


BIT 1st Year

Semester 2

IT 2405



Systems Analysis and Design

Chapter 2

System Development Life Cycle

- Sequential development approach
 - Sequential development Phases
 - Problems with waterfall development approach
 - Modified waterfall model
- Iterative development approach
- Systems Development
 - Underlying Principles for Systems Development
 - Major components of System Development
 - Life cycle Vs. Methodology

System Development Life Cycle (SDLC)



↗ **Problem Definition**



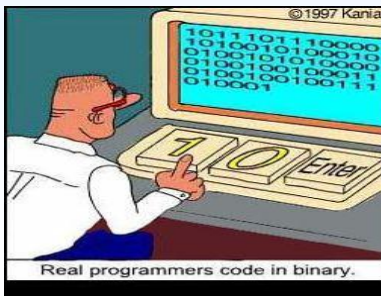
↘ **System Analysis**



↘ **System Design**



↘ **System Implementation**



↗ **System Testing**



↗ **Maintenance**

System Development Life Cycle (SDLC)

- A systematic approach to software development
- Composed of several phases,
 - **Problem Definition** - identifies and defines a need for the new system
 - **System Analysis** - analyzes the information needs of the end users
 - **System Design** - creates a blueprint for the design with the necessary specifications for the hardware, software, people and data resources
 - **System Implementation**- creates and programs the final system
 - **System testing** - evaluates the system's actual functionality in relation to expected or intended functionality.
 - **Maintenance** – keeping the system up to date with the changes in the organization and ensuring it meets the goals of the organization

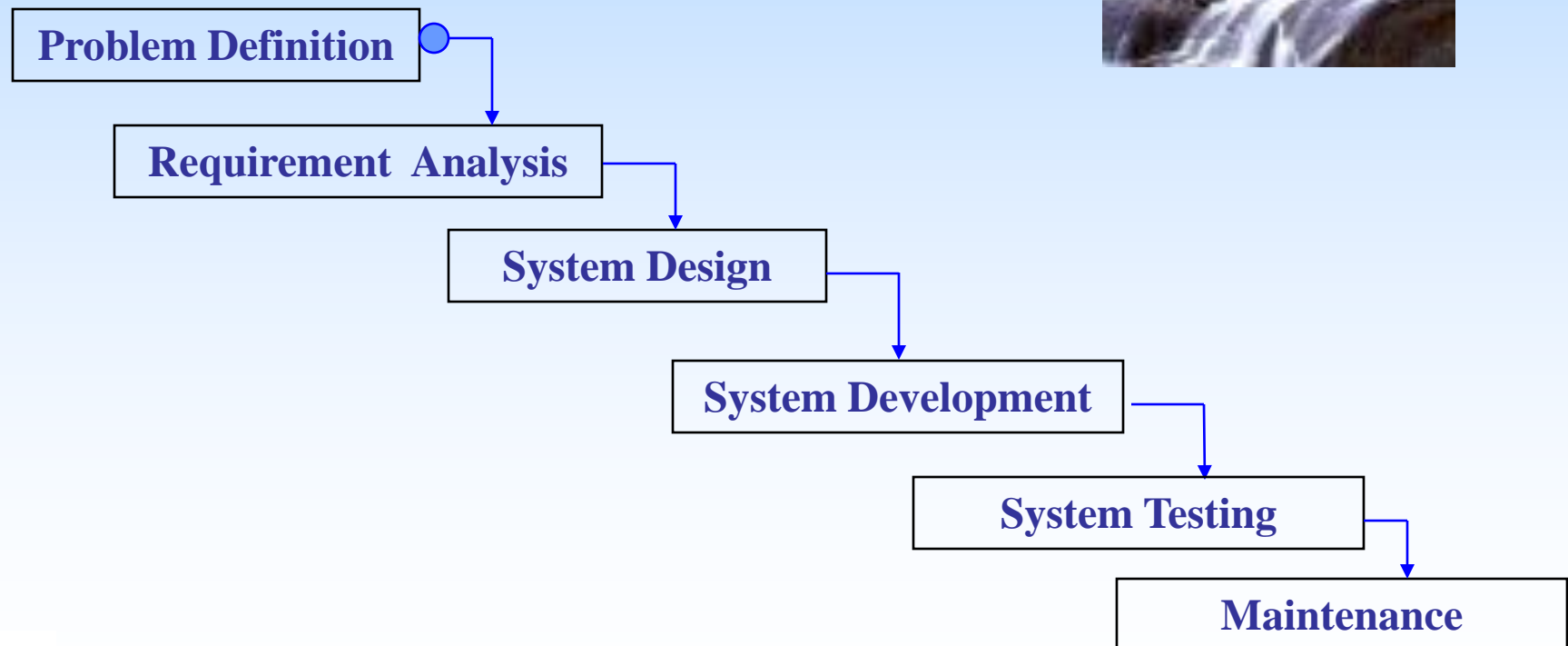
Why we need a life cycle in systems development?

- **to ease the process** of building a system
- **to build high** quality systems that meets customer expectations, within time and cost estimates
- **to work effectively** and efficiently in the current and planned information technology infrastructure
- **to avoid failures** like unclear objectives, cost overruns, and
- **to maintain** cheaply and **enhance** cost effectively



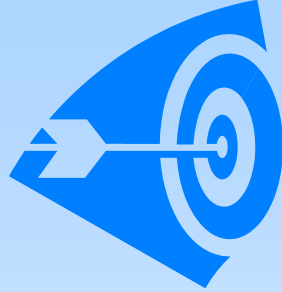
Sequential or Waterfall development approach

- An approach to system analysis and design
- Completes each phase one after another and only once.



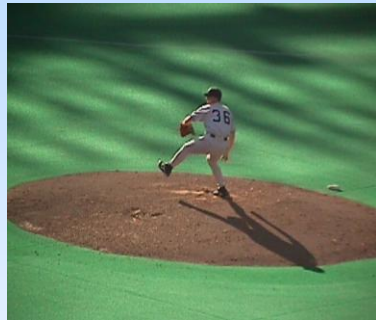
Problem Definition (Scope Definition, System Initiation)

Project goals



Provides a broad statement of user requirements in users terms, or what the users expect the system to do

Project bound



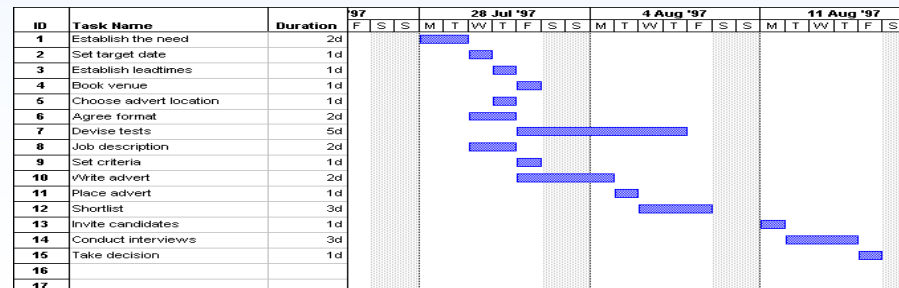
project bounds are set during this phase. Defines what part of the system can be changed by the project and what parts are to remain same.

Project limits



Specify the resources to be made available for the project (*resource limits*).

Project Schedule



System Analysis

- The study of a business problem domain to recommend improvements
- Specify the business requirements and priorities for the solution
- Business area is studied and analyzed to gain more information
- Produces a statement of the system users' business requirements, expectations and priorities for a solution to the business problem

System Analysis



how the current
system works and
what it does

Producing a detailed model of what the new
system will do and how it will work.



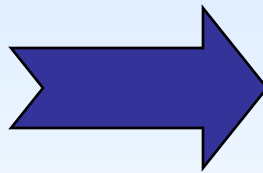
Producing a high-level
description of the system

System Design

- The specification or construction of a technical, computer based solution for the business requirements identified in the system analysis



Analysts



Design

System Design

- Things to be done:
 - Explore alternative technical solutions
 - Identify the best solution
 - Develop technical models and specifications to implement
 - Required databases
 - Programs
 - User interfaces
 - Networks etc.



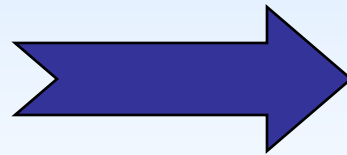
Design

System Implementation

- @ Individual system components are built and tested
- @ Data and tools are used to build the system
- @ User interfaces are developed and tried by users
- @ Database is initialized with data



Analysts



System

System testing

- Test and evaluate results, and
- the system ready to be delivered to the user/client.



Maintenance

- Eliminate errors in the system during its working life.
- Fixing any bugs and problem found by users
- Tune the system to any variations in its working environment



Problems with waterfall cycle

- ✓ It has a rigid design
- ✓ Inflexible
- ✓ It has a top-down procedure
- ✓ One phase must be completed before the next phase starts
- ✓ No phase can be repeated
- ✓ Time consuming

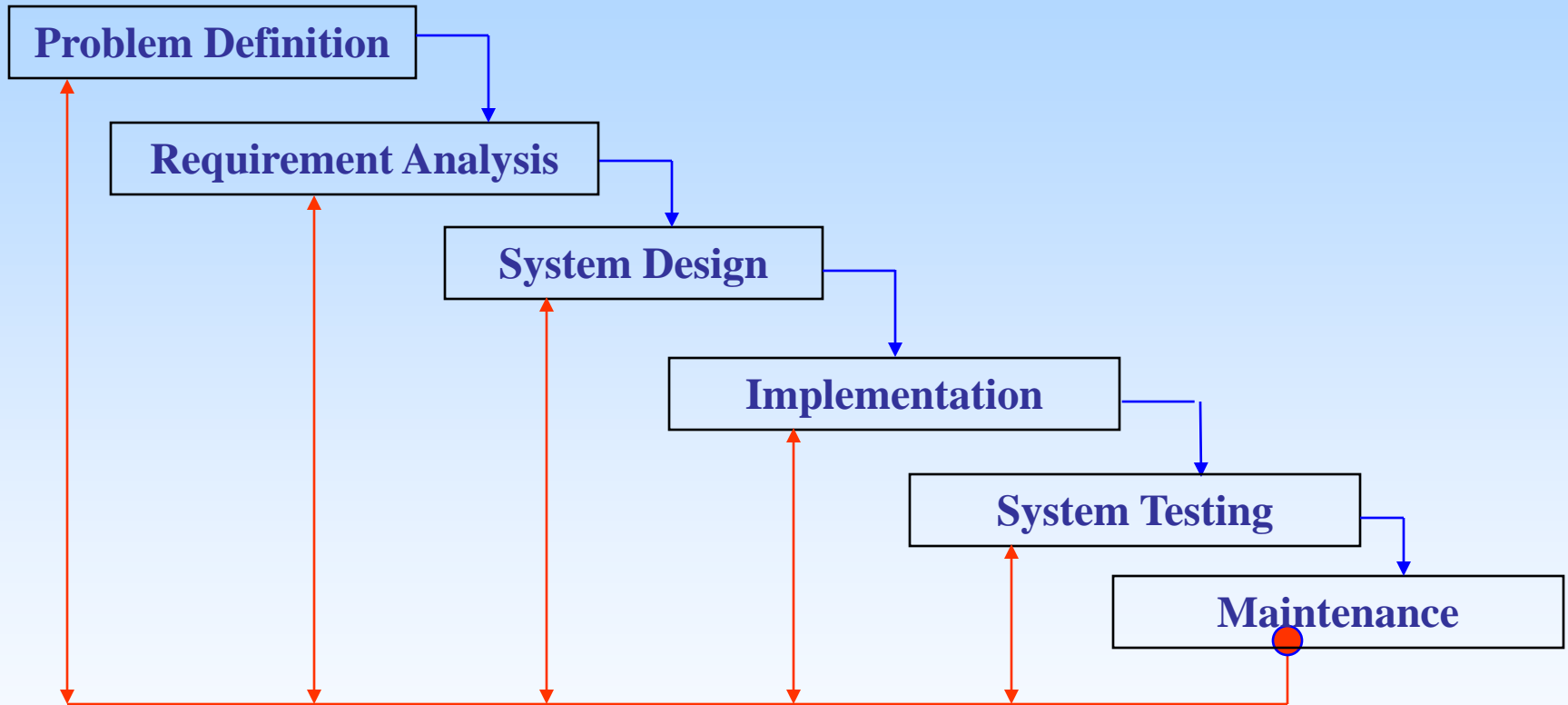
Criticisms fall into the following categories:

- ✓ Real projects rarely follow the sequential flow that the model proposes.
- ✓ At the beginning of most projects there is often a great deal of uncertainty about requirements and goals, and it is therefore difficult for customers to identify these criteria on a detailed level. The model does not accommodate this natural uncertainty very well.

Criticisms fall into the following categories: cont...

- ✓ Assumptions made in the early phases no longer hold
- ✓ Some of the early work is incomplete
- ✓ Something was overlooked or not completely understood.

Modified Waterfall Model



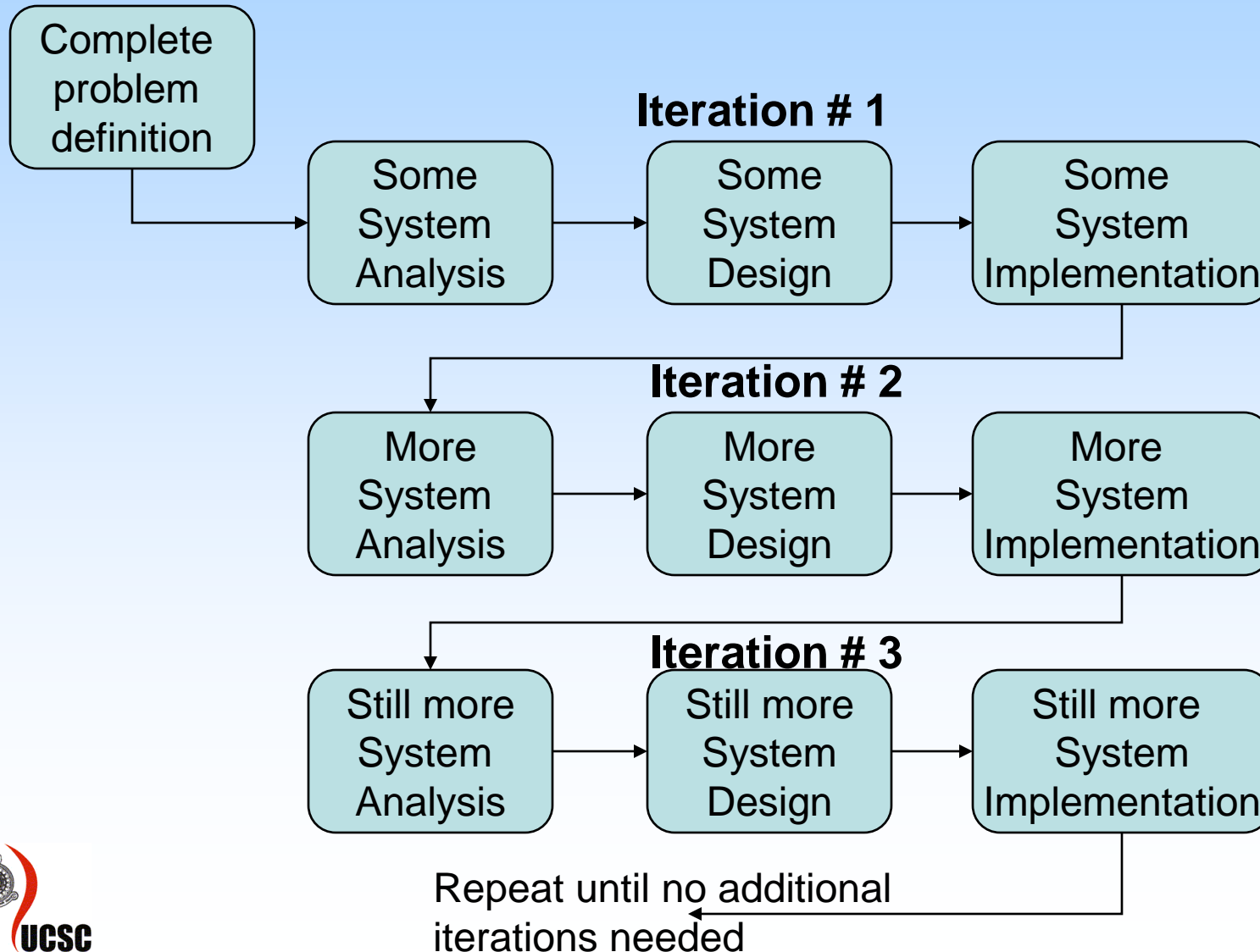
Modified Waterfall Model

- Allow some of the stages to overlap, such as the requirements stage and the design stage
- Make it possible to integrate feedback from one phase to another
- Incorporate prototyping.
- Verification and validation are added.
 - Verification checks that the system is correct (building the system right).
 - Validation checks that the system meets the users desires (building the right system).
- Progress is more difficult to track.

Iterative development approach

- An approach to systems analysis and design
- Completes the entire information system in successive iterations
- Each iteration does some
 - Analysis
 - design
 - Construction
- Allows versions of usable information to be delivered in regular and shorter time frames

Iterative development approach



Underlying Principles for System Development methodology

- **P1:** Get the system users involved
 - A communication between system users, analysts, designers, and builders
 - Minimizes miscommunication and misunderstanding
 - Help to win acceptance of new ideas and technological change

- **P2: Use a problem-solving approach.**

Study and understand the problem and its context

Define the requirement of a suitable solution.

Identify candidate solutions that fulfill the requirements and select the **best** solution.

Design and/or implement the solution.

Observe and evaluate the solution's impact, and refine the solution accordingly.



• **P3: Establish phases and activities.**

- All methodologies prescribe phases and activities
- The number and scope of phases and activities may vary.
- The Phases are

Scope definition

Problem analysis

Requirement analysis

Logical design

Decision analysis

Physical Design

Construction & Testing

Installation & Delivery

- **P4 : Document through out Development**
 - An ongoing activity of recording facts and specifications for a system for current and future reference
 - Documentation enhances communications and acceptance
 - Stimulates user involvement and reassures management about progress
 - Reveals strengths and weaknesses of the system to multiple stakeholders.

P5: Establish standards.

- To achieve or improve systems integration , organization turns to standards.
- In many organizations these standards take the form of enterprise information technology architecture.
- An information technology architecture typically standardizes on the following:
 - Database technology
 - Software technology
 - Interface technology.

- **P6 :Manage the process and Projects**

Process Management

- Ensures that an organizations chosen process or management is used consistently on and across all projects
- An ongoing activity
 - Documents
 - Teaches
 - Oversees the use of
 - Improves
- Concerned with
 - Phases
 - Activities
 - Deliverables
 - Quality Standards

An organization's
chosen methodology
For system development

- **P6** :Manage the process and Projects Cont....

Project Management

- Process of
 - Scoping
 - Planning
 - Staffing
 - Organizing
 - Directing
 - Controlling a project
- ensures that an information system is developed
 - at minimum cost,
 - within a specified time frame and
 - with acceptable quality.

P7:Justify systems as Capital Investments.

Cost-effectiveness

- Obtained by striking a balance between the lifetime cost of Developing, Maintaining, Operating an information system and the benefits derived from that system
- measured by cost-benefit analysis
- Performed throughout the system development



P8: Don't be afraid to cancel or revise scope.

Cancel the project if it is no longer feasible



If project scope is to be increased, reevaluate and adjust the cost and schedule



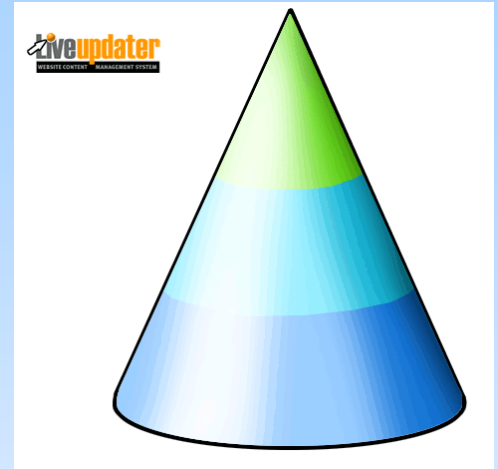
If the project budget and schedule are frozen and not sufficient to cover all project objectives, reduce the scope.



P9:Divide and conquer.

**Divide a system into subsystem
and components**

- Easily to conquer the problem**
- Easy to build a large problem**



P10: Design systems for growth and change.

the business, their need and priorities change over time

thus, information system that supports a business must also change over time

good methodologies should embrace the reality of change

the systems should be designed to accommodate both growth and changing requirements

#the systems should be designed to scale up and adapt to the business

Major components of system development

Major
Components

- Methodology
- Modeling Methods or Techniques
- Tools



Methodology

- A set of
 - Activities
 - Methods
 - Best practices
 - Deliverables
 - Automated tools
- Used by stakeholders to
 - Develop
 - Continuously improve

**Information systems
and
Software**

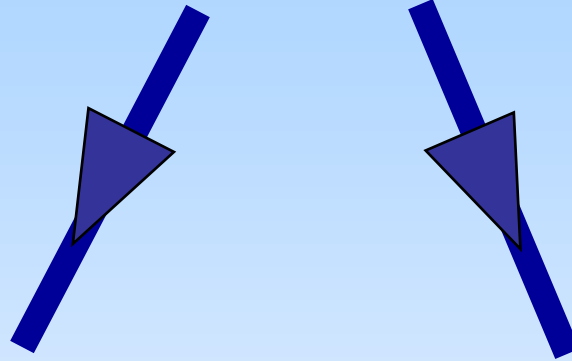
Methodology

- Provides the framework
- Has a predefined set of steps
- Ensures that systems are built in the most effective way

e.g. SSADM, RUP



Methodology



**Modeling Methods or
Techniques**

**Class Diagram,
Use Case Diagrams etc.**

Tools

**Rational Rose,
Rational Suit**

Eg .Rational Unified Process

Methodology

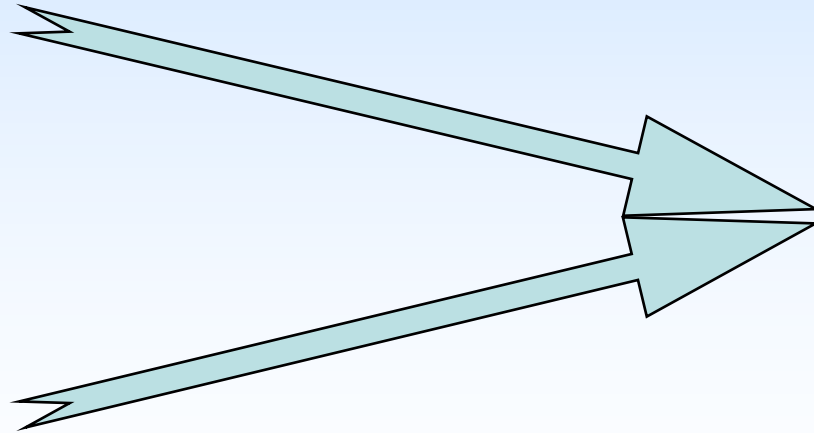
- Uses tools and modeling methods



Tools



Methods



Most Effective
Way of
Building

Methodology

Supported by Modeling Methods or Techniques

- Techniques used to implement the Methodology.
- Provides the descriptions of the business system requirements from various view points.



Life Cycle vs. Methodology

- The system development methodology consists of several well-defined steps.
- When following a design methodology, a designer can select appropriate modeling method related to each step.

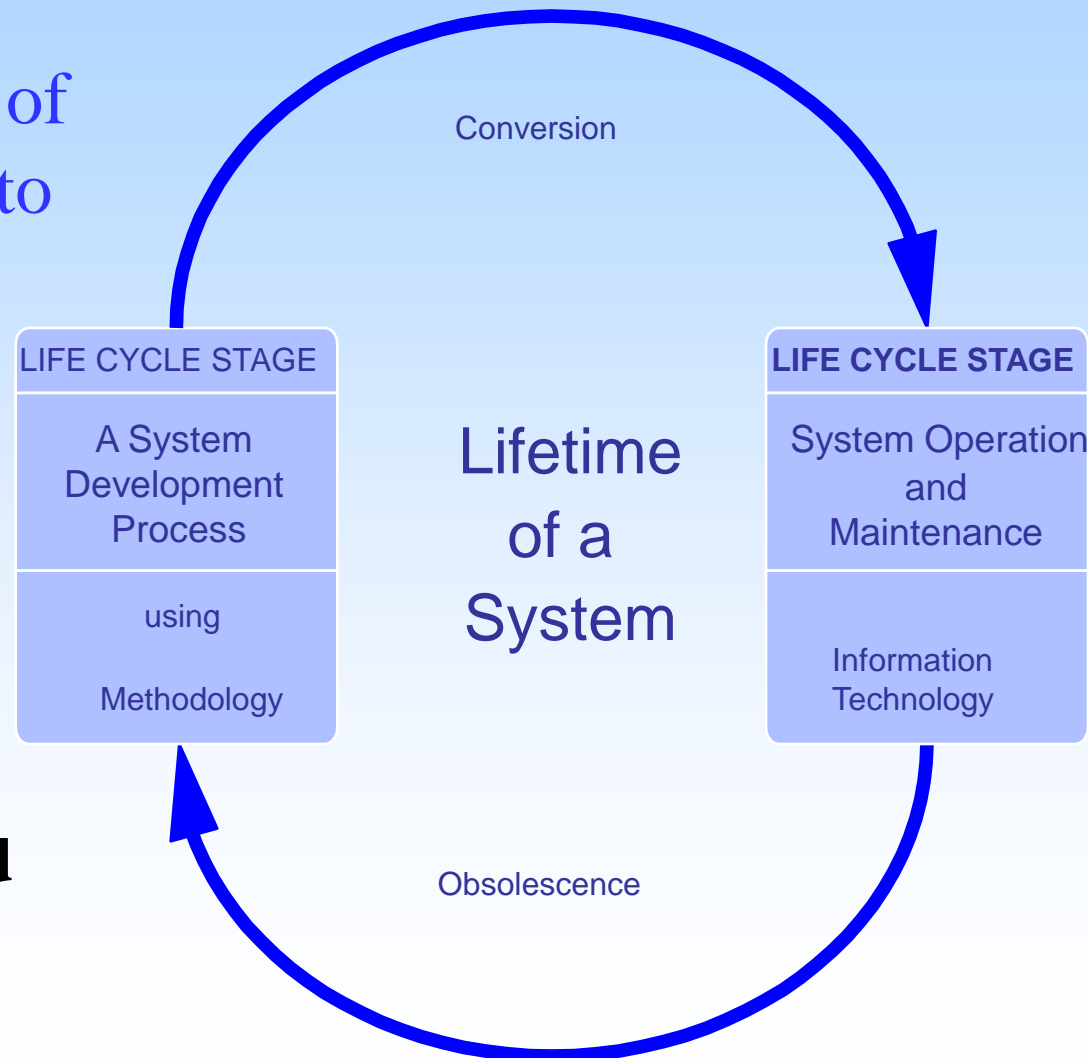
Life Cycle vs. Methodology

- A system development **life cycle** divides the life of an information system into two major stages,

- **Systems development** (consists of system analysis, system design, system implementation and testing phases)

and

- **Systems operation and support** (maintenance)



Life Cycle vs. Methodology

- A **system development methodology** is a very formal and precise system development process that defines
 - a set of activities,
 - methods,
 - best practices,
 - deliverables,
 - and automated tools

Modeling Methods

A set of techniques used to implement Methodology



- Data Flow Diagrams -
 - A process model
 - Depict the flow of data through a system and the work performed by the system
- Entity Relationship Diagrams –
 - A data model
 - Depict data in terms of entities and relationships described by the data
 - Consists of several notations
- Structure Charts etc

**Different Views
of the System**

Tools



- Software systems
- Assists analysts and designer to build information systems
- They will not replace Systems Analysts.

e.g. Easy Case, Rational Rose



Tools

General Aim :

- ❖ Decrease the human effort required to develop the software.
- ❖ Increase the quality of software
- ❖ Tools will support methodologies but will not replace system analysts.

