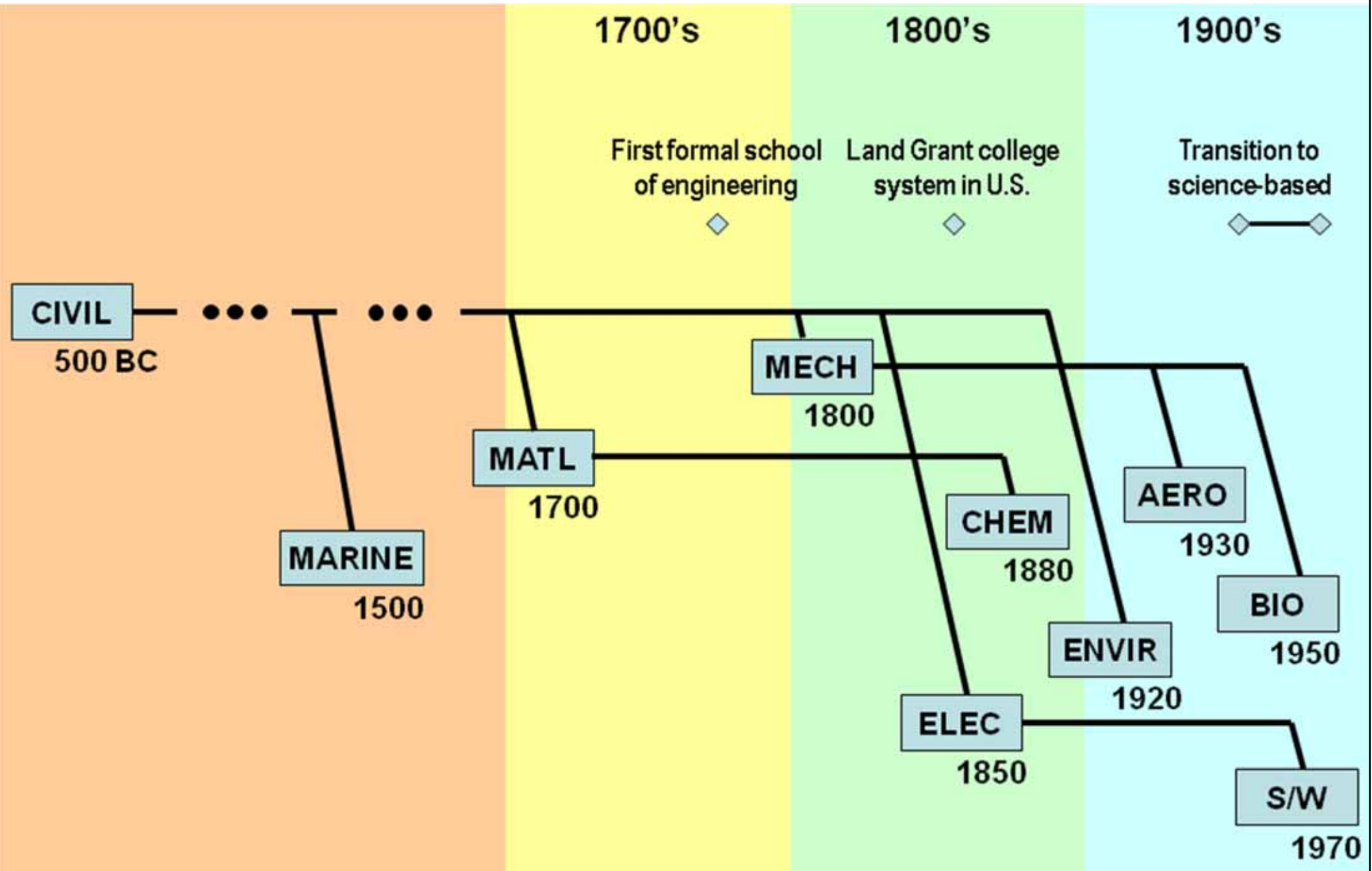
Engineering

- Engineering jobs in a company (e.g. manufacturing)
  - Engineering research
  - Engineering design
  - Design support
  - Manufacturing
  - Industrial, plant, maintenance
  - Quality control
  - Technical sales
  - Field service and logistics support
  - Purchasing, recruitment, general management

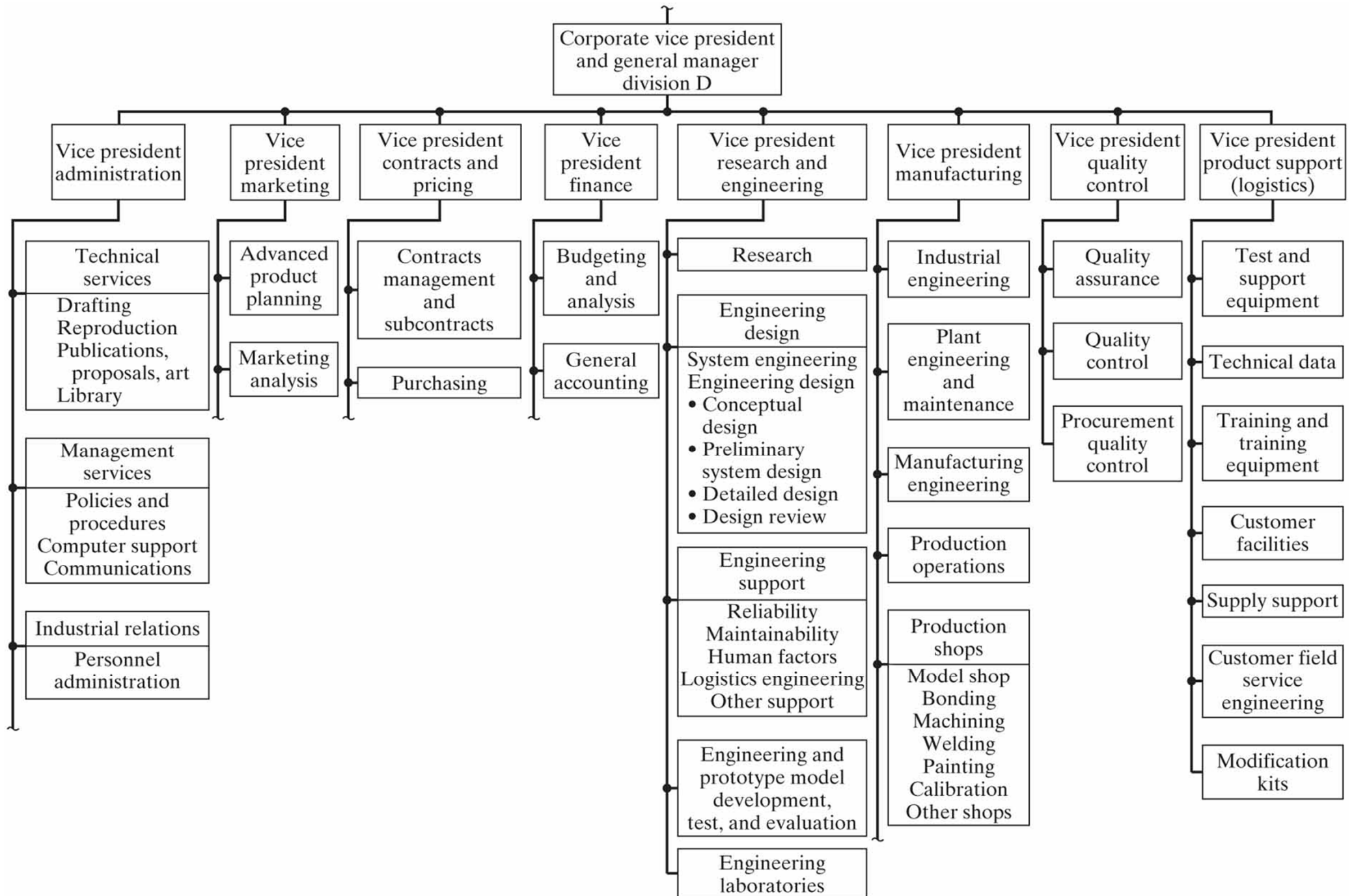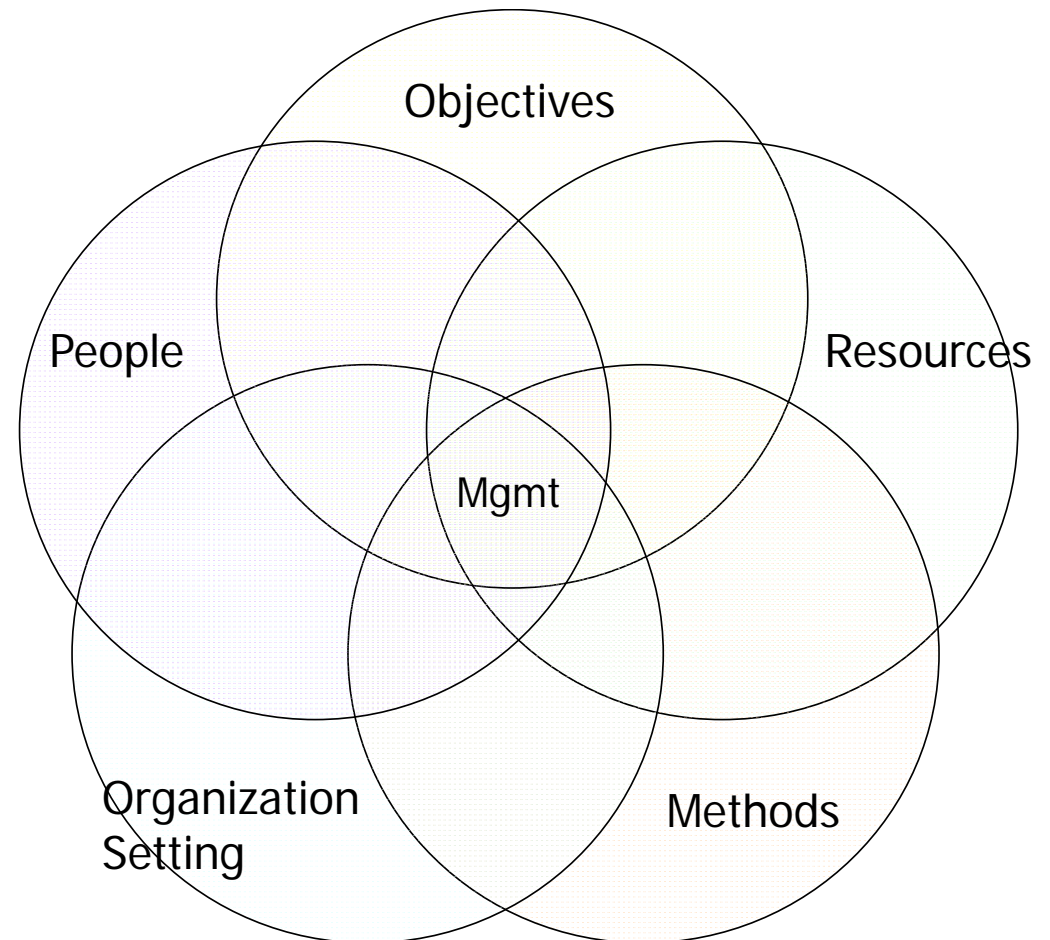# Engineering activities within a division of a large corporation

```
                          Corporate vice president
                          and general manager
                          division D
```

Vice president administration	Vice president marketing	Vice president contracts and pricing	Vice president finance	Vice president research and engineering	Vice president manufacturing	Vice president quality control	Vice president product support (logistics)

Vice president administration:
- Technical services
  - Drafting
  - Reproduction
  - Publications, proposals, art
  - Library
- Management services
  - Policies and procedures
  - Computer support
  - Communications
- Industrial relations
  - Personnel administration

Vice president marketing:
- Advanced product planning
- Marketing analysis

Vice president contracts and pricing:
- Contracts management and subcontracts
- Purchasing

Vice president finance:
- Budgeting and analysis
- General accounting

Vice president research and engineering:
- Research
- Engineering design
  - System engineering
  - Engineering design
    - Conceptual design
    - Preliminary system design
    - Detailed design
    - Design review
- Engineering support
  - Reliability
  - Maintainability
  - Human factors
  - Logistics engineering
  - Other support
- Engineering and prototype model development, test, and evaluation
- Engineering laboratories

Vice president manufacturing:
- Industrial engineering
- Plant engineering and maintenance
- Manufacturing engineering
- Production operations
- Production shops
  - Model shop
  - Bonding
  - Machining
  - Welding
  - Painting
  - Calibration
  - Other shops

Vice president quality control:
- Quality assurance
- Quality control
- Procurement quality control

Vice president product support (logistics):
- Test and support equipment
- Technical data
- Training and training equipment
- Customer facilities
- Supply support
- Customer field service engineering
- Modification kits

(Source: Morse, L. C. and Babcock, D. L., 2010. *Managing Engineering and Technology*, 5th ed.)

Principles of Management

- ***Management*** is getting things through others
- Management needs
  - 1) Objective
  - 2) Resources
  - 3) Methods
  - 4) Organization setting
  - 5) People

Objectives

People

Resources

Mgmt

Organization Setting

Methods

Principles of Management

- Definition of Management
  - Traditionally, the term "management" refers to the activities (and often the group of people) involved in the four general functions:
    - Planning
    - Organizing
    - Leading and
    - Coordinating of resources
  - The four functions are done throughout the organization and are highly integrated
  - Emerging trends in management explains that leading is different than managing

Principles of Management

- Management definitions
  - Organizational or administrative process
  - Group running an organization
  - Occupational career
- Management in organizations
  - **Manager**: Someone whose primary responsibility is to carry out the management process
  - **Effective**: Making the right decisions and successfully implementing them
  - **Efficient**: Using resources wisely in a cost-effective way

Principles of Management

- The scope of management
  - <u>Large businesses</u>: Most knowledge comes from large profit-seeking organizations
  - <u>Small and start-up businesses</u>: Management is key as wrong decisions may never be recovered. This is how most businesses start
  - <u>International management</u>: Most large organizations derive a significant portion of their business from international markets

Principles of Management

- Management: the driving forces
    - Social Forces: The norms and values that characterize a culture.

    - Economic Forces: Economic systems and general economic conditions. Market economy. Competition.

    - Political Forces: Governing institutions and general policies and attitudes. Legal cases against business.

Principles of Management

- Basic functions:
    - **Planning**: Deciding what needs to happen in the future (today, next week, next month, next year, over the next five years, etc.) and generating plans for action.

    - **Organizing**: (Implementation) pattern of relationships among workers, making optimum use of the resources required to enable the successful carrying out of plans.

    - **Staffing**: Job analysis, recruitment and hiring for appropriate jobs.

    - **Leading/directing**: Determining what must be done in a situation and getting people to do it.

Principles of Management

- Basic functions: (cont'd)
  - **Motivation**: Motivation is also a kind of basic function of management, because without motivation, employees cannot work effectively. If motivation does not take place in an organization, then employees may not contribute to the other functions (which are usually set by top-level management).

  - **Controlling/monitoring**: Checking progress against plans.
  - **Communicating**: is giving, receiving, or exchange information.
  - **Creating**: ability to produce original idea, thought through the use of imagination

Fundamental functions of management

(Source: Dhillon, B. S., 2002. *Engineering and Technology Management Tools and Applications*, Artech House, Boston.)
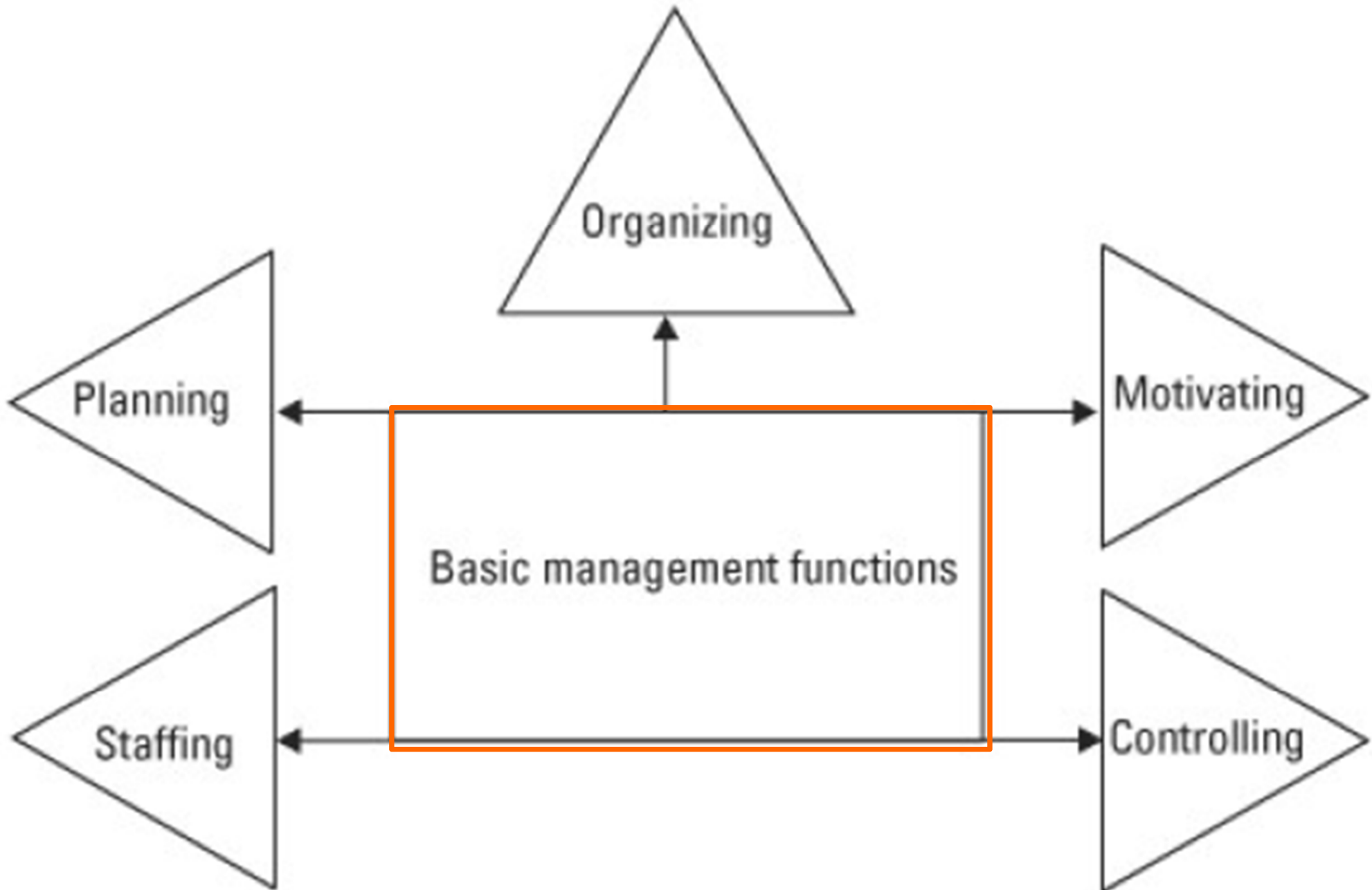
Engineering management functions

Organizing
(organizing workplace, selecting structure, delegating, establishing working relationship)

Planning
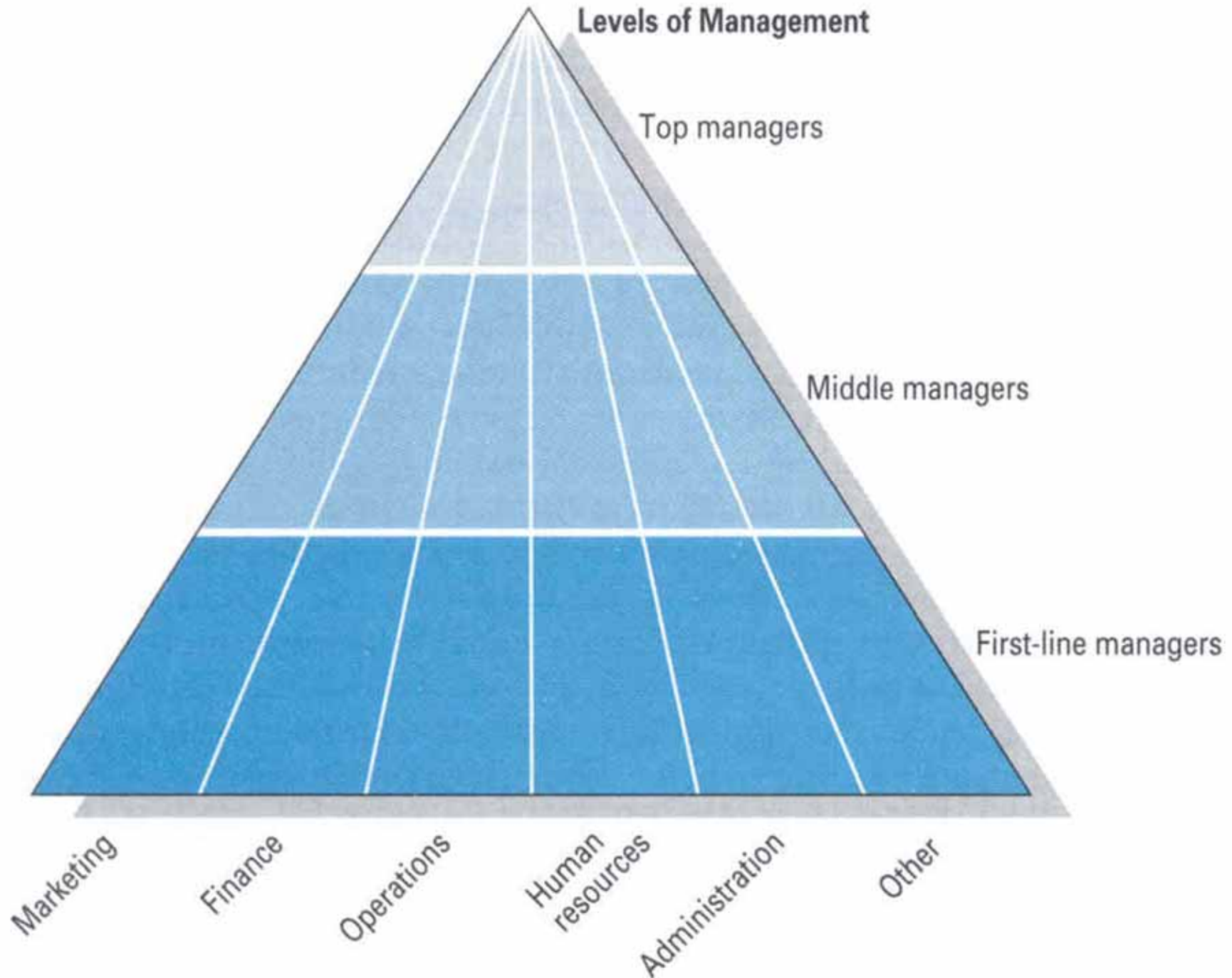(forecasting, setting objectives, action planning, administering policies, establishing procedures)
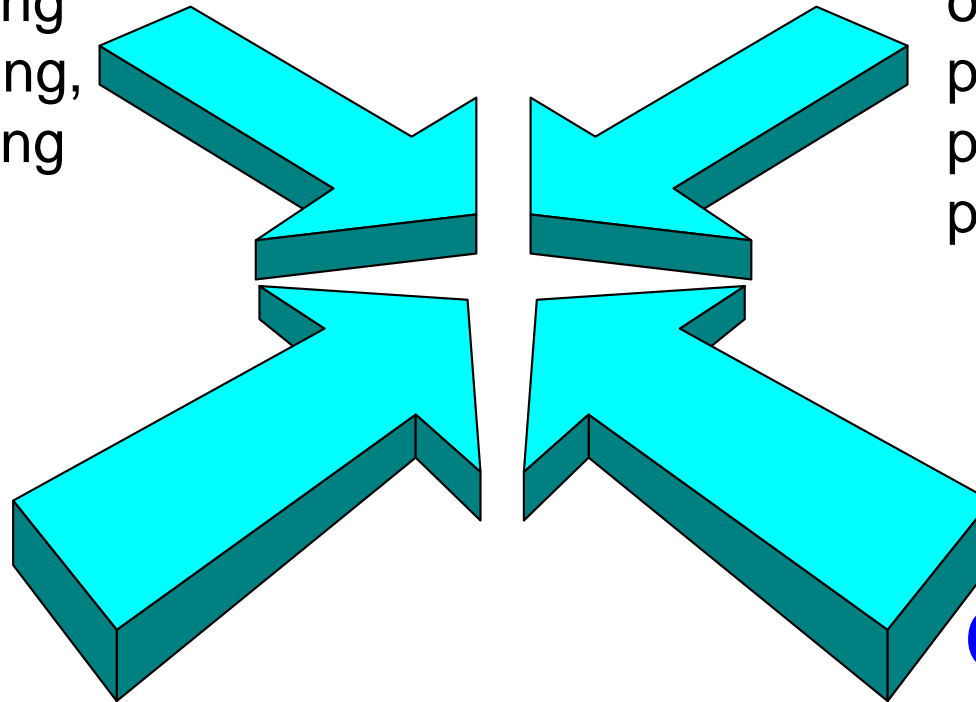
Leading
(deciding, communicating, motivating, selecting/developing people)

Controlling
(setting performance standards, evaluating/ documenting/ correcting performance)
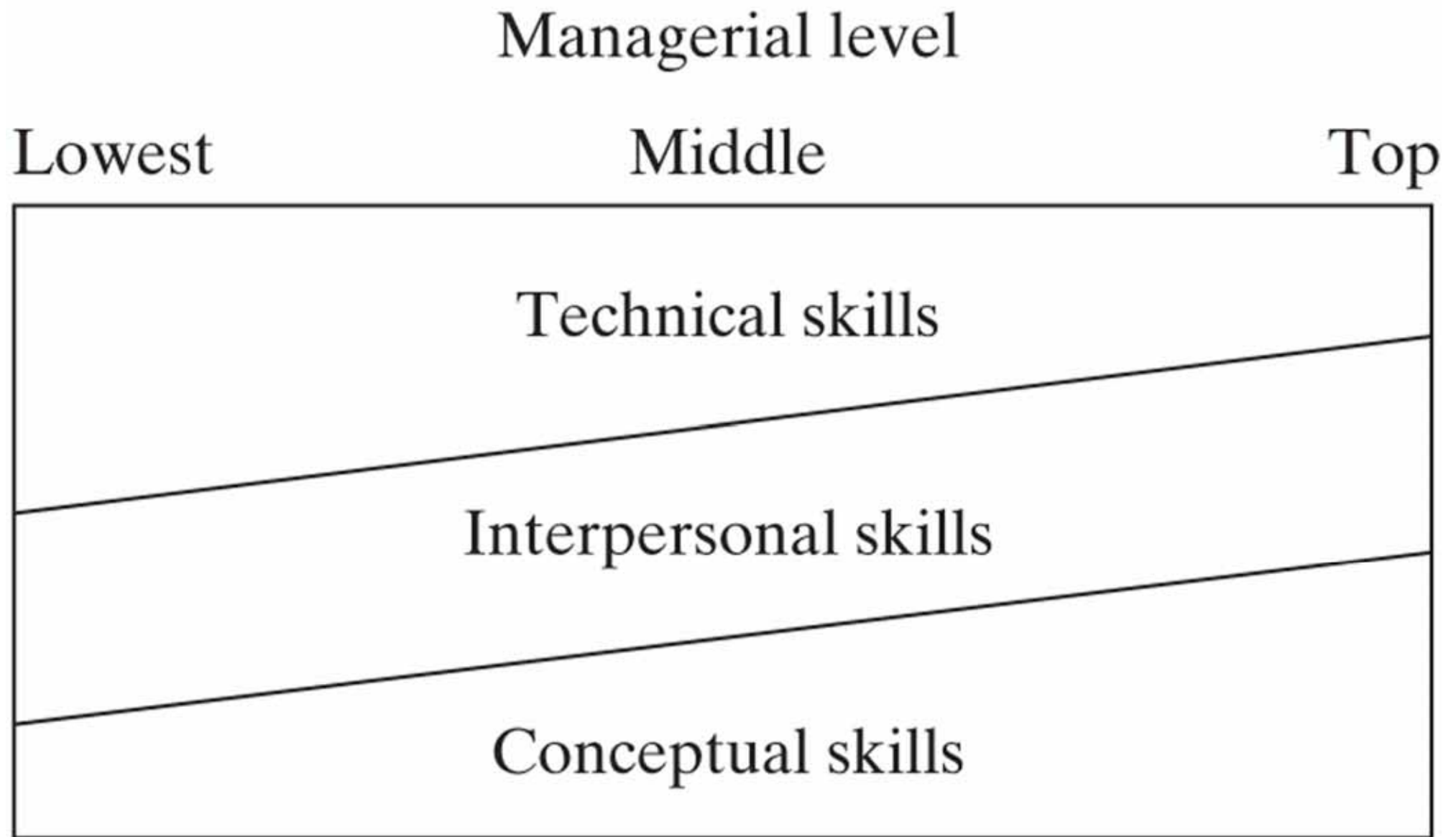
Management levels and areas

Levels of Management

Top managers

Middle managers

First-line managers

Marketing • Finance • Operations • Human resources • Administration • Other

(Source: Griffin, R., 2010. *Management*, 10th Ed.)

Principles of Management

- Levels of management: (hierarchy of authority)
  - **Top-level managers**
    - Board of directors (including non-executive directors and executive directors), president, vice-president, CEOs
    - Develop strategic plans, company policies, and make decisions on the direction of the business
  - **Middle-level managers**
    - General managers, branch managers and department managers
    - Devote more time to organizational and directional functions
  - **First-level managers**
    - Supervisors, section leaders, foremen, etc.
    - Focus on controlling and directing (employees)

Hierarchy of authority (example)

Board of Directors	**Establish policies and determine objectives**
Chief Executive	**Direct senior executives to achieve objectives**
Senior Executives (Heads of Functional Areas)	**Coordinate activities of middle managers to achieve function area objectives**
Middle Managers (Departmental Heads)	**Coordinate departmental seniors to achieve department objectives**
Supervisors and Section Leaders	**Coordinate work of operatives**
Operative Staff	

—————— **Authority**

—●—●—●— **Responsibility**

— · — · — **Accountability**

Skills required versus management level

Managerial level

Lowest   Middle   Top

Technical skills

Interpersonal skills

Conceptual skills

Management Roles and Skills
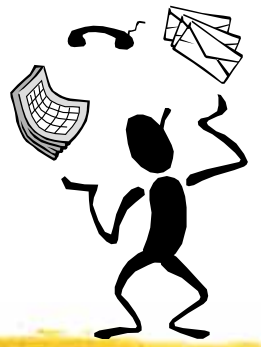
- Basic roles (from Henry Mintzberg)
  - **Interpersonal**: roles that involve coordination and interaction with employees
    - Figurehead, Leader, Liaison
  - **Informational**: roles that involve handling, sharing, and analyzing information
    - Monitor, Disseminator, Spokesperson
  - **Decisional**: roles that require decision-making
    - Entrepreneurial
    - Disturbance Handler
    - Resource Allocator
    - Negotiator

Basic managerial roles

Category	Role	Sample Activities
Interpersonal	Figurehead	Attending ribbon–cutting ceremony for new plant
	Leader	Encouraging employees to improve productivity
	Liaison	Coordinating activities of two project groups
Informational	Monitor	Scanning industry reports to stay abreast of developments
	Disseminator	Sending memos outlining new organizational initiatives
	Spokesperson	Making a speech to discuss growth plans
Decisional	Entrepreneur	Developing new ideas for innovation
	Disturbance handler	Resolving conflict between two subordinates
	Resource allocator	Reviewing and revising budget requests
	Negotiator	Reaching agreement with a key supplier or labor union

(Source: Griffin, R., 2010. *Management*, 10th Ed.)

Managerial hierarchy and roles

Top management → Interpersonal roles → : Figurehead
: Leader
: liaison w/ others,

Middle management → Information roles → : Monitor
: Disseminator
: Spokesperson

Supervisory management → Decisional roles → : Entrepreneur
: Disturbance handler
: Resource allocator
: Negotiator
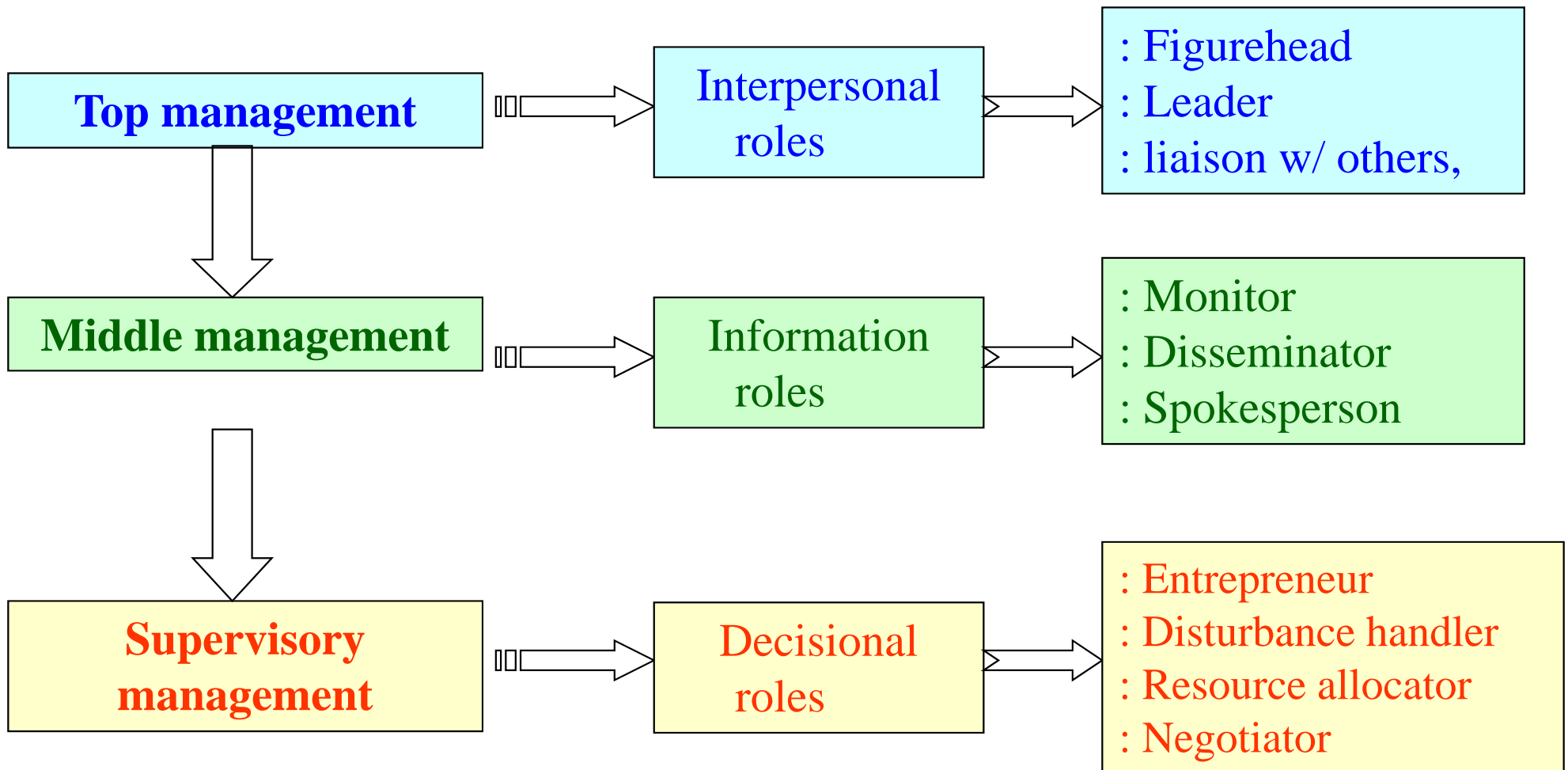
Basic managerial skills
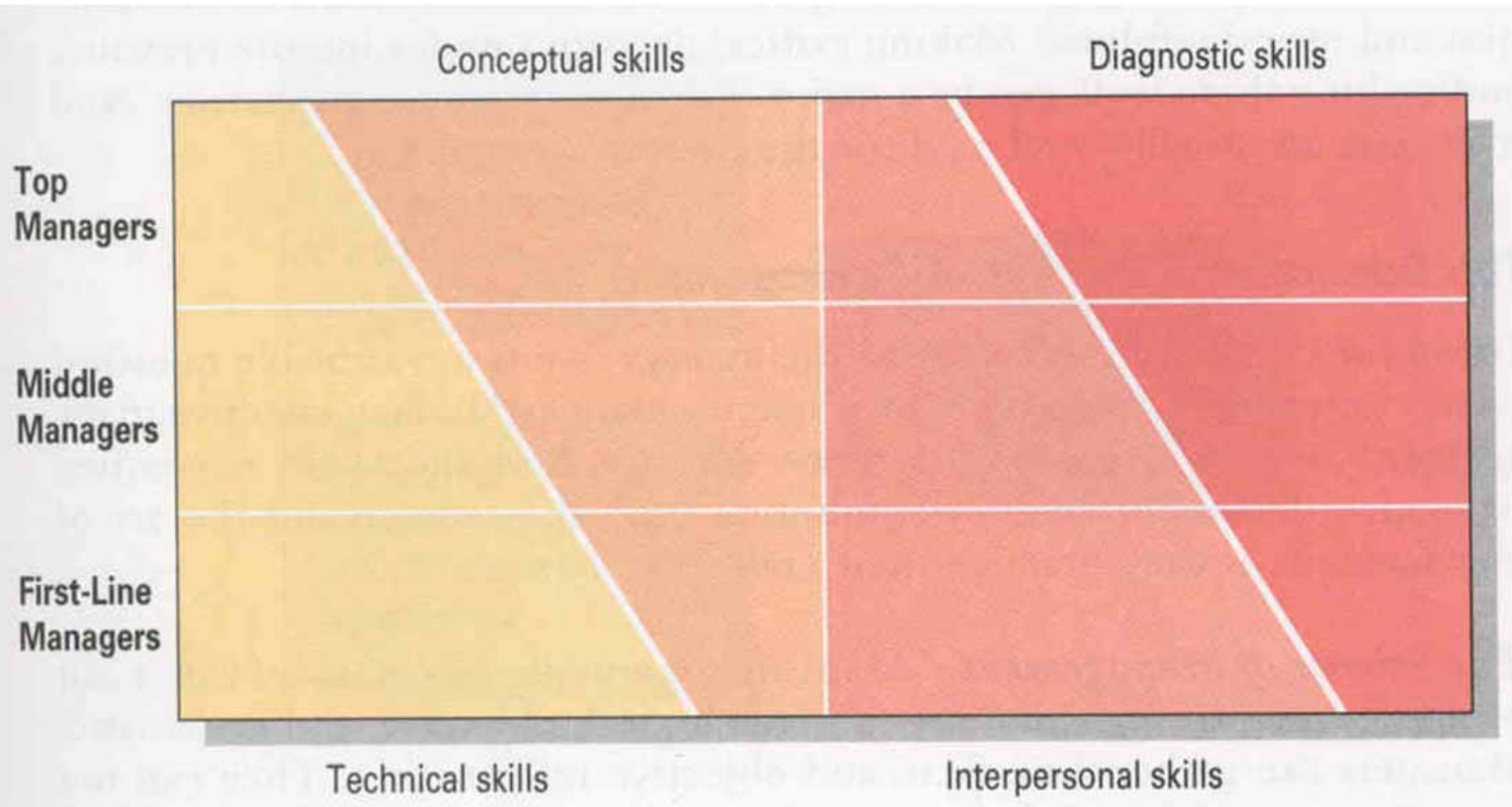
Management Roles and Skills
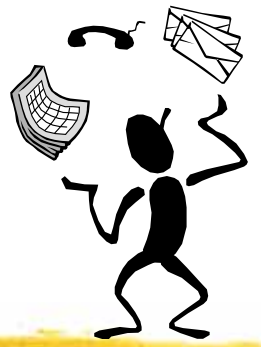
- Management skills
  - **Political**: used to build a power base and establish connections
  - **Conceptual**: used to analyze complex situations
  - **Interpersonal**: used to communicate, motivate, mentor and delegate
  - **Diagnostic**: ability to visualize most appropriate response to a situation
  - **Technical**: Expertise in one's particular functional area

Managerial skills

Focus by level

Skills needed
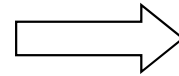
Top management ⟹ **Conceptual**
(ability to solve long-term problems and view the total organization as an interactive system)
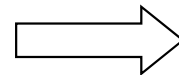
Middle management ⟹ **Human relation**
(ability to work affectively, lead and assure harmonious interpersonal relations)
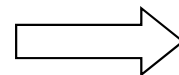
Supervisory management ⟹ **Technical**
(ability to use tools, apply specialized knowledge and manage processes and techniques)

Management Roles and Skills
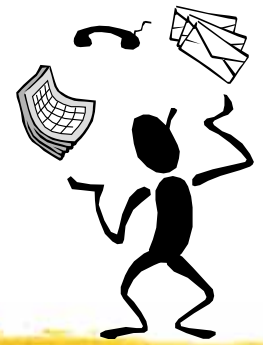
- Organization theories are seeking to understand, explain and predict organizational processes of the followings:

  - 1. <u>Individual</u> (micro level)
    - 1.1 Division of labour
    - 1.2 Motivation
    - 1.3 Leadership

  - 2. <u>Global</u> (macro level)
    - 2.1 Organization structure
    - 2.2 Interorganizational relation (relationship between organizations)
    - 2.3 Strategies issues, ie. competitive strategies

Contrast between American and Japanese organizations

American

- Mobile employees
- Personal decision making
- Individual responsibility
- Rapid advancement

- Specialization in careers
- Explicit control mechanisms
- Focused concern for employees

Japanese

- Lifetime employment
- Collective decision making
- Group responsibility
- Slow and systematic advancement
- General career perspective
- Implicit control system
- Holistic concern for employees.

Management Styles

- Managers have to perform many roles in an organization and how they handle various situations will depend on their style of management

- A [management style](#) is an overall method of leadership used by a manager

- There are two sharply contrasting styles that will be broken down into smaller subsets later:
  - Autocratic
  - Permissive

Management Styles

- Characteristics of management styles
  - **Autocratic**: Leader makes all decisions unilaterally
  - **Permissive**: Leader permits subordinates to take part in decision making and also gives them a considerable degree of autonomy in completing routine work activities
  - Combining these categories with democratic (subordinates are allowed to participate in decision making) and directive (subordinates are told exactly how to do their jobs) styles gives us four distinct ways to manage:

Management Styles

- Characteristics of management styles (cont'd)

  - 1. <u>Directive Democrat</u>: Makes decisions participatively; closely supervises subordinates

  - 2. <u>Directive Autocrat</u>: Makes decisions unilaterally; closely supervises subordinates

  - 3. <u>Permissive Democrat</u>: Makes decisions participatively; gives subordinates latitude in carrying out their work

  - 4. <u>Permissive Autocrat</u>: Makes decisions unilaterally; gives subordinates latitude in carrying out their work

- In what situations would each style be appropriate? Inappropriate?

Management Styles

- Managers must adjust their styles according to the situation that they are presented with. Below are four quadrants of situational leadership that depend on the amount of support and guidance needed:

    - Telling: Works best when employees are neither willing nor able to do the job (high need of support and high need of guidance)

    - Delegating: Works best when employees are willing to do the job and know how to go about it (low need of support and guidance)

    - Participating: Works best when employees have the ability to do the job, but need a high amount of support (low need of guidance but high need of support)

    - Selling: Works best when employees are willing to do the job, but don't know how to do it (low need of support but high need of guidance)

    (See also: http://www.rpi.edu/dept/advising/free_enterprise/business_structures/management_styles.htm)

Management Styles

- [Situation 1](#):
    - The employees in your program appear to be having serious problems getting the job done. Their performance has been going downhill rapidly. They have not responded to your efforts to be friendly or to your expressions of concern for their welfare.
    - Which style would you pick? What would you do?
        - (a) Reestablish the need for following program procedures and meeting the expectations for task accomplishment.
        - (b) Be sure that staff members know you are available for discussion, but don't pressure them.
        - (c) Talk with your employees and then set performance goals.
        - (d) Wait and see what happens.

Management Styles

- Situation 2:

  - During the past few months, the quality of work done by staff members has been increasing. Record keeping is accurate and up to date. You are careful to ensure that the staff members are aware of your performance expectations.

  - Which style would you pick? What would you do?

    - (a) Stay uninvolved.

    - (b) Continue to emphasize the importance of completing tasks and meeting deadlines.

    - (c) Be supportive and provide clear feedback. Continue to make sure that staff members are aware of performance expectations.

    - (d) Make every effort to let staff members feel important and involved in the decision making process.

Management Styles

- [Situation 3](#):

  - Performance and interpersonal relations among your staff have been good. You have normally left them alone. However, a new situation has developed, and it appears that staff members are unable to solve the problem themselves.

  - Which style would you pick? What would you do?

    - (a) Bring the group together, work as a team to solve the problem.

    - (b) Continue to leave them alone to work it out.

    - (c) Act quickly and firmly to identify the problem and establish procedures to correct it.

    - (d) Encourage the staff to work on the problem, letting them know you are available as a resource and for discussion if they need you.

Management Styles

- Situation 4:
  - You are considering a major change in your program. Your staff has a fine record of accomplishment and a strong commitment to excellence. They are supportive of the need for change and have been involved in the planning.
  - Which style would you pick? What would you do?
    - (a) Continue to involve the staff in the planning, but direct the change.
    - (b) Announce the changes and then implement them with close supervision.
    - (c) Allow the group to be involved in developing the change, but don't push the process.
    - (d) Let the staff manage the change process.

Management Styles

- 7 typical management styles:
  - 1. Administrators
  - 2. Time Servers
  - 3. Climbers
  - 4. Generals
  - 5. Supporters
  - 6. Nice Guys
  - 7. Bosses

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"No, your management style is fine. It's your mismanagement style that worries me."

Management Styles

- 1. [Administrators](#)
  - Work company rule and regulations
  - Live by book
  - Very good employees
  - Strong loyalty
  - Work with company for very long time
  - Work strictly according to the demarcation of departments
  - Expect every thing in black and white
  - Very logical and very practical
  - Have good planning skills
  - Always respected by their seniors and juniors

Management Styles

- ## 2. Time Savers
    - Old managers who have lost their interest
    - Take necessary steps to avoid stress
    - Low motivated
    - Conflict at all levels are avoided
    - Decisions are avoided
    - Personals status is important
    - Have very good management experiences
    - They consider themselves father of organization
    - They can build good team

Management Styles

- 3. [Climbers]

  - Driven by extremely personal ambitions

  - Sacrifice every thing, themselves, family etc.

  - Want to achieve good position by fair or unfair means

  - Become de-motivated if fail

  - They learn from their staff and push them back

Management Styles

- 4. Generals
  - Usually younger persons
  - Like to rule and manipulate power
  - Work hard and guide their subordinates
  - Social and mix at all levels
  - Status is important
  - Strong willed individuals
  - Highly optimistic

Management Styles

- 5. Supporters
  - They maintain balance views about world organization, subordinates, themselves
  - Good facilitators
  - Knowable in applying techniques
  - Work through their people
  - Delegate power and responsibilities to their subordinates.
  - Highly motivated
  - Good compromisers and flexible
  - Determined and patient to achieve targets

Management Styles

- 6. Nice Guys

    - Weak willed persons

    - Interested to develop links with seniors and subordinates

    - Do not criticize to others

    - Poor performers

    - Very few decisions are made

    - Yield to pressure from any source

Management Styles

- 7. <u>Bosses</u>
  - Power hungry
  - Very rude and impatient
  - Operate in administrative modes , plying things by books where it suits them
  - Drive their subordinate but not themselves
  - Extremely inflexible, mistaken as strong minded people
  - Strong talkers
  - Terrorize their subordinates and peers
  - Creating conflict for their powers

Management Styles

- 7. [Bosses (cont'd)](#)

  - In short term they are result oriented, but long term they are destructive and harm full

  - They are insecure and humiliate others

  - Promoted by pointing out mistakes of others, not their own achievements

People and Task

	General	Supporters
Administrators	Climbers	
Time Savers	Bosses	Nice Guys

Task →

O   People →

Engineering Management
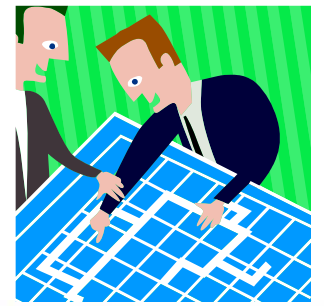
- Engineering management is a process of leading and controlling a technical enterprise
  - Direct supervision of engineers or of engineering functions
- It is similar to other definitions of management, but with a slant toward technical issues

- Engineering Managers are distinguished from other managers because they possess both the ability to apply engineering principles and skill in organizing and directing people and projects

The engineering management education program
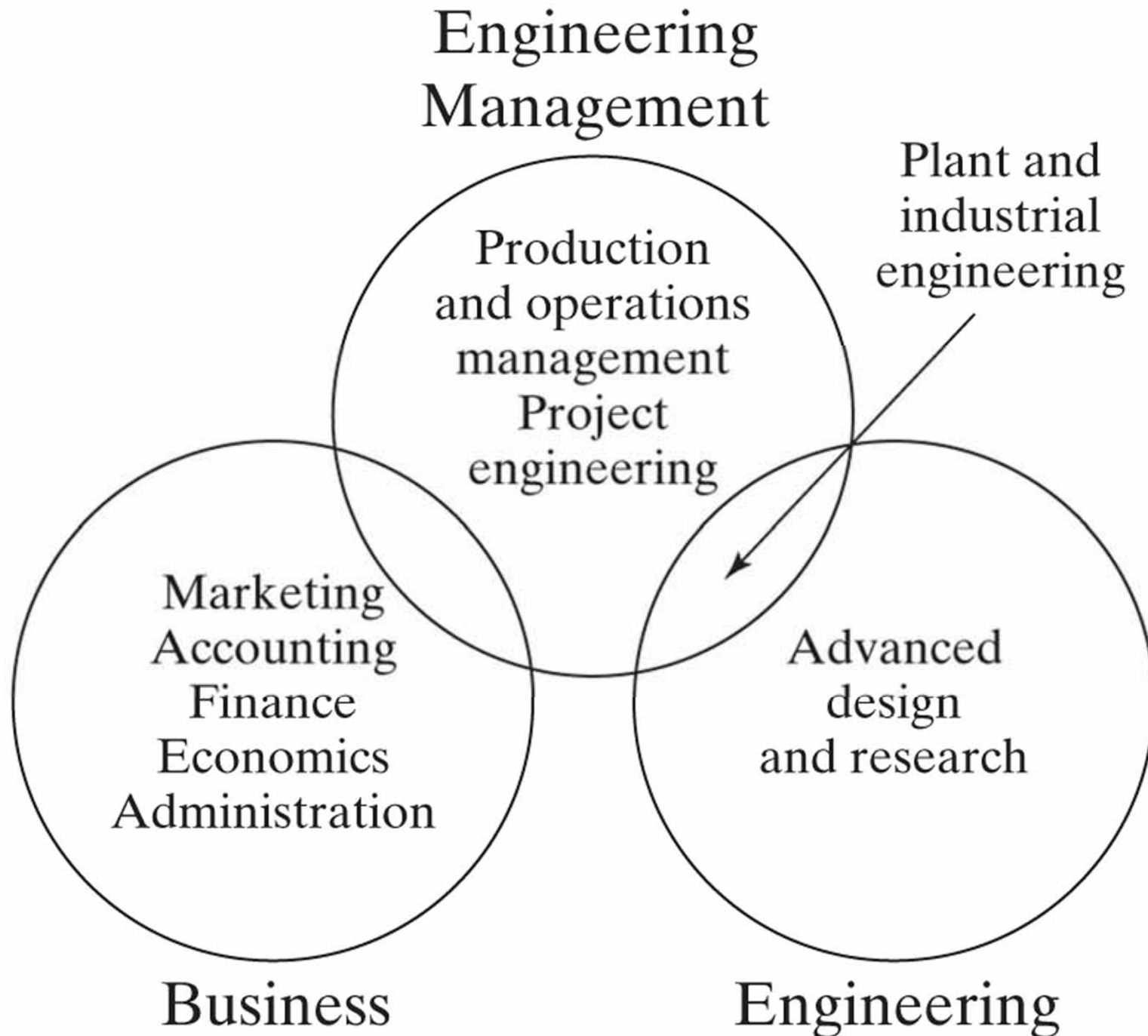
Engineering Management

Plant and industrial engineering

Production and operations management
Project engineering

Advanced design and research

Marketing
Accounting
Finance
Economics
Administration

Business

Engineering

Engineering Management
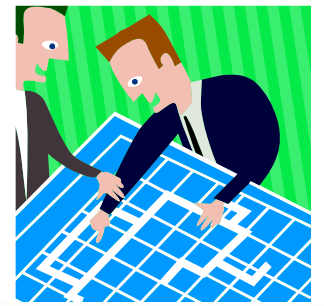
- Why an engineering background can help prepare for an engineering management position?

  - Engineers: logical, methodical, objective, and make unemotional decisions based on facts

  - Use their technical knowledge to check the validity of information

  - Can analyze problems thoroughly, look beyond the immediate ones, and ask good questions to explore alternative solutions to technical problems

  - Understand what motivates engineers

  - Can review and evaluate the work of their subordinates since they understand what they are doing

Engineering Management
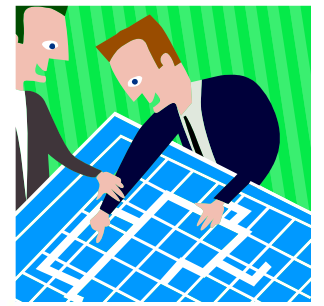
- Why an engineering background can help prepare for an engineering management position? (cont'd)

  - Can engage in future planning with appropriate consideration for technology and its relationship to cost effectiveness

  - Engineering backgrounds help in technical discussions with customers

  - Their background increases the manager's credibility with subordinates, customers, and superiors. People attribute qualities, abilities, skills, and knowledge to them, which allows the manager to influence those who have that perception

Role differences between Engineers and Managers

Position	Engineer	Manager
Focus	More concerned with things technical/scientific	More concerned with people
Decision making	Makes decisions with much information, under conditions of greater certainty	Makes decisions often with inadequate information, under conditions of greater uncertainty
Involvement	Works on tasks and problems solving personally	Directs the work of others to goals
Process outcomes	Work based on facts with quantifiable outcomes	Work based on fewer facts, less measurable outcomes
Effectiveness	Depends on person technical expertise, attention to detail, mathematical/technical problem solving, and decision making	Depends on interpersonal skills in communication, conflict, management, getting ideas across, negotiating, and coaching

Role differences between Engineers and Managers (cont'd)

Position	Engineer	Manager
Dependency	Experiences role as autonomous	Experiences role as interdependent
Responsibility	Individual accomplishment in one project, task, or problem at a time	Many objectives at once, requiring orchestrating a broad range of variables and organizational entities
Creativity	Creative with products, designs, materials	Creative with people and organizations
Bottom line	Will it work?	Will it make/save money for the organization?

Engineers Versus Managers

What Engineers Do	What Managers Do
Minimize risk	Take calculated risks
Emphasize accuracy and mathematical precision	Rely heavily on intuition, take educated guesses, and try to be "about right"
Exercise care in applying sound scientific methods on the basis of reproducible data	Exercise leadership in making decisions under widely varying conditions based on sketchy information
Solve technical problems based on their own individual skills	Solve techno-people problems based on skills in integrating the talents of others
Work largely through their own abilities to get things done	Work through others to get things done

Engineering Management
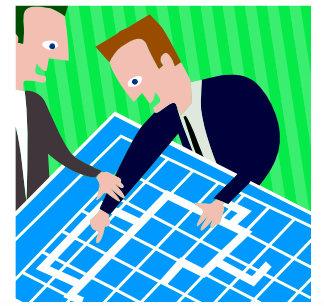
- Philosophical similarities between engineering and management

  - Both engineers and managers are trained to be decision makers in a complex environment

  - Both allocate resources for the operation of existing systems or for the development of new systems

  - Both have to recognize, identify and evaluate the interactions among system components

You and Your Career
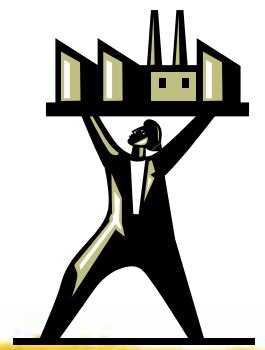
- Jobs are no longer as secure for managers as they used to be
  - Organizations still try to develop and retain good employees
  - Employee loyalty and commitment are still important
- Companies offering "employability" to workers tend to be more successful
  - Provide training and other learning experiences
  - Employees perform work with greater responsibility
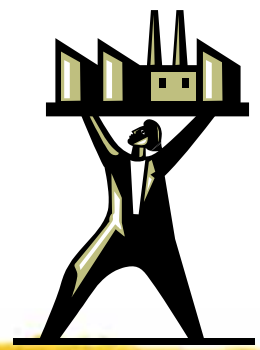
You and Your Career

- Be both a specialist and generalist
  - *Specialist* - expert in something
    - Provide concrete, identifiable value to the firm
  - *Generalist* - knowing about a variety of business functions so you can understand work with different perspectives
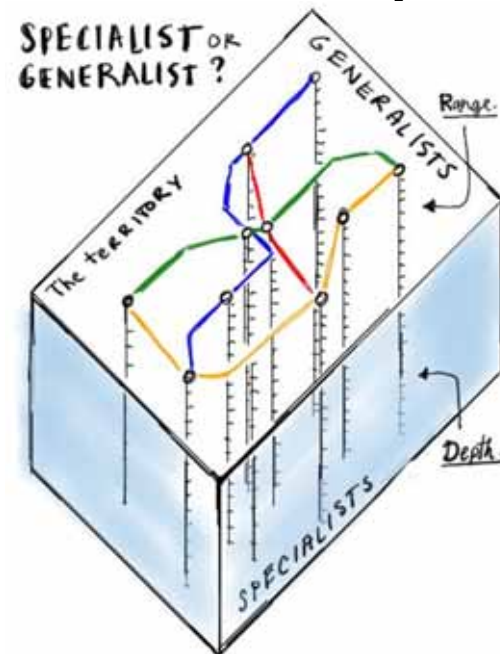
You and Your Career
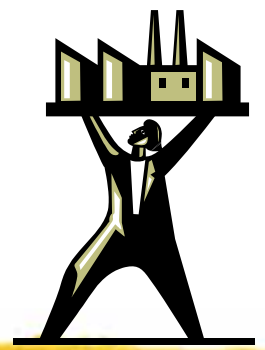
- Be self-reliant
  - Take responsibility for yourself, your actions, and your career regardless of where you work
  - Think and act like an *entrepreneur*
    - Look for opportunities to contribute in new ways
    - Generate constructive change
- Be connected
  - Establish many good working relationships
  - Be a team player with strong interpersonal skills
 - All business is a function of human relationships
    - Competitive advantage depends upon you and other people

You and Your Career
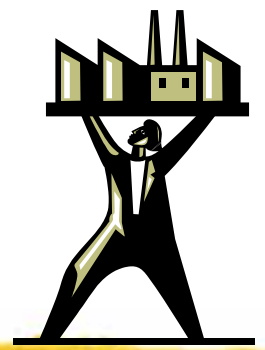
- Keys to career management:
    - 1. Think of yourself as a business
    - 2. Define your product: What is your area of expertise?
    - 3. Know your target market: To whom are you going to sell this?
    - 4. Be clear on why your customer buys from you. What is your "value proposition" - what are you offering that causes him to use you?
    - 5. As in any business, strive for quality and customer satisfaction, even if your customer is just someone else in your organization - like your boss
    - 6. Know your profession or field and what's going on there
    - 7. Invest in your own growth and development, the way a company invests in research and development. What new products will you be able to provide?
    - 8. Be willing to consider changing your career
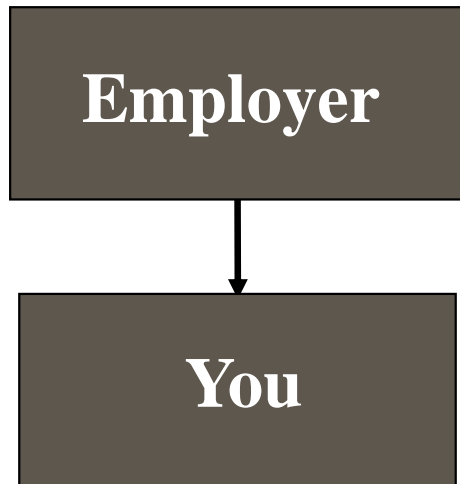
You and Your Career
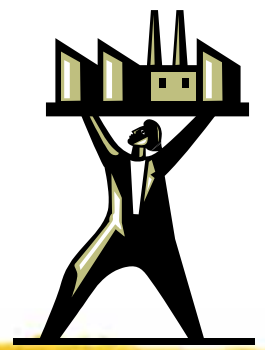
- Actively manage your relationship with your organization
  - Two ways to think about the nature of the relationships between you and your employer
    - View yourself as an employee
      - Model for just getting by
      - Contributions likely to be minimal
  - Two-way, mutually-beneficial exchange relationship
    - Think about how you can contribute and act accordingly
      - Figure out new ways to add value
    - Organization likely provide full and fair rewards, support further personal development, and offer more gratifying work environment

Managerial action is your opportunity to contribute
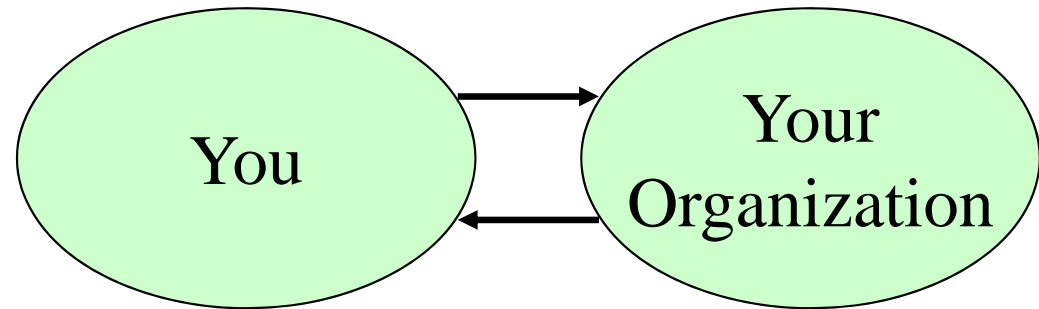

You

Your Organization

Managerial Actions
1. Delivering Strategic Value
2. Building a Dynamic Organization
3. Mobilizing People
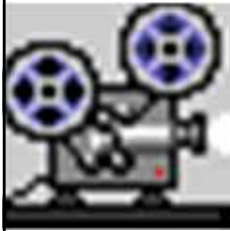4. Learning and Changing
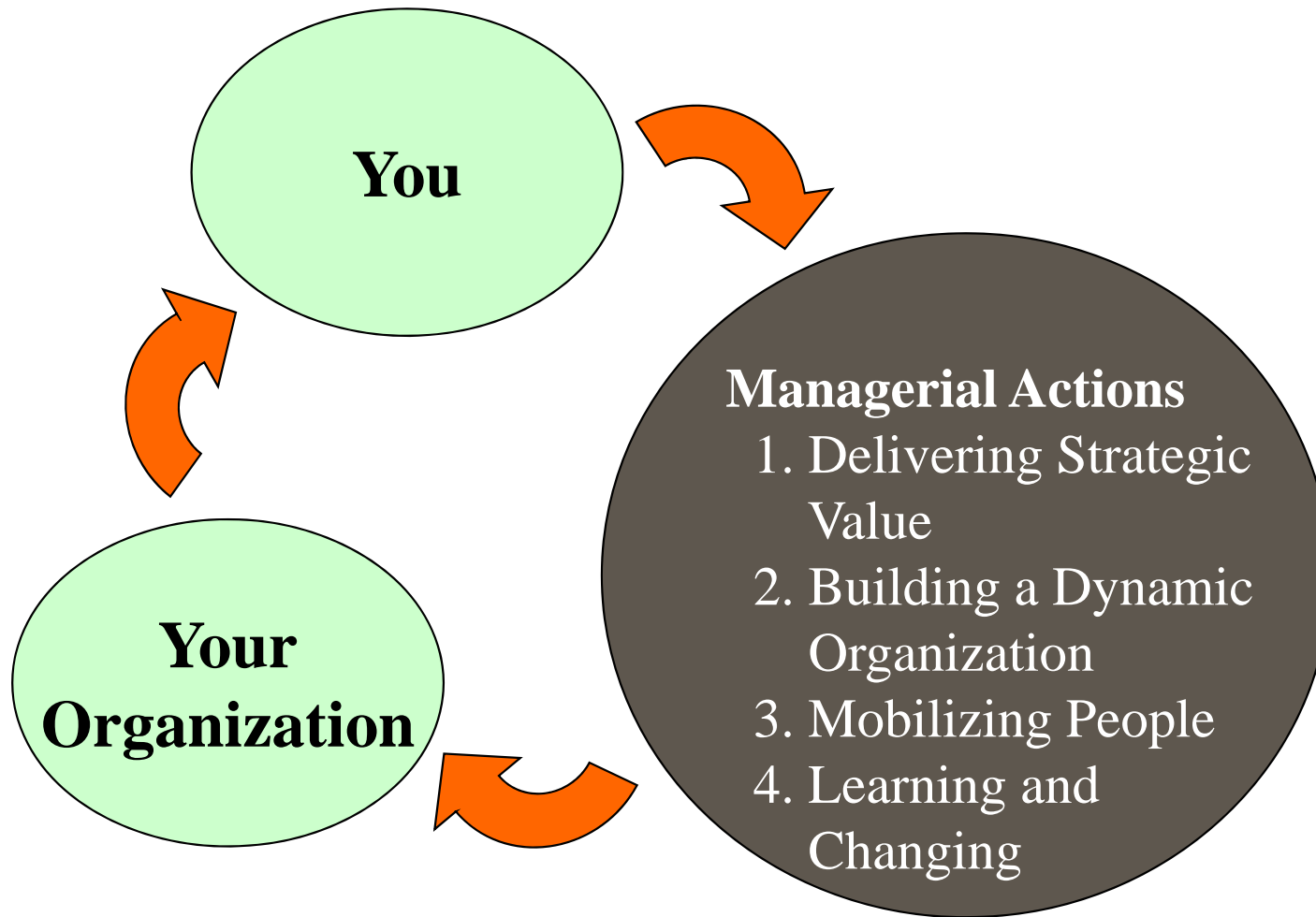
You and Your Career
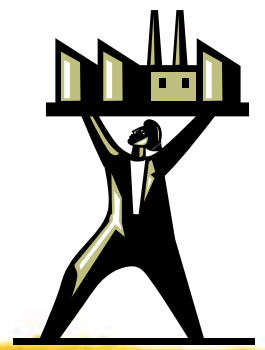
- Survive and thrive
  - Be prepared to move from project to project, team to team
  - Be a master at something that the world values
  - Develop a strong network of colleagues who can help with current and future projects
  - Have entrepreneurial skills that help you act as if you were running your own business
  - Love technology
  - Market yourself
  - Be willing to constantly improve and even reinvent yourself

Further Reading

- Management Basics (4 lesseons) (video and texts)
  - http://education-portal.com/academy/topic/management-basics.html
  - Management in Organizations: Top, Middle & Low-Level Managers (5:56)
  - Managerial Skills: How Good Managers Promote Productivity (6:25)
  - Henry Mintzberg's Managerial Roles (11:25)
  - Four Functions of Management: Planning, Organizing, Leading & Controlling (6:37)
  - Chapter Exam

Further Reading

- Engineering - Wikipedia
  - http://en.wikipedia.org/wiki/Engineering
- Management - Wikipedia
  - http://en.wikipedia.org/wiki/Management
- Engineering management -- Wikipedia,
  - http://en.wikipedia.org/wiki/Engineering_management