EMBEDDED PRODUCT DEVELOPMENT LIFE CYCLE

DLC is an 'Analysis-Design-Implementation based standard problem solving approach it is developed for understanding the scope and complexity of the work involved in Embedded product development. It defines the interaction and activities among various groups of a development sector - project management, systems design, development, testing etc.

Objectives

The 3 primary objectives are:-

⟹ Ensure that high quality products are delivered
⟹ Risk minimisation and defect prevention in product development
⟹ Maximise the productivity.

1 Ensuring high quality of products

* Primary definition of quality is Return on Investment (ROI) achieved by the product

* EDLC must ensure the development of the product has taken account of all the qualitative attributes of the embedded system.

2 Risk Minimisation & Defect Prevention

* Time Frame

* Resource Allocation

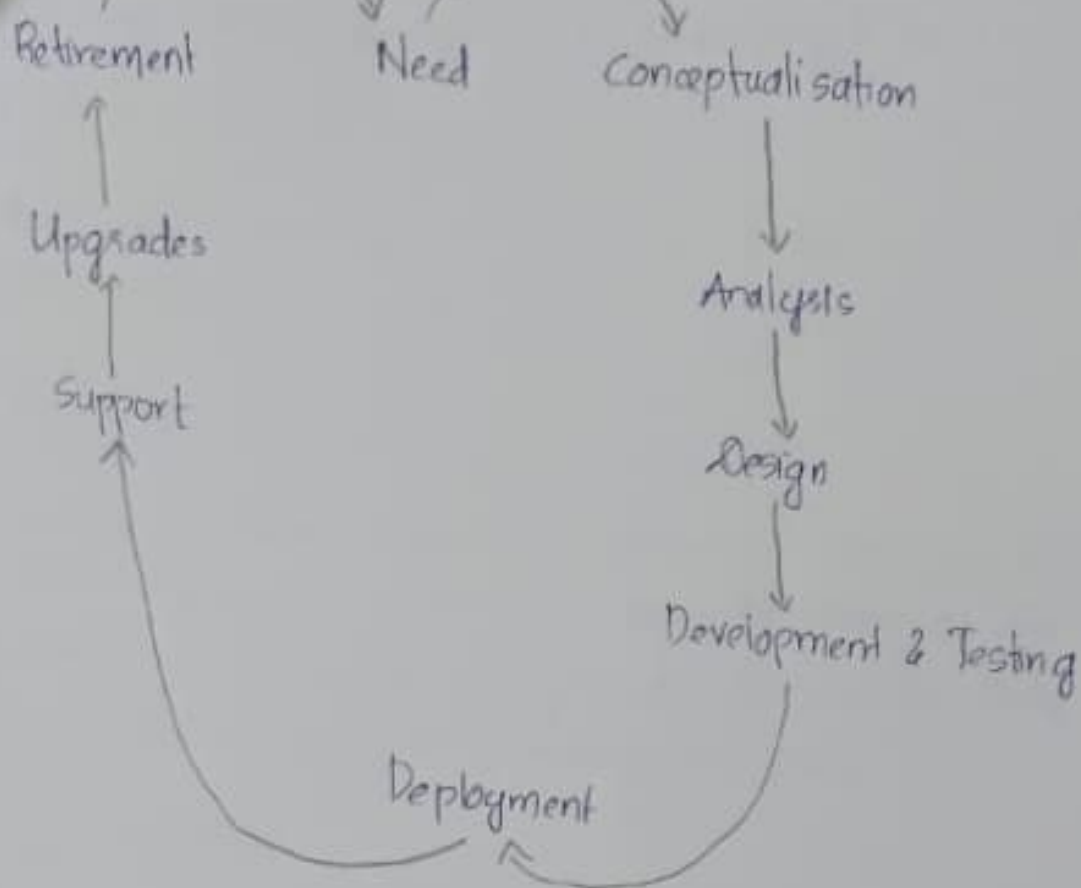* Ensuring development process is going in the right direction

3 Increased Productivity

* Productivity is a measure of ROI as well as the measure of efficiency

It Covers:-

⟶ How many resources are utilised
⟶ How much investment required

How much time is taken etc
* Saving manpower effort can increase productivity
    * Usage of automated tools
* Re-usable effort can increase productivity
    * Reduces the development effort
* Using resources with the desired skill sets of the exact requirement
        * Reduces learning time.
* Use of Commercial off-the-Shelf Components (COTS)
    * Ready to use components as plug in modules.

Phases

The Embedded Product Development Life Cycle has the phases:-
1. Need
2. Conceptualisation
3. Analysis
4. Design
5. Development and testing
6. Deployment
7. Support
8. Upgrades
9. Retirement/Disposal

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           Retirement        Need        Conceptualisation

              ↑
           Upgrades                            ↓

              ↑                            Analysis
           Support
              ↑                               ↓

                                           Design

                                              ↓

                                      Development & Testing

                       Deployment
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Need

Embedded product evolves as an output of 'Need'. The need may come from an individual or public or company. Based on the need, a statement or concept proposal is prepared. This proposal should be reviewed by the Senior management.
There are 3 types of Need :-

→ **New/Custom Product Development**

The need for a product which does not exist in market or a product which acts as a competitor to an existing product in the current market will lead to development of a new product

→ **Product Re-Engineering**

The embedded product market is dynamic and competitive.

Re-engineering a product is the process of making changes in an existing product design and launching it as a new version

→ Product Maintenance

It deals with providing technical support to the end user for an existing product in the market.

Conceptualisation

It is the 'Product Concept Development Phase' and it begins immediately after approval. It defines the scope of the concept, performs cost benefit analysis and feasibility study and prepares project and risk management plans.

→ Feasibility Study

It examines the need for product carefully and suggests solutions to build the need as product along with alternatives

→ Cost Benefit Analysis

Identifying and analysing total development cost and profit expected from the product

→ Product Scope

It deals with knowing what is scope and not in scope of the product

→ Planning Activities

It covers various plans required for product development.

Analysis

It starts after the conceptualisation phase is approved by client of the product. It is performed to develop a functional model of the product under consideration. Here, product is defined in detail wort input, process, outputs and interfaces at a functional level. It determines what functions must be performed by the product

→ **Analysis & Documentation**

It consolidates the business needs of a product development and analyses the purpose of the product

→ **Interface Definition & Documentation**

If embedded product is part of another system, there should be an interface b/w product and other parts of the system

→ **Defining Test plan & Procedures**

Identifies the tests to be informed and what should be included in the test

→ Unit testing
→ Integration testing
→ System testing
→ User Acceptance testing

Design

It deals with entire design of the product taking requirements into consideration & focusing on 'how' the required functionalities can be delivered to the product

...velopment & Testing

It transforms the design into a realizable product

Deployment

It is launching the first fully functional model of the product in the market. It includes:

→ Notification of product deployment

Launching ceremony details should be communicated to stake holders and the public

→ Execution of training Plan

Training has to be given to the end user to get them acquainted with the new product

→ Product Installation

Install the document as per the installation document to ensure that is fully functional.

→ Product post-implementation review

This has to be conducted to determine the success of the product.

Support

It deals with the operation and maintenance of product.

→ Setup a dedicated support wing

→ Identify bugs and areas of improvement

...grades

It deals with development of upgrades of the product which is already present in the market. Product o/p results as an o/p of major bug fixes or feature enhancement requirements from the end user. In this phase, there will be modifications to fix the bugs.

Retirement / Disposal

Due to increased needs of user and revolutionary technological changes, a product can't sustain in the market for a long time. This is the last phase where the product is declared as obsolete and discontinued from the market.

Modelling Techniques

Some SDLC Models are:-

→ Waterfall or Linear Model
→ Iterative / Incremental Model
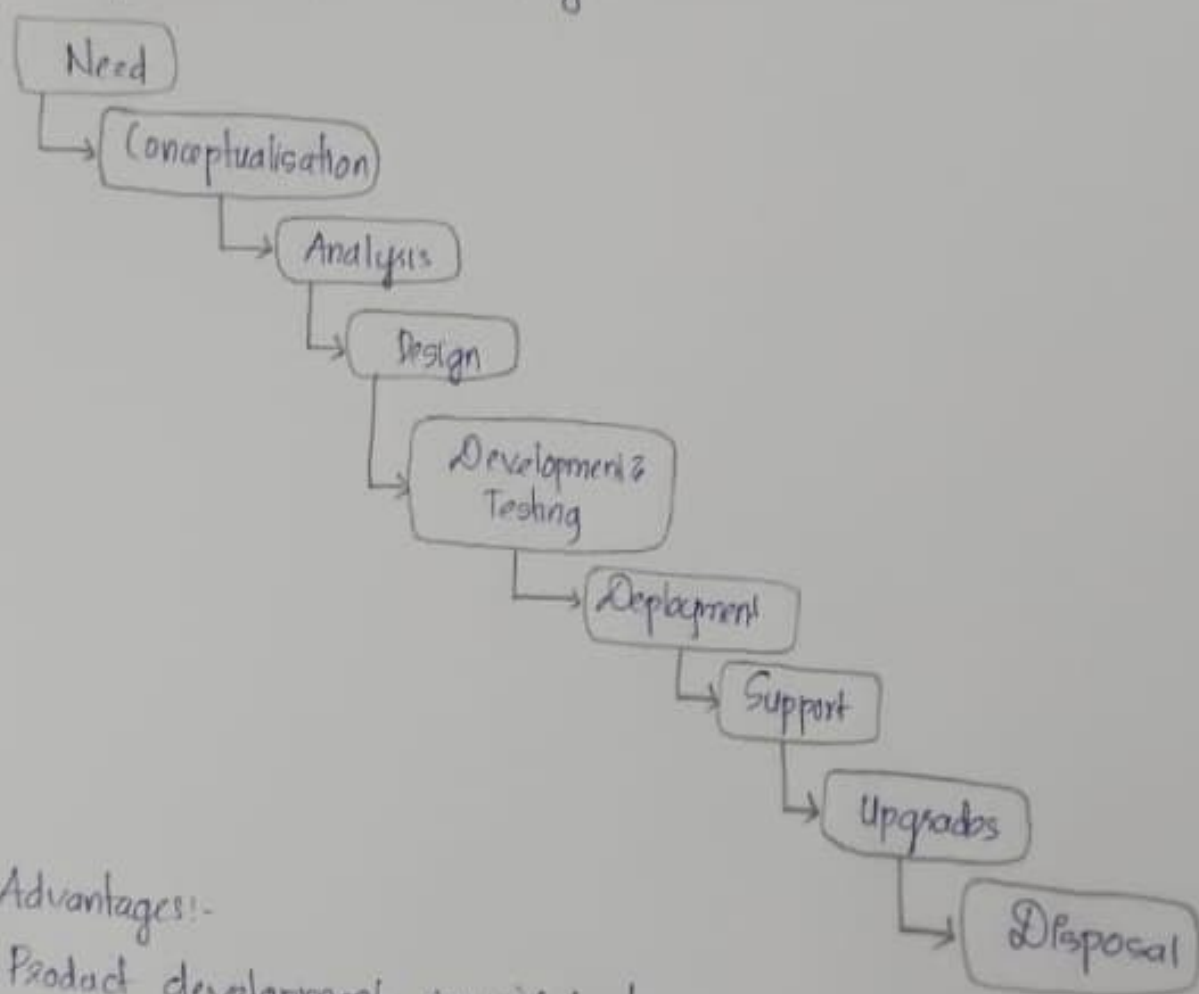→ Prototyping Model
→ Spiral Model

Waterfall Model

Linear or Waterfall Model is the one adopted in most of the olden systems.

In this approach each phase of SDLC is executed in sequence. It establishes analysis and design with highly structured development phases.

execution flow is undirectional. The output of one phase serves as the input of the next phase.

All activities involved in each phase are well planned so that what should be done in the next phase and how it can be done. The feedback of each phase is available only after they are executed. One significant feature of this model is that even if you identify bugs in the current design, the development process proceeds with the design.

Need

→ Conceptualisation

→ Analysis

→ Design

→ Development & Testing

→ Deployment

→ Support

→ Upgrades

→ Disposal

Advantages:-

Product development is rich in terms of:-

→ Documentation
→ Easy project management
→ Good control over cost & schedule.