

✓ Process Design

Process design is the design of processes for desired physical and/or chemical transformation of materials. Process design is central to chemical engineering, and it can be considered to be the summit of that field, bringing together all the field's components.

Process design can be the design of new facilities or it can be the modification or expansion of existing facilities. The design starts at a conceptual level and ultimately ends in the form of fabrication and construction plans.

Process design documents serve to define the design and they ensure that the design components fit together. They are useful in communicating ideas and plans to other engineering involved with the design, to external regulatory agencies, to equipment vendors and to construction contractors.

Process design documents includes :

(a) Block Flow Diagrams (BFD) : Very simple diagrams composed of rectangles and lines indicating major materials or energy flows.

(b) **Process Flow Diagrams (PFD's)** : Typically more complex diagrams of major unit operations as well as flow lines. They usually include a material balance, and sometimes an energy balance, showing typical or design flowrates, stream compositions and stream and equipment pressure and temperatures.

(c) **Piping and Instrumentation Diagrams (PSID's)** : Diagrams showing each and every pipeline with piping class and pipe size. They also show valving along with instrument locations and process control schemes.

(d) **Specifications** : Written design requirements of all major equipment items.

Process design have objectives and constraints.

Objectives

- Throughput rate
- Process yield
- Product purity

Constraints

- Capital cost
- Available space
- Safety concerns

✓ User Interface Design

User interface design or user interface engineering is the design of websites, computers, appliances, machines, mobile communication devices and software applications with the focus on the user's experience and interaction. The goal of user interface design is to make the user's interaction as simple and efficient as possible, in terms of accomplishing user goals-which is often known as user centered design.

Good user interface design facilitates finishing the task in hand without drawing unnecessary attention to itself. Graphic design may be utilized to support its usability. The design process must balance technical functionality and visual elements to create a system that is not only operational but also usable and adaptable to changing user needs.

Interface design is involved in a wide range of projects from computer systems, to cars, to commercial planes. All of these projects involve much of the same basic human interactions yet also require some unique skills and knowledge. As a result, **designers** tend to specialize in certain types of projects and have skills centered around their expertise, whether that will be software design, user research, web design, industrial design.

✓ Phases of User Interface Design

Phase 1 :

Functionality Requirements gathering

Phase 2 :

User analysis

Phase 3 :

Information architecture

Phase 4 :

Prototyping

✓ Prototyping

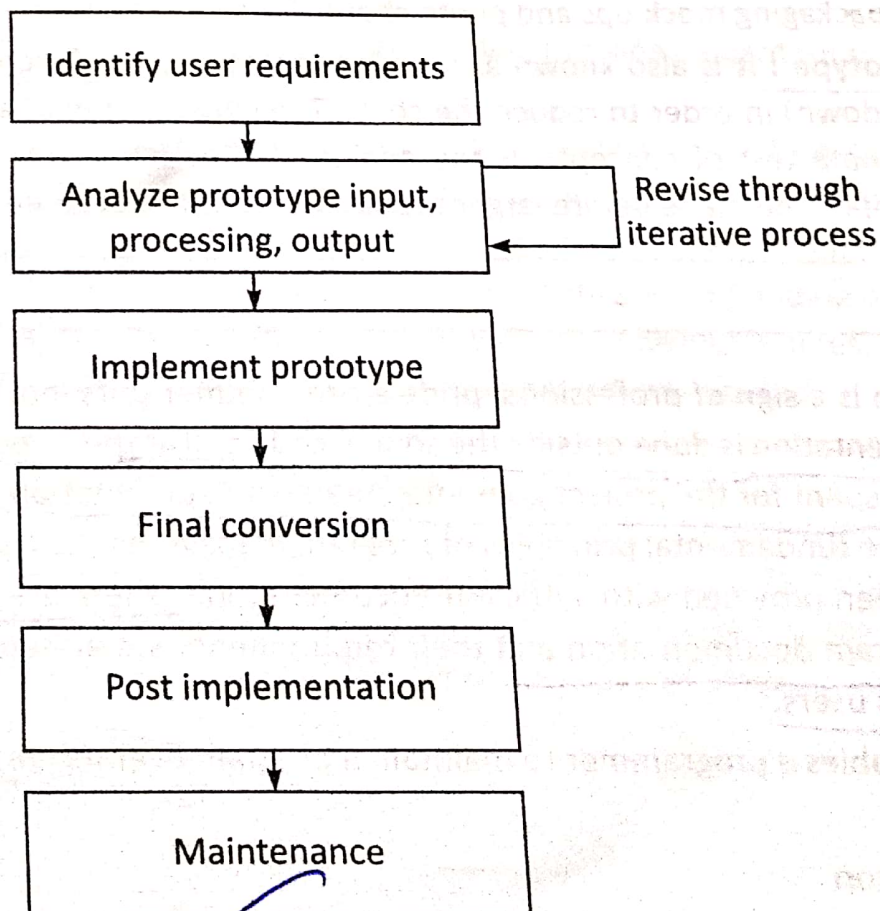
There are 2 major problems with building information systems :

- (1) The system development cycle takes too long.
- (2) The right system is rarely developed the first time.

Lengthy development frustrates the user. Analysts seem to get bogged down with tedious methodologies for developing systems. The reason they often come up with the wrong system is that they expect users to define their information requirements. It usually turns out that what users ask for is not what they want, and what they want is not what they need.

An alternative to this 'paralysis by analysis' is an advanced technique called prototyping. Prototyping recognizes problems of cognitive style and uses advanced computer technology. It advocates building a simple system through trial and error and refining it through an iterative process. The most extensive research on prototyping has been conducted by Naumann and Jenkins. The basic steps are as follows :

1. Identify the user's information and operating requirements.
2. Develop a working prototype that focuses on only the most important functions, using a basic database.
3. Allow the user to use the prototype, discuss requested changes, and implement the most important changes.
4. Repeat the next version of the prototype with further changes incorporates until the system fully meets the user requirements.



SDLC with prototyping

✓ Categories of Prototyping

1. Proof of Principle Prototype : A proof of principle prototype is used to test some aspect of the intended design without attempting to exactly simulate the visual appearance, choice of materials or intended manufacturing process. Such prototype can be used to 'prove' out a potential design approach such as range of motion, mechanics, sensors, architecture etc.

2. Form Study Prototype : This type of prototype will allow the designers to explore the basic size, look and feel of the product without simulating the actual function or exact visual appearance of the product. They can help assess ergonomic factors and provide insight into visual aspects of the products' final form. Form study prototypes are often hand carved or machined models from easily sculpted, inexpensive materials, without representing the intended color, finishing or texture.

3. User Experience Prototype : A user experience prototype invites human interaction and is primarily used to support user focused research. While intentionally not addressing possible aesthetic treatments, this type of model does more accurately represents the overall size, proportions, interfaces and articulation of a promising concept.

4. Visual Prototype : Visual prototype will capture the intended design aesthetic and simulate the appearance, color and surface textures of the intended product but will not actually embody the functions of the final product. These models will be suitable for use in the market research, execute reviews and approval, packaging mock-ups and photo shoots for sales literature.

5. Functional Prototype : It is also known as working prototype, the functional prototype may be reduced in size (scaled down) in order to reduce the costs. The construction of a fully working full-scale prototype and the ultimate test of concepts, is the engineer's final check for design flaws and allow last-minute improvements to be made before larger production runs are ordered.

✓ Documentation

Good documentation is a sign of professional pride a programmer puts into a program. Normally in large projects, the documentation is done outside the source code and at the same time a large amount of time out of the total time spent for the project goes into creating documentation. Documentation should be considered as one of the fundamental principles of program management as no program is allowed to be used without having been provided with sufficient documentation. There are three groups of people who need to refer to program documentation and their requirements are all some what different. They are programmes, operators users.

1. Programmers : It enables a programmer to maintain a program over its life span. It may be divided into 2 categories :

- Internal documentation
- External documentation