

Introduction to Systems Analysis and Design

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Key concepts, phases, tools, and best practices

1. What Is Systems Analysis & Design?

Aspect	Definition
Systems Analysis	The systematic study of a business problem or opportunity to identify requirements and determine the most effective solution.
Systems Design	The process of specifying how the solution will be built, including architecture, data structures, interfaces, and processes.
Goal	Deliver information systems that meet user needs, are cost-effective, reliable, and adaptable to change.

2. The Systems Development Life Cycle (SDLC)

Phase	Primary Activities	Typical Deliverables
1. Planning	- Define project scope & objectives - Conduct feasibility studies (technical, economic, operational, legal, schedule) - Create project charter	Feasibility report, project charter, high-level schedule
2. Analysis	- Gather detailed requirements (interviews, questionnaires, observation) - Model current processes (As-Is) - Identify problems & opportunities - Translate requirements into system specifications	Requirements Specification (SRS), process models, data flow diagrams
3. Design	- Design logical & physical data models - Define UI/UX, system architecture, security, and interfaces	Design Specification (DSD), ER diagrams, UI mockups, prototype

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Phase	Primary Activities	Typical Deliverables
4. Implementation (Construction)	• Code modules, develop databases, configure hardware • Conduct unit and integration testing	Source code, test scripts, compiled builds
5. Testing	• Perform system, acceptance, performance, and security testing • Validate against requirements	Test reports, defect logs, user acceptance sign-off
6. Deployment	• Install system in production environment • Migrate data, train users, establish support procedures	Deployment plan, training materials, go-live checklist
7. Maintenance	• Monitor performance, fix bugs, add enhancements • Conduct periodic reviews	Maintenance logs, change requests, updated documentation

Iterative & agile variants compress or repeat these phases to accommodate rapid feedback.

3. Core Activities in Systems Analysis

1. Requirements Elicitation

- Techniques: interviews, workshops, surveys, observation, document analysis, joint application design (JAD).
- Goal: capture functional (what the system does) and non-functional requirements (performance, security, usability).

2. Requirements Documentation

- Use cases, user stories, functional specifications, data dictionaries.
- Prioritize with MoSCoW (Must, Should, Could, Won't) or other ranking methods.

3. Modeling Business Processes

- **Data Flow Diagrams (DFDs)** – show movement of data between processes, stores, and external entities.

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- **Business Process Model and Notation (BPMN)** – standardized flowchart for complex workflows.
- **Entity-Relationship Diagrams (ERDs)** – depict data entities, attributes, and relationships.

4. Feasibility Analysis

- **Technical:** can the technology support the solution?
 - **Economic:** cost-benefit, ROI, payback period.
 - **Operational:** will users adopt it?
 - **Legal/Regulatory:** compliance considerations.
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4. Core Activities in Systems Design

Design Aspect	Focus	Typical Artifacts
Architectural Design	Overall structure (client-server, web-based, microservices)	Architecture diagram, technology stack