

# Principles & Architecture



## EPITA Bachelor of Science

### Principles and Architecture of Information Systems

#### Chapter #1

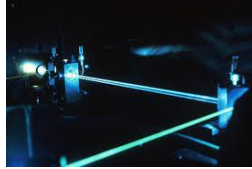
#### Introduction & Organizations



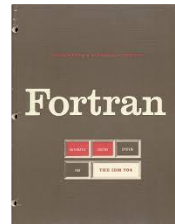
Olivier BERTHET

# Principles & Architecture

## My background



### Education



### Hobbies



### Professional experience



Givaudan<sup>®</sup>

# Principles & Architecture

Green IT

My courses at EPITA

CRM

PM Principles

PM Workshops

IT Purchasing

Introduction to 6σ



# Principles & Architecture

**Tell me and I forget,  
teach me and I may remember,  
involve me and I learn.**

*Benjamin Franklin*



# Principles & Architecture

## Tool : Wooclap

### 0. Connection slide



[Copy participation link](#)



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- 2 Enter the event code in the top banner

Event code  
**NYAMII**



- 1 Send **@NYAMII** to **06 44 60 96 62**
- 2 You can participate



# Principles & Architecture

## Wooclap

- **What are some important keywords in Information Systems ?**

**For Instance Computer , Internet , 5G**



# Principles & Architecture

## Structure

- **Chapter 1 : Introduction and Organisations**
- **Chapter 2 : Hardware**
- **Chapter 3 : Software**
- **Chapter 4 : Database Systems**
- **Chapter 5 : Network**
- **Chapter 6 : Internet and E-Commerce**
- **Chapter 7 : Major Information Systems**
- **Chapter 8 : Systems Development**
- **Chapter 9 : Security, Privacy and Ethical issues**



# Principles & Architecture

## Objectives

- **Review the panorama of Information Systems**
- **Understand the value of Information Systems for the Business**
- **Grasp the eco-systems of IS and the different components**
- **Recognize the various categories in Information Systems and Technologies**
  - **Hardware**
  - **Software**
  - **Databases**
  - **Network**
  - **Applications**





# Principles & Architecture

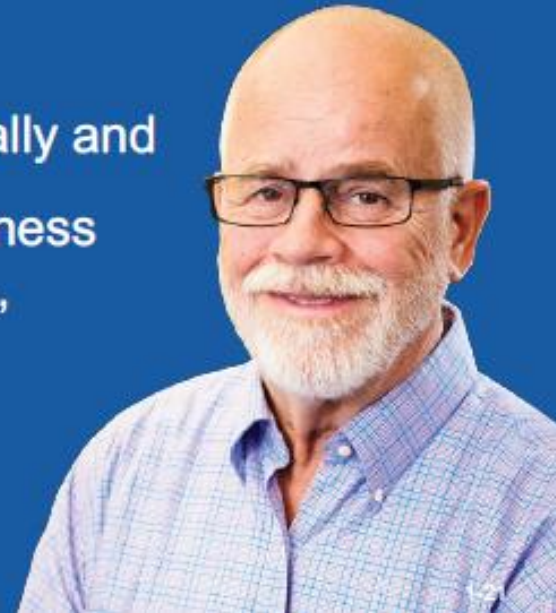
**Every business is a software business now**



*Every business is a software business now.*

Achieving a state of Business Agility means that the entire organization—*not just development*—is engaged in continually and proactively delivering innovative business solutions faster than the competition.”

—Dean Leffingwell, Creator of SAFe



Dean Leffingwell, Creator of SAFe.



# Principles & Architecture

## Product



Those who master large-scale software delivery will define the economic landscape of the 21st century..."

—Mik Kersten, *Project to Product*



# Principles & Architecture

## Introduction

- **Most functional areas of the business rely on information systems**
- **The value of information is directly linked to how it helps decision makers achieve the organization's goals**
- **Computers and information systems help make it possible for organizations to improve the way they conduct business**



# Principles & Architecture

## Introduction

- **System users, business managers, and information systems professionals must work together to build a successful information system**
- **Information systems must be applied thoughtfully and carefully so that society, businesses, and industries can reap their enormous benefits**



# Principles & Architecture

## Definition of an Information System

- **An Information System can integrate data from various sources to provide the information necessary for decision making at the management level.**
- **An organized assembly of resources and procedures required to collect, process, and distribute data for use in decision-making.**



# Principles & Architecture

## Role of Information System



# Principles & Architecture

## Change Equation

$$R = Q \times A$$



# Principles & Architecture

## Organizational resistance to change

- **Information systems become bound up in organizational politics because they influence access to a key resource : the information**
- **Information systems potentially change an organization's structure, culture, politics, and work**
- **Most common reason for failure of large projects is due to organizational and political resistance to change.**
- **Employees may resist changes that disrupt their routines so IS cannot implemented**





# Principles & Architecture

## Evolution

***Once considered a technical specialist, today the IS Professional operates as an internal consultant to all functional areas of the organization, being knowledgeable about their needs and competent in bringing the power of information systems to bear throughout the entire organization.***



# Principles & Architecture

## Why Learn About Information Systems?

- **Information systems used by**
  - Engineers
  - Workers
  - Sales representatives
  - Managers
  - Financial advisors
  - Human Resources employees
- **Information systems**
  - Indispensable tools to help you achieve your career goals



# Principles & Architecture

## Introduction

- **Information system (IS)**
  - A set of interrelated components that collect, manipulate and disseminate data and information and provide feedback to meet an objective
- **Businesses**
  - Can use information systems to increase revenues and reduce costs



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## Information Concepts

- **Information:**
  - One of an organization's most valuable resources
  - Often confused with the term data



# Principles & Architecture

## Data, Information and Knowledge

- **Data**
  - Raw facts (employee number, part number, hours, amount in Euros)
- **Information**
  - Collection of facts organized and processed in such a way that they have value beyond the facts themselves ( total sales of the month for France)
- **Process**
  - Set of logically related tasks performed to achieve a defined outcome
- **Knowledge**
  - Awareness and understanding of a set of information. Ways that information can be made useful to support a specific task or reach a decision

**Information is data made more useful through the application of knowledge**



# Principles & Architecture

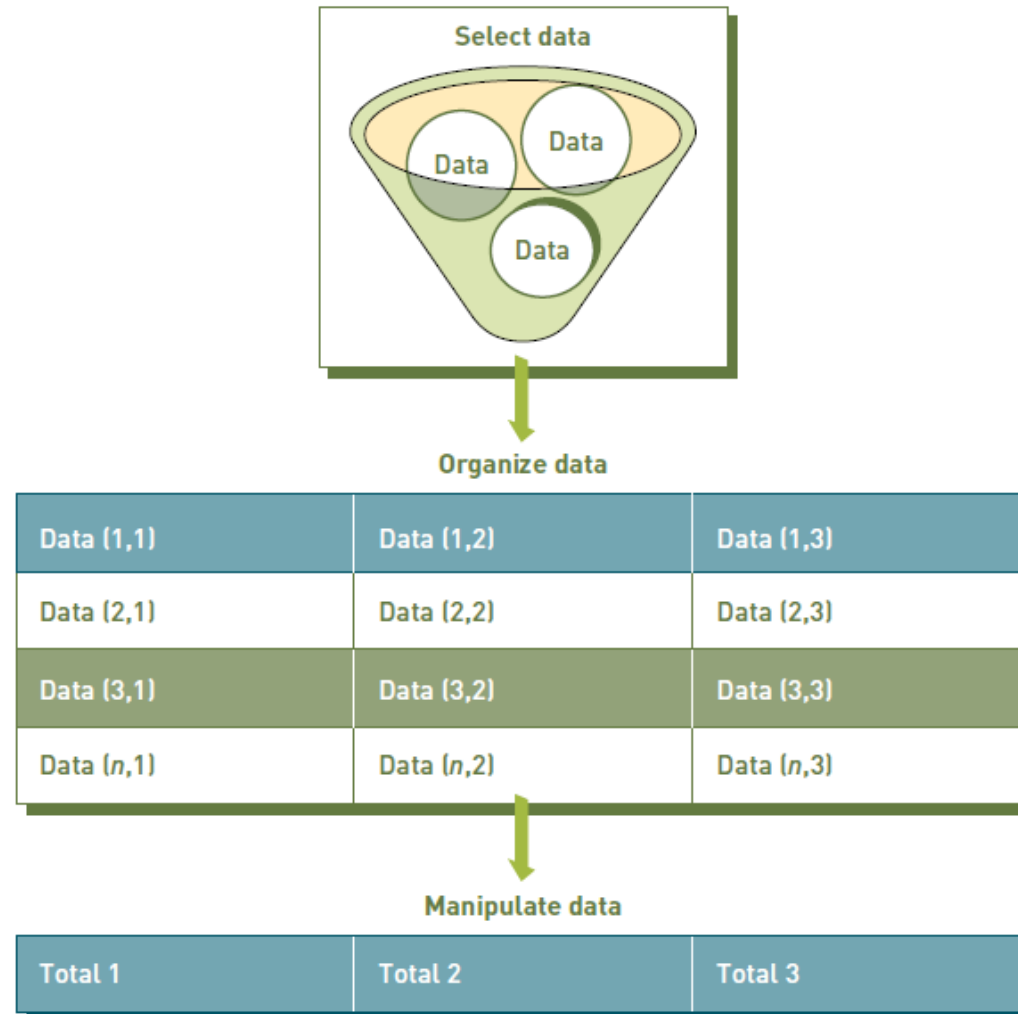
## Types of data

Data	Represented By
Alphanumeric data	Numbers, letters, and other characters
Audio data	Sounds, noises, or tones
Image data	Graphic images and pictures
Video data	Moving images or pictures



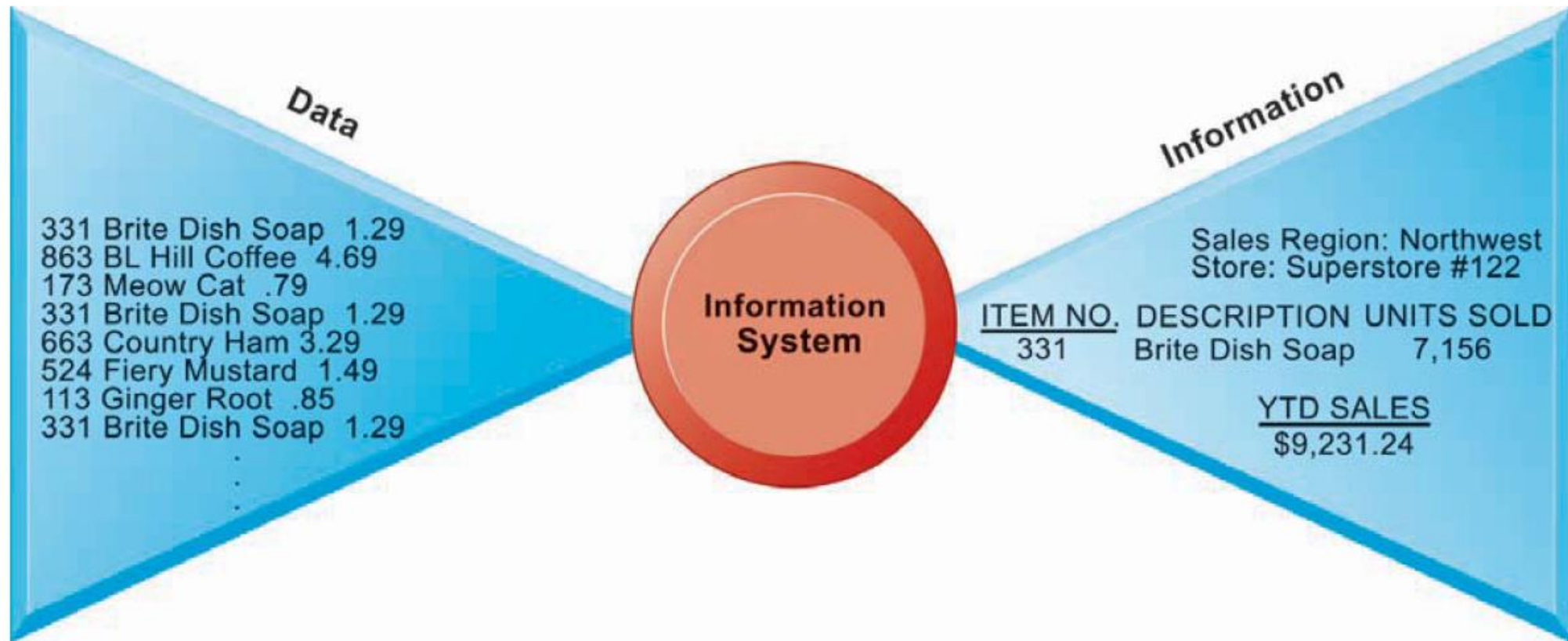
# Principles & Architecture

## Process of transforming data into information



# Principles & Architecture

## Data and Information





# Principles & Architecture

## The Characteristics of Valuable Information

- If an organization's information is not accurate or complete:
  - People can make poor decisions, costing thousands or even millions of dollars
- Depending on the type of data you need:
  - Some characteristics become more important than others



# Principles & Architecture

Characteristic	Definition
Accessible	Information should be easily accessible by authorized users so they can obtain it in the right format and at the right time to meet their needs.
Accurate	Accurate information is error free. In some cases, inaccurate information is generated because inaccurate data is fed into the transformation process. This is commonly called garbage in, garbage out.
Complete	Complete information contains all the important facts. For example, an investment report that does not include all important costs is not complete.
Economical	Information should also be relatively economical to produce. Decision makers must always balance the value of information with the cost of producing it.
Flexible	Flexible information can be used for a variety of purposes. For example, information on how much inventory is on hand for a particular part can be used by a sales representative in closing a sale, by a production manager to determine whether more inventory is needed, and by a financial executive to determine the amount of money the company has invested in inventory.

# Principles & Architecture

Characteristic	Definition
Relevant	Relevant information is important to the decision maker. Information showing that lumber prices might drop is probably not relevant to a computer chip manufacturer.
Reliable	Reliable information can be trusted by users. In many cases, the reliability of the information depends on the reliability of the data-collection method. In other instances, reliability depends on the source of the information. A rumor from an unknown source that oil prices might go up may not be reliable.
Secure	Information should be secure from access by unauthorized users.
Simple	Information should be simple, not complex. Sophisticated and detailed information might not be needed. In fact, too much information can cause information overload, whereby a decision maker has too much information and is unable to determine what is really important.
Timely	Timely information is delivered when it is needed. Knowing last week's weather conditions will not help when trying to decide what coat to wear today.
Verifiable	Information should be verifiable. This means that you can check it to make sure it is correct, perhaps by checking many sources for the same information.

# Principles & Architecture

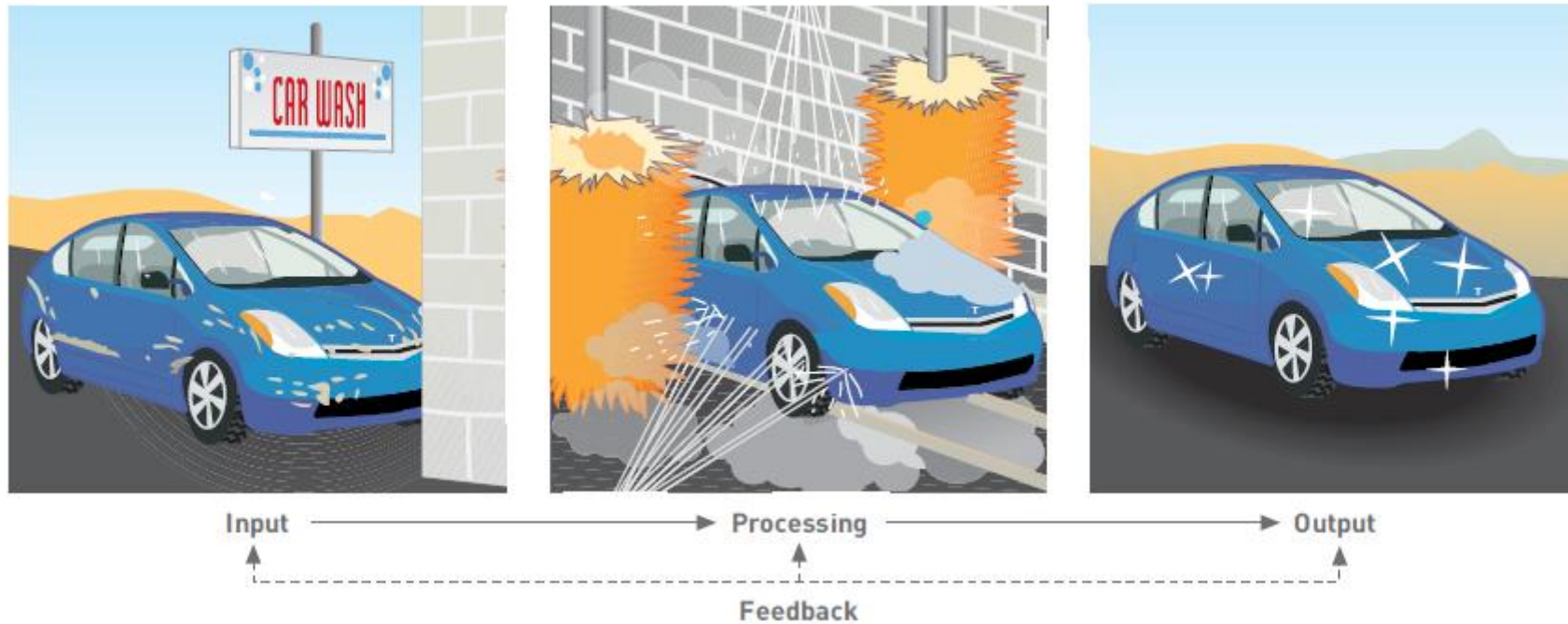
## System Concepts

- **System:**
  - Set of elements or components that interact to accomplish goals
- **Components of a system:**
  - Inputs
  - Processing mechanisms
  - Outputs
  - Feedback



# Principles & Architecture

## System Concepts



# Principles & Architecture

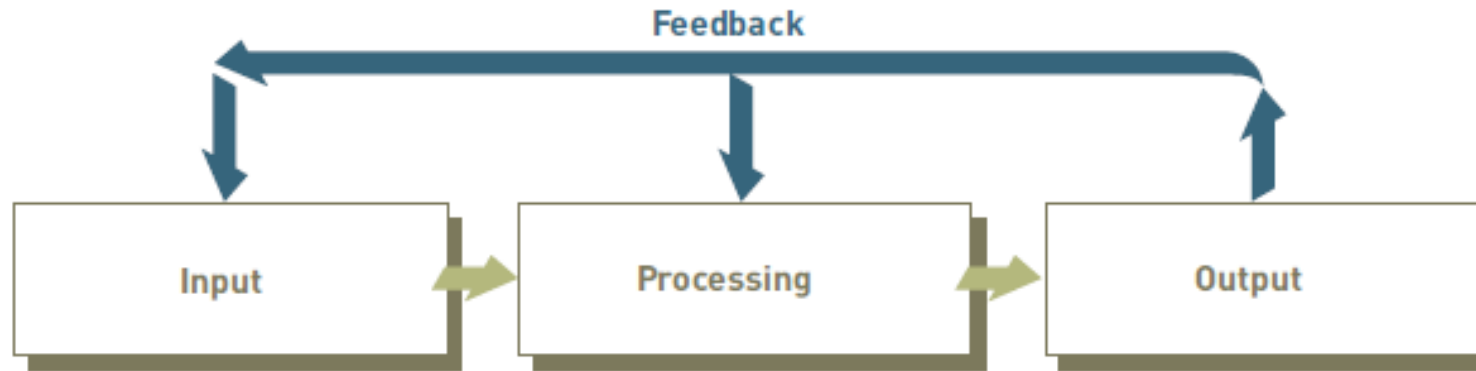
## What is an Information System?

- **Information system (IS) is a set of interrelated elements that:**
  - **Collect (input)**
  - **Manipulate (process)**
  - **Store**
  - **Disseminate (output) data and information**
  - **Provide a corrective reaction (feedback mechanism) to meet an objective**



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**Feedback is critical to the successful operation**

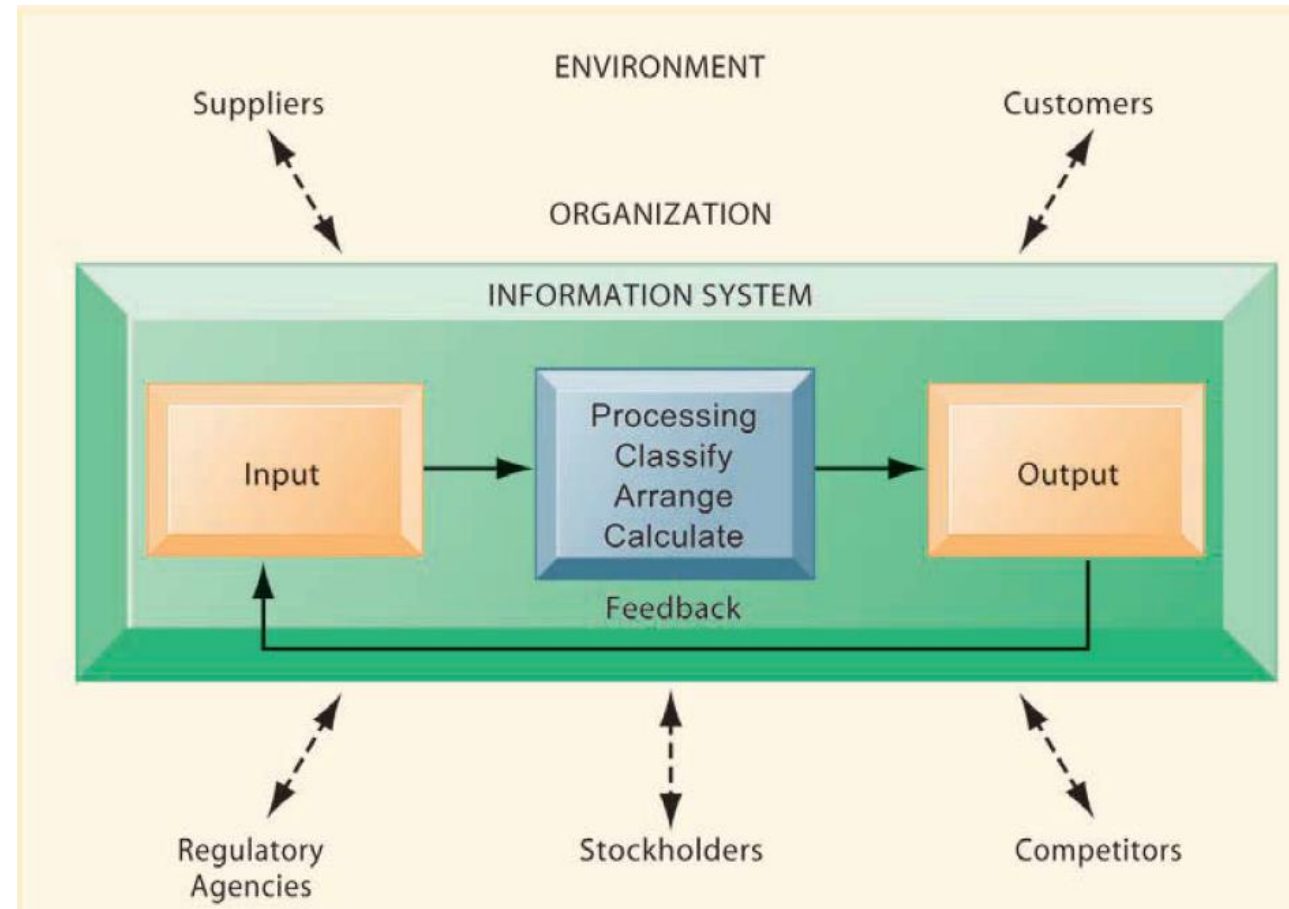


Input, Processing, Output, Feedback



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## Functions of an Information System





# Principles & Architecture

## Input, Processing, Output, Feedback

- **Input**
  - Activity of gathering and capturing raw data
- **Processing**
  - Converting data into useful outputs
- **Output**
  - Production of useful information, usually in the form of documents and reports
- **Feedback**
  - Information from the system that is used to make changes to input or processing activities



# Principles & Architecture

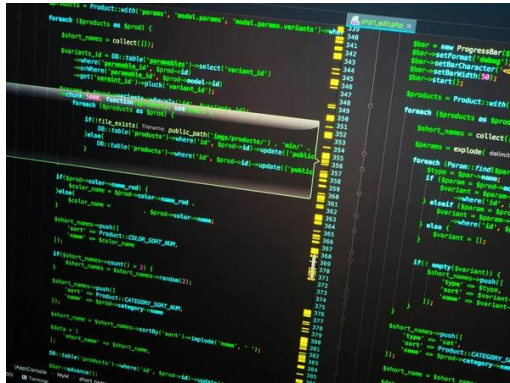
## Wooclap NYAMII

- **What are the key components of a computer based Information system ?**



# Principles & Architecture

## Computer-based Information system components



# Principles & Architecture

## Computer-Based Information Systems

- **Hardware**
  - Consists of computer equipment used to perform input, processing, and output activities
- **Software**
  - Consists of the computer programs that govern the operation of the computer
- **People**
  - The most important element in most computer-based information systems
- **Procedures**
  - Include strategies, policies, methods, and rules for using the Information System



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## Network

- **Telecommunications, networks, and the Internet**
  - The electronic transmission of signals for communications
- **Networks**
  - Connect computers and equipment to enable electronic communication
- **Internet**
  - World's largest computer network, consisting of thousands of interconnected networks, all freely exchanging information



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## Another Word cloud

- **What are the key functional areas of a business or a company ?**



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## Information Systems in the Functional Areas of Business

- **Functional areas and operating divisions of business:**
  - Research & Development
  - Manufacturing
  - Logistics
  - Sales and marketing
  - Finance and accounting
  - Human resource management
  - Legal
  - Information systems
  - General Management



# Principles & Architecture

## Information Systems in Industry

- **Industries:**
  - Airline industry
  - Chemicals
  - Steel
  - Automotive
  - Investment firms
  - Banks
  - Transportation industry
  - Publishing companies
  - Healthcare
  - Retail companies
  - Power management and utility companies
  - Professional services
  - Management consulting firms

**I is EVERYWHERE**





# Principles & Architecture

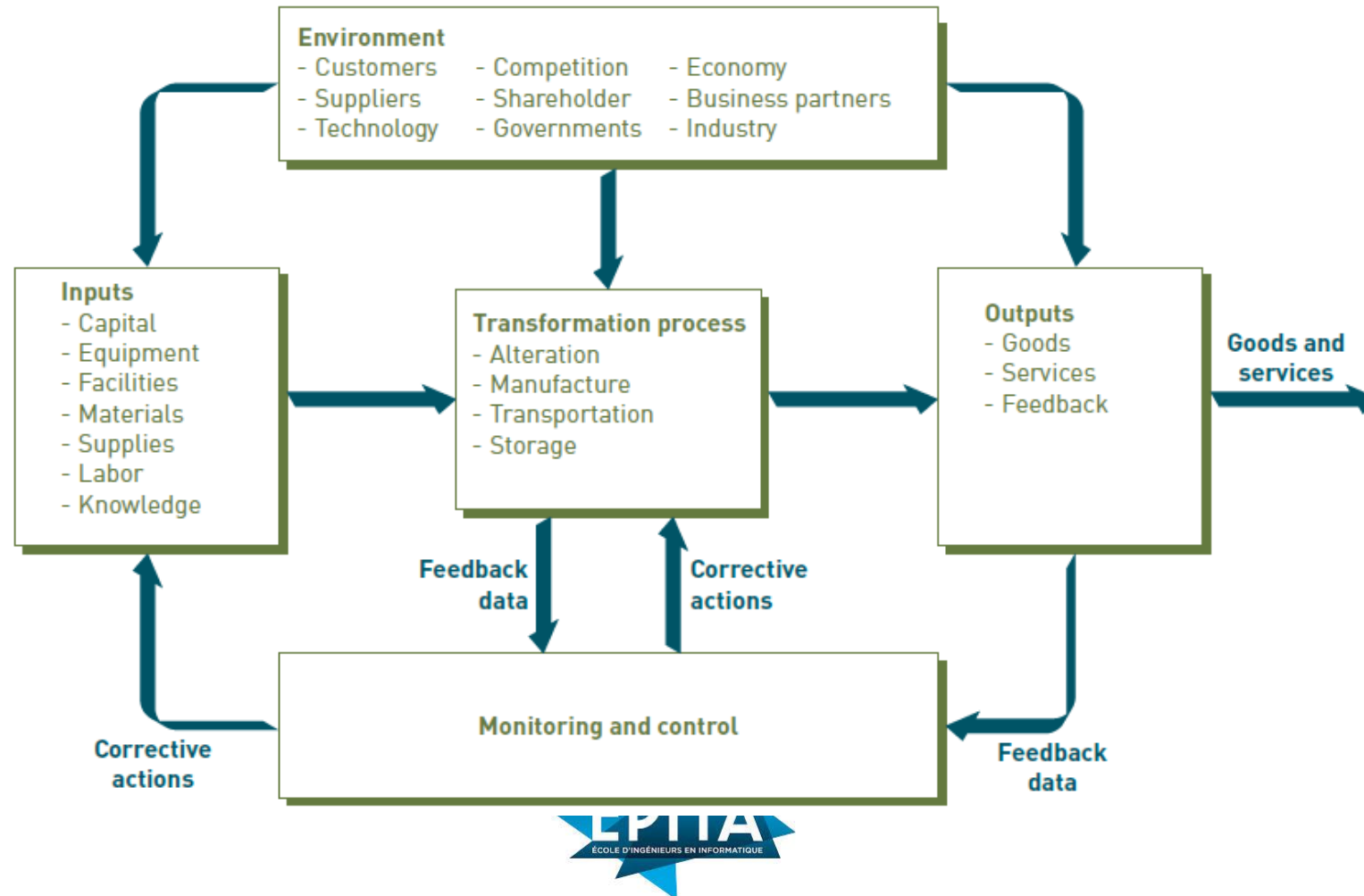
## Organizations and Information Systems

- **Organization:**
  - Formal collection of people and other resources established to accomplish a set of goals
  - A system
  - Constantly uses money, people, materials, machines and other equipment, data, information, and decisions



# Principles & Architecture

## General model of an Organization



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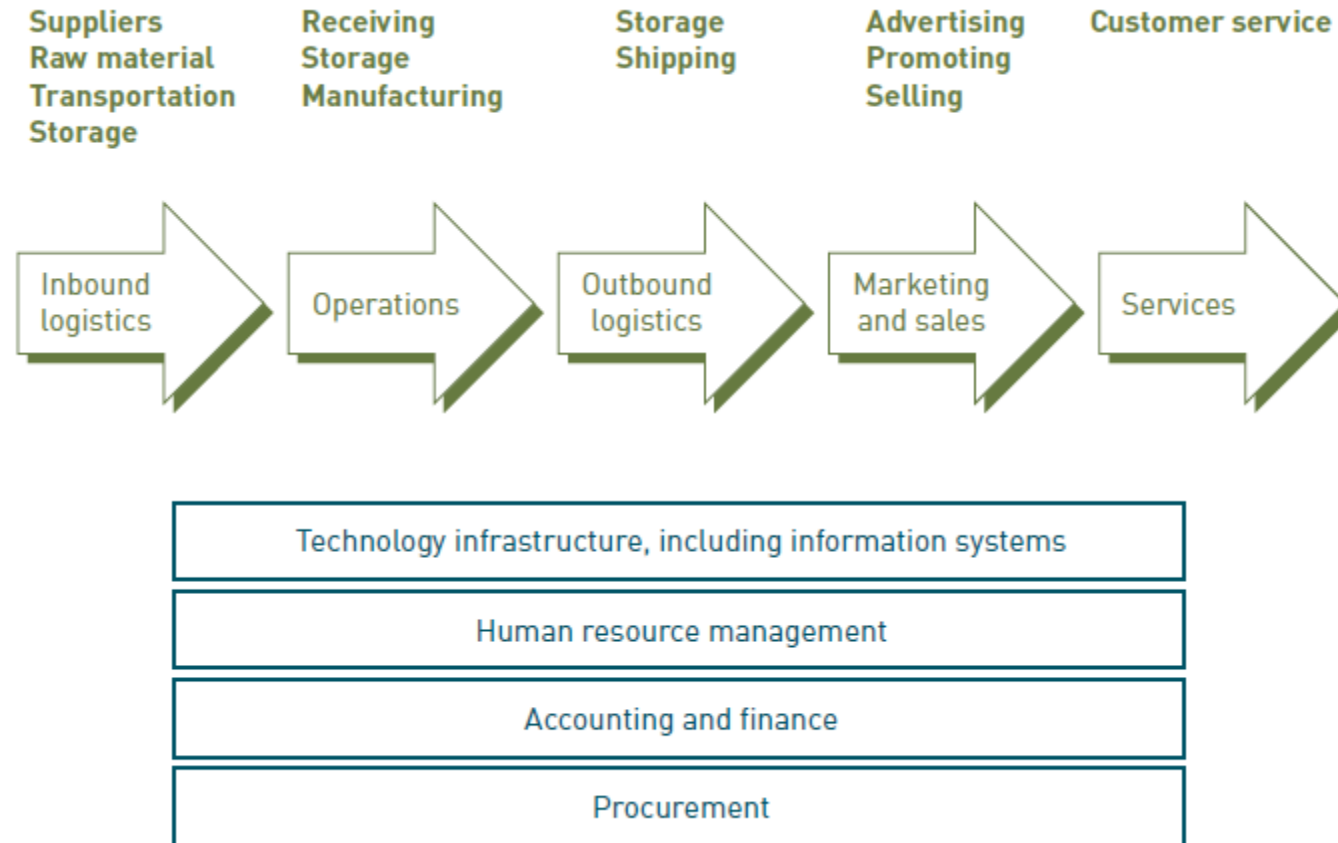
## Organizations and Information Systems

- **Value chain**
  - Series (chain) of activities that includes inbound logistics and warehouse and storage
- **Supply chain management (SCM) determines**
  - What supplies are required for value chain
  - What quantities are needed to meet customer demand
  - How supplies should be processed into finished goods and services
  - How shipment of supplies and products to customers should be scheduled, monitored, and controlled



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## Supply chain



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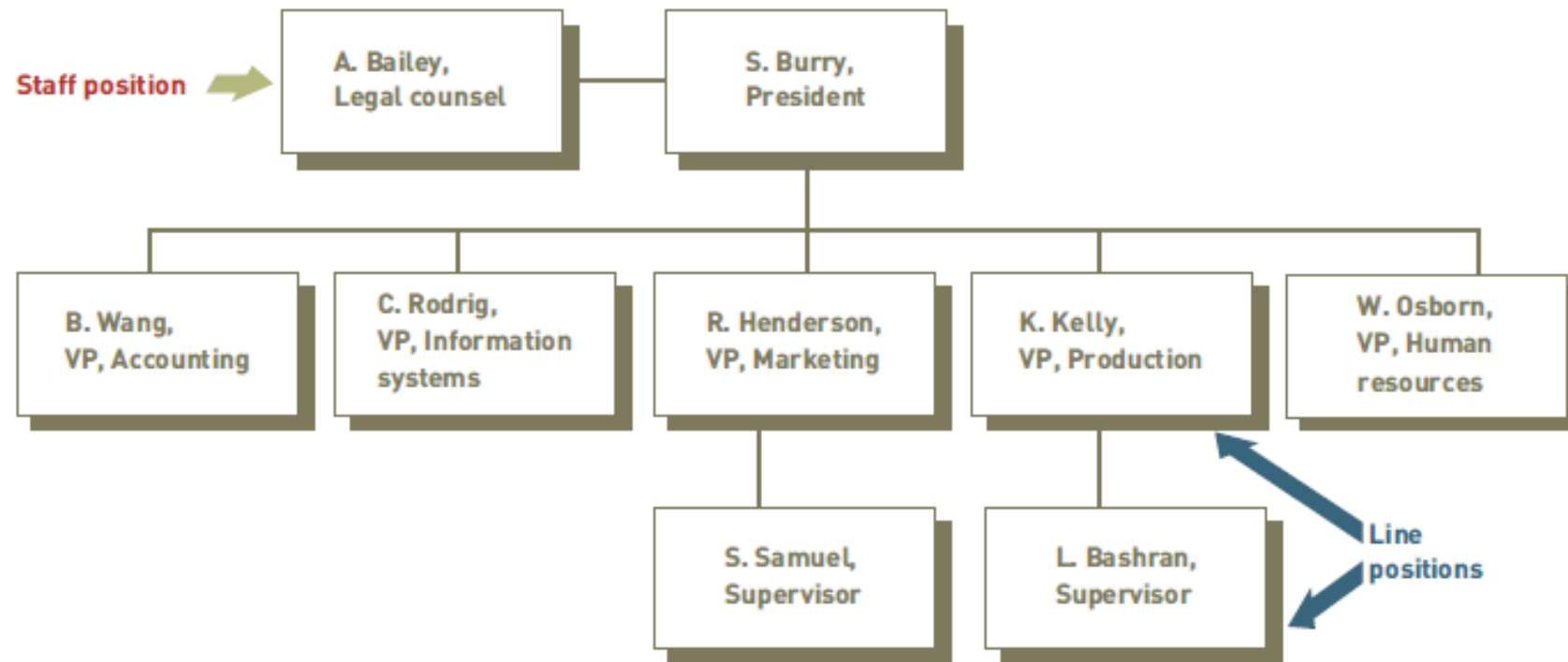
## Organizational Structures

- **Organizational structure:**
  - Organizational subunits and the way they relate to the overall organization
- **Types of organizational structures:**
  - Traditional
  - Project
  - Team
  - Virtual



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## Traditional Organizational Structure



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## Roles, Functions, and Careers in IS

- **Primary responsibilities in information systems:**
  - **Operations**
    - System operators primarily run and maintain IS equipment
  - **Systems development**
    - Focuses on specific development projects and ongoing maintenance and review
  - **Support**
    - Provides user assistance in hardware and software acquisition and use, data administration, user training and assistance, and Web administration



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## Wooclap

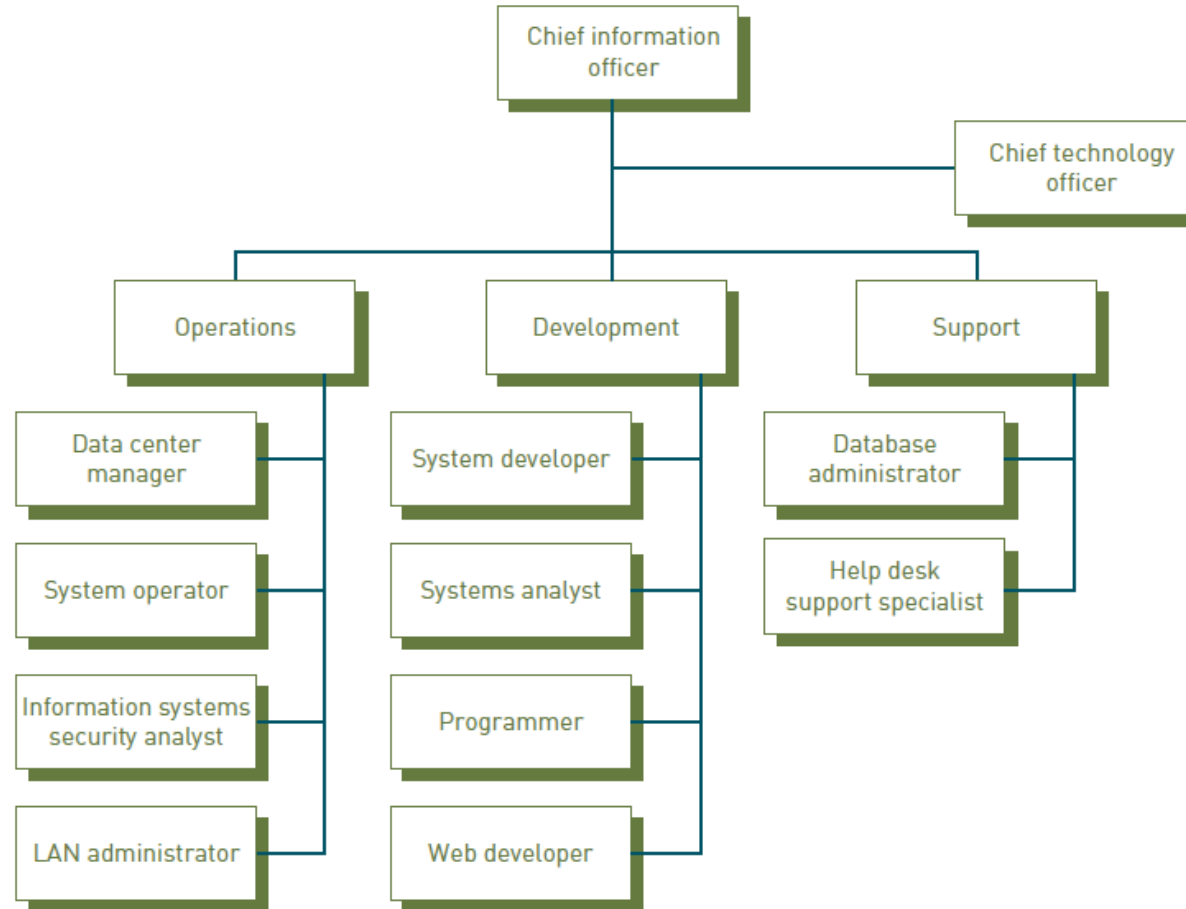
- Can you name some examples of IS job titles ? IS roles ?





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## Typical IS Titles and Functions



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## Typical IS Titles and functions

- **CIO Chief Information Officer**
  - is to employ an IS department's equipment and personnel to help the organization attain its goals.
  - A good CIO is typically a visionary who provides leadership and direction to the IS department
- **Senior Managers**
  - A large organization may have several people employed in senior IS managerial levels with job titles such as Infrastructure Manager, Applications Manager , Project Office Manager, chief technology officer (CTO)
  - Together with the CIO, they can best decide what information systems will support corporate goals



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## Typical IS Titles and functions - Operations

- **Data center manager**
  - Data center managers are responsible for the maintenance and operation of the organization's computing facilities
- **Systems Operators**
  - System operators run and maintain IS equipment
- **Information systems security analyst**
  - IS security analysts are responsible for maintaining the security and integrity of their organizations' systems and data.
- **LAN administrator**
  - Local area network (LAN) administrators set up and manage network hardware, software, and security processes



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## Typical IS Titles and functions - Development

- **Software developer**
  - are involved in writing the software that customers and employees use
- **Systems analyst**
  - frequently consult with management and users, and they convey system requirements to software developers
- **Programmer**
  - convert a program design developed by a systems analyst or software developer into one of many computer languages.
- **Web developers**
  - These professionals design and maintain Web sites, including site layout and function, to meet the client's requirements.



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## Typical IS Titles and functions - Support

- **Database administrator**
  - Database administrators (DBAs) design and set up databases to meet an organization's needs.
- **System support specialist**
  - These skilled specialists respond to telephone calls, electronic mail, and other inquiries from computer users regarding hardware, software, networking, or other IS-related problems or needs.



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## New IT roles

- **Data scientist**
- **UX/UI Specialist**
- **Scrum Master**
- **Product manager/Product owner**
- **Agile coach**



# Principles & Architecture

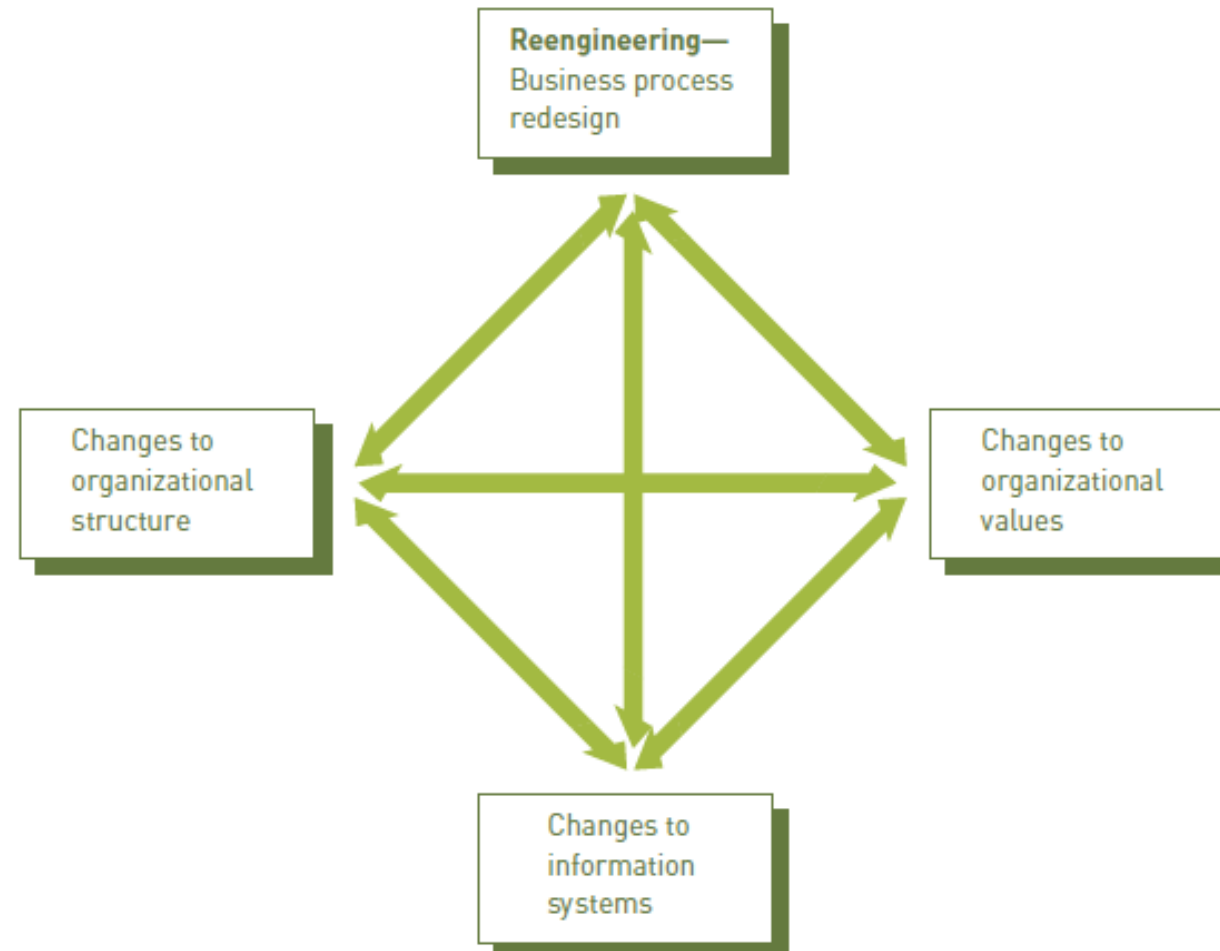
## Reengineering and Continuous Improvement

- **To stay competitive, organizations must occasionally make fundamental changes in the way they do business.**
- **In other words, they must innovate and change the activities, tasks, or processes they use to achieve their goals.**
- **Reengineering, also called process redesign and business process reengineering (BPR), involves the radical redesign of business processes, organizational structures, information systems, and values of the organization to achieve a breakthrough in business results.**
- **In contrast to reengineering, the idea of continuous improvement (often referred to by the Japanese word “Kaizen”) is a form of innovation that constantly seeks ways to improve business processes and add value to products and services.**



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## Reengineering and Continuous Improvement





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## Outsourcing, On-Demand Computing and Downsizing

- **Outsourcing**
  - Contracting with outside professional services
- **Offshoring**
  - is an outsourcing arrangement in which the organization providing the service is located in a country different from the firm obtaining the services
- **Downsizing**
  - Reducing number of employees to cut costs



# Principles & Architecture

## Certifications

- **Process for testing skills and knowledge resulting in an endorsement by the certifying authority**
  - Project Management Institute PMP
  - SCRUM Master certification
  - Citrix Certified Enterprise Engineer
  - Comp TIA Security+
  - GIAC Certified Windows System Administrator
  - AWS Certified SysOps Administrator-Associate (Cloud)
  - Mongo DB Certified DBA
  - Microsoft Certified Solution Developer: Applications Lifecycle Management
  - Cisco Certified Design Associate



# Principles & Architecture

## Working in Teams



# Principles & Architecture

## Types of Information Systems

- **Personal IS:** An information system that improves the productivity of individual users in performing stand-alone tasks. Examples ?
- **Group IS:** An information system that improves communications and support collaboration among members of a workgroup. Examples?
- **Enterprise IS:** An information system that an organization uses to define structured interactions among its own employees and/or with external customers, suppliers, government agencies and other business partners. Examples?



# Principles & Architecture

## Types of Information Systems

	Personal IS	Group IS	Enterprise IS
Examples	Personal productivity software, decision-support system	Email, instant messaging, project management software	Transaction processing systems, enterprise systems, interorganizational systems
Benefits	Improved productivity	Increased collaboration	Increased standardization and ability to monitor work
Organizational complements (including well-trained workers, better teamwork, redesigned processes, and new decision rights)	<ul style="list-style-type: none"><li>• Does not bring complements with it</li><li>• Partial benefits can be achieved without all complements being in place</li></ul>	<ul style="list-style-type: none"><li>• At least some complements must be in place when IS “goes live”</li><li>• Allows users to implement and modify complements over time</li></ul>	<ul style="list-style-type: none"><li>• Full complements must be in place when IS “goes live”</li></ul>
Manager’s role	<ul style="list-style-type: none"><li>• Ensure that employees understand and connect to the change</li><li>• Encourage use</li><li>• Challenge workers to find new uses</li></ul>	<ul style="list-style-type: none"><li>• Demonstrate how technology can be used</li><li>• Set norms for participation</li></ul>	<ul style="list-style-type: none"><li>• Identify and put into place the full set of organizational complements prior to adoption</li><li>• Intervene forcefully and continually to ensure adoption</li></ul>



# Principles & Architecture

## Organizational complements

- **Well-trained workers**
  - Employees must be well trained and understand the need for the new system, what their role is in using or operating the system, and how to get the results they need from the system.
- **System support**
  - Trained and experienced users who can show others how to gain value from the system and overcome start-up problems.
- **Better teamwork**
  - Employees must understand and be motivated to work together to achieve the anticipated benefits of the system.
- **Redesigned processes**
  - New systems often require radical redesign of existing work processes as well as the automation of new processes.
- **New decision rights**
  - Employees must understand and accept their new roles and responsibilities including who is responsible for making what decisions.



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## Global Challenges in Information Systems

- **Cultural challenges**
- **Language challenges**
- **Time and distance challenges**
- **Infrastructure challenges**
- **Currency challenges**
- **Product and service challenges**
- **Technology transfer issues**
- **State, regional, and national laws**
- **Trade agreements**



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## Exercise

### **Kroger's QueVision System Improves Customer Service**





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## Critical Thinking Exercise Kroger's QueVision System Improves Customer ServiceReview

- **Kroger has annual sales in excess of \$100 billion and operates stores across the United States under various names, including Kroger's, Ralph's, and Harris Teeter. In surveys, Kroger's customers have consistently rated waiting at the checkout lane as the worst part of the grocery shopping experience. In response, Kroger developed its QueVision computer-based information system, which relies on real-time data feeds from point-of-sale systems as well as infrared sensors over store doors and cash registers to count customers entering the store and standing at checkout lanes.**

