Software Engineering

Prepared by: Neha Tripathi

Prototyping Model

- **Throw Away Prototyping**
- **Evolutionary Prototyping**

Prototyping Model

- Prototyping is defined as the process of developing a **working replication** of a product or system that has to be engineered. It offers a **small scale** facsimile of the end product and is used for obtaining customers feedback.

- The Prototyping Model is one of the **most popularly used Software Development Life Cycle Models (SDLC models).**

- This model is used when the customers **do not know the exact project requirements** beforehand.

- In this model, a prototype of the end product is first developed, tested and refined as per customer feedback repeatedly till a final acceptable prototype is achieved which forms the basis for developing the final product.

- Final Product is developed using **Iterative Waterfall approach.**

Prototyping Model-Representation

Fig: Prototype Model
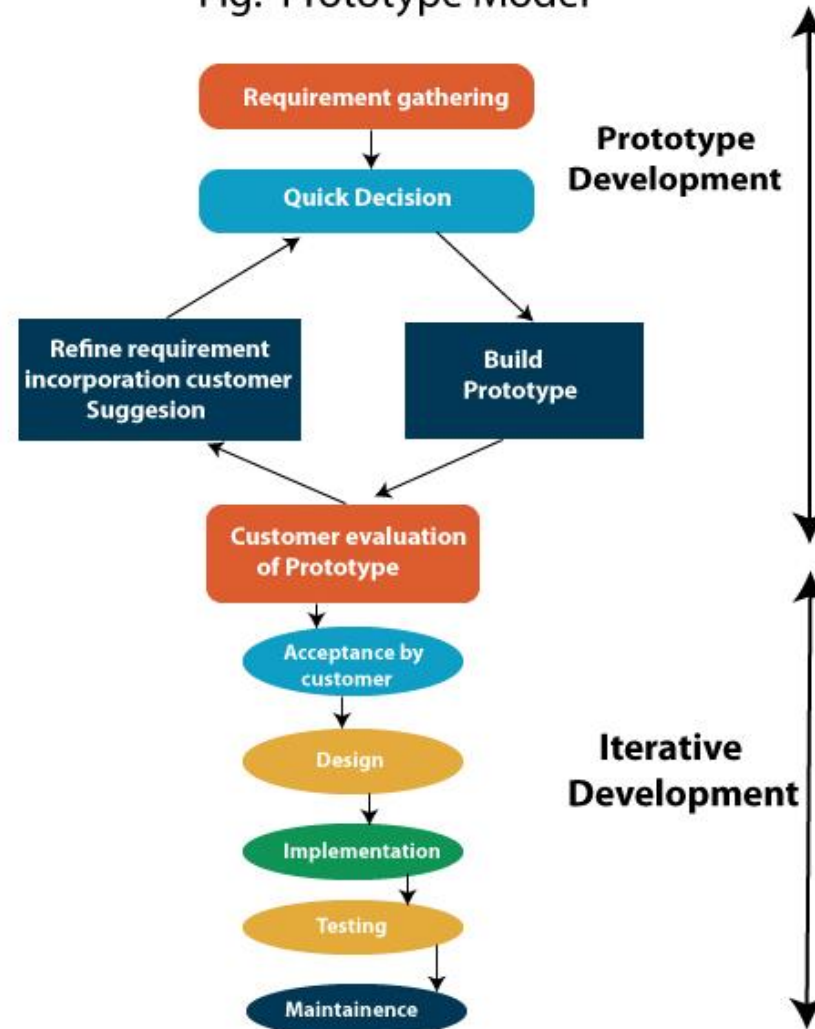
- **A prototype is a toy implementation of a system:**
  - limited functional capabilities,
  - low reliability,
  - inefficient performance.
  - Small scale
  - Developed using shortcuts
- **Start with approximate requirements.**
- **Carry out a quick design.**
- **Prototype model is built using several short-cuts:**
  - Short-cuts might involve using inefficient, inaccurate, or dummy functions.
    - A function may use a table look-up rather than performing the actual computations.
- **The developed prototype is submitted to the customer for his evaluation:**
  - Based on the user feedback, requirements are refined.
  - This cycle continues until the user approves the prototype.
- **The actual system is developed using the iterative waterfall approach.**

When to use prototyping Model-Application?

- The Prototyping Model should be used when the requirements of the product are **not clearly understood or are unstable.**

- It is also a very good choice to **demonstrate the technical feasibility** of the product.

- Prototype model should be used when the **desired system needs to have a lot of interaction with the end users**.

- Typically, online systems**, web interfaces** have a very high amount of interaction with end users, are best suited for Prototype model. It might take a while for a system to be built that allows ease of use and needs minimal training for the end user.

- Prototyping ensures that the end users constantly work with the system and provide a feedback which is incorporated in the prototype to result in a useable system. They are excellent for **designing good human computer interface systems.**

Advantages–

- The customers get to see the partial product early in the life cycle. This ensures a greater level of customer satisfaction and comfort.

- New requirements can be easily accommodated as there is scope for refinement.

- Missing functionalities can be easily figured out.

- Errors can be detected much earlier thereby saving a lot of effort and cost, besides enhancing the quality of the software.

- The developed prototype can be reused by the developer for more complicated projects in the future.

- Flexibility in design.

Disadvantages –

- Costly w.r.t time as well as money.
- There may be too much variation in requirements each time the prototype is evaluated by the customer.
- Poor Documentation due to continuously changing customer requirements.
- It is very difficult for the developers to accommodate all the changes demanded by the customer.
- There is uncertainty in determining the number of iterations that would be required before the prototype is finally accepted by the customer.
- After seeing an early prototype, the customers sometimes demand the actual product to be delivered soon.
- Developers in a hurry to build prototypes may end up with sub-optimal solutions.
- The customer might lose interest in the product if he/she is not satisfied with the initial prototype.

Types of Prototyping Model

- **Rapid Throwaway Prototyping –**

 This technique offers a useful method of exploring ideas and getting customer feedback for each of them. In this method, <mark>a developed prototype need not necessarily be a part of the ultimately accepted prototype</mark>. Customer feedback helps in preventing unnecessary design faults and hence, the final prototype developed is of a better quality.

- **Evolutionary Prototyping –**

In this method, the prototype developed initially is incrementally refined on the basis of customer feedback till it finally gets accepted. In comparison to Rapid Throwaway Prototyping, it offers a better approach which saves time as well as effort. This is because developing a prototype from scratch for every iteration of the process can sometimes be very frustrating for the developers.
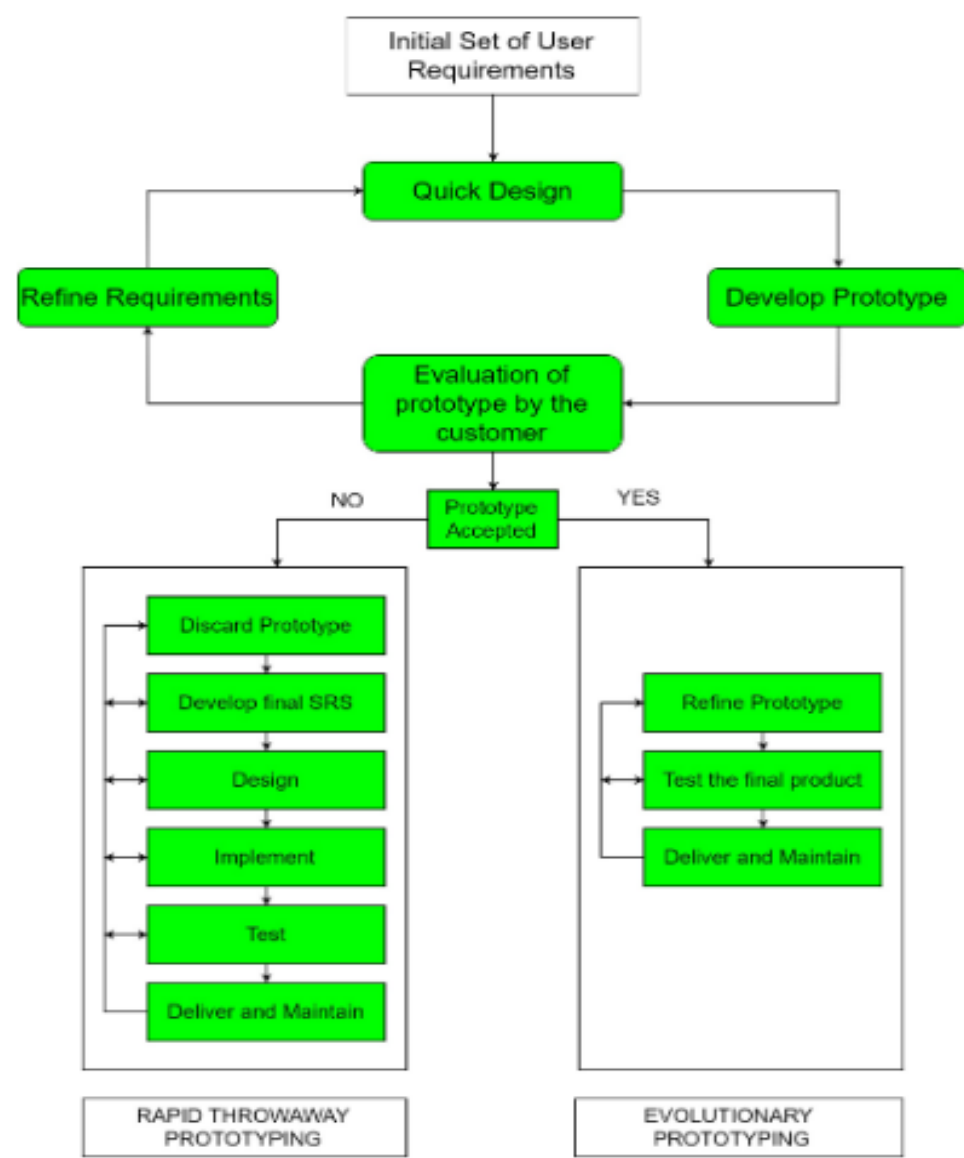
Summary

- In Software Engineering, Prototype methodology is a software development model in which a prototype is built, test and then reworked when needed until an acceptable prototype is achieved.

- 1) Requirements gathering and analysis, 2) Quick design, 3) Build a Prototype, 4) Initial user evaluation, 5) Refining prototype, 6)Implement Product and Maintain; are the basic steps of the prototyping process

- Type of prototyping models are 1) Rapid Throwaway prototypes 2) Evolutionary prototype

- Regular meetings are essential to keep the project on time and avoid costly delays in prototyping approach.

- Missing functionality can be identified, which helps to reduce the risk of failure as Prototyping is also considered as a risk reduction activity in SDLC.

- Prototyping may encourage excessive change requests.

Thank You!