Systems Development:

The Agile vs. Waterfall Methodologies

Systems Development:

• the activity of creating new or modifying / enhancing existing business systems.

• Objectives of SD - to ensure that:
  — systems contain the desired capabilities
  — systems are developed within budget
  — systems are developed on time

Factors required for successful SD:

• A feasible project
• Good communications
• User involvement

Factors required for successful SD (cont.)

• Simple and straightforward design
• Comprehensive testing
• Organized maintenance program

Reasons to initiate a SD project:

• Problems with the existing system
• Desire to exploit new opportunities
• Increasing competition
• Desire to make more effective use of information
• Organizational Growth
• Merger or acquisition
• Change in market or external environment

Participants

• Users
• Support Personnel
• Management

Development Team
Development Team

• group of individuals who work together on a project. Consist of both the users and technical information system personnel

Support Personnel (cont.)

• system analysts: IS professional who specializes in analyzing and designing business systems
• computer programmers
• database personnel
• data communications experts
• system librarians: responsible for managing data stored on tape and disk

Users

• those who will ultimately benefit from the development project. The people who will use the system (upon completion of the development project) to perform their work

Management

• authorize and provide financial resources for the team

Support Personnel

• technical support for the development team (will come and go on the project as their skills are needed)

Problem

• Change:
  —People are resistant to change.
  —Implementing a system will change the way people do their jobs.
Approaches to SD:

- **Waterfall**
  - Traditional
  - SDLC
  - Systems Development Life Cycle
- **Agile**
  - RAD = Rapid Application Development
  - ASD = Agile Systems Development
  - Prototyping
  - XP = Extreme Programming

Agile

- Emphasizes communication
- Emphasizes teamwork

Waterfall

- Systems investigation
- Systems analysis
- Systems design
- Systems implementation
- Systems maintenance and review

Prototypes

- Operational prototyping
- Nonworking prototyping

Agile

- quick model
- users can provide input on changes needed before a lot of time and money has been spent on developing a system’s full functionality

Operational prototyping

- this prototype actually contains all the functions of the system being developed. It accesses real files, performs computations, and produces real outputs
Nonworking prototyping

• this is simply a model of what the system will look like. It can accept inputs to show how data is captured and produce outputs to show what reports look like, but no processing occurs.

Waterfall Approach

• Progress is measured by deliverables and milestones
• Drives to a single solution
• Minimal customer interaction

Agile Approach

• Progress is measured by working software
• Changes are welcomed
• Deliverables are working software frequently
• Significant customer interaction

Systems Investigation Purpose

• to determine the feasibility of improving the existing system and to determine whether or not the existing system is satisfying the goals and objectives of the organization.

Systems Investigation Questions

• What primary problems might a new or enhanced system solve?
• What opportunities might a new or enhanced system provide?
• What new hardware, software, database, telecommunications, personnel, or procedures will improve an existing system, or are required in a new system?
• What are the potential costs?
• What are the associated risks?
Steps in Systems Investigation:

• Forming an Investigation team
• Performing a feasibility analysis
• Establishing goals for Systems Development
• Selecting a Systems Development Methodology
• Creating the Systems Investigation Report

Feasibility Analysis

• Technical feasibility
  • concerned with the actual ability of hardware and software to the what is required

Feasibility Analysis (cont.)

• Operational feasibility
  • measures whether the business can actually put the system into action/operation

Feasibility Analysis (cont.)

• Schedule feasibility
  • determines preliminary project time frames, and evaluates whether it can be performed in a reasonable amount of time

Feasibility Analysis (cont.)

• Economic feasibility
  • determines whether the costs and benefits are worth undertaking the project

Feasibility Analysis (cont.)

• The Feasibility study should take about 5 or 10% of the resources expended for the entire system development

• If the project is deemed feasible:
  – perform a complete systems development study
Selecting a Development Methodology:

- Waterfall
- Agile

Systems Analysis

- If you choose the Waterfall approach, then your next step is to conduct a Systems Analysis.

Systems Analysis:

- What is it?
- a detailed study of the existing system and an in-depth study of end-user information needs. Its emphasis is the discovery of system problems, limitations, and opportunities.

Participants in Systems Analysis:

- Users
- Analysts
Skills of Analysts

• Technical skills - systems concepts, system development techniques, etc.
• Non-technical skills - interpersonal and human aspects
• Due to the demanding nature of these skill requirements, systems analysis is often a team effort, so that the team members can complement and support each other

Analysis Steps:

• assemble the Analysis Team
• collect the data
• analyze the data
• determine user and org. requirements
• report the results: Systems Analysis Report

Data Collection Methods

• Research
• Participating
• Brainstorming
• Structured interview
• Unstructured interview
• Direct observation
• Questionnaires
• Pilot Study
• Statistical Sampling

Systems Analysis Report Contents:

• Background Information
• Problem Statement
• Data Collection
• Data and Requirements Analysis
• Recommendations
• Appendixes of Documents, Tables and Charts
• Glossary of Terms

Systems Design

• Purpose: specify a new system that
  — achieves the critical organizational goals and objectives
  — overcomes the shortcomings of the existing system
  — stays within budget (money and time)
Deliverables of Systems Design

- User interface design
- File design
- Overall system structure
- Test specification
- Standards manual (naming conventions)
- Rough user manual
- Implementation strategy and schedule

Types of Contracts in SD

- Fixed Price
- Cost Plus

Implementation strategy and schedule

- Programming
- Testing
- System Installation
- User Training

The Design Report

- The final result of systems design is the system specifications.
- These include a technical description that details system output, inputs, and user interfaces, as well as all hardware, software, databases, telecommunications, personnel, and procedure components.
- The design report reflects the decisions made for the system design and prepares the way for systems implementation.

Freezing a Design Specification

- Freezing systems design specifications means that no more changes can be made to the design of the system.
- This normally means that the user agrees in writing that the design is acceptable.

Systems Implementation
Decisions

• Where to acquire Hardware
• Internally vs. Externally Develop Software

Systems Implementation

• User Preparation
• Personnel: Hiring and Training

Systems Implementation (cont.)

• Site Preparation
• Data Conversion

Systems Implementation - Installation

• Installation

Systems Implementation - Testing

• Testing involves the entire information system.
  - Unit Testing
  - System Testing
  - Volume Testing
  - Integration Testing
  - Acceptance Testing

Systems Implementation - Startup

• Startup takes the final, tested information system and places it into the business environment.
• There are several startup approaches:
  – Direct conversion.
  – Parallel conversion.
  – Phase-in conversion.
  – Pilot conversion.
Conversion Approaches

- **Direct**
  - OLD SYSTEM
  - NEW SYSTEM

- **Parallel**
  - OLD SYSTEM
  - NEW SYSTEM

- **Phase-In**
  - OLD SYSTEM
  - NEW SYSTEM

- **Pilot**
  - OLD SYSTEM
  - NEW SYSTEM

**Systems Maintenance**

- **Causes:**
  - requests for enhancements
  - bugs
  - technical or hardware problems
  - corporate reorganization (mergers and acquisitions)
  - governmental regulations (that require changes in programs)

**Systems Implementation (cont.)**

- **User Acceptance**
  - formal agreement signed by the customer that the complete system is approved

**Maintenance & Design**

- Good design, less maintenance
- Bad design, more maintenance

**Systems Review**

- a review of all the components of the information system: hardware, software, telecommunications, databases, people, and procedures.
Waterfall vs. Agile – The End