

ISYS2110

Analysis and Design of Web Information Systems

Lecture 1

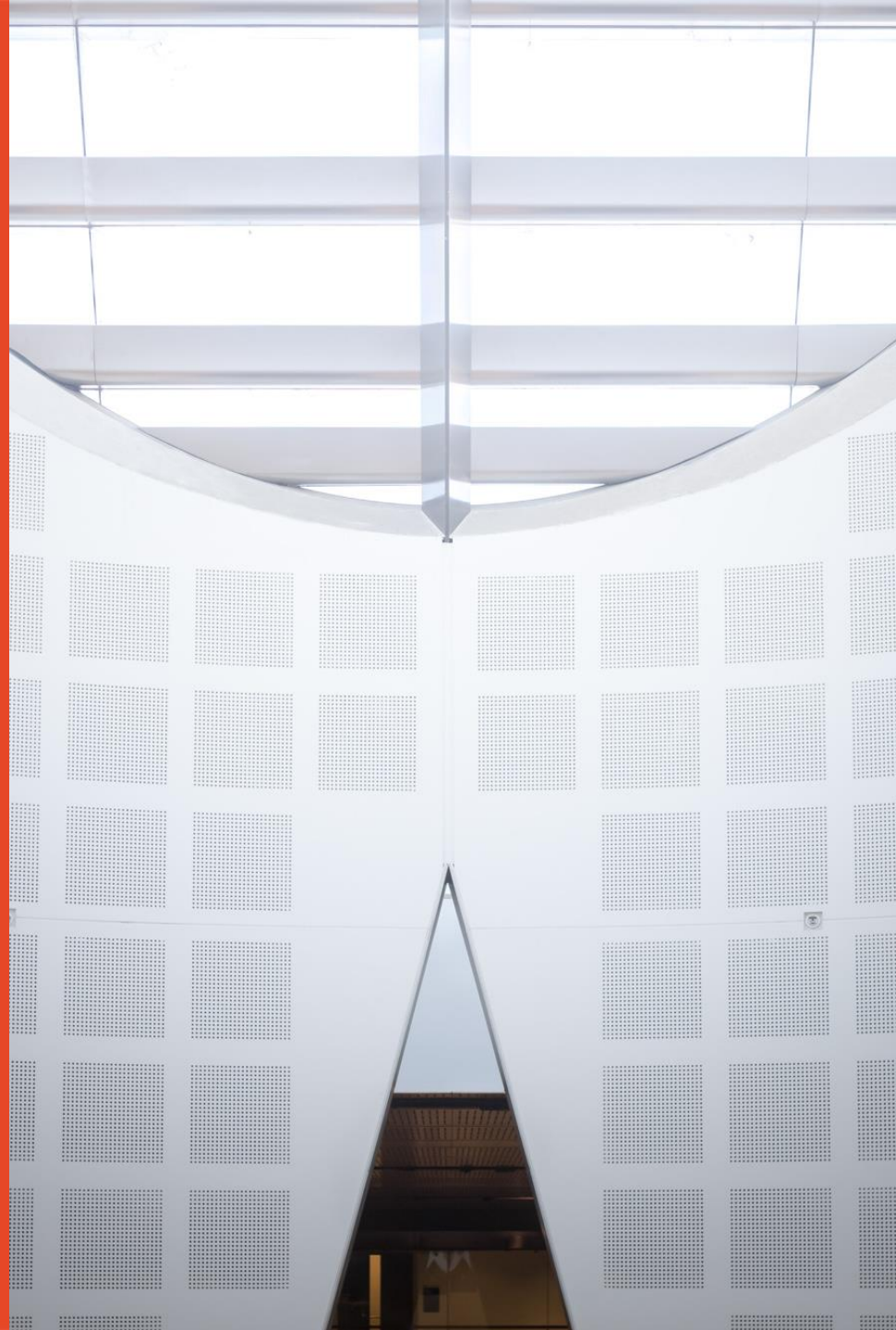
Introduction to Systems Analysis and Design

Semester 1, 2018

Dr Rabiul Hasan



THE UNIVERSITY OF
SYDNEY



Welcome !

ISYS2110: Day, Time, & Venue

- **Lecture:** Friday 14:00-16:00, Merewether Lecture Theatre 1 (Rm 131)
- **Tutorial:** 2 hours

<i>Tutor Name</i>	<i>Tutorial Session</i>	<i>Time</i>	<i>Venue</i>
<i>Kiran Ijaz</i>	M08A (Monday)	8:00 - 10:00	<u>School of Information Technologies Laboratory 117</u>
<i>Khushnood Naqshbandi</i>	M09A (Monday)	9:00 - 11:00	<u>Link Building 122</u>
<i>Kiran Ijaz</i>	M10A (Monday)	10:00 - 12:00	<u>School of Information Technologies Laboratory 117</u>
<i>Burhan Rajbhoy</i>	M10B (Monday)	10:00 - 12:00	<u>Link Building 222 (North)</u>
<i>Khushnood Naqshbandi</i>	M11A (Monday)	11:00 - 13:00	<u>Link Building 122</u>
<i>Burhan Rajbhoy</i>	M12A (Monday)	12:00 - 14:00	<u>School of Information Technologies Laboratory 117</u>
<i>Mayank Shekhar</i>	M12B (Monday)	12:00 - 14:00	<u>Link Building 222 (North)</u>
<i>Pauline Hor</i>	M13A (Monday)	13:00 -15:00	<u>Link Building 122</u>
<i>Mayank Shekhar</i>	M14A (Monday)	14:00 - 16:00	<u>School of Information Technologies Laboratory 115</u>
<i>Pauline Hor</i>	M15A (Monday)	15:00 – 17:00	<u>Link Building 122</u>
<i>Kiran Ijaz</i>	T08A (Tuesday)	8:00 - 10:00	<u>School of Information Technologies Laboratory 116</u>
<i>Cokorda Pramatha (Rai)</i>	T10A (Tuesday)	10:00 - 12:00	<u>School of Information Technologies Laboratory 116</u>
<i>Pauline Hor</i>	T10C (Tuesday)	10:00 - 12:00	<u>School of Information Technologies Laboratory 114</u>
<i>Cokorda Pramatha (Rai)</i>	T12A (Tuesday)	12:00 - 14:00	<u>School of Information Technologies Laboratory 115</u>

Unit Information and Resources

- Let's explore **Canvas site**
 - Login using Unikey and password
 - Link to CUSP
 - Official schedule, list of learning outcomes, etc
 - Copies of Lecture Slides
 - Tutorial Practices
 - Assignment instructions



1. Project Overview

Your group (composed of 4-5 members from the same tutorial session) is going to study, research, design, and analyse a project of your choice. Try to organise your discussion or report by what have you learnt from the class or lecture.

2. Deliverables

A written system requirements document will be submitted electronically (doc or pdf format) through Learning Management System (<https://canvas.sydney.edu.au/>).



INFO2110 Analysis & Design of Web Information Systems

Semester 1, 2018

Assignment 2, 2018 (20%)

System Modelling and Design

1. Project Overview

The second assignment is based on project topic of your choice. The members of the team remain the same as in Assignment 1. This assignment aims to produce a system modelling and design document that uses appropriate notations with a clear explanation.

2. Deliverables

2.1. Documents

A written electronic system modelling document (doc or pdf format) need to be submitted to Learning Management System (<https://canvas.sydney.edu.au/>).

Books

■ Text Book

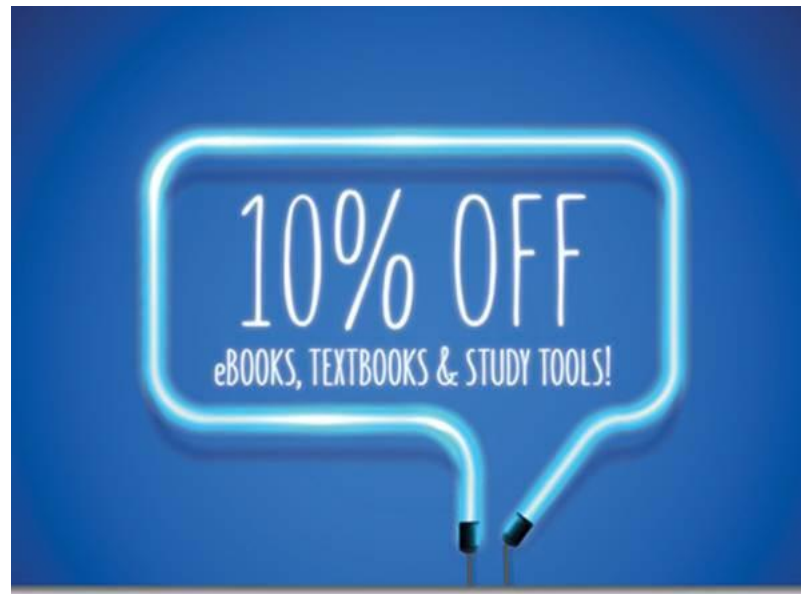
- Scott Tilley & Harry J. Rosenblatt, Systems Analysis and Design 11th Ed, Cengage Learning US.

■ Reference Books

- 1) Dennis, A., Wixom, B.H., and Tegarden, D., System Analysis & Design (5th Ed). John Wiley & Sons, 2015.
 - 2) Satzinger, Jackson & Burd, Systems Analysis and Design in a Changing World (7th Ed), Cengage Learning US.
- These and other relevant books can be found in the university library

Text Book Purchase Information

(requested by Cengage Learning to share with students)



Redeem your discount at cengagebrain.com
plus get **FREE SHIPPING** with all purchases and
unlock **BONUS** online study tools.

USE DISCOUNT CODE

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Terms & Conditions: Valid until 31.12.2018. This code can be used
on multiple transactions, share the code with your friends!

Assessments

Assessment Summary

Assessment name	Team-based?	Weight	Due	Outcomes Assessed
Assignment 1	Yes	10%	Week 5	1, 2, 3, 4, 5, 6, 7
Quiz 1	No	5%	Week 6	1, 2, 5, 6, 7
Quiz 2	No	5%	Week 9	1, 2, 5, 6, 7
Assignment 2	Yes	20%	Week 12	1, 2, 3, 4, 5, 6, 7
Final Exam	No	60%	Exam Period	1, 2, 5, 6, 7

School of IT policy: you must get **at least 40%** of the marks available on the exam, in order to pass the unit.

Late Submission of Assessments

If you submit your work/assignment, or any form of assessments after the deadline, and if you have not been granted special consideration or arrangements

- A penalty of **10%** of the marks will be taken, per day late.

What We Expect From You?

- Attend and participate in scheduled Lectures and Tutorials, and devote an *extra* 6-9 hrs per week
 - doing assessments
 - preparing and reviewing for classes
 - revising and integrating the ideas
 - practice and self-assess
- Do not miss class, except for illness, emergencies, etc
- Get help from staff if you feel you are falling behind
 - Notify academics whenever there are difficulties
 - Notify team members honestly and promptly about difficulties
- Check eLearning site at least once a week!
- Being a team player
- Have a good plan for the course

Communication and Contacts

Tutors:

- Burhan Rajbhoy: braj5449@uni.sydney.edu.au
- Cokorda Pramatha: cokorda.rai@sydney.edu.au
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- Khushnood Naqshbandi: khushnood.naqshbandi@sydney.edu.au
- Mayank Shekhar: mshe6149@uni.sydney.edu.au
- Pauline Hor: pauline.hor@sydney.edu.au

Tutorial Coordinator and Teaching Assistant:

Cokorda Pramatha (Rai), cokorda.rai@sydney.edu.au

Course Coordinator and Lecturer:

Dr Rabiul Hasan, rabiul.hasan@sydney.edu.au

Lecture 1:

Introduction to Systems Analysis & Design

Where Are We Now ? -- Course map

Week	Topics/Activities
Week 1	Introduction to Systems Analysis and Design
Week 2	Investigating System Requirements
Week 3	Managing System Projects
Week 4	Public Holiday (no class)
Week 5	Requirement Modelling
	Assessment Due: Assignment 1
Week 6	Data and Process Modelling
	Assessment Due: Quiz 1
Week 7	Object Modelling
Week 8	User Interface Design
Week 9	Data Design
	Assessment Due: Quiz 2
Week 10	System Architecture Design
Week 11	System Implementation
Week 12	Documentation and Systems Support
	Assessment Due: Assignment 2
Week 13	Review
Exam Period	Assessment Due: Final Exam

What Will We Do Today ?

- Lecture
 - Information Systems
 - Systems Development Methodology
 - Systems Analyst
- Class activities
 - Critical Thinking / No Problem Solving Today
 - <https://padlet.com>
 - <https://answer garden.ch>
- Assessment
 - Forming teams: will be done in the first tutorials
 - Quiz
 - Assignment
- Tutorial Updates: starting in week 2, check your timetable
- Announcement (if any)

Today's Learning Objectives

- Understand **Information System** and its components
- Discuss **Business Operations** and Information Systems
- Understand the role of a **Systems Analyst**

Today's Learning Objectives.. cont.

- Understand **methodologies** – structured analysis, object-oriented analysis, and agile methods
- Discuss **Trends** in IT (global and Australia contexts)
- Discuss **functions of IT department** and the systems analysts who work there

What is Information Systems?

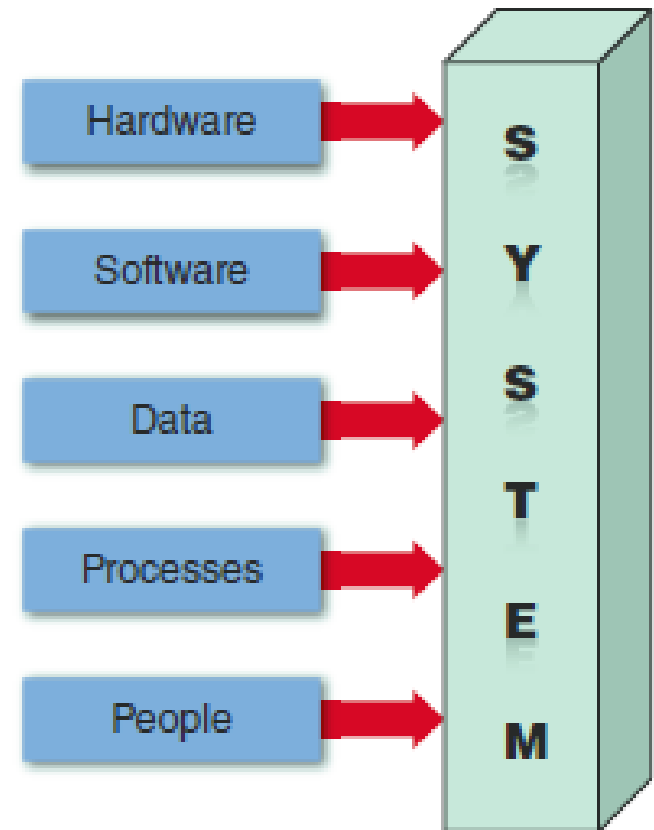
- **What comes to your mind?**

Information Systems

- **Information systems:** Combination of technology, people, and data to perform certain business functions and satisfy organizational needs.

Information System Components

- **System:** Set of related components that produces specific results
 - **Mission-critical systems** are vital to a company's operations
- All systems require input data
 - **Data:** Basic facts that serve as raw materials
 - **Information:** Data transformed into output



An information system needs these components.

Information System Components (Cont.1)

■ Hardware

- Physical layer of the information system
- **Moore's Law** was integral to the development of hardware

■ Software

- Controls hardware
- **System software**
- **Application software**
 - **Horizontal system**
 - **Vertical system**
 - **Legacy system**

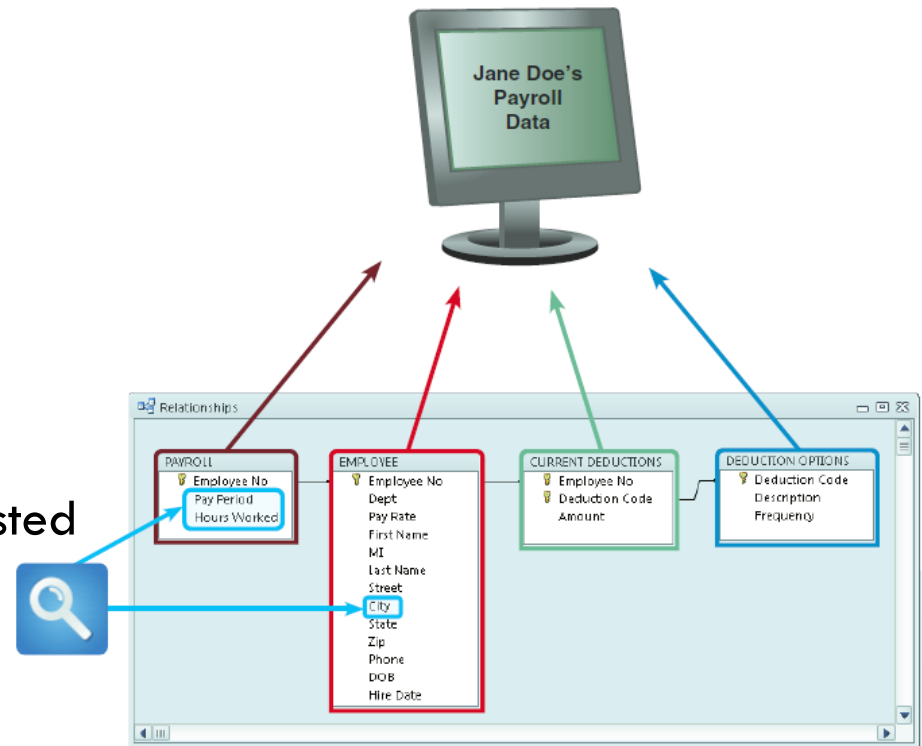


Server farms provide the enormous power and speed that modern IT systems need.

dotshock/Shutterstock.com

Information System Components (Cont. 2)

- **Data**
 - Stored in tables
- **Processes**
 - Describe the tasks and business functions performed to achieve specific results
- **People**
 - **Stakeholders:** Individuals interested in an information system



In a typical payroll system, data is stored in separate tables that are linked to form an overall database.

Web Information Systems

- A **Web Information System** (WIS) is an information system that can be accessed through the world-wide-web.
- On a high level of abstraction a WIS can be described by a storyboard, which in an abstract way specifies who will be using the system, in which way and for which goals.

Business Today

- Influenced by:
 - Rapidly increasing globalization
 - Technology integration for seamless information access
 - Rapid growth of cloud-based computing and services
- All trends are Internet-centric

Business Today (Cont.1)

■ The Internet Model

- **Ecommerce (electronic commerce)**
- User interface - Enables communication between a data-base management software and a web-based server
 - Mobile devices interact with the system using **apps**
- Sectors
 - B2C (business-to-customer)
 - B2B (business-to-business)

Business Today (Cont.2)

■ B2C (Business-to-Customer)

- In a single convenient session, customers can:
 - Do research and compare prices and features
 - Check availability and arrange delivery
 - Choose payment methods

■ B2B (Business-to-Business)

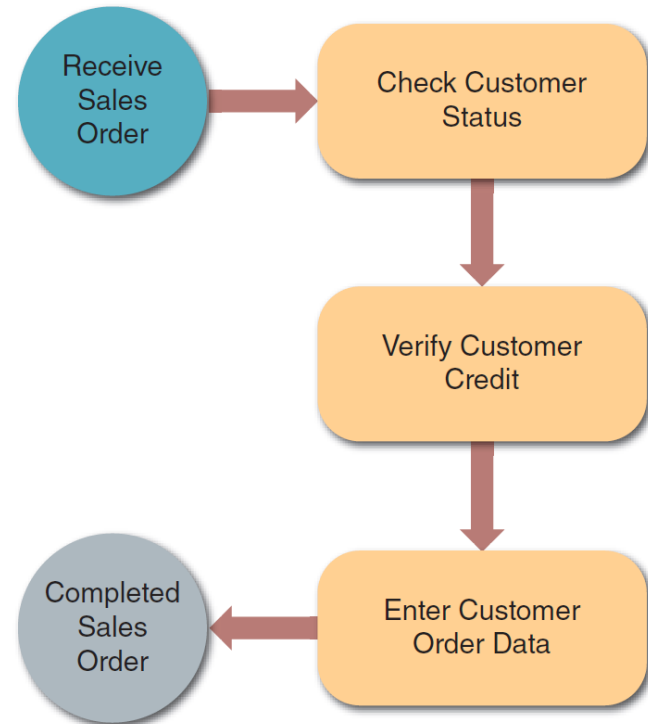
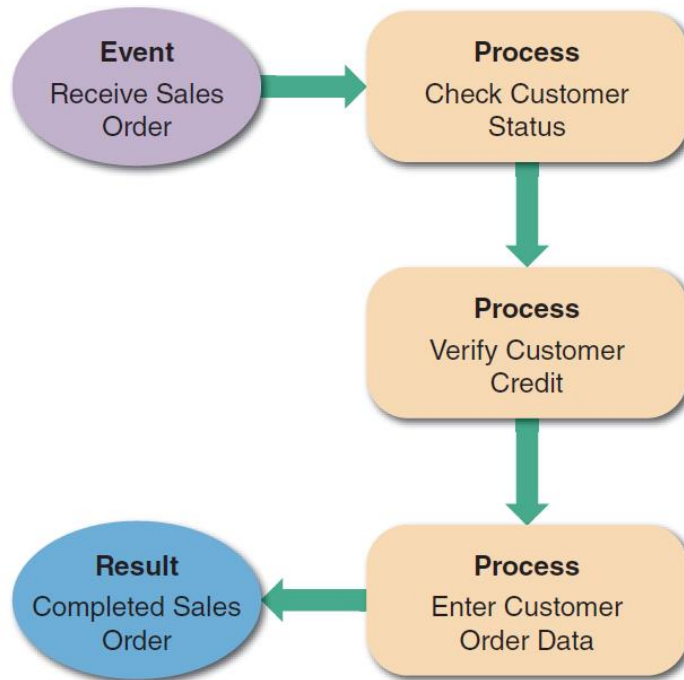
- Ecommerce was initially carried out using **electronic data interchange (EDI)**
- Most firms use **supply chain** management (SCM) software, which helps businesses manage inventory levels, costs, alternate suppliers

Modeling Business Operations

- Business Profile
 - Overview of a company's mission, functions, organization, products, services, customers, suppliers, competitors, constraints, and future direction
- Business Process
 - Specific set of transactions, events, and results that can be described and documented
 - **Business process model (BPM)**
 - **Business process modeling notation (BPMN)**

Modeling Business Operations (Cont.)

A simple business model might consist of an event, three processes, and a result.



This sample uses business process modeling notation (BPMN) to represent the same events, processes, and workflow.

Source: Drawio.com

Business Information Systems

■ **Current Method**

- All employees use office productivity systems
- Operations users require decision support systems
- Systems are defined by their functions and features

■ **Enterprise Computing**

- Supports company-wide operations and data management requirements
 - **Enterprise resource planning (ERP)** systems provide cost-effective support for users and managers throughout the company

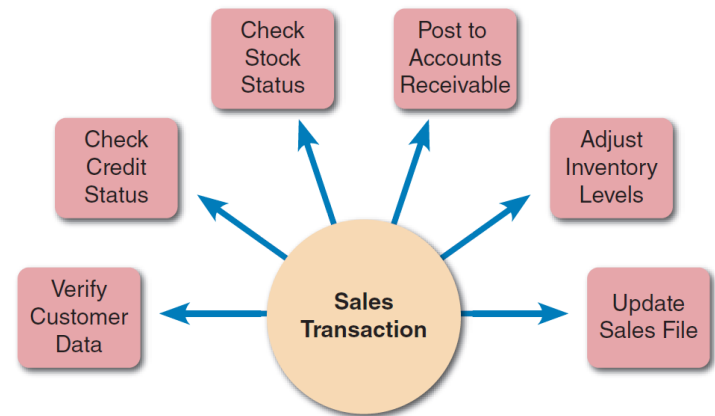
Business Information Systems (Cont.1)

■ Transaction Processing (TP) Systems

- Processes data generated by day-to-day business operations
- Examples - Customer order processing, accounts receivable, and warranty claim processing

■ Business Support Systems

- Provide job-related information support to users at all levels of a company
- Can work hand-in-hand with a TP system



A single sales transaction consists of six separate tasks, which the TP system processes as a group.

Business Information Systems (Cont.2)

- **Management Information Systems (MIS)**
- **Radio frequency identification (RFID)**
 - Uses high-frequency radio waves to track physical objects

■ Knowledge Management

- Uses a knowledge base and inference rules
 - **Knowledge base:** Large database to find information by entering keywords
 - **Inference rules:** Identify data patterns and relationships



With an RFID tag, items can be tracked and monitored throughout the shipping process.

© nullplus/photos.com

Business Information Systems (Cont.3)

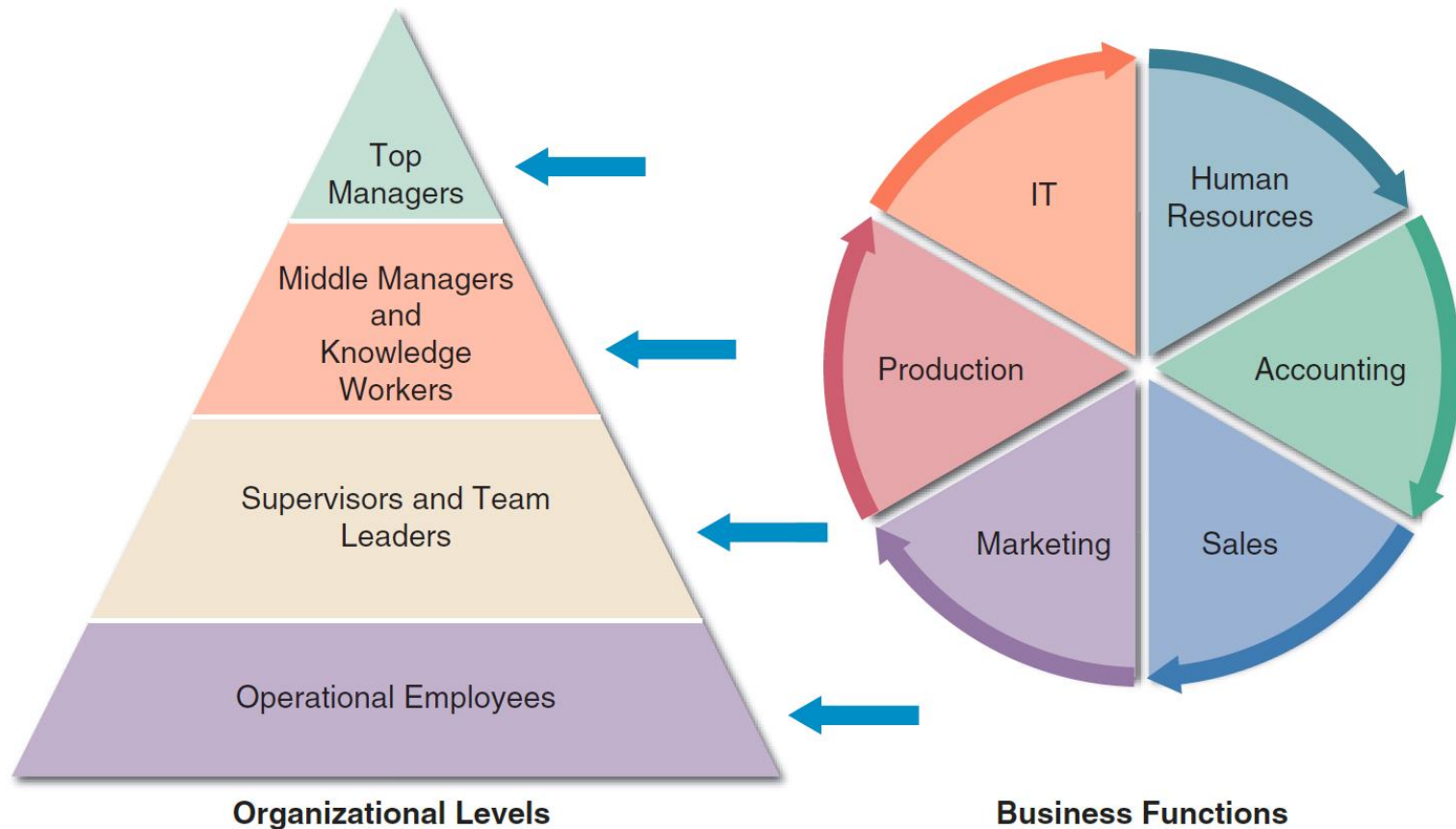
■ User Productivity Systems

- Technology that improves productivity
- **Groupware:** Enables data sharing and coordination of efforts

■ Systems Integration

- Combination of transaction processing, business support, knowledge management, and user productivity features

What Information Do Users Need?



A typical organizational model identifies business functions and organizational levels.

What Information Do Users Need? (Cont.1)

■ **Top Managers**

- Use IT to develop long-range **strategic plans**
 - Require information such as economic forecasts, technology trends, competitive threats, and governmental issues

■ **Middle Managers and Knowledge Workers**

- Middle managers provide direction, resources, and performance feedback to supervisors and team leaders
 - Require more detailed information than top managers
- Knowledge workers provide support for the organization's basic functions

What Information Do Users Need? (Cont.2)

■ Supervisors and Team Leaders

- Oversee operational employees and carry out day-to-day functions
 - Require decision support information, knowledge management systems, and user productivity systems

■ Operational Employees

- Rely on TP systems to enter and receive data they need to perform their jobs
- **Empowered** to handle tasks and make decisions that were assigned previously to supervisors

Systems Development Tools

■ **Modeling**

- Graphical representation of a concept or process
 - Business model
 - Data model
 - Object model
 - Network model
 - Process model

Systems Development Tools (Cont.1)

■ Prototyping

- Early working version of an information system
 - Disadvantage - Important decisions might be made before business or IT issues are thoroughly understood
- A prototype based on careful fact-finding and modeling techniques can be an extremely valuable tool

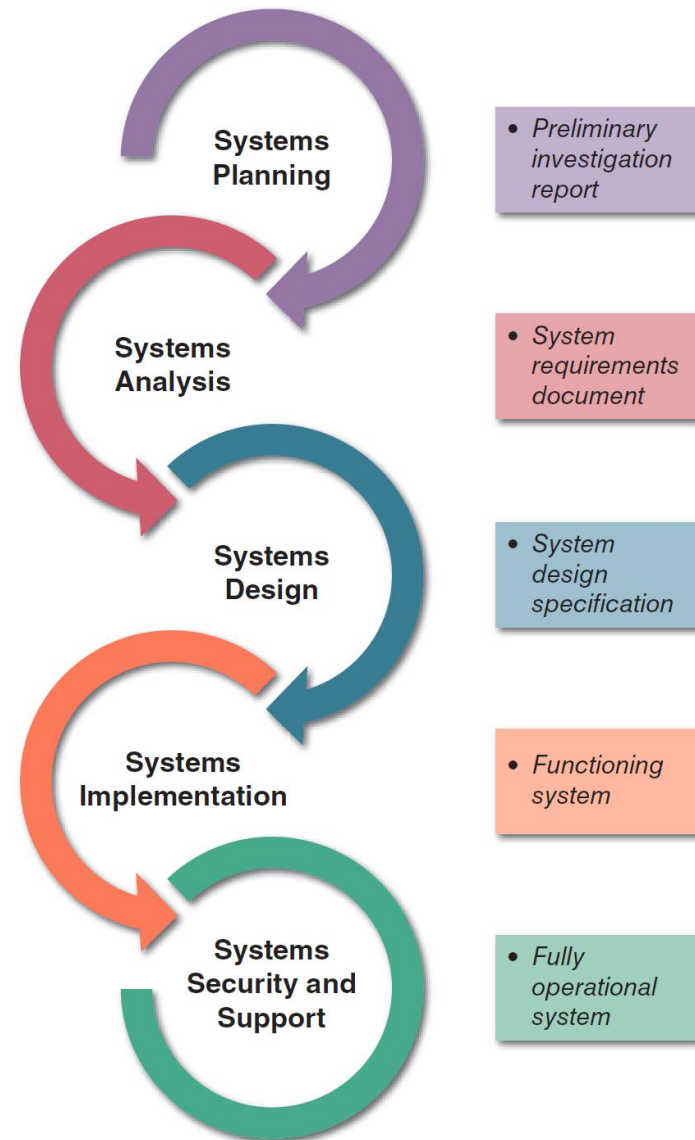
Systems Development Tools (Cont.2)

- **Computer-Aided Systems Engineering (CASE) Tools**
 - Known as **computer-aided software engineering**
 - Provide an overall framework for systems development
 - Support design methodologies
 - Structured analysis
 - Object-oriented analysis
 - Generate program code
 - Speeds the implementation process

Systems Development Life Cycle (SDLC)

Development phases and deliverables are shown in the waterfall model.

The circular symbols indicate interaction among the phases.



Systems Development Life Cycle (SDLC)

■ Steps in the SDLC Model

– Systems planning

- Initiated by a **systems request**
- Goal - To perform a **preliminary investigation**
- **Feasibility study**: Reviews anticipated costs and benefits and recommends a course of action

– Systems analysis

- Goal – To build a logical model of the new system
- **Requirements modeling**: Analyst investigates business processes and documents the functions to be performed by the new system
- Deliverable - **System requirements document**

Systems Development Life Cycle (SDLC)

– Systems design

- Goal – To create a physical model that satisfies all documented requirements
- User interface is designed and application architecture is determined
- Outputs, inputs, and processes are identified
- Deliverable - **System design specification**
- Management and user involvement is critical

Systems Development Life Cycle (SDLC)

– Systems implementation

- New system is constructed, programs are written, tested, and documented, and the system is installed
- Deliverable - A completely functional and documented information system
- Includes systems evaluation

– Systems support and security

- IT staff maintains, enhances, and protects the system
- A well-designed system must be secure, reliable, maintainable, and **scalable**

Systems Development Methods

Structured Analysis

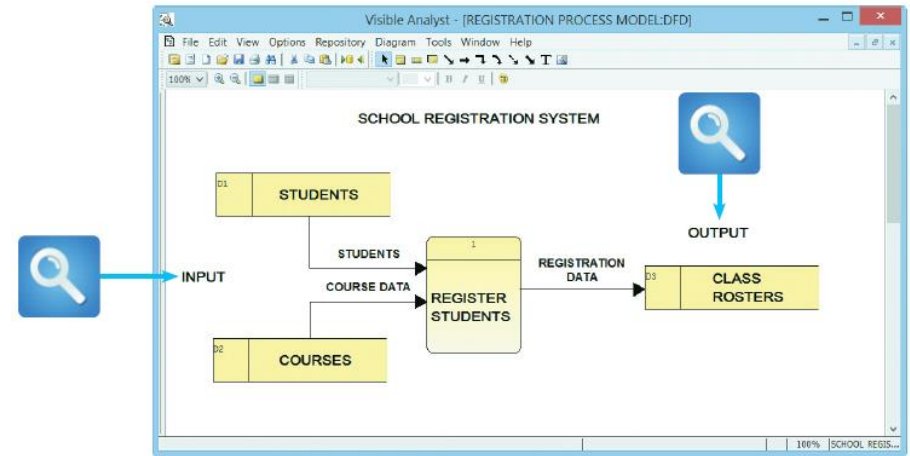
Object-Oriented
(O-O) Analysis

Agile/Adaptive
Methods

Systems Development Methods – (Structured Analysis)

■ Structured Analysis

- Time-tested and easy to understand
- Uses the **systems development life cycle (SDLC)**
- Based on predictive approach
- Process-centered
 - Uses process models to graphically describe a system



This Visible Analyst screen shows a process model for a school registration system. The **REGISTER STUDENTS** process accepts input data from two sources and transforms it into output data.

Source: Visible Systems Corporation

Systems Development Methods – (Structured Analysis)

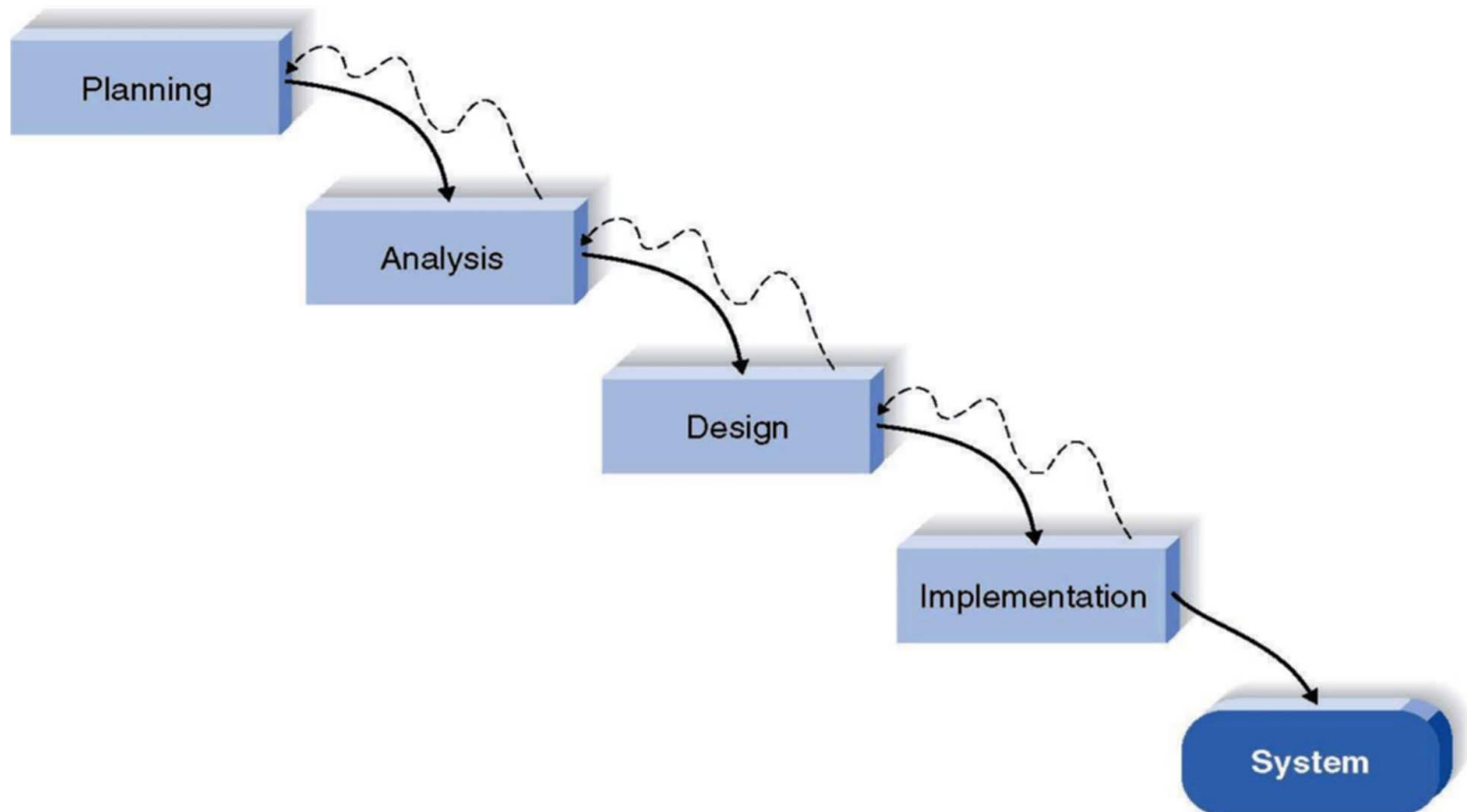
- Addresses data organization and structure, relational database design, and user interface issues
- The **SDLC describes activities and functions** that all systems developers perform, regardless of which approach they use

Systems Development Methods – (Structured Analysis)

- Structured Development:
 - Waterfall Development
 - Parallel Development

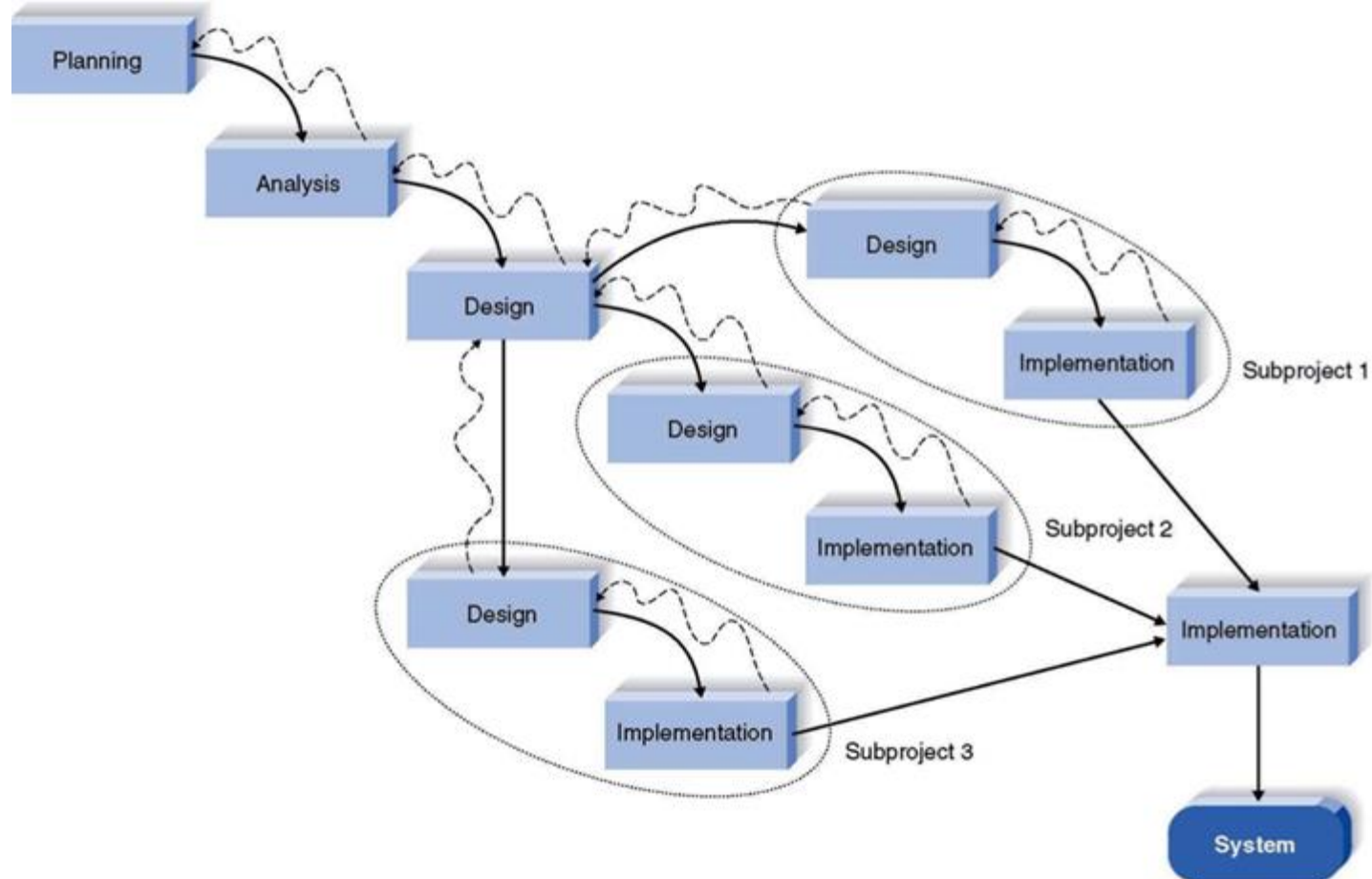
Systems Development Methods – (Structured Analysis)

- Structured Development:
 - Waterfall Development



Systems Development Methods – (Structured Analysis)

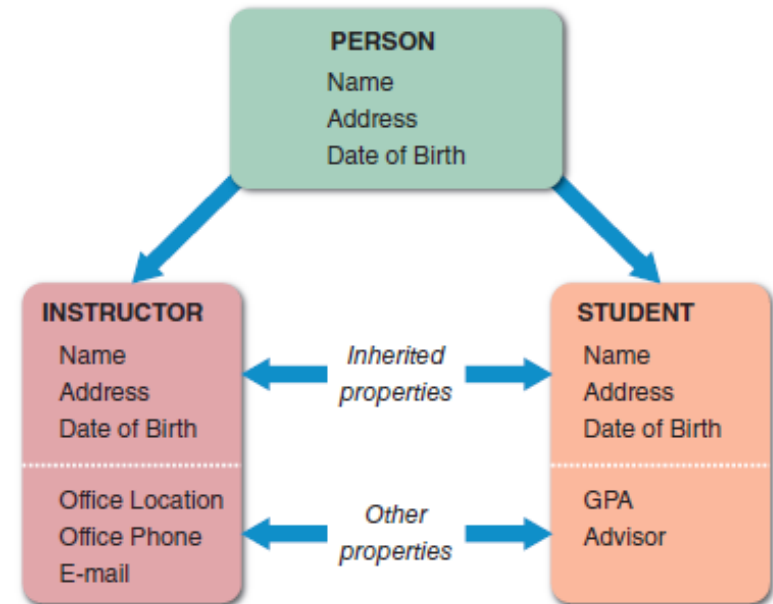
- Structured Development:
 - Parallel Development



Systems Development Methods – (Object-Oriented Analysis)

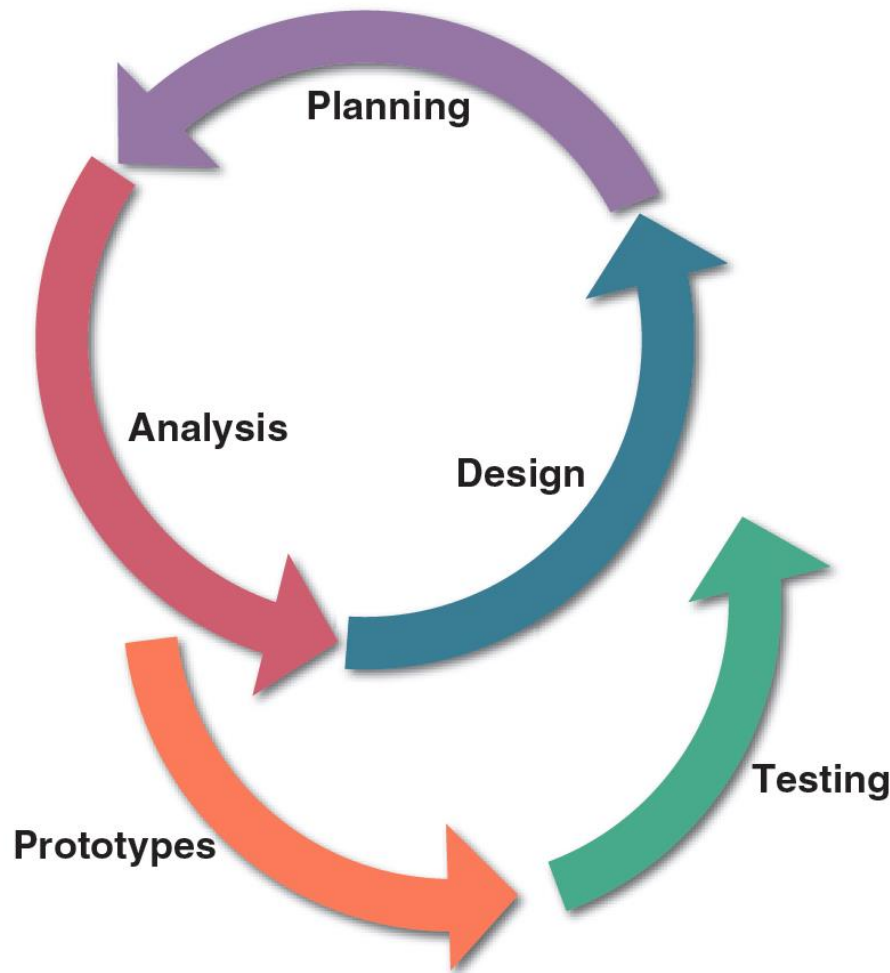
■ Object-Oriented Analysis

- Combines data and the processes that act on the data into objects
 - **Object:** Member of a **class**, which possesses **properties**
 - O-O methodology provides easy transition to O-O programming languages like Java



The **PERSON** class includes **INSTRUCTOR** and **STUDENT** objects, which have their own properties and inherited properties.

Systems Development Methods – (Object-Oriented Analysis)



In a typical O-O development model, planning, analysis, and design tasks interact continuously to generate prototypes that can be tested.

Systems Development Methods – (Agile Methods)

■ Agile Methods

- Involve building and constantly adjusting a series of prototypes to user requirements
- Use a spiral model
 - **Spiral model:** Series of **iterations** based on user feedback
 - Feedback from prior steps is incorporated in each incremental step
- Allow developers to be more flexible and responsive

■ Disadvantages

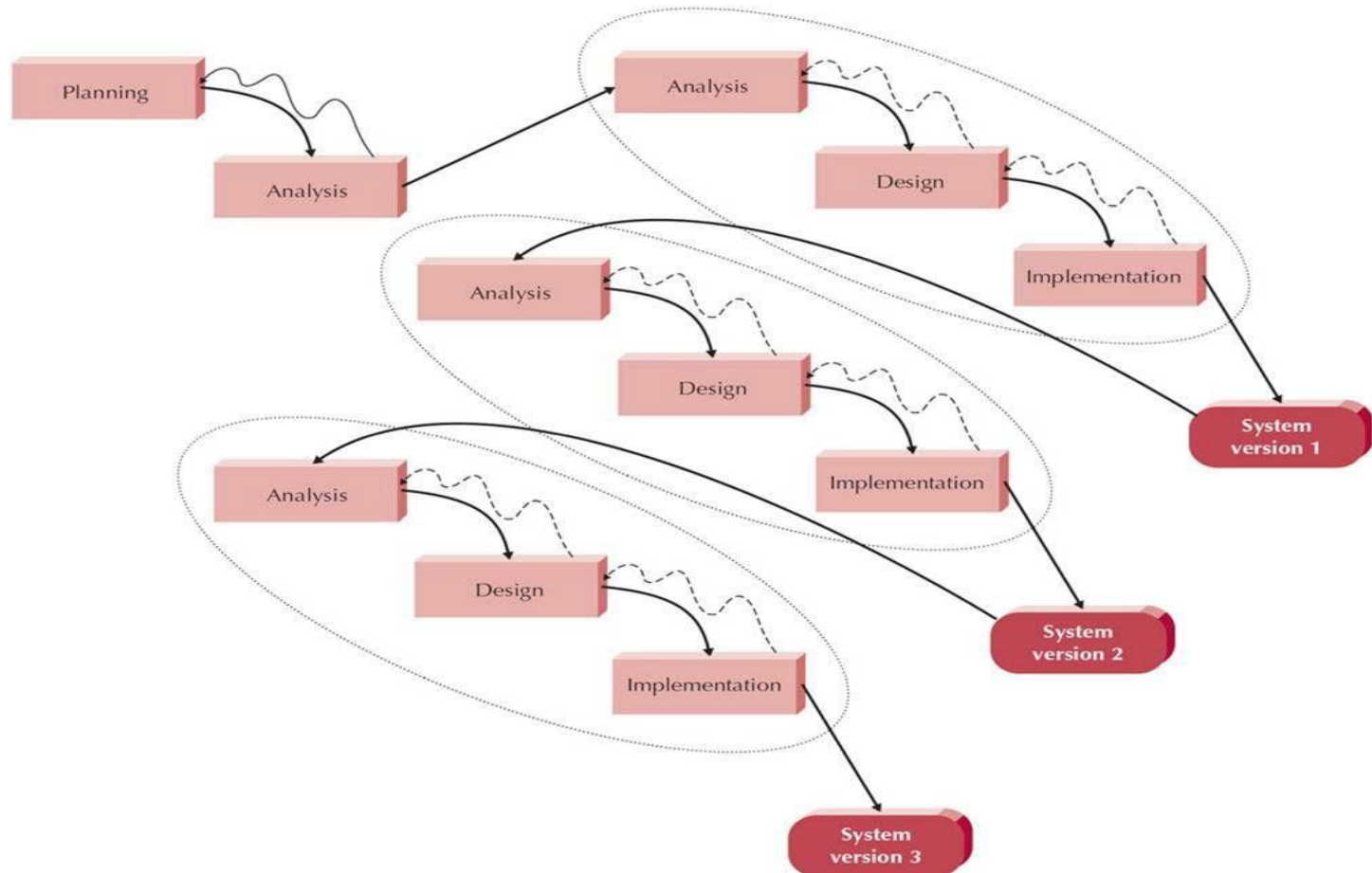
- Riskier than traditional methods
- Weak documentation and blurred lines of accountability
- Lack of emphasis on the larger business picture

Systems Development Methods – (Other Methods)

- **Rapid Application Development (RAD)**
 - **Phased Development**
 - **Prototyping-based Development**

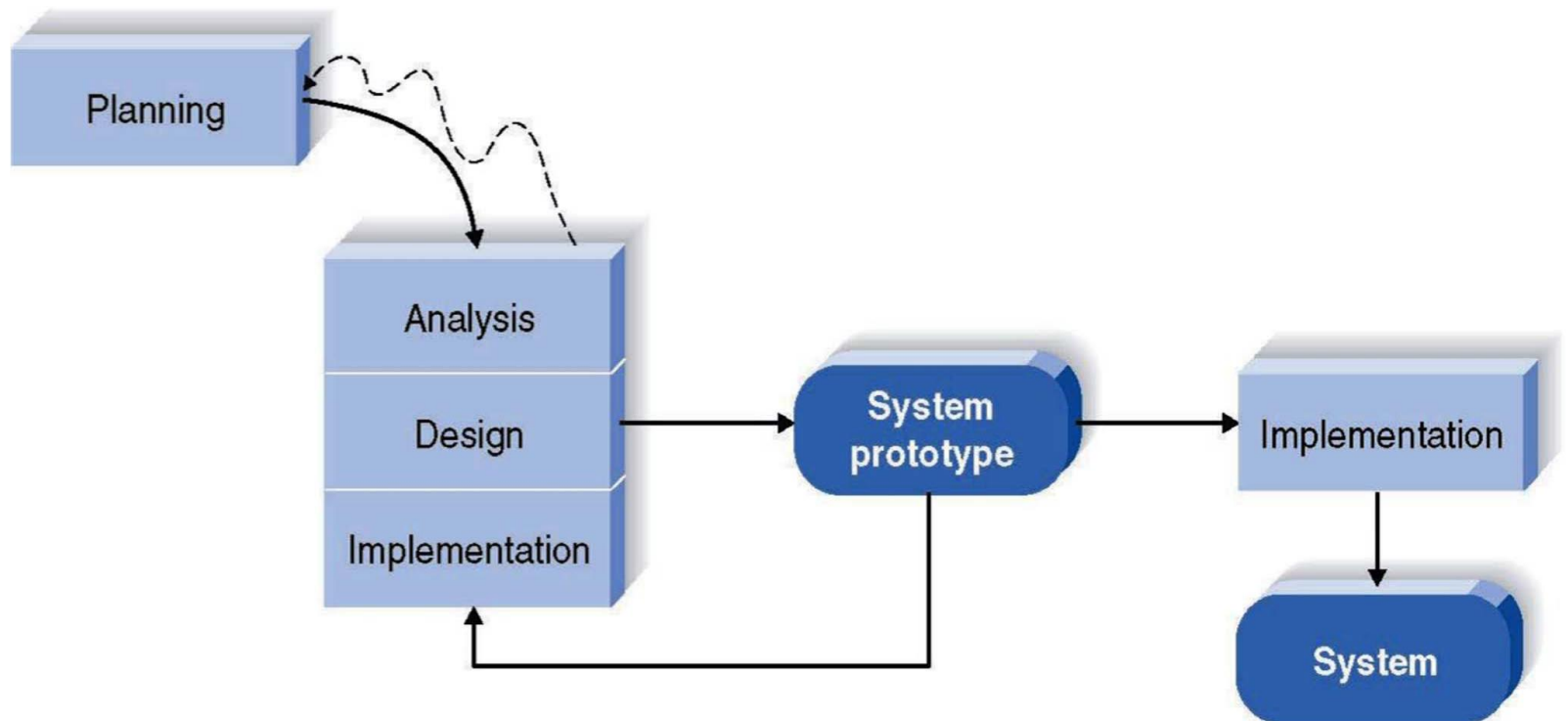
Systems Development Methods – (Other Methods)

- **Rapid Application Development (RAD)**
 - **Phased Development**



Systems Development Methods – (Other Methods)

- **Rapid Application Development (RAD)**
 - Prototyping-based Development



Critical Thinking Exercise 1:

- Which Systems Development Method should you choose?
 - With short time schedule
- Please submit answer at AnswerGarden:
share ONE WORD ONLY
<https://answergarden.ch/>

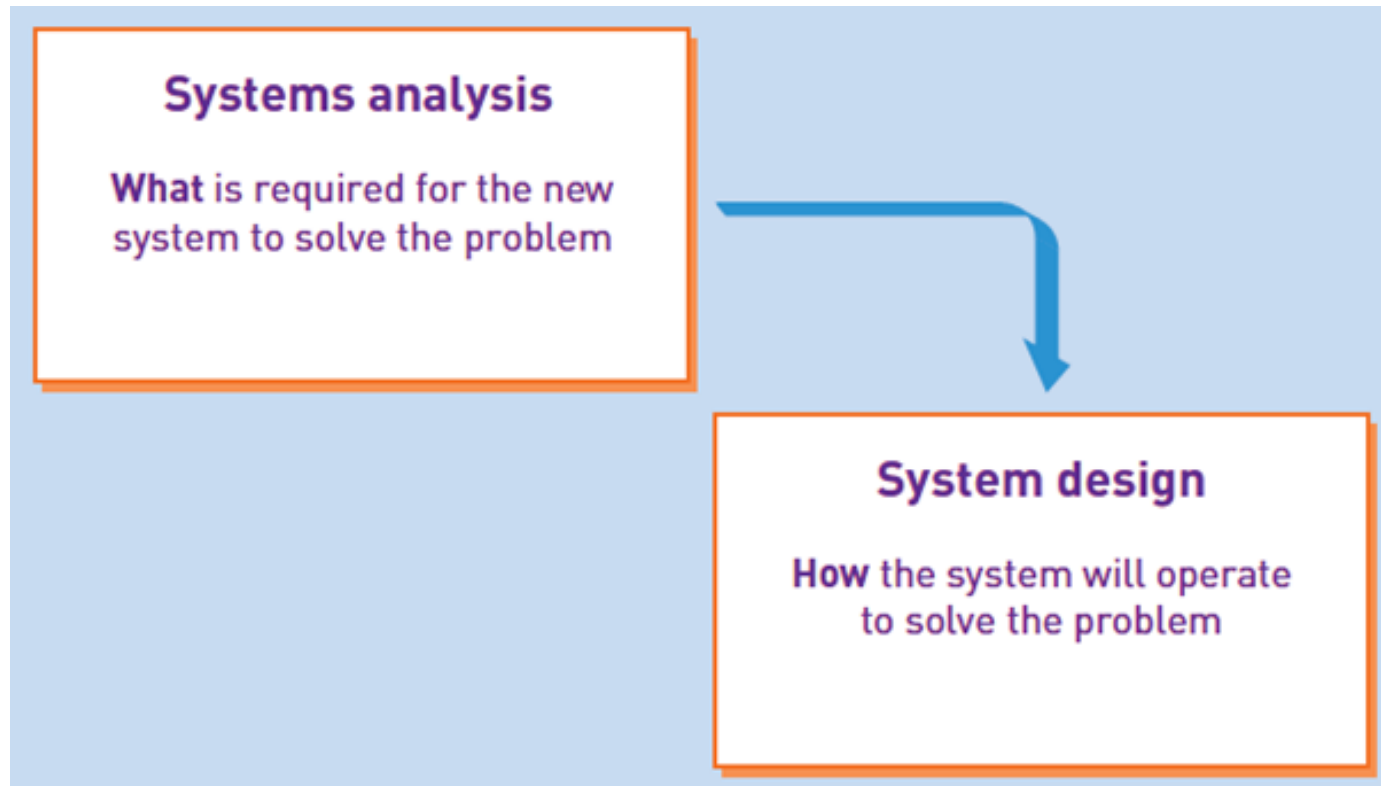
Critical Thinking Exercise 2:

- Which Systems Development Method should you choose?
 - With unclear user requirements
- Please submit answer at AnswerGarden:
share ONE WORD ONLY
<https://answergarden.ch/>

Critical Thinking Exercise 3:

- Which Systems Development Method should you choose?
 - With unfamiliar technology
- Please submit answer at AnswerGarden:
share ONE WORD ONLY
<https://answergarden.ch/>

Systems Analysis (.. what?) & Systems Design (.. How?)



The Systems Analyst

- The System Analyst is the **key person** in the world of Analysis and Design of Web Information Systems



The Systems Analyst

- Investigates, analyzes, designs, develops, installs, evaluates, and maintains a company's information systems
- Constantly interacts with users and managers within and outside the organization
- Must understand business processes
- Requires specific skill sets

The Systems Analyst

- Anyone Working as Systems Analyst ?
- Want to be?

Critical Thinking Exercise 4:

Most Important Skills for a Systems Analyst?

- Please submit answer at AnswerGarden:
share ONE WORD ONLY
<https://answergarden.ch/>

The Systems Analyst (Cont.1)

■ Roles

- Acts a translators to managers and programmers
- A company's best line of defense in an IT disaster
- Seeks feedback from users to ensure that systems do not deviate from accomplishing set objectives

■ Knowledge, Skills, and Education

The Systems Analyst (Cont.2)

- **Education** - A college degree in information systems, science, or business
 - Some IT experience is required
- **Certification**
 - Helps IT professionals learn new skills and gain recognition for their efforts

The Systems Analyst (Cont.3)

■ Career Opportunities

- Companies will need systems analysts to apply new information systems/technology
- Important factors to consider:
 - Job titles
 - Company organization
 - Company size
 - Salary, location and future Growth
 - Corporate culture

Current Job Market in Australia: Example 1

Responsibilities & Requirements for Systems Analyst Role

- One of the world's leading smart-card payment company is looking for System Analyst to join their dynamic team.
- **Responsibilities:**
 - Perform full Software Development Life Cycle (SDLC), including but not limited to design, development, testing and system implementation
 - Provide production support and interfacing with other systems
 - Implement use interface by collecting human input
 - Transform business requirements into technical design using designated framework
 - Prepare quality technical specification documents using UML or plain English
- **Requirements:**
 - Degree holders in Computer Science, Information System or related field
 - Min. 4 years of hands-on experience in software design and development using Java and SQL
 - Knowledge in Spring and web services, Oracle database and MySQL would be an advantage
 - Strong analytical/ troubleshooting skills
 - Able to work with tight schedule and independently
 - Candidate with less experience will be considered as Analyst Programmer

Current Job Market in Australia: Example 2

Responsibilities & Requirements for Systems Analyst Role

- **ABC** requires **Systems Analysts** with excellent communication skills, technical and problem solving skills.
- **ABC** seeks people who have the following skills and experience:
Extensive experience working as a System Analyst in a team environment to achieve high quality outcomes
 - Must be able to demonstrate high level analysis skills, modelling techniques and critical thinking
 - Support improvement processes to meet business needs and provide guidance
 - Experience working with technical and non-technical stakeholders to solve problems and deliver timely implementations of projects
 - Create business solution designs that meet the business requirements
 - Experience in large and diverse projects and programmes
 - Ability to manage multiple tasks with various deadlines with attention to detail
 - Highly desirable to have experience with Agile methodology and SAP CRM

Current Job Market in Australia: Example 3

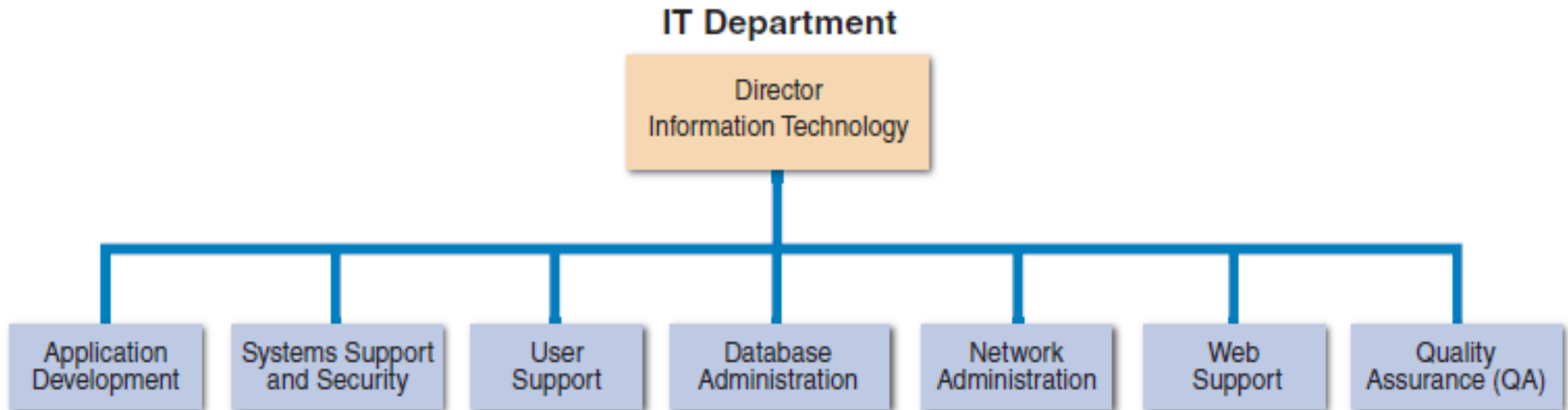
Responsibilities & Requirements for Systems Analyst Role

Our **federal government client** is inviting System Analyst who have strong work ethics and high integrity to join the team.

- If you've worked in **Agile environment** & are an Australian Citizen, Apply here!!
- **Key Responsibilities:**
 - **Explore, design and implement business requirements** and support improvement processes to meet Business needs
 - Liaise with stakeholders and work to set priorities for the delivery of work programs in line with business imperatives, customer priorities and negotiated outcomes
 - Ensure that system upgrade and support is provided to effectively minimise business disruption
 - Analyse impact assessment of IT changes and produce recommendations around their implementation
- **Candidate Background**
 - Strong experience of working as a System/ Technical Analyst and providing system upgrade and support
 - Knowledge of Agile development methodology and Working Age social service payments highly desirable.
 - Experience in a Government or similar environment is highly desirable.
 - Ability to manage multiple tasks with various deadlines, completing work to a high level of accuracy.
 - To qualify for this role, you are required to be an Australian Citizen

Understanding Systems Analyst's Workplace

– Functions of IT Department



Depending on its size, an IT department might have separate organizational units for these functions, or they might be combined into a smaller number of teams.

Understanding Systems Analyst's Workplace

– Functions of IT Department

- **Application Development**
 - **Systems are developed by teams** consisting of users, managers, and IT staff members
- **Systems Support and Security**
 - Provides vital protection and maintenance services
- **User Support**
 - Provides users with technical information, training, and productivity support
 - Known as a **help desk**

Understanding Systems Analyst's Workplace

– Functions of IT Department

- **Database Administration**

- Involves data design, management, security, backup, and access systems

- **Network Administration**

- Includes hardware and software maintenance, support, and security

- **Web Support**

- Web support specialists design and construct Web pages
 - Monitor traffic and manage hardware and software
 - Link Web-based applications information systems to the company's information systems

Understanding Systems Analyst's Workplace

– Functions of IT Department

- **Quality Assurance (QA)**
 - QA team reviews and tests all applications and systems changes to verify specifications and software quality standards

IT Trends

- IT is one of the fastest evolving industries
- Knowledge of current trends is vital to a systems analyst
- Key trends
 - Agile methods
 - Cloud computing
 - Mobile devices and apps
 - IT firms now offer a mix of products, services, and support
 - Social media

IT Trends in Australia (2015-16) -- Demand

Comparison of 2011-12 to 2015-16 period:

- In 2015-16 total ICT spend increased by 4.9%.
- Of total ICT spend, outsourcing to external providers has increased by 8% (from 20% to 28%)since 2011-12.

IT Trends in Australia (2015-16) -- Demand

- In 2015-16, 78% of total ICT spend (including projects) was on **Run** (**On-going** and Run projects); 13% was on **Grow** and 9% was on **Transform**.
- **On-going** ICT spend declined from 67% to 64% while spend on **ICT projects increased** by 3% (from 33% to 36%).

Chapter Summary

- Essential components of an information system
 - Hardware, software, data, processes, and people

- Types of information systems
 - Enterprise computing systems,
 - transaction processing systems,
 - business support systems,
 - knowledge management systems,
 - or user productivity systems

Chapter Summary (Cont.1)

- Popular system development approaches
 - Structured analysis, object-oriented analysis, and agile methods
- Systems Analysts – Investigates, analyzes, designs, develops, installs, evaluates, and maintains a company's information systems
- In addition to technical knowledge, a systems analyst must understand the business, think critically, and communicate effectively

Class Exercises

- Suppose you are a systems analyst working for a small company to develop an accounting system.
 - What type of methodology would you use? Why?

Announcement (if any)

Q &A?

Thanks everyone !