Information System Analysis and Design

Course no: CSE 4109

Chapter 3

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🎓 Role of a System Analyst

- ✅ **Definition:**
- A **System Analyst** is a professional who **analyzes, designs, and implements information systems** to solve business problems and meet organizational goals. They act as a bridge between the **business stakeholders** (e.g., management, users) and the **technical team** (e.g., developers, IT staff).

🎯 Primary Responsibilities of a System Analyst

1. Requirement Gathering and Analysis

- **Understand user needs** by collecting information from stakeholders through interviews, surveys, and observations.
- Analyze business processes and **define functional and non-functional requirements** for the system.
- Create **use case diagrams**, **user stories**, and **data flow diagrams (DFDs)** to represent system requirements.

🎯 Primary Responsibilities of a System Analyst

2. System Design

- Translate requirements into a **system blueprint**: define system architecture, interfaces, data flow, and database design.
- Collaborate with **developers and architects** to design the technical specifications.
- Choose appropriate technologies and tools for the system’s development.

3. Feasibility Study and Reporting

- Conduct a **feasibility study** to assess technical, economic, operational, and legal feasibility of the proposed system.
- Prepare **feasibility reports** and present them to stakeholders for decision-making.

🎯 Primary Responsibilities of a System Analyst

4. System Implementation Support

- **Coordinate the development process**, ensuring that the system aligns with the original specifications.
- Work with **project managers** to track progress, budgets, and timelines.
- Oversee the testing phase to ensure the system works as intended (e.g., through **unit testing**, **integration testing, user acceptance testing**).

5. System Testing and Quality Assurance

- Ensure the system meets user expectations through **quality assurance** and **testing**.
- Develop or assist in creating test plans and test cases.
- Coordinate **user acceptance testing (UAT)** and facilitate feedback collection.

🎯 Primary Responsibilities of a System Analyst

6. User Training and Documentation

- Design and deliver **training programs** for users to ensure they are comfortable with the new system.
- Develop **user manuals**, **help guides**, and **technical documentation** to aid in system adoption and long-term maintenance.

7. Maintenance and Continuous Improvement

- After system implementation, monitor its performance and gather feedback.
- Address issues and make **improvements** or **upgrades** based on user feedback and emerging requirements.
- Ensure **system updates** and modifications are done in a controlled and efficient manner.

✅ Skills of a System Analyst

- 🤝 **1. Interpersonal Skills (Soft Skills)**

Skill	Description
Communication Skills	Explaining technical ideas to non-technical users and vice versa; clear writing and speaking.
Active Listening	Carefully listening to user needs, concerns, and feedback without interruption.
Team Collaboration	Working well with cross-functional teams — users, developers, testers, managers.
Problem-Solving	Finding creative solutions to business or system issues.
Negotiation Skills	Resolving conflicts between stakeholders with different goals.
Leadership & Facilitation	Leading meetings, guiding discussions, and facilitating workshops.
Adaptability	Adjusting to changing requirements, team structures, or technology.
Empathy	Understanding user frustrations and expectations to improve system usability.

✅ Skills of a System Analyst

- 🛠️ **2. Technical Skills (Hard Skills)**

Skill	Description
Systems Analysis & Design	Knowledge of SDLC, UML, DFDs, ERDs, use cases, and modeling tools.
Database Knowledge	Understanding of relational databases (SQL, normalization, ER modeling).
Programming Fundamentals	Familiarity with programming logic, even if not writing full code.
Business Process Modeling	Creating diagrams and models to represent workflows (e.g., BPMN, flowcharts).
Software Development Tools	Using CASE tools, project tracking systems, and version control systems.
Requirements Engineering	Eliciting, documenting, and validating requirements using standard methods.
Testing & QA Basics	Designing test cases, participating in UAT, understanding system validation.
Cybersecurity Awareness	Understanding data privacy, access control, and basic security principles.
Technical Writing	Creating clear documentation such as SRS, user manuals, and system specs.

🎯 Example in Action

- A system analyst gathers requirements for a hospital management system.
- Uses **interpersonal skills** to communicate with doctors, nurses, and admin staff.
- Uses **technical skills** to model patient workflow, design database tables, and prepare requirement specs.

🧠 Interpersonal & Technical Skills Across SDLC Phases

SDLC Phase	Interpersonal Skills Needed	Technical Skills Needed
1. Recognition of Need	- Active listening to users- Empathy- Communication with stakeholders	- Problem identification techniques- Basic system knowledge
2. Feasibility Study	- Negotiation with stakeholders- Presentation skills- Analytical reasoning	- Cost-benefit analysis- Risk analysis- Tech viability check
3. Requirements Analysis	- Interviewing & questioning- Documentation- Conflict resolution	- Requirements engineering- Use of modeling tools (DFD, UML)
4. System Design	- Team collaboration- Clarifying feedback- Clear reporting	- System architecture design- Database and interface design tools
5. Development (Coding)	- Coordination between analysts and developers- Agile communication	- Programming skills- Version control- Integration planning
6. Testing	- Patience and detail-oriented communication- Explaining errors clearly	- Test plan writing- Automated/manual testing- Bug tracking
7. Implementation	- Training users- User support- Change management leadership	- Deployment scripting- System configuration- Backup planning
8. Maintenance	- Feedback handling- Helpdesk communication- Issue escalation	- Debugging- System updates- Performance tuning

🎯 Why This Matters

Skill Type	Why It’s Important in SDLC
Interpersonal	Ensures smooth collaboration, user satisfaction, and accurate requirement gathering
Technical	Ensures that the system is properly designed, implemented, tested, and maintained

🧑‍💻 Example

In the **Requirements Analysis Phase**:

- The **analyst** must communicate with users (interpersonal) to gather correct needs.

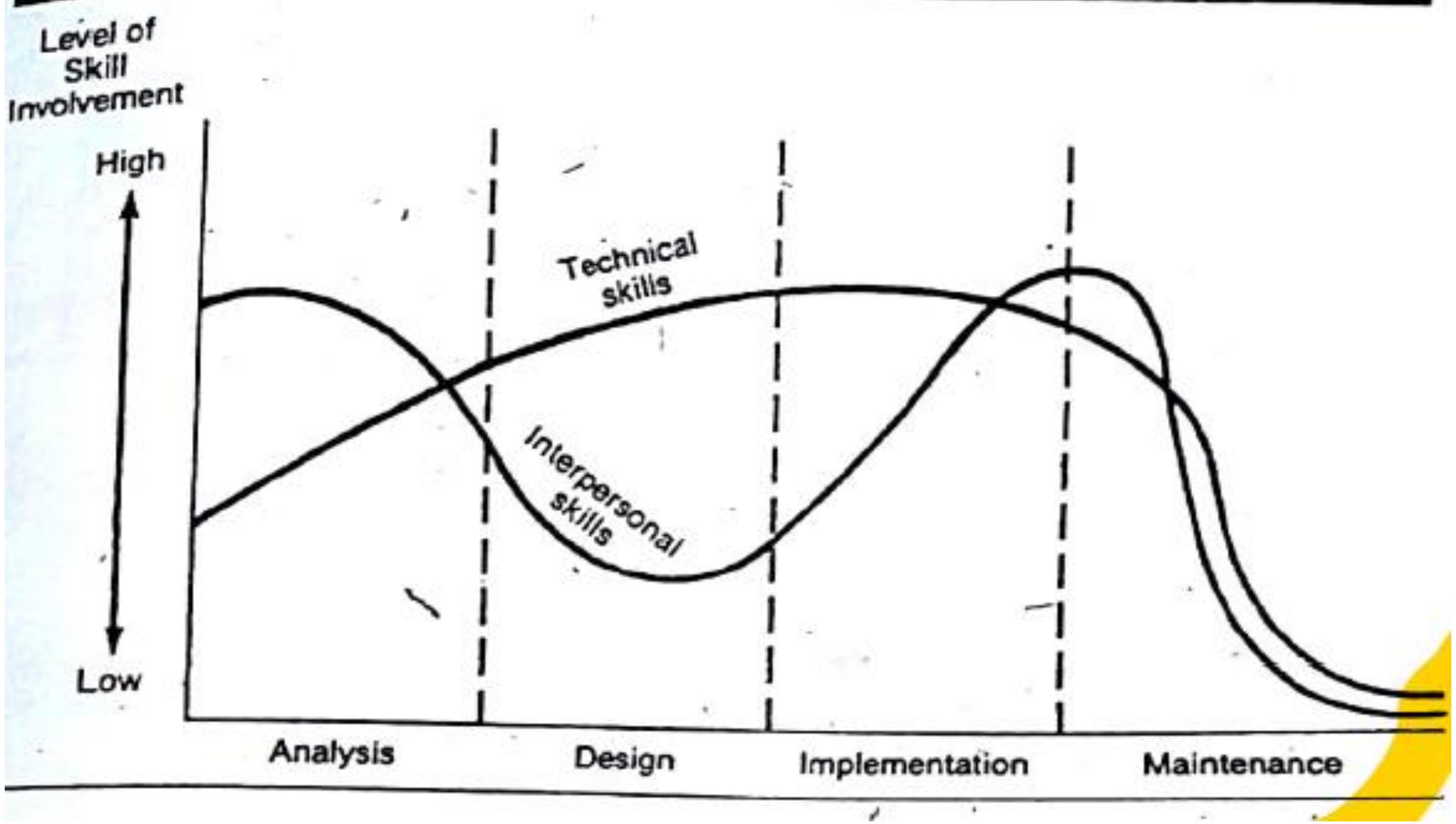
Then, they must draw **DFDs and ER diagrams** (technical) to document the system accurately.

✅ Skill Importance by SDLC Phase

SDLC Phase	Dominant Skill Needed	Explanation
1. Recognition of Need	Interpersonal	Requires communication, active listening, and stakeholder engagement to understand problems or opportunities.
2. Feasibility Study	Balanced	Both are critical: interpersonal for presenting findings, and technical for cost-benefit, risk, and technical analysis.
3. Requirements Analysis	Interpersonal	Gathering accurate requirements from users requires interviewing, empathy, negotiation, and documentation skills.
4. System Design	Technical	Requires strong technical knowledge in architecture, database design, UI/UX, and system specifications.
5. Development (Coding)	Technical	Involves programming, software tools, frameworks, and system integration — deeply technical work.
6. Testing	Technical	Requires test planning, bug tracking, and use of testing tools; though communication with testers/users also helps.
7. Implementation	Interpersonal	User training, communication, change management, and support skills are essential.
8. Maintenance	Balanced	Requires technical debugging skills and interpersonal communication to respond to user feedback and issues.

✅ Skill Importance by SDLC Phase

FIGURE 3-1 Interpersonal and Technical Skills Necessary in System Development



✅ Skill Importance by SDLC Phase

Phase	Interpersonal Focus	Technical Focus	Most Needed Skill Type
Recognition of Need	✅ High	❌ Low	Interpersonal
Feasibility Study	✅ Medium	✅ Medium	Balanced
Requirements Analysis	✅ High	❌ Low	Interpersonal
System Design	❌ Low	✅ High	Technical
Development	❌ Low	✅ High	Technical
Testing	❌ Medium	✅ High	Technical
Implementation	✅ High	❌ Medium	Interpersonal
Maintenance	✅ Medium	✅ Medium	Balanced

🎓 Multifaceted Role of a System Analyst

- A **System Analyst** plays a **multifaceted role** because they must act as a **bridge between business and technology**, fulfilling multiple responsibilities that span communication, analysis, design, coordination, and sometimes even management.
- 🧩 **1. Investigator and Problem Solver**
- **Analyzes the existing system** to find problems, inefficiencies, or missed opportunities.
- **Investigates business needs**, user complaints, and operational goals.
- Uses techniques like interviews, observations, and document analysis.
- 📌 *Example:* Identifying bottlenecks in a hospital appointment system.

🎓 Multifaceted Role of a System Analyst

- 📋 **2. Requirements Analyst**
- Gathers, organizes, and documents **functional and non-functional requirements**.
- Works closely with stakeholders to **translate user needs into technical specifications**.
- 📌 *Example:* Defining user login, report generation, and access control features.
- 🏗 **3. System Designer**
- Converts requirements into **logical and physical designs**.
- Prepares **data flow diagrams (DFD)**, **ER diagrams**, screen layouts, and database designs.
- 📌 *Example:* Designing a centralized inventory database for a retail chain.

🎓 Multifaceted Role of a System Analyst

- 🔄 **4. Change Agent**
- Helps **manage organizational change** due to new systems.
- Addresses **user resistance**, conducts **training**, and promotes system acceptance.
- 📌 *Example:* Leading training sessions for staff after deploying an HR automation tool.
- 👥 **5. Communicator and Liaison**
- Acts as a **link between users and developers**.
- Explains technical details to non-technical stakeholders and vice versa.
- 📌 *Example:* Clarifying end-user concerns to software developers.

🎓 Multifaceted Role of a System Analyst

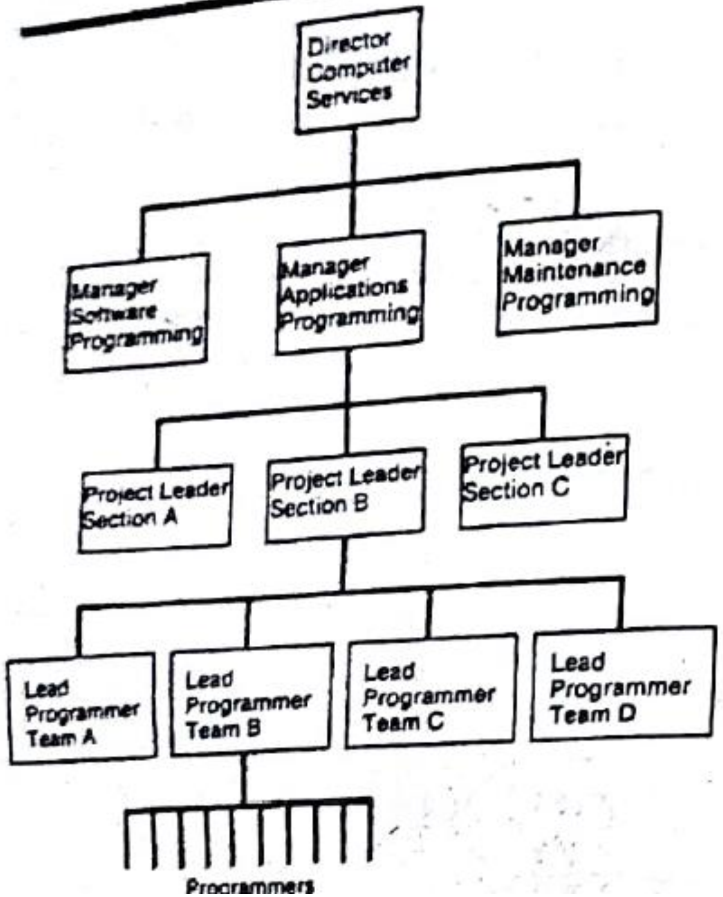
- 📊 **6. Project Coordinator**
- Coordinates with cross-functional teams during the **development lifecycle**.
- Tracks project progress, **timelines**, and **deliverables**.
- 📌 *Example:* Scheduling requirement validation meetings with both users and the development team.
- 🛠️ **7. Technical Advisor**
- Provides input on **technology choices**, platforms, tools, and system architecture.
- Assists in **evaluating technical feasibility** of solutions.
- 📌 *Example:* Recommending cloud deployment instead of on-premises for scalability.

🎓 Multifaceted Role of a System Analyst

- 🧪 **8. Tester and Quality Validator**
- Participates in **system testing**, **UAT (User Acceptance Testing)**, and validation.
- Ensures that the final system **meets the original requirements** and functions correctly.
- 📌 *Example:* Verifying that the invoice system correctly applies tax calculations.
- 📖 **9. Documentation Specialist**
- Prepares **user manuals**, **technical documentation**, and **training guides**.
- Ensures future maintainers can understand and update the system easily.
- 📌 *Example:* Writing a step-by-step user guide for a library system.

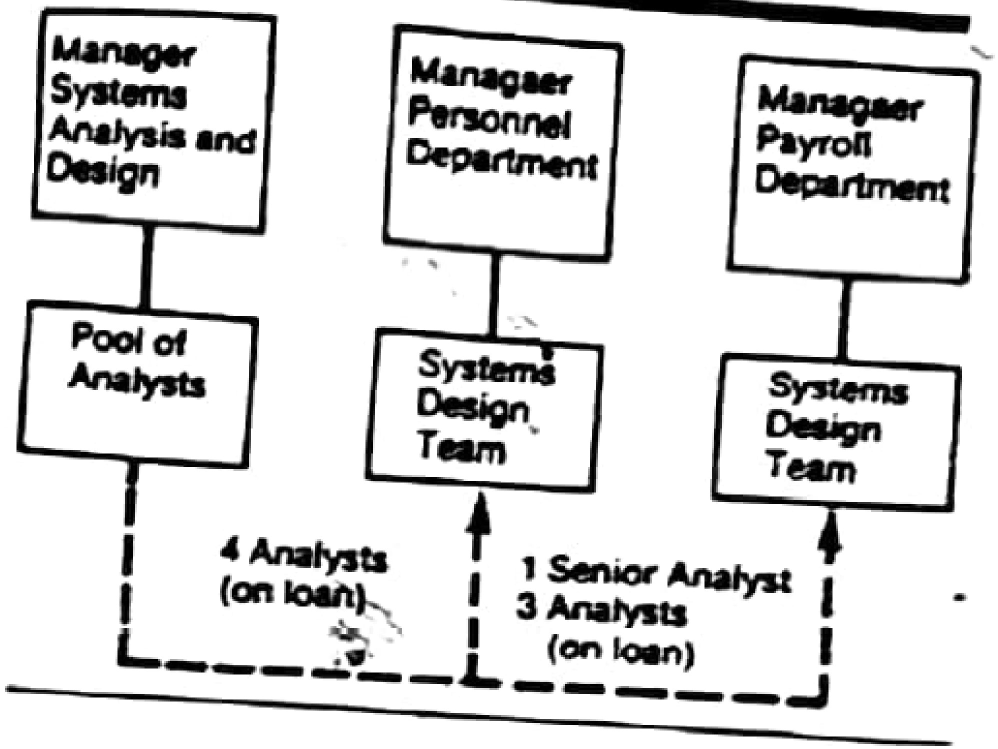
Organizational structures related to the System Analyst's role

FIGURE 3-6 A Team-Oriented Structure of Programmers



Organizational structures related to the System Analyst’s role

Figure 3–4 A Pool-Oriented Structure of Systems Analysis



Manager Systems Analysis and Design

Managaer Personnel Department

Managaer Payroll Department

Pool of Analysts

Systems Design Team

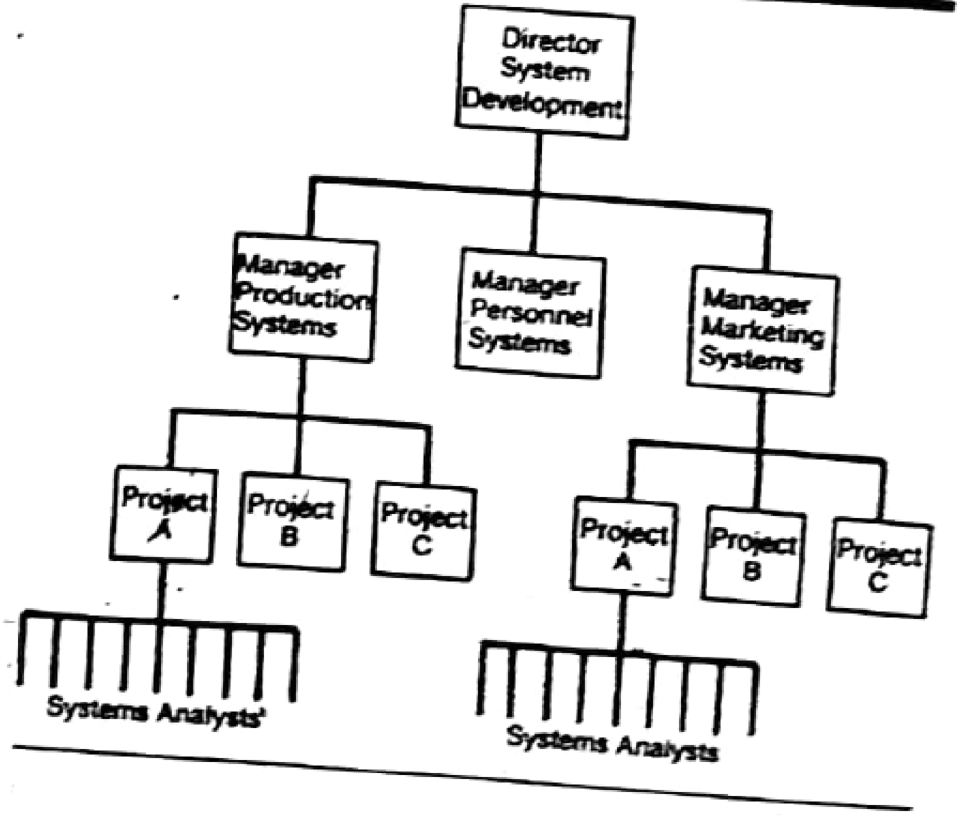
Systems Design Team

4 Analysts (on loan)

1 Senior Analyst
3 Analysts
(on loan)

Organizational structures related to the System Analyst’s role

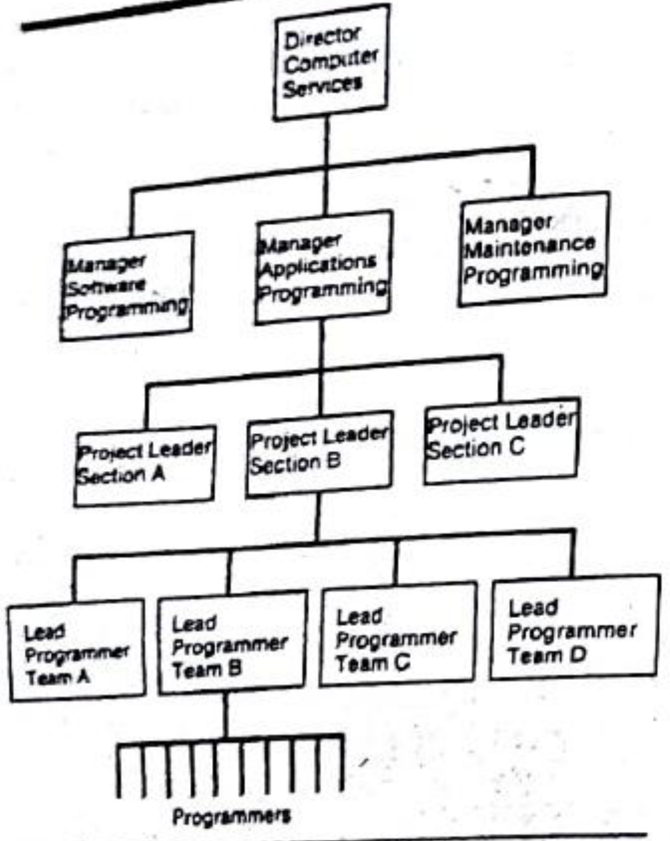
FIGURE 3–5 A Functional Structure of Systems Analysis


Director System Development
Manager Production Systems
Manager Personnel Systems
Manager Marketing Systems
Project A
Project B
Project C
Project A
Project B
Project C
Systems Analysts'
Systems Analysts

Organizational structures related to the System Analyst’s role

(see Figure 3-

FIGURE 3-6 A Team-Oriented Structure of Programmers



Director Computer Services

Manager Software Programming

Manager Applications Programming

Manager Maintenance Programming

Project Leader Section A

Project Leader Section B

Project Leader Section C

Lead Programmer Team A

Lead Programmer Team B

Lead Programmer Team C

Lead Programmer Team D

Programmers

🏢 Structures of System Analyst Roles

Structure Type	Definition	Functions	Example
1. Project-Oriented	Analysts are assigned full-time to individual projects. Teams are formed per project.	- Full dedication to one project- Analyst leads requirement gathering, design, support- Cross-functional team	A system analyst is assigned to develop a new hospital management system, working only on this task.
2. Pool-Oriented	Analysts are placed in a central pool and assigned to multiple projects as needed.	- Shared resource model- Analysts may work part-time on many projects- Called in during specific project phases	A system analyst supports multiple departments: HR, Finance, and Sales on their IT initiatives.
3. Functional-Oriented	Analysts belong to a department and support projects within that function only (e.g., HR, Finance).	- Analyst has deep domain knowledge- Long-term involvement with one department- May support many small systems	A system analyst works exclusively with the Finance department to support budget tracking systems.

📊 Comparison Table of Structure Types

Feature	Project-Oriented	Pool-Oriented	Functional-Oriented
Primary Focus	Single project	Multiple projects	Specific department function
Resource Allocation	Full-time, dedicated	Shared (on-demand)	Long-term departmental association
Flexibility	Medium	High	Low
Project Control	High	Moderate	Low
Domain Knowledge Depth	Medium	Low to medium	High
Skill Utilization	Efficient for complex tasks	Broad exposure, multitasking	Deep specialization
User Relationship	Close to end users	Varies across projects	Strong with department users
Best For	Large/critical one-time projects	Organizations with many small projects	Ongoing support within departments

Thank you!