# BUILDING INFORMATION SYSTEMS

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# Learning Objectives

- How does building new systems produce organizational change?
- What are the core activities in the systems development process?
- What are the principal methodologies for modeling and designing systems?

- **مثال: ساخت بنا**
  - بلافاصله
  - پیمانکار اجرایی
  - معمار
- **تحلیل گر سیستم**
  - واسط بین مشتری (کاربر نهایی) و سازنده (برنامه نویس)

# متدلوژی Methodology

- مجموعه ای از روش ها، قواعد و اصولی که دریک رشته به کار می روند.
- مجموعه ای از روش ها که بر مبنای مجموعه ای از اصول پایه به همراه قواعدی برای کاربرد آنها بنا شده اند.
- راهبردهای مشخص و مرحله به مرحله برای تکمیل یک یا چند دوره از چرخه عمر ایجاد و توسعه سیستم ها
- توسعه دهندگان سیستم با اجرای گام به گام مراحل مشخص شده در متدلوژی ها و استفاده از ابزارها و تکنیک های هر مرحله، پروژه های توسعه IS ها را برنامه ریزی، اداره و کنترل و ارزیابی نمایند.

## سوالاتی که یک متدلوژی باید پاسخ دهد:

- چگونه یک پروژه باید به مراحل فرعی تجزیه شود؟
- در هر مرحله
  - چه اقداماتی باید صورت گیرد؟
  - چه خروجی هایی باید تولید شود؟
  - چه محدودیت هایی باید اعمال شود؟
  - چه کسانی باید در گیر شوند؟
  - از چه ابزارهایی باید استفاده شود؟

## Systems as Planned Organizational Change

- **Structural organizational changes enabled by IT**

1. **Automation**
   - Increases efficiency
   - Replaces manual tasks
2. **Rationalization of procedures**
   - Streamlines standard operating procedures
   - Often found in programs for making continuous quality improvements

## Systems as Planned Organizational Change

- **Structural organizational changes enabled by IT**

### 3. Business process redesign

- Analyze, simplify, and redesign business processes
- Reorganize workflow, combine steps, eliminate repetition

### 4. Paradigm shifts

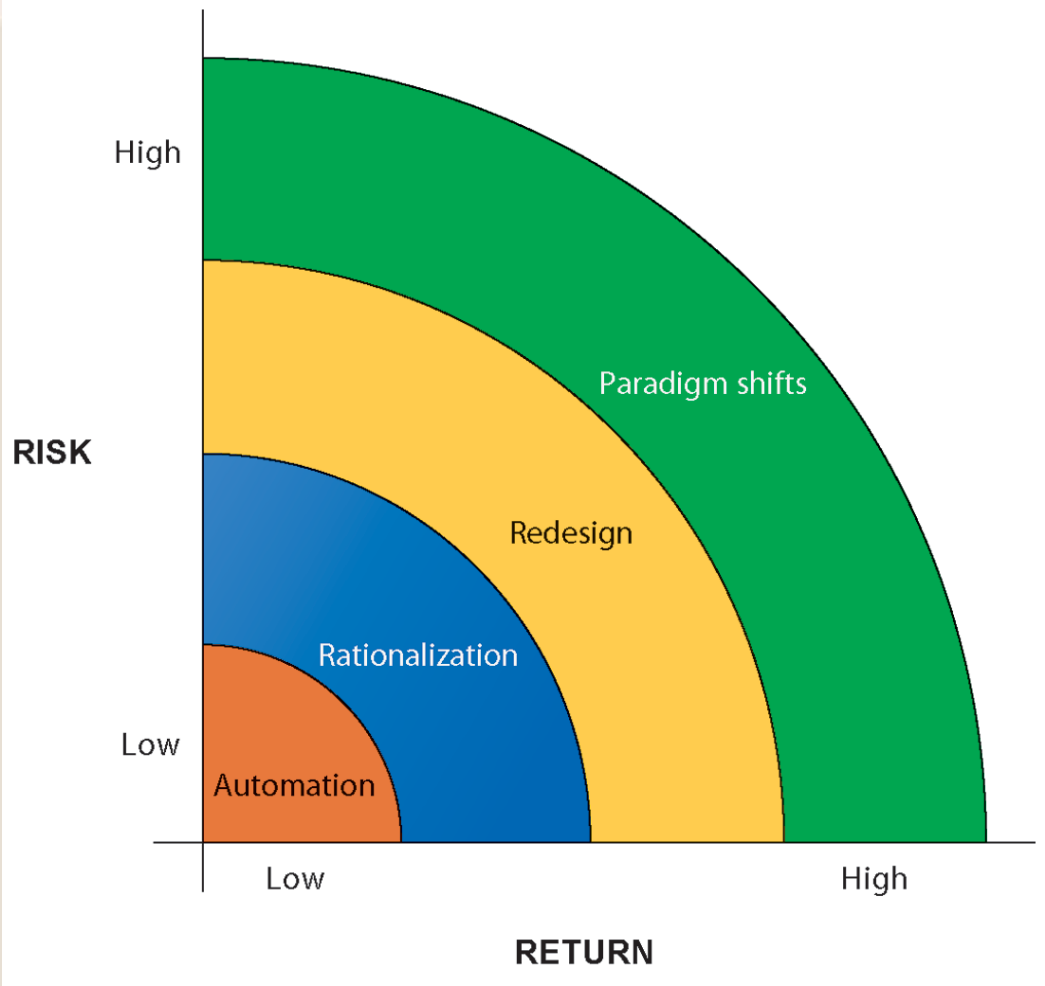
- Rethink nature of business
- Define new business model
- Change nature of organization

# Systems as Planned Organizational Change

## ORGANIZATIONAL CHANGE CARRIES RISKS AND REWARDS

The most common forms of organizational change are automation and rationalization. These relatively slow-moving and slow-changing strategies present modest returns but little risk. Faster and more comprehensive change—such as redesign and paradigm shifts—carries high rewards but offers substantial chances of failure.

**FIGURE 13-1**



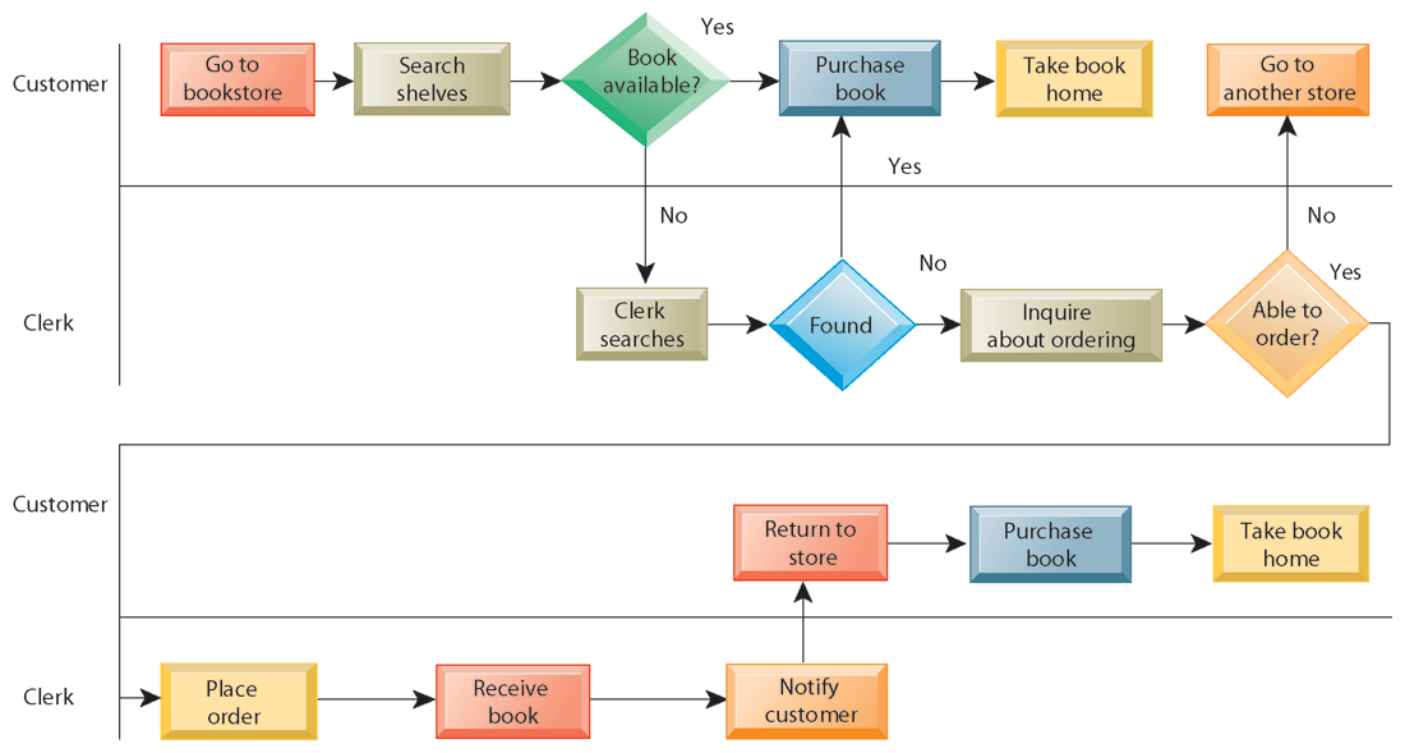
# Systems as Planned Organizational Change

- Business process management (BPM)
  - Variety of tools, methodologies to analyze, design, optimize processes
  - Used by firms to manage business process redesign
- Steps in BPM
  1. Identify processes for change
  2. Analyze existing processes
  3. Design the new process
  4. Implement the new process
  5. Continuous measurement

# Systems as Planned Organizational Change

## AS-IS BUSINESS PROCESS FOR PURCHASING A BOOK FROM A PHYSICAL BOOKSTORE

## Process Flow Diagram (PFD)/ Process Model (PM)



# Systems as Planned Organizational Change

## REDESIGNED PROCESS FOR PURCHASING A BOOK ONLINE

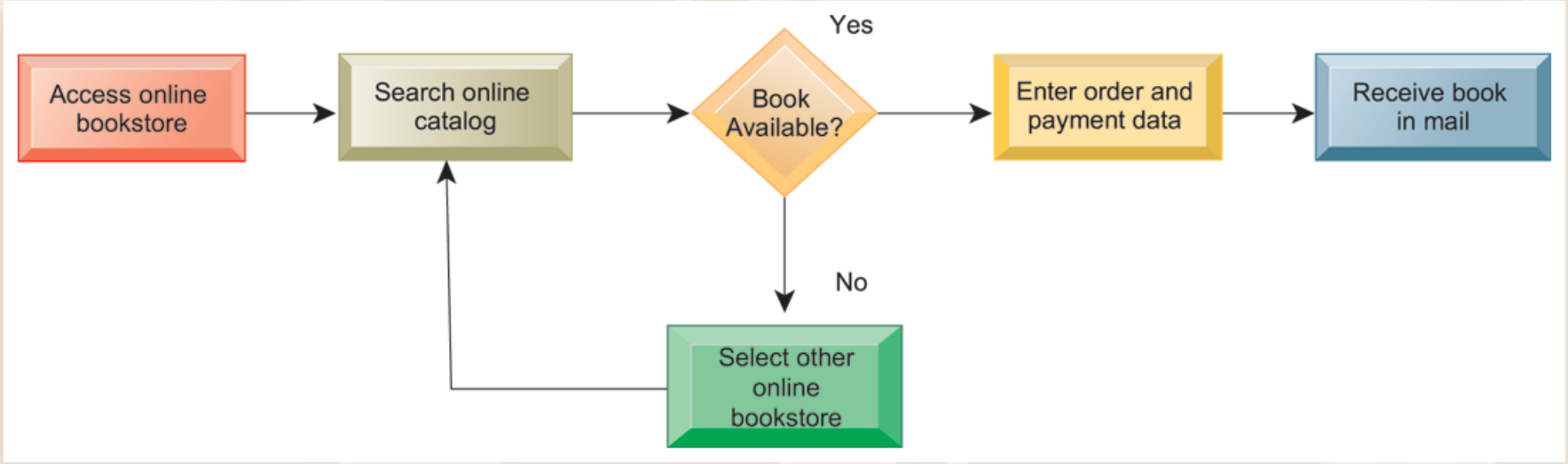



**FIGURE 13-3** Using Internet technology makes it possible to redesign the process for purchasing a book so that it requires fewer steps and consumes fewer resources.

## Systems as Planned Organizational Change

- **Variety of tools for BPM, to**
  - **Identify and document existing processes**
    - Identify inefficiencies
  - **Create models of improved processes**
  - **Capture and enforce business rules for performing processes**
  - **Integrate existing systems to support process improvements**
  - **Verify that new processes have improved**
  - **Measure impact of process changes on key business performance indicators**

# Overview of Systems Development

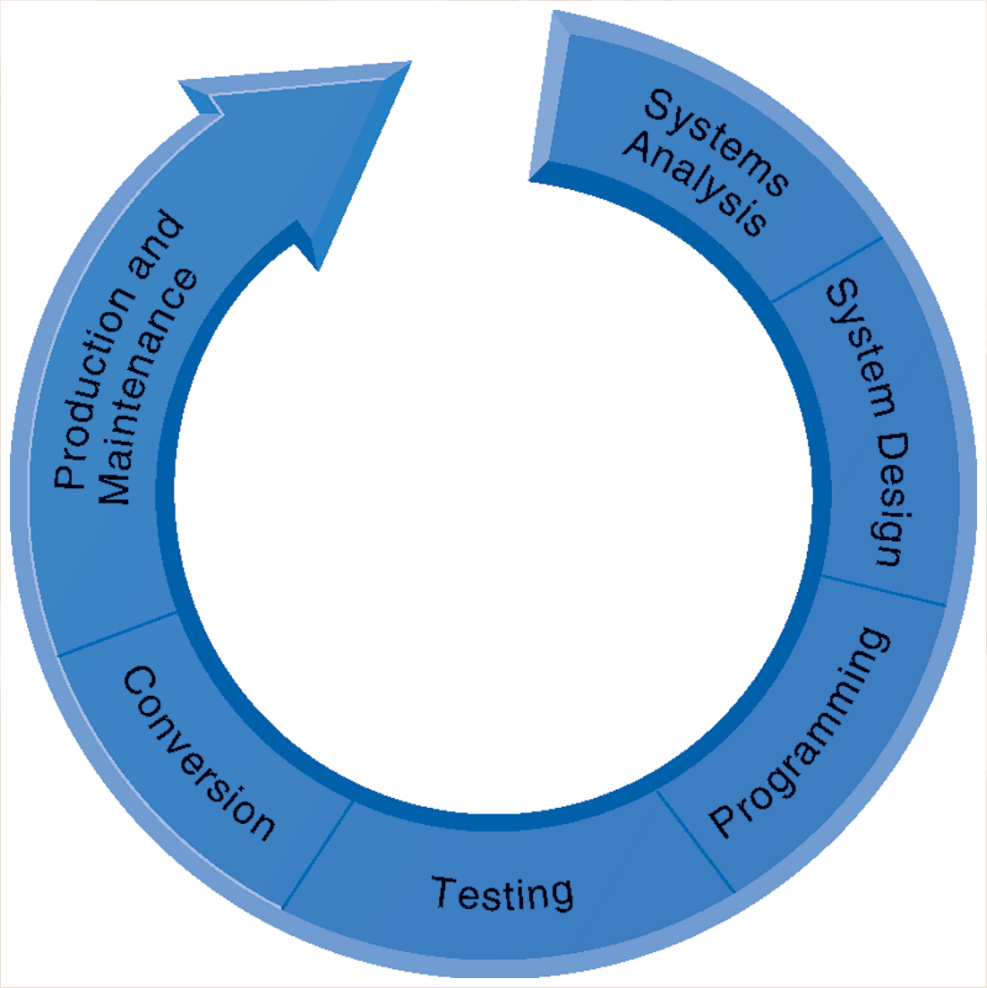
- **Systems development:**
  - **Activities that go into producing an information system solution to an organizational problem or opportunity**
  1. **Systems analysis**
  2. **Systems design**
  3. **Programming**
  4. **Testing**
  5. **Conversion**
  6. **Production and maintenance**

# Overview of Systems Development

- **THE SYSTEMS DEVELOPMENT PROCESS**

Building a system can be broken down into six core activities.

FIGURE 13-4



# Overview of Systems Development

- **Systems analysis**
  - **Analysis of problem to be solved by new system**
    - Defining the problem and identifying causes
    - Specifying solutions
      - Systems proposal report identifies and examines alternative solutions
    - Identifying information requirements
  - **Includes feasibility study**
    - Is solution feasible and good investment?
    - Is required technology, skill available?

## Overview of Systems Development

- **System analysis (cont.)**
  - **Establishing information requirements**
    - Who needs what information, where, when, and how
    - Define objectives of new/modified system
    - Detail the functions new system must perform
  - **Faulty requirements analysis is leading cause of systems failure and high systems development cost**

# Overview of Systems Development

- **Systems design**
  - **Describes system specifications that will deliver functions identified during systems analysis**
  - **Should address all managerial, organizational, and technological components of system solution**
  - **Role of end users**
    - User information requirements drive system building
    - Users must have sufficient control over design process to ensure system reflects their business priorities and information needs
    - Insufficient user involvement in design effort is major cause of system failure

# Overview of Systems Development

- **Programming:**
  - System specifications from design stage are translated into software program code
- **Testing**
  - Ensures system produces right results
  - Unit testing: Tests each program in system separately
  - System testing: Test functioning of system as a whole
  - Acceptance testing: Makes sure system is ready to be used in production setting
  - Test plan: All preparations for series of tests

# Overview of Systems Development

- **Conversion**
  - **Process of changing from old system to new system**
  - **Four main strategies**
    1. Parallel strategy
    2. Direct cutover
    3. Pilot study
    4. Phased approach
  - **Requires end-user training**
  - **Finalization of detailed documentation showing how system works from technical and end-user standpoint**

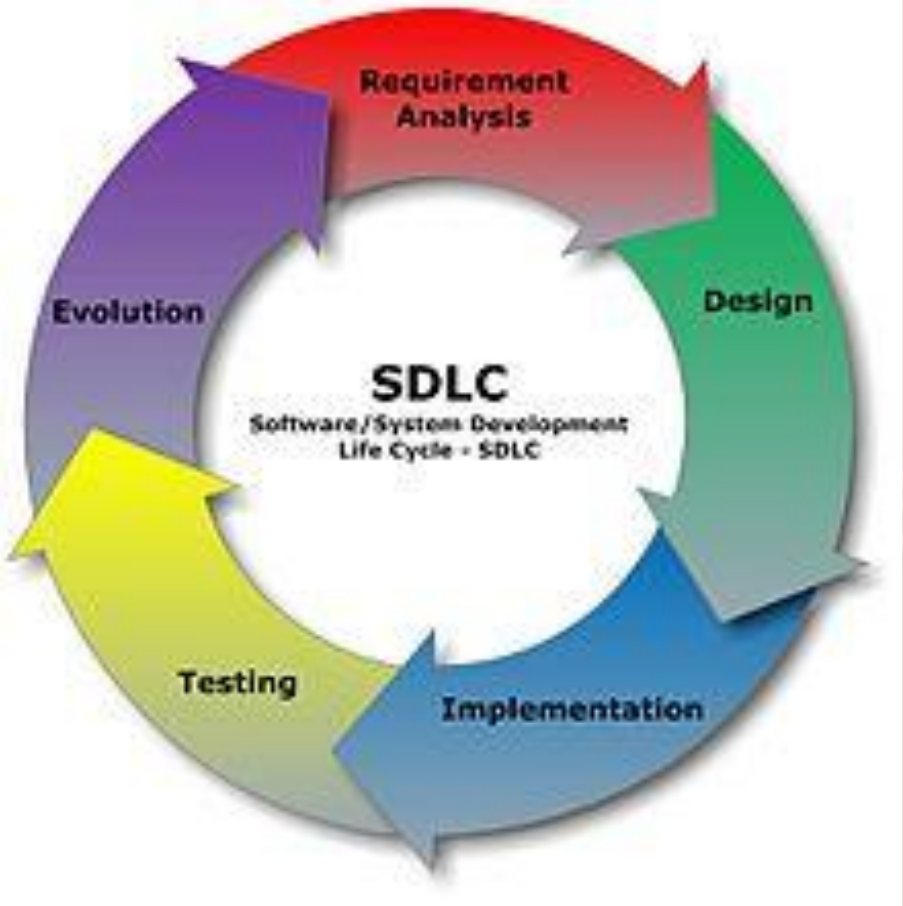
# Overview of Systems Development

- **Production and maintenance**
  - **System reviewed to determine if revisions needed**
  - **Maintenance**
    - Changes in hardware, software, documentation, or procedures to a production system to correct errors, meet new requirements, or improve processing efficiency
      - 20% debugging, emergency work
      - 20% changes to hardware, software, data, reporting
      - 60% of work: User enhancements, improving documentation, recoding for greater processing efficiency

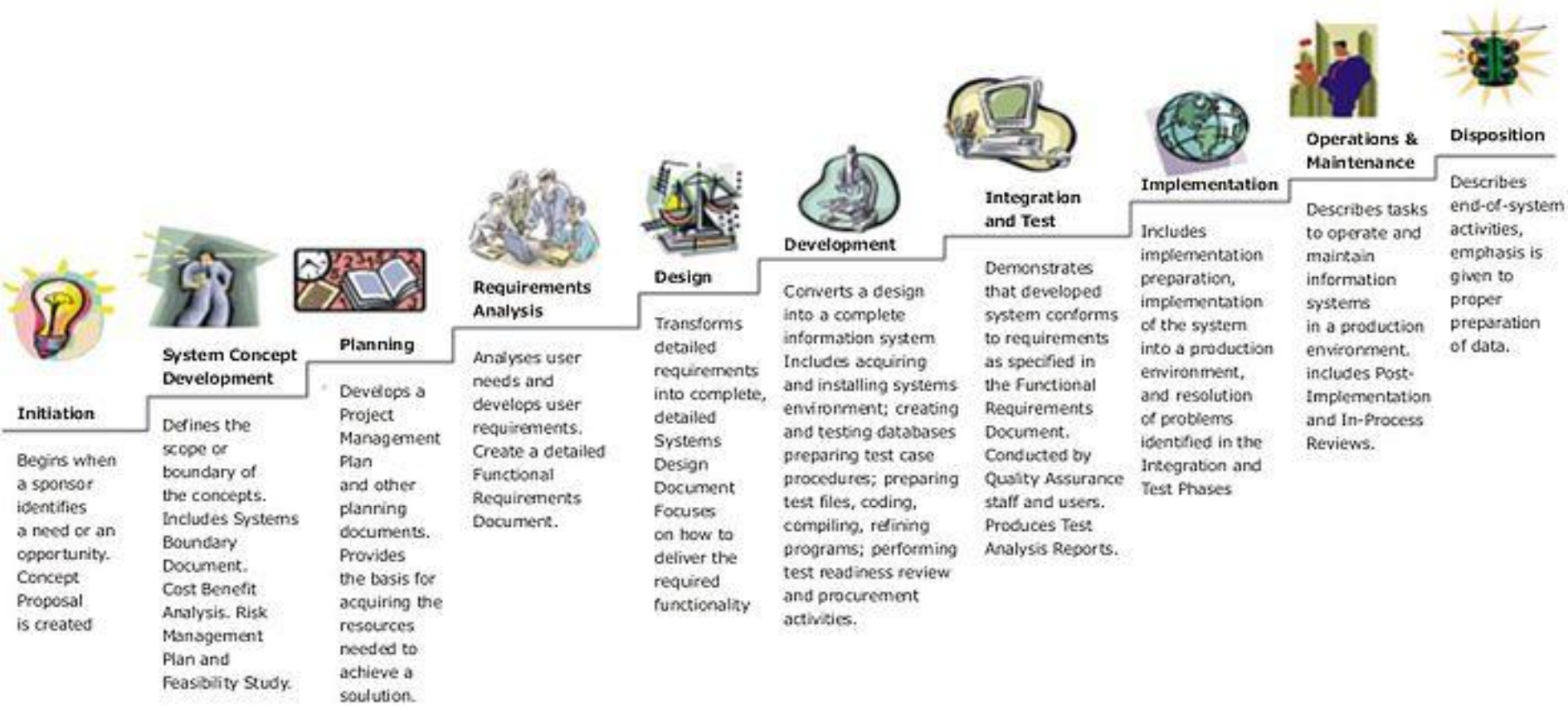
# Overview of Systems Development

| SUMMARY OF SYSTEMS DEVELOPMENT ACTIVITIES | |
|---|---|
| **CORE ACTIVITY** | **DESCRIPTION** |
| Systems analysis | Identify problem(s)<br>Specify solutions<br>Establish information requirements |
| Systems design | Create design specifications |
| Programming | Translate design specifications into code |
| Testing | Unit test<br>Systems test<br>Acceptance test |
| Conversion | Plan conversion<br>Prepare documentation<br>Train users and technical staff |
| Production and maintenance | Operate the system<br>Evaluate the system<br>Modify the system |

# SDLC


Requirement Analysis
Design
Implementation
Testing
Evolution
SDLC
Software/System Development Life Cycle - SDLC

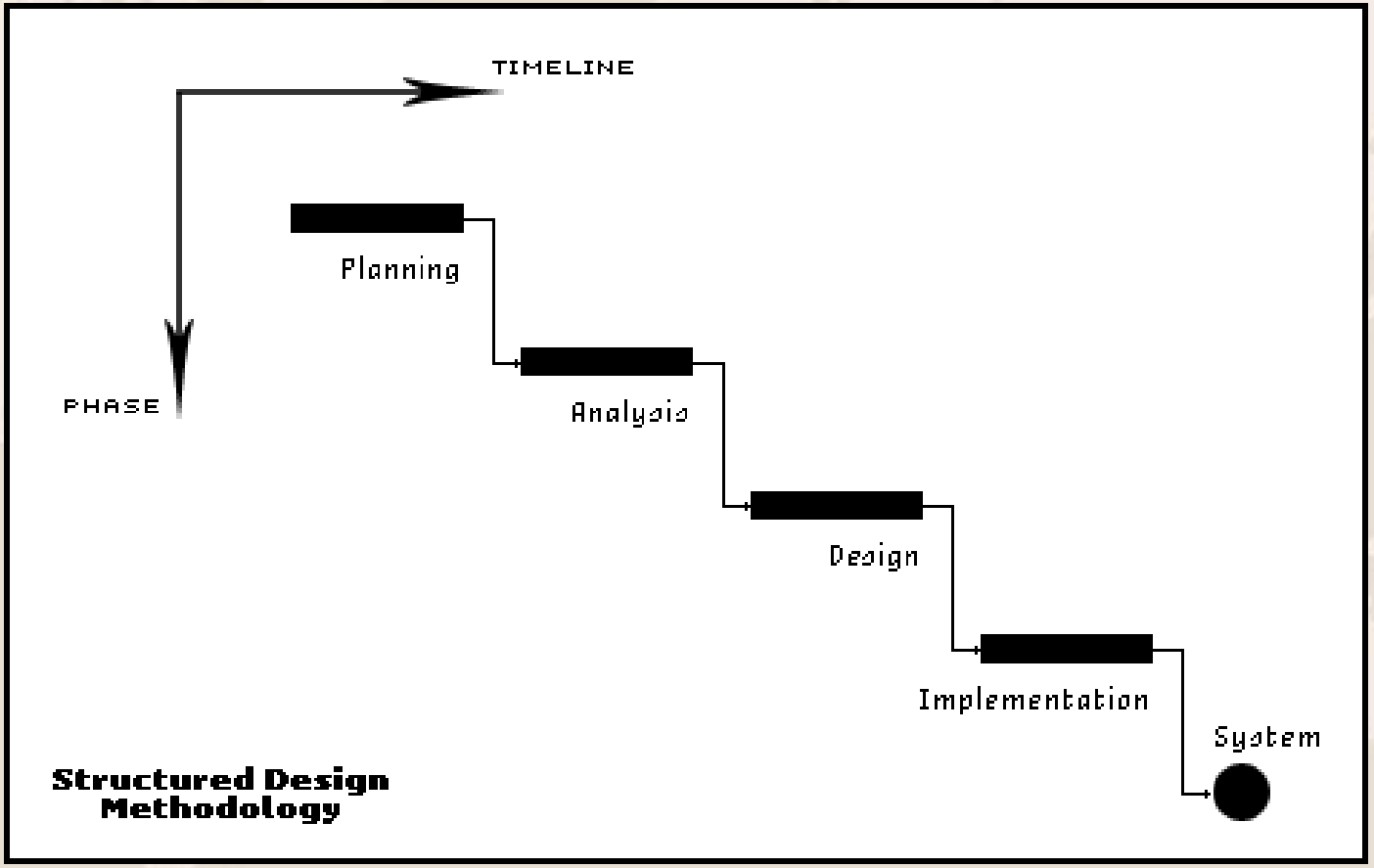
# Systems Development Life Cycle (SDLC)
## Life-Cycle Phases



# System Development Life Cycle (SDLC) Methodologies

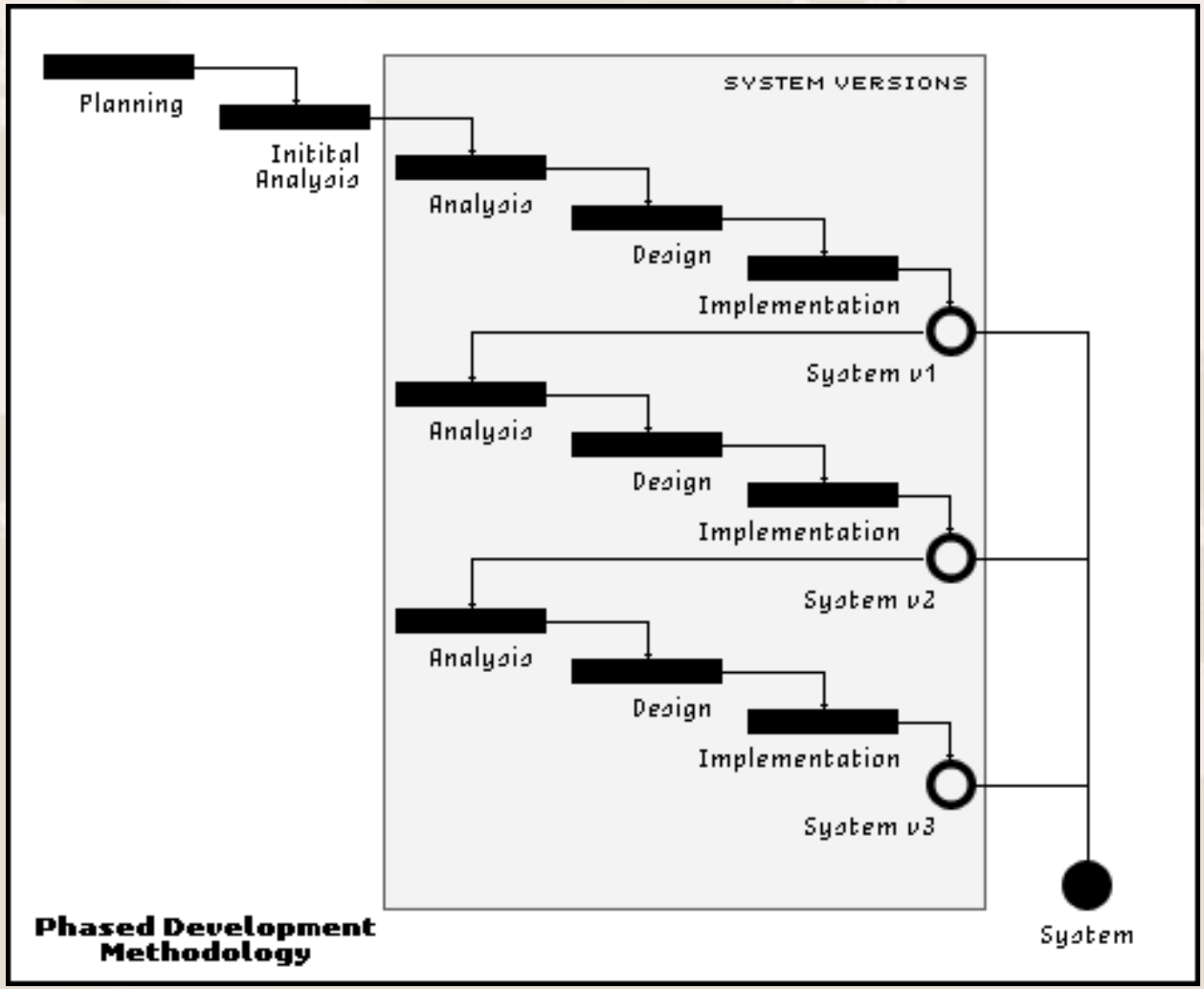
- SSADM: Structured systems analysis and design method
- RUP:Rational Unified Process
- RAD: Rapid Application Development
- BSP: Business System Planning
- Waterfall

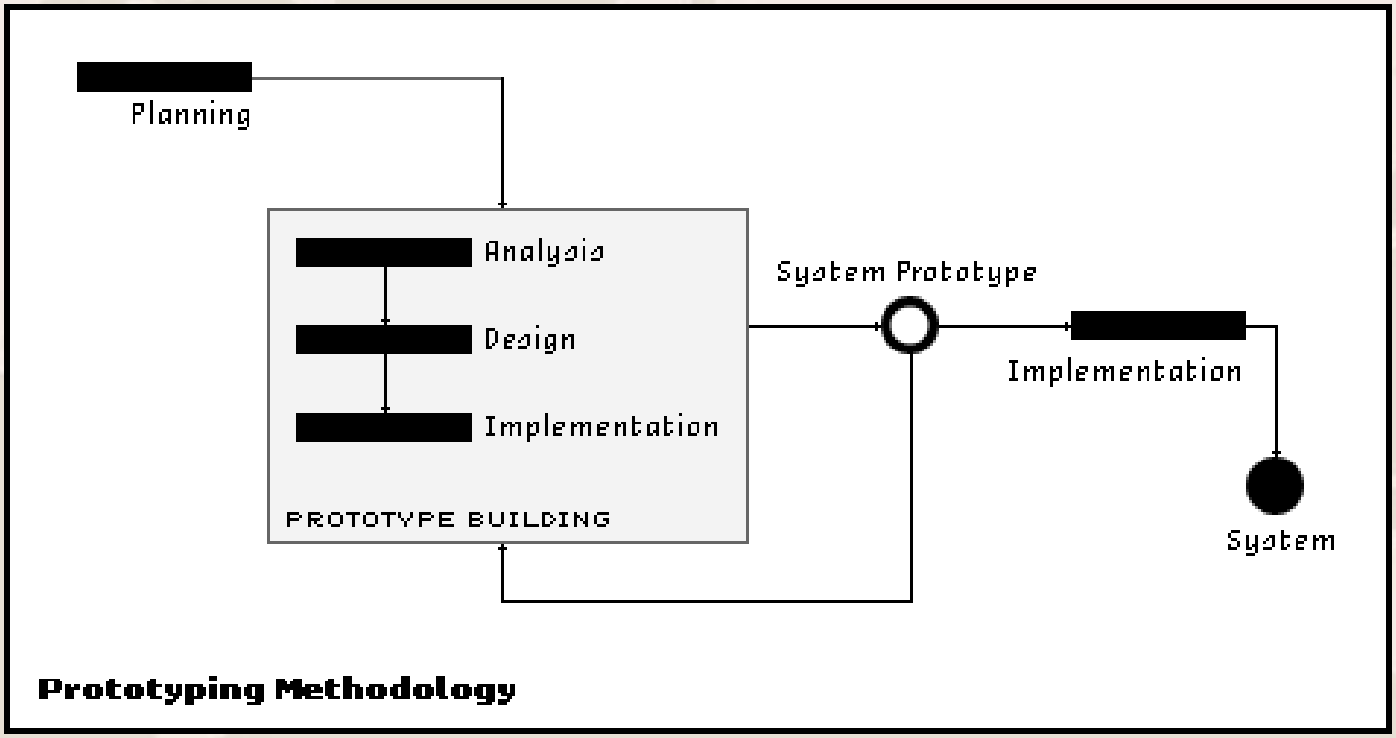
# Waterfall


TIMELINE
PHASE
Planning
Analysis
Design
Implementation
System
Structured Design Methodology

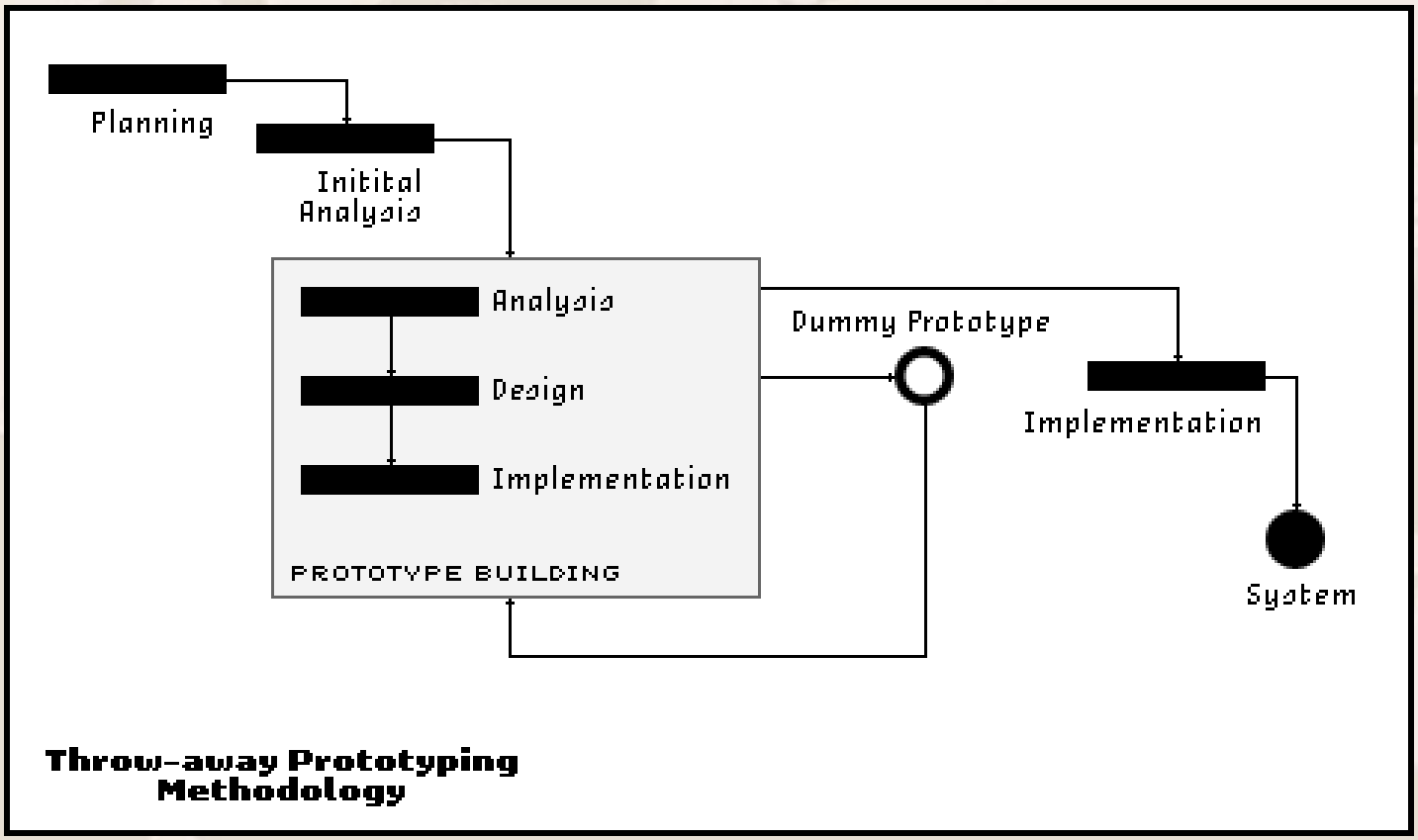
# RAD (Rapid Application Development)

- There are three categories of RAD:
  - Phased Development
  - Prototyping
  - Throw-away Prototyping

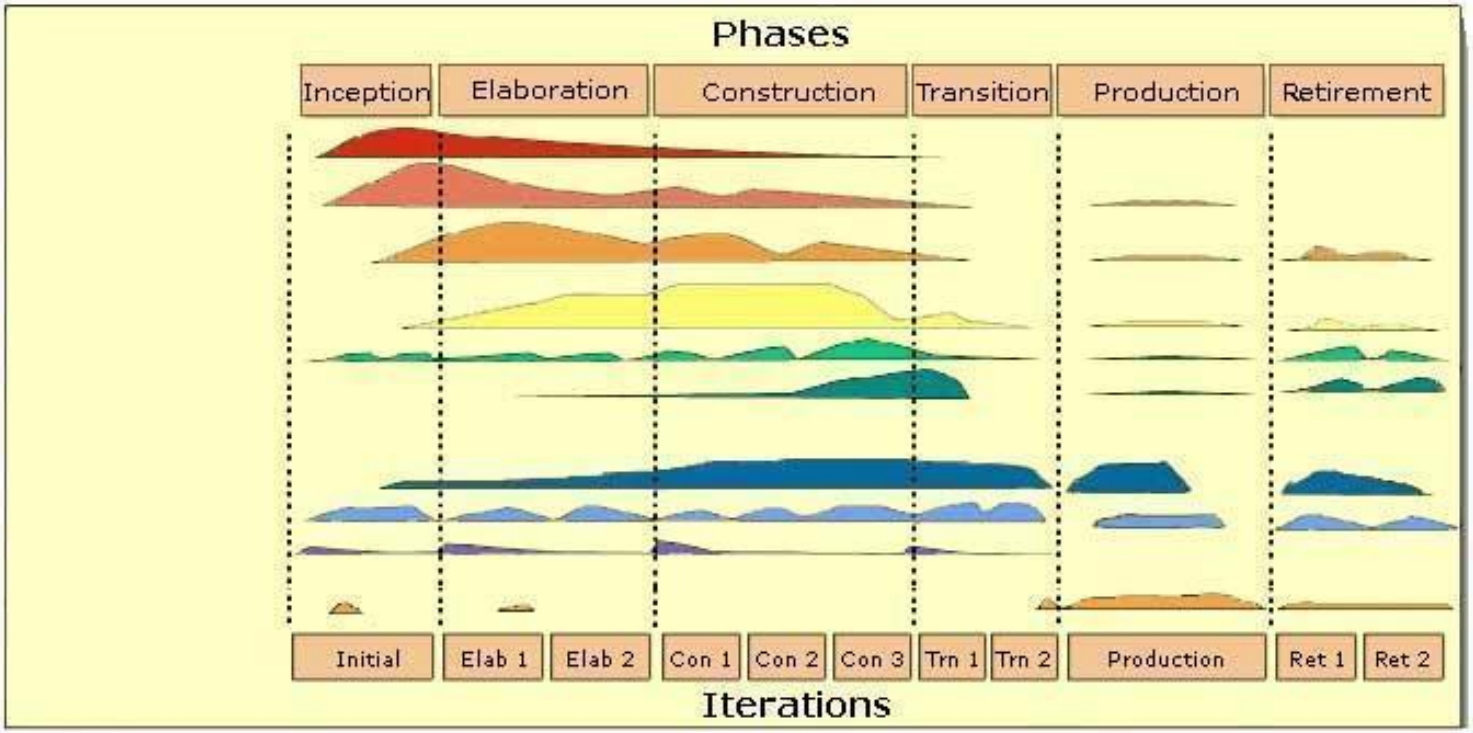

SYSTEM VERSIONS
Planning
Initital Analysis
Analysis
Design
Implementation
System v1
Analysis
Design
Implementation
System v2
Analysis
Design
Implementation
System v3
System
Phased Development Methodology

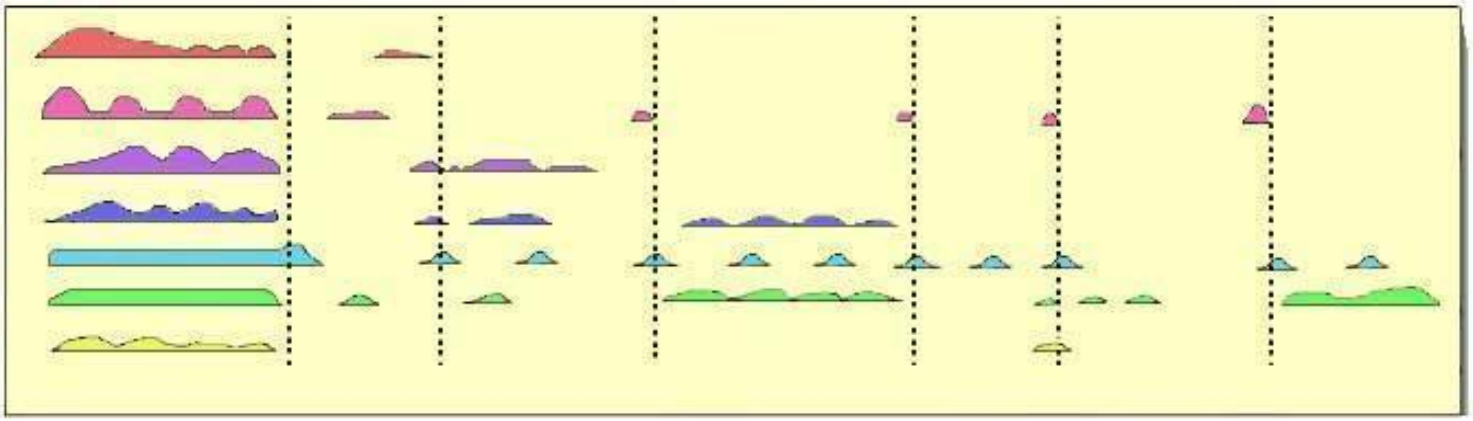



**Prototyping Methodology**




**Throw-away Prototyping Methodology**



# SSADM

- 1980: Central Computer and Telecommunications Agency (CCTA) evaluate analysis and design methods.
- 1981: Consultants working for Learmonth & Burchett Management Systems,
- 1983: SSADM made mandatory for all new information system developments
- 1984: Version 2 of SSADM released
- 1986: Version 3 of SSADM released, adopted by NCC
- 1988: SSADM Certificate of Proficiency launched, SSADM promoted as ‘open’ standard
- 1989: Moves towards Euromethod, launch of CASE products certification scheme
- 1990: Version 4 launched
- 1993: SSADM V4 Standard and Tools Conformance Scheme Launched
- 1995: SSADM V4+ announced, V4.2 launched
- 2000: CCTA renamed SSADM as "Business System Development". The method was repackaged into 15 modules and another 6 modules were added.

# ابزارهای مورد استفاده در متدلوژی ها

- ابزارهای مدل سازی فرایندها
  - DFD: Data Flow Diagram
  - PFD: Process Flow Diagram (PM: Process Model)
  - FHD: Function Hierarchy Diagram
  - DT: Decision Table
  - عبارات ساخت یافته

# ابزارهای مورد استفاده در متدلوژی ها

- **ابزارهای مدل سازی داده ها**
  - Data Dictionary
  - ...
- **موجودیت Entity**
  - **شخصی یا چیزی یا مفهومی که سیستم می خواهد درباره آن اطلاعاتی داشته باشد**
    - مثال: در سیستم حسابداري يا فروش: اطلاعات مشتريان، محصولات، سفارشات

# ابزارهای مورد استفاده در متدلوژی ها

- **ابزارهای مدل سازی تاثیر فرایندها بر داده ها**
  - ELH: Entity Lifecycle History
  - Function/Entity Matrix
  - Event/Entity Matrix
  - ....