

Information engineering

DATA, INFORMATION AND THE SDLC

B Holland

Introduction

Information

“Information is data that have been shaped into a form that is meaningful and useful to human beings.”

“Information is data processed for a purpose.”

“Information is data that has been processed in such a way as to be meaningful to the person who receives it.”

Information is *“some tangible or intangible entity that reduces uncertainty about some state or event”*.

“Information is data that has been put into context”



The Qualities of Good Information

Accurate

Complete

Cost-beneficial

User-targeted

Relevant

Authoritative

Timely

Easy to use



Systems and Information Systems

A system is defined by **Chaffey et al** as '*a collection of interrelated components that work together towards a collective goal*'.

The function of a system is to receive inputs and transform these into outputs. It can be said that data is used as the **input** for a **process** that creates information as an **output**.



A basic model of the transformation process

Information Systems

Chaffey et al define an information system as:

- *“a group of interrelated components that work collectively to carry out input, processing, output, storage and control actions in order to convert data into information products that can be used to support forecasting, planning, control, co-ordination, decision making and operational activities in an organisation”.*

OR:

- *“A system designed to produce information that can be used to support the activities of managers and other workers.”*

Does This Make Sense What is it ?

Male	Yes
Female	No
Male	Yes
Male	No
Female	Yes
Female	No
Male	Yes
Female	Yes
Male	No
Male	Yes
Female	Yes
Female	No
Female	No
Male	Yes

Now We have Some Information

Students who drink coffee	
Gender	Response
Male	Yes
Female	No
Male	Yes
Male	No
Female	Yes
Female	No
Male	Yes
Female	Yes
Male	No
Male	Yes
Female	Yes
Female	No
Female	No
Male	Yes

What is Information Systems Analysis and Design?

- The analysis and design of computer-based information systems began in the 1950s. Since then, the development environment has changed dramatically, driven by organizational needs as well as by rapid changes in the technological capabilities of computers
- A method used by companies to create and maintain systems that perform basic business functions
- Main goal is to improve employee efficiency by applying software solutions to key business tasks
- A structured approach must be used in order to ensure success



The Systems Development Lifecycle (SDLC)

In the early days of computing;

- systems development was piecemeal.
- involved automation of existing procedures rather than forming part of a planned strategy.

The development of systems was *not properly planned*.

Consequently;

- systems were poorly designed
- cost too much to make
- not suited to users' needs.

The Systems Development Lifecycle (SDLC)

These problems led to the development of *linear* systems development lifecycle models

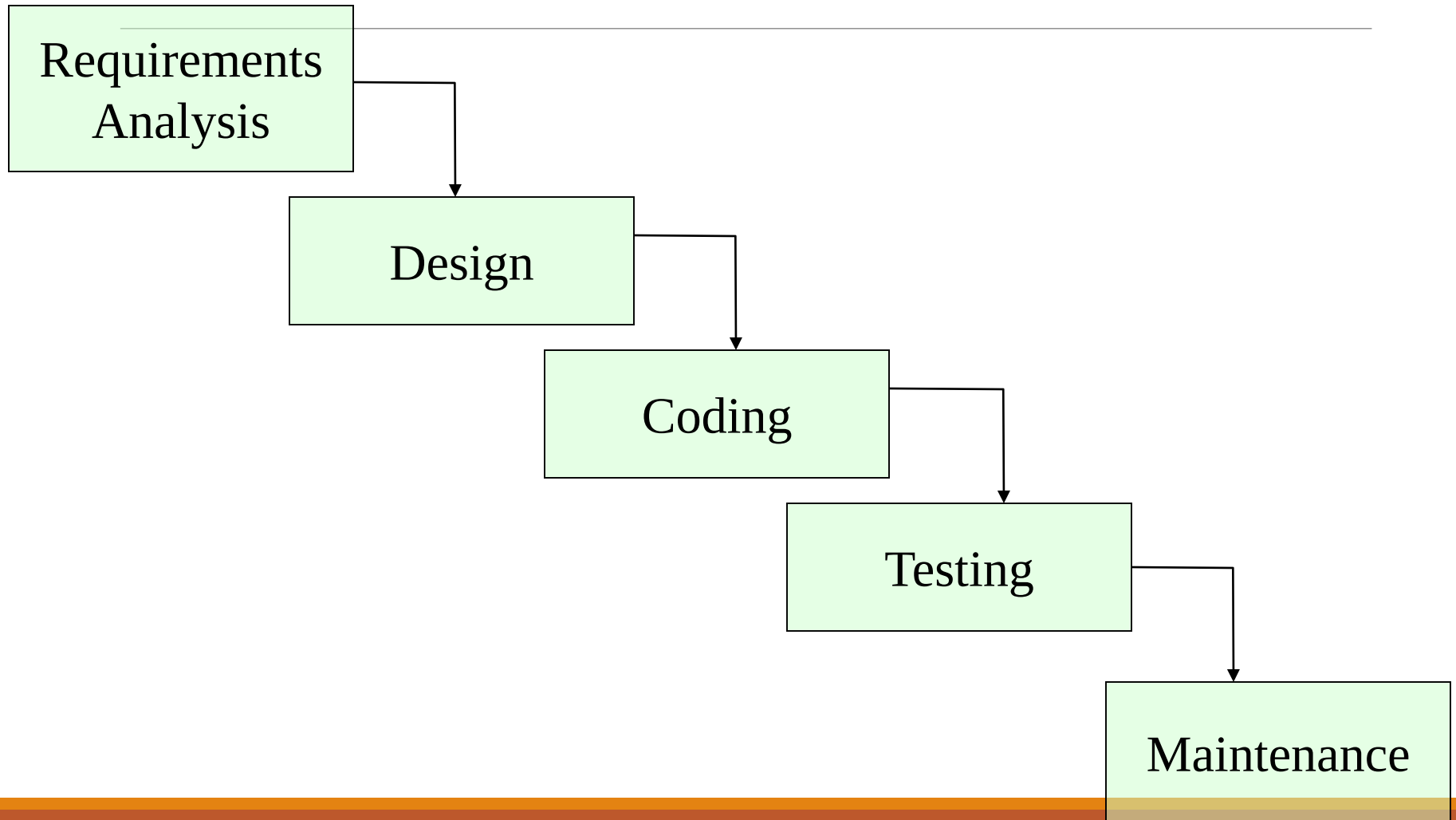
Examples include;

- the National Computing Centre model (in the 1960's)
- Royce's 'Waterfall' model (in the 1970's).

Linear models suggest that analysts must first define the problem to be solved and then use an ordered set of steps to reach a solution.



Waterfall Model



The Systems Development Lifecycle (SDLC)

Numerous linear models have since been developed each viewing the development process as a set of predefined steps (or sequence of tasks) for building a system.

Such *structured* and *traditional* approaches to systems development identify several differently named stages of development, although all conform to four basic phases.

SDLC

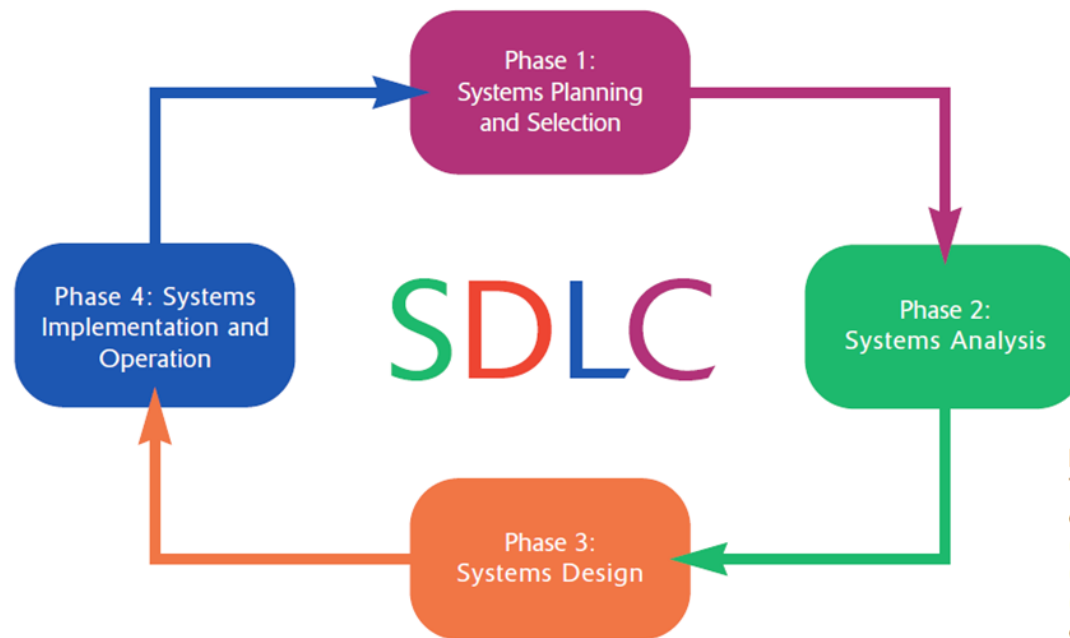


FIGURE 1-1

The four steps of the systems development life cycle (SDLC): (1) planning and selection, (2) analysis, (3) design, and (4) implementation and operation.



Steps In The SDLC

Phase 1 - Concept

Identification of problem or opportunity

- **Purpose:** Determine current problems & set scope and objectives of new system
- **Key activities:** Brief review of existing system, identification of constraints
- **Input:** brief opinions of managers/users/analyst
- **Output:** *Statement of scope and objectives*

Steps In The SDLC

Phase 1 - Concept

Feasibility study

- **Purpose:** Determine if the system is worth doing and can be done
- **Key activities:** Technical/operational/economic feasibility (cost/benefit analysis)
- **Input:** Idea for new system or problem(s) with existing system
- **Output:** Feasibility study, recommendation to proceed.

Steps In The SDLC

Phase 2 - Analysis

Systems investigation

- **Purpose:** Identify current problems/restrictions & what users want from new system
- **Key activities:** investigation/fact finding techniques, diagramming and recording
- **Input:** User's opinions/requirements, system documentation, observation
- **Output:** Documentation of investigation findings (e.g. data flow diagrams, use case diagrams)

Steps In The SDLC

Phase 2 - Analysis

Systems analysis

- **Purpose:** Identify *what* the new system must/will do (requirements)
- **Key activities:** Consider why current methods are used and identify alternatives
- **Input:** Documentation of investigation findings
- **Output:** *Requirements specification*



Steps In The SDLC

Phase 3 - Design

Outline systems design

- **Purpose:** Identify solutions that define broadly *how* the new system may work
- **Key activities:** Determine how to distribute processing and the method, database or file approach, hardware specification, make or buy software, input methods.
- **Input:** Requirements specification
- **Output:** *Outline system design specification (otherwise known as a system proposal ERD to physical Database)*



Steps In The SDLC

Phase 4 - Development

Systems build/ development

- **Purpose:** To produce a working system
- **Key activities:** Programming (coding), system and user documentation, testing.
- **Input:** Requirements specification and detailed design specification
- **Output:** Preliminary working system which can be tested by end users



Steps In The SDLC

Phase 4 – Development

Systems implementation and changeover

- **Purpose:** To install the system in the live environment
- **Key activities:** Install hard/software, user acceptance test, conversion, changeover
- **Input:** Preliminary versions of software
- **Output:** Tested, release version of software

Steps In The SDLC

Phase 4 – Development

Systems maintenance

- **Purpose:** To ensure system remains available to end users
- **Key activities:** Monitoring errors, reviewing and fixing problems, releasing patches
- **Input:** Tested, release version of software
- **Output:** Revised version of software

Project identification and selection/feasibility

Project identification / concept formation

The first step in the SDLC is called project identification and selection.

The key question is *what is the problem?*

- Often the user will encounter difficulties and ask for help;
- Operational management may identify an area of poor performance within their function;
- Alternatively, senior management may feel that the current system is not helping to achieve the objectives of the overall business.

Project identification and selection/feasibility

Project identification / concept formation

The main point is that someone identifies the need for a new or enhanced system.

This need for a new system may result from:

- *problems that occur as a result of current procedures* (e.g. taking too long to fulfil customer orders, not having access to up-to-date information);
- *the desire to perform additional tasks* (e.g. generate summary reports); or
- *the realisation that IT could be used to capitalise on an existing opportunity* (e.g. internet trading).



Project identification and selection/feasibility

Project identification / concept formation

- Although the need for problem definition may seem obvious, this is perhaps the most frequently by-passed step in the entire SDLC process.
- James Wetherbe (1994) developed a useful framework for classifying problems (the PIECES framework):

Project identification and selection/feasibility

Project identification / concept formation

P	The need to improve performance
I	The need to improve information (and data)
E	The need to improve economics , control costs, or increase profits
C	The need to improve control or security
E	The need to improve efficiency of people and processes
S	The need to improve service to customers, suppliers, employees, etc

Project identification and selection/feasibility

- A preliminary investigation must take place to try to identify the problems and their urgency/importance
- The PIECES framework can be used as a checklist when trying to identify problems
- A systems analyst usually leads this task in consultation with management and users.

Project identification and selection/feasibility

- If the problems are deemed significant, the system project can be defined.
- A critical step at this point is the determination of the scope of the new system.
- Scope defines how big the project is - it normally identifies what business processes lie within the boundary of the proposed system and what processes lie outside the system boundary.

Project identification and selection/feasibility

For example,

- a 'sales information system' will include:
 - *data* about customers and products ordered
 - *processes* for order taking, order tracking and order fulfilment.
- It will not include employee data or the process for the payment of employees.

Project identification and selection/feasibility

Given our understanding of the current system's problems and the scope of the new project, we can now establish system improvement **objectives** – what we hope to achieve with the new system.

Objectives represent the first attempt to establish expectations for any new system.

Project identification and selection/feasibility

For each significant problem, the analyst and users should define specific system improvement objectives.

These objectives should be precise, measurable statements of business performance.

Some examples might include:

- Increase by 25% the number of loan applications that can be processed during an eight-hour shift.
- Order information must be accessed in under 1 minute.
- Customers must be given accurate delivery dates.
- All customer orders must be processed within 24 hours of receipt.

Project identification and selection/feasibility

We also need to define any **constraints** that might limit or restrict the study/solution in any way.

Constraints fall into four main categories:

- *Schedule*: e.g. the new system must be operational by April 20XX
- *Cost*: e.g. the new system must not cost more than £100, 000.
- *Technology*: e.g. the new system must be in real-time and must be compatible with the DB2 database management system.
- *Policy*: e.g. the new system must use double declining balance inventory techniques. There will be no increase in the order processing workforce.

Project identification and selection/feasibility

The outcome of this first step, problem identification, is a written **statement of scope and objectives**.

This brief document outlines the analyst's understanding of:

- the **problems** with the current system;
- the **scope** of the new system;
- the **objectives** of the new system, based on the requirements stated by users and management;
- the **constraints** imposed on the new system;
- any broad, **preliminary ideas**/solutions that seem evident;
- the **next stage** in the SDLC, e.g. feasibility study;
- who, in the client organisation, will supervise and **authorise** the project.

Project identification and selection/feasibility

The purpose of this document is to get user and management involvement and feedback

People respond to written statements. They ask for clarification; they correct any obvious errors or misunderstandings

This is why a clear statement of scope and objectives is important.

Although this stage of the SDLC can be brief, lasting a day or two, or less, it is essential that the users, management and the analyst agree on a general direction very early in the project.

A misunderstanding of the problem definition virtually guarantees that the new system will fail to solve the problem.

Summary

- ▣ An information system can be defined as *“A system designed to produce information that can be used to support the activities of managers and other workers.”*
- ▣ A CBIS is made up of hardware, software, telecommunications, people and procedures