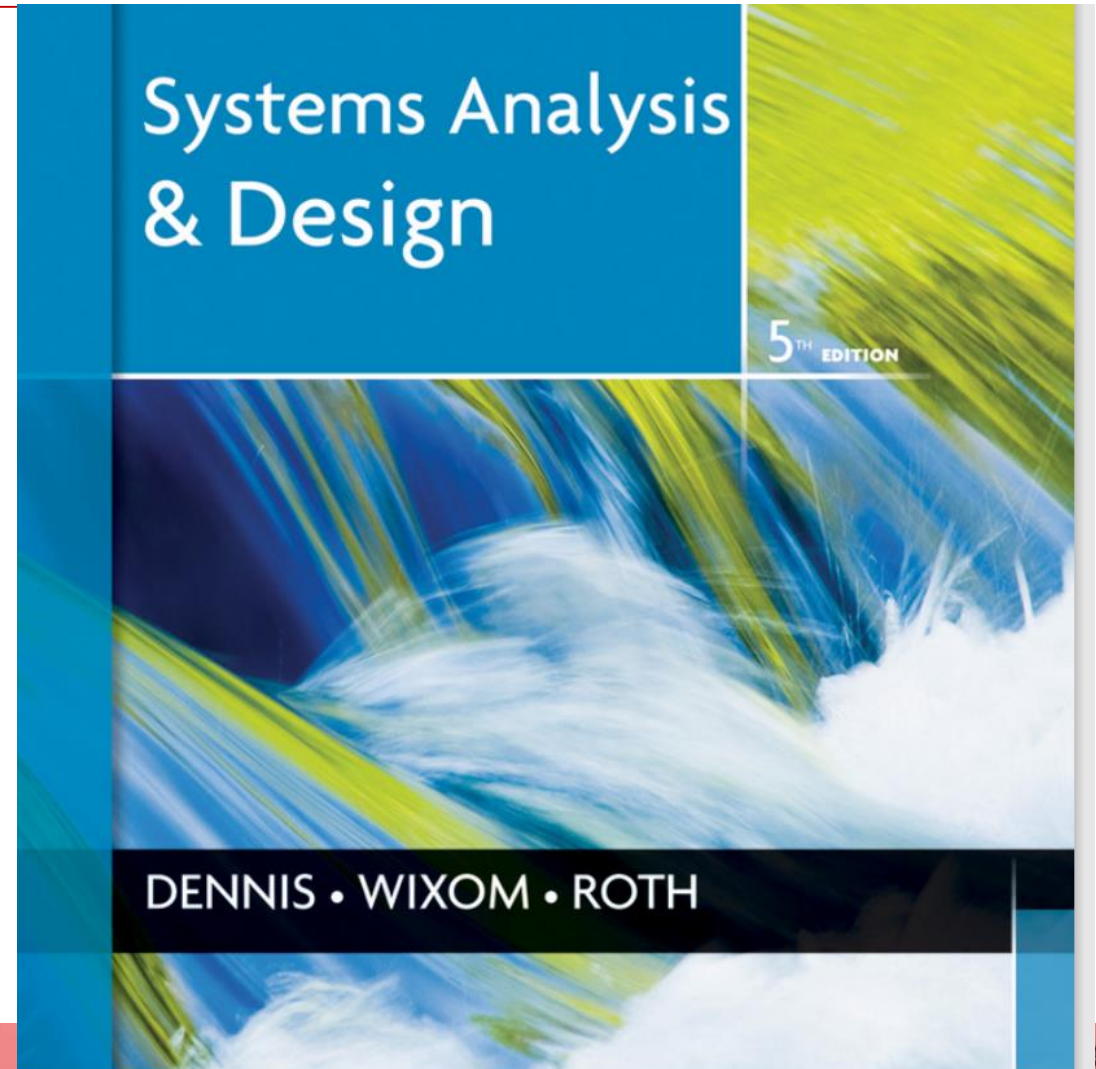




THE SYSTEM ANALYST AND INFORMATION SYSTEM DEVELOPMENT

Lecture 1

Recommended Text



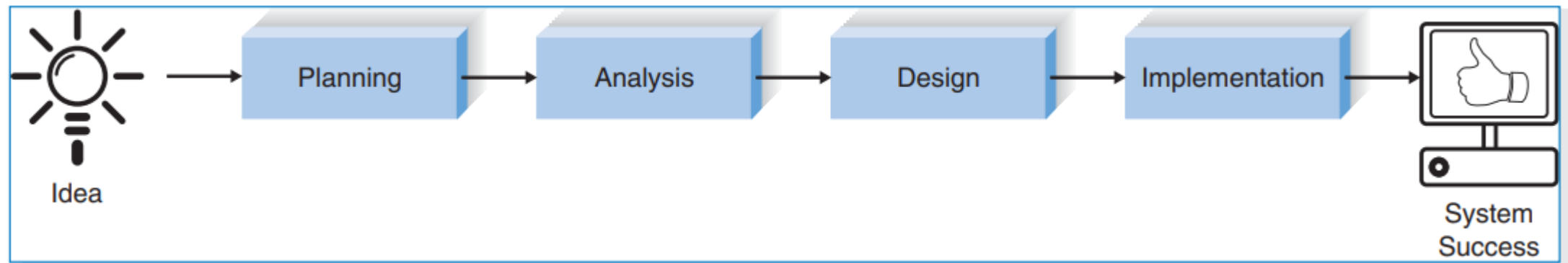
Learning Objectives

At the end of this lesson, students should have understanding of:

- the key roles of a systems analyst in business in system development
- the importance of technical skills, people skills, and business skills for an analyst
- the various types of tools and technologies an analyst might use
- various job titles in the field and places of employment where analysis and design work is done
- differentiate between methodology, tools and techniques

The System Development Life Cycle

- The systems development life cycle (SDLC) is the process of determining how an information system (IS) can support business needs, designing the system, building it, and delivering it to users.



- Figure 1: System Development Life Cycle

The Planning Phase

- The planning phase is the fundamental process of understanding why an information system should be built and determining how the project team will go about building it. It has two steps:
 - 1) During project initiation, the system's business value to the organization is identified—how will it lower costs or increase revenues?
 - 2) Project management

The Planning Phase - Initiation

- A system request which indicates a brief summary of a business need, and how a system that supports the need will create business value is presented
- The IS department works together with the person or department generating the request (called the project sponsor) to conduct a feasibility analysis.
- The feasibility analysis examines key aspects of the proposed project:
 - The technical feasibility (Can we build it?)
 - The economic feasibility (Will it provide business value?)
 - The organizational feasibility (If we build it, will it be used?)

The Planning Phase - **Initiation**

- **Example of Costs and Benefits for Economic Feasibility**

Development Costs	Operational Costs
Development team salaries	Software upgrades
Consultant fees	Software licensing fees
Development training	Hardware repairs
Hardware and software	Hardware upgrades
Vendor installation	Operational team salaries
Office space and equipment	Communications charges
Data conversion costs	User training
Tangible Benefits	Intangible Benefits
Increased sales	Increased market share
Reductions in staff	Increased brand recognition
Reductions in inventory	Higher quality products
Reductions in IT costs	Improved customer service
Better supplier prices	Better supplier relations

The Planning Phase - **Initiation**

- **Technical Feasibility**
 - Users' and analysts' familiarity with the application
 - Familiarity with the technology
 - Project size
- **Organizational Feasibility**
 - Strategic alignment
 - Stakeholder analysis
 - System users

*The Planning Phase – **Project Management***

- The project manager creates a work plan, staffs the project, and puts techniques in place to help the project team control and direct the project through the entire SDLC

Analysis Phase

- **System Analysis** – is the process of understanding and specifying in detail what an information system should accomplish.
- System analysis is all about
 - understanding the business and its goals and strategies,
 - defining requirements for information systems that support those goals and strategies and
 - supporting the business.

Analysis Phase

- The analysis phase answers the questions of
 - who will use the system, what the system will do, and where and when it will be used.
- Steps in the Analysis Phase
 - A guide for the study of the current system (analysis strategy)
 - Requirement gathering
 - System proposal (analyses, system concept, and models combined) it is the high-level initial design

Design Phase

- After the systems analyst has determined the best solution in consultation with management, the design details must then be worked out.
- Analyst is now concerned with creating a blueprint (design specifications) for how the new system will work.
- **Systems design specifications**
 - describe the construction details of all parts of the system, including
 - databases,
 - program modules,
 - user interfaces,
 - networks,
 - operating procedures, and
 - conversion plans.

Design Phase

- **Systems Design –**

- Specifying in detail how the many components of an information system should be physically implemented.

- **Steps in the Design Phase**

- Design strategy: in-house or outsourced
- Basic architecture design: describes the hardware, software, and network infrastructure
- Database and file specifications
- Program design

Implementation Phase

- After detailed design, then comes programming.
- Building a system based on incomplete or misunderstood requirements may lead to
 - **over budgeting,**
 - **late delivery,**
 - or delivery of a system that **doesn't fully solve the problems it was intended to address.**

Implementation Phase

- In implementation phase, the system is actually built. It is the longest and most expensive single part of the development process.
- Steps in the implementation Phase
 - System construction
 - Installed
 - Support

Who is a Systems Analyst ?

- **Systems analyst –**

- A business professional who uses analysis and design techniques to solve business problems using information technology.
- Requires extensive technical, business, and people knowledge and skills to solve business problems.
- Essentially a system analyst is a **problem solver**.
- The systems analyst works closely with all project team members so that the team develops the right system in an effective way.

How does an analyst solve problems?

- The analyst must
 - **first understand the problem and learn everything possible about it—**
 - who is involved, what business processes come into play, and what other systems would be affected by solving the problem.
- Then the analyst needs to confirm from management that the **benefits of solving the problem outweigh the costs.**

Analyst Approach to Problem Solving

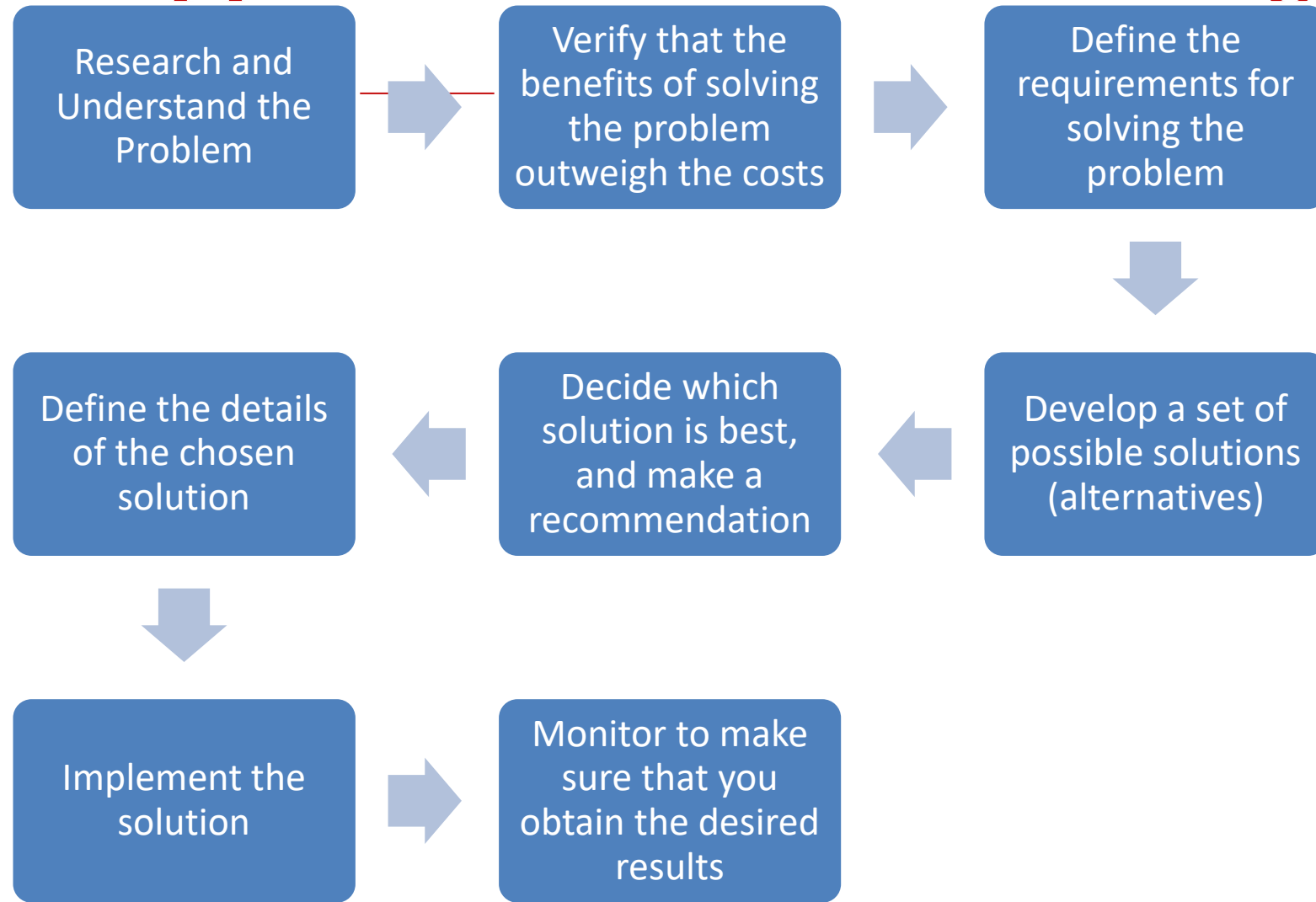


Figure 1: Analyst Approach to Solving Problems

How does an analyst solve problems? (Cont'd)

- If solving the problem is feasible, the analyst defines in detail **what is required to solve it**—
 - what specific objectives must be satisfied,
 - what data needs to be stored and used,
 - what processing must be done to the data, and what outputs must be produced.
- *What needs to be done* must be defined first. *How it will be done is not important yet.*
- Many different alternatives must be considered, and the challenge is to select the best
 - that is, the solution with the fewest risks and most benefits.

Required skills of systems analysts

- They need to be able to understand
 - how to build information systems, which requires quite a bit of **technical knowledge**.
 - the **business** they are working for and how the business uses each of the types of systems.
 - quite a bit about **people** and the way they work.
- People are the source of information about requirements, the labour that builds systems, and the ultimate users of the information system.

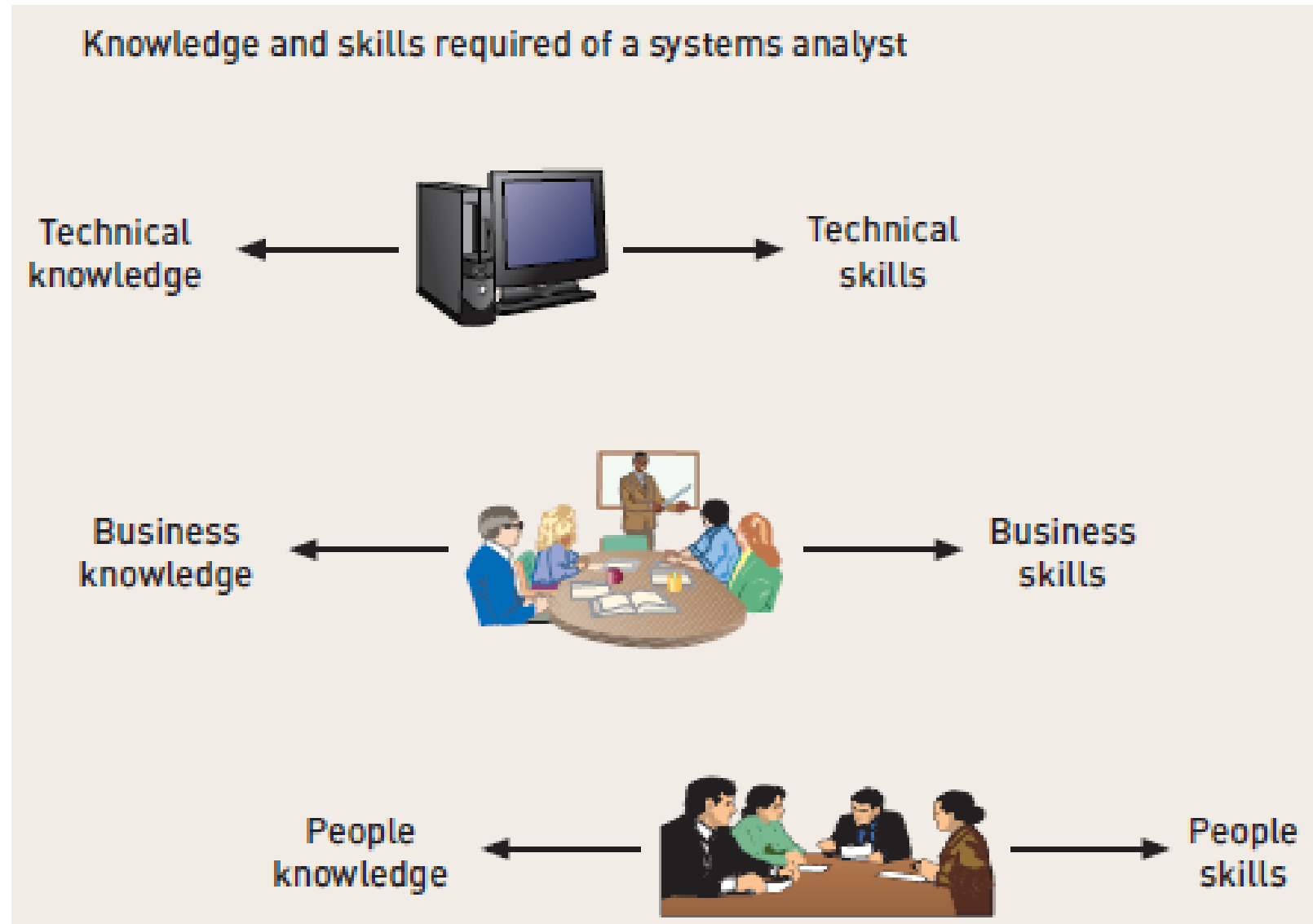


Figure 4: Required skills of system analyst

Technical knowledge and skills.

- Systems analyst needs technical expertise.
- Even if an analyst is not involved in activities such as programming, network design, or hardware configuration, it is still crucial to have an understanding of different types of technology— what they are used for, how they work, and how they are evolving.

Technical knowledge and skills (Cont'd)

- A systems analyst should understand the fundamentals about the following:
 - **tools and techniques** for developing systems.
 - File, database, and storage hardware and software
 - Input and output hardware and software
 - Computer networks and protocols
 - Programming languages, operating systems, and utilities
 - Communication and collaboration technology such as digital telephones, videoconferencing, and Web-based document management systems

Technical knowledge and skills (Cont'd)

- **Techniques** are strategies for completing specific system development activities.
 - How do you plan and manage a system development project?
 - How do you define requirements?
 - How do you design user interactions using design principles and best practices?
 - How do you complete implementation and testing?
 - How do you install and support a new information system?

Technical knowledge and skills (Cont'd)

- Some examples of techniques include the following:
 - Project planning techniques
 - Cost/benefit analysis techniques
 - Interviewing techniques
 - Requirements modeling techniques
 - Architectural design techniques
 - Network configuration techniques
 - Database design techniques

Technical knowledge and skills (Cont'd)

- Some tools used in system development include the following:
 - Software packages such as
 - Microsoft Access, and Adobe Dreamweaver that can be used to implement small systems or develop subsystems
 - Integrated development environments (IDEs) such as
 - Oracle JDeveloper and Microsoft Visual Studio that support program development, database design, software testing, and system deployment.
 - Computer-aided visual modelling tools, such as
 - Rational XDE Modeler, Visible Analyst, and Embarcadero Describe, that help analysts create, store, modify, and manage system specifications and sometimes generate programs, databases, Web-based interfaces, and other software components.

Business knowledge and skills

- The problem to be solved is a business problem.
- What does the analyst need to know?
- The following are examples:
 - What business functions do organizations perform?
 - How are organizations structured?
 - How are organizations managed?
 - What type of work goes on in organizations (finance, manufacturing, marketing, customer service, and so on)

Business knowledge and skills Cont'd

- Some specifics the analyst needs to know about the company include the following:
 - What the specific organization does
 - What makes it successful
 - What its strategies and plans are
 - What its traditions and values are

Best Practices

- *Be sure you understand the organization, its culture, its mission, and its objectives before jumping to conclusions about system solutions.*

People knowledge and skills

■ **Interpersonal skills**

- are the analyst's most important skills, because analysts rely on others, including managers, users, programmers, technical specialists, customers, and vendors, to take a system from initial idea to final implementation.
- The analyst is a translator for all project participants, translating
 - business objectives into functional requirements,
 - user needs into system specifications, and
 - technical jargon and details into terms that nontechnical personnel can easily understand.
- The analyst must be an effective communicator in many contexts, including conversations, interviews, technical reviews, and formal presentations.

People knowledge and skills Cont'd

Best Practice

- Analysts typically devote several weeks per year to training and continuing education.
- An analyst should devote time to developing so-called “**soft skills**”
 - such as interviewing, team management, and leadership,
- and should develop **hard skills** such as
 - database design, programming, and telecommunications.
- Analyst should be a person of integrity and maintain ethics of the profession due to numerous secret information at his/her disposal.

Technical knowledge and skills (Cont'd)

- A systems analyst also needs to know a lot about **tools** and **techniques** for developing systems.
- **Tools**
 - are software products that are used to develop analysis and design specifications and completed system components.
- **Techniques**
 - are strategies for completing specific system development activities.

Methodologies, Models, Tools and Techniques

- System analysts have a variety of aids at their disposal to help them complete activities and tasks in the SDLC.
- Among them are *methodologies, models, tools, and techniques*.

METHODOLOGIES

- A **system development methodology** provides guidelines to follow for completing every activity in the systems development life cycle, including specific models, tools, and techniques.

Methodology Cont'd

- Methodologies contain written documentation. The documentation defines everything the developers might need to produce at any point in the project, including how documentation should look and what reports to management should contain.
- Methodology contains instructions about how to use models, tools, and techniques.
- Various models are often called “methodology”

Models

- Anytime people need to record or communicate information, in any context, it is very useful to create a model and a model in information systems development has the same purpose as any other model.
- A **model** is a representation of an important aspect of the real world.
- Sometimes the term ***abstraction*** is used because we *abstract (separate out) an aspect of particular importance* to us.

Models Cont'd

- Some models are physically similar to the real product.
- Some models are graphical representations of important details.
- Some models are abstract mathematical notations. Each emphasizes a different type of information.

Models Cont'd

- Models used in system development include **representations of inputs, outputs, processes, data, objects, object interactions, locations, networks, and devices, among other things.**
- Most of the models are graphical models, which are drawn representations that employ agreed-upon symbols and conventions. These are often called ***diagrams and charts.***

Some models of system components

Flowchart

Data flow diagram (DFD)

Entity-relationship diagram (ERD)

Structure chart

Use case diagram

Class diagram

Sequence diagram

Some models used to manage the development process

Gantt chart

Organizational hierarchy chart

Financial analysis models – NPV, ROI

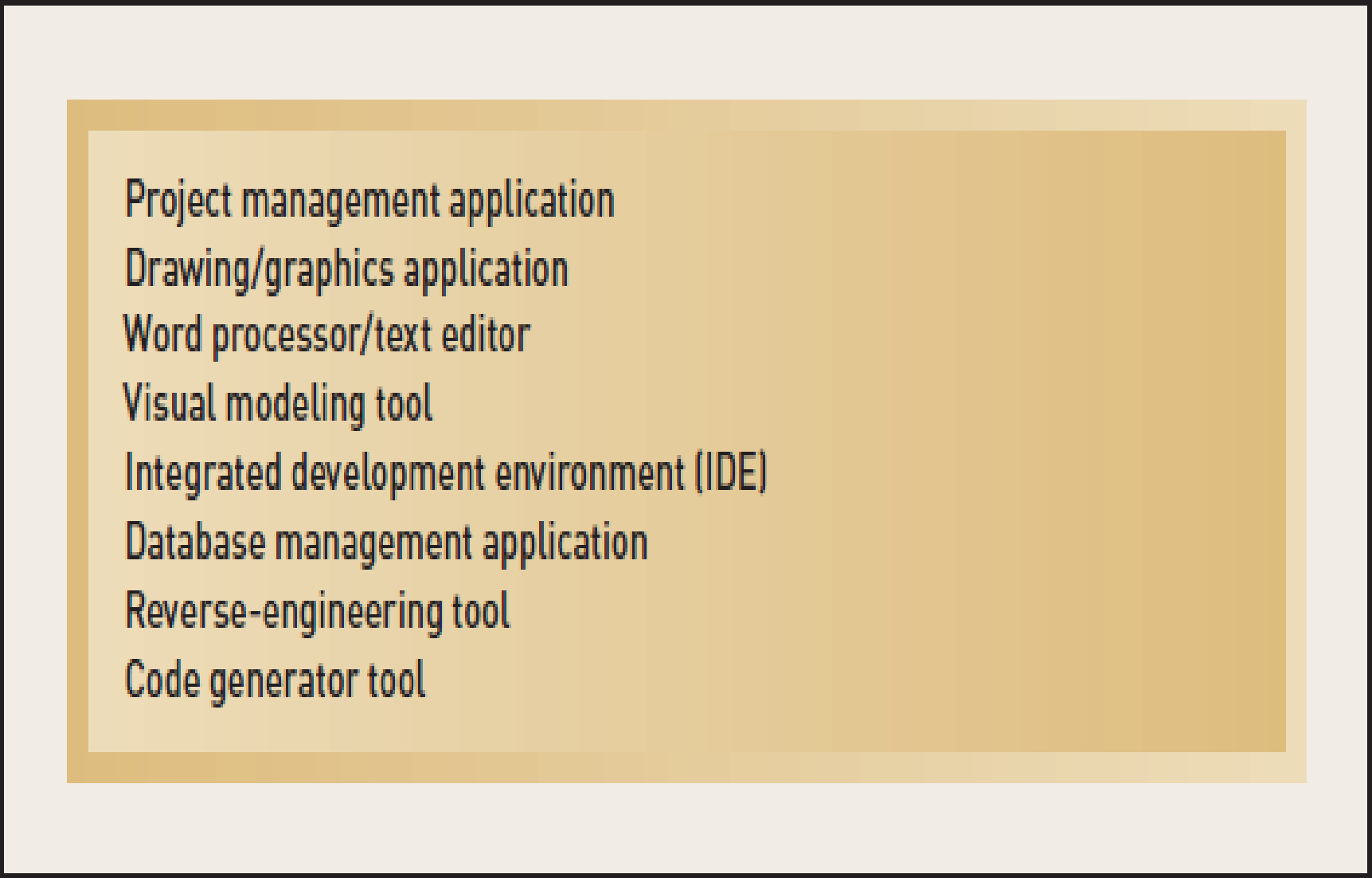
Figure 2: Some models used in system development

Tools

- **A tool in the context of system development is software support that helps create models or other components required in the project.**
- Tools might be simple drawing programs for creating diagrams.

Tools Cont'd

- Tools have been specifically designed to help system developers. Programmers should be familiar with **integrated development environments (IDEs)** that include many tools to help with programming tasks—smart editors, context-sensitive help, and debugging tools. Some tools can generate program code for the developer.




Project management application
Drawing/graphics application
Word processor/text editor
Visual modeling tool
Integrated development environment (IDE)
Database management application
Reverse-engineering tool
Code generator tool

Figure 4: Some tools used in system development

Techniques

- A **technique** in system development is a **collection of guidelines that help an analyst complete a system development activity or task.**
- A technique often includes step-by-step instructions for creating a model, or it might include more general advice for collecting information from system users.
- Some examples include data-modeling techniques, software-testing techniques, user-interviewing techniques, and relational database design techniques.



Strategic planning techniques
Project management techniques
User interviewing techniques
Data-modeling techniques
Relational database design techniques
Structured analysis technique
Structured design technique
Structured programming technique
Software-testing techniques
Object-oriented analysis and design techniques

Figure 3 : Some techniques used in system development

Techniques Cont'd

- How do all these components fit together?
- A **methodology** includes a collection of **techniques** that are used to complete activities within each phase of the systems development life cycle.
- The activities include completion of a variety of **models** as well as other documents and deliverables. Like any other professional, system developers use software **tools** to help them complete their activities.

Some Job Titles

Here are some job titles you might encounter:

- ✓ Programmer analyst
- ✓ Business systems analyst
- ✓ System liaison
- ✓ End-user analyst
- ✓ Business consultant
- ✓ Systems consultant
- ✓ Systems support analyst
- ✓ Systems designer
- ✓ Software engineer
- ✓ Web architect
- ✓ Webmaster
- ✓ Web developer

Review Questions

1. Give an example of a business problem.
2. What are the main steps followed when solving a problem?
3. List the six fundamental technologies an analyst needs to understand.
4. List four types of tools the analyst needs to use to develop systems.
5. List five types of techniques used during system development.
6. What are some of the things an analyst needs to understand about businesses and organizations in general?
7. What are some of the things an analyst needs to understand about people?
8. List 10 job titles that involve analysis and design work.