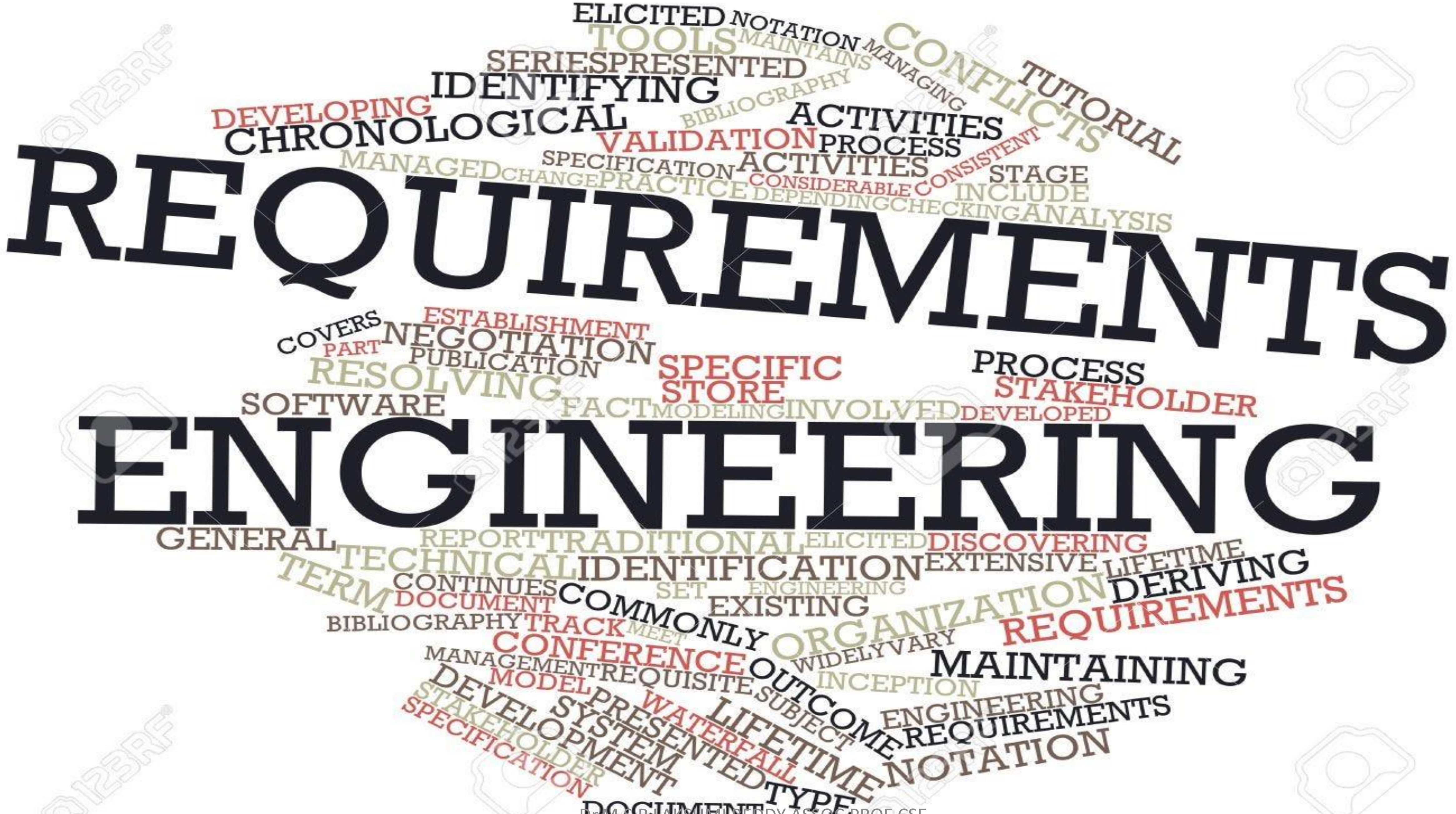
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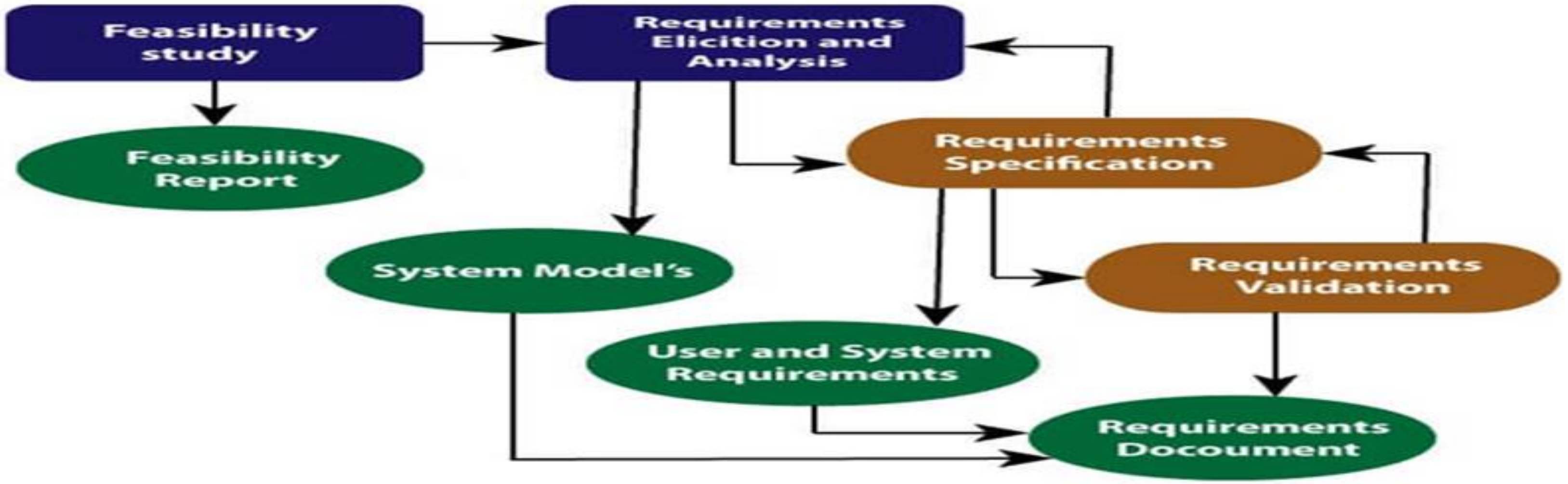
Requirements engineering process

- **A systematic and strict approach** to the ***definition, creation, and verification*** of requirements for a software system is known as requirements engineering.
- To guarantee the ***effective creation of a software product***, the requirements engineering process entails several tasks that help in *understanding, recording, and managing the demands of stakeholders.*



- The generic activities that are common to all processes are
  - *Feasibility Study*
  - *Requirements Elicitation and Analysis (or) Requirements Dicovery*
  - *Requirements specification*
  - *Requirements Validation*
  - *Requirements Management*
- Requirements engineering process can also be viewed as structured analysis method in which the system is analyzed fully, some system models are prepared.
- Along with creation of *system models* some additional information is also provided in the requirements engineering process.

➢Feasibility Study:

❑A **feasibility study** in software engineering is a critical early-phase analysis used to determine whether a proposed *software project is viable – technically, economically, legally, and operationally*.

❑It helps stakeholders decide whether to proceed with development based on a thorough evaluation of risks, costs, and benefits.

❑The focus of feasibility study is to check

- If the system contributes to organizational objectives.
- If the system can be engineered using current technology.
- If the system is with in the given budget.
- If the system can be integrated with other useful systems.

❑Types of Feasibility:

❑Technical Feasibility

❑Operational Feasibility

❑Economic Feasibility

❑Management Feasibility

❑Legal Feasibility

❑Time Feasibility

❑Social Feasibility

❑Technical Feasibility:

The technical feasibility is the study of configuration of the system.

- What is the exact configuration of the system?
- How many workstations are required?
- How different units are interconnected?
- What should be the speed at which the input is given and at what speed the output has to be generated?

❑Operational Feasibility:

- The assessment of the range for software in which the required software performs a series of levels to solve the problems in ***business and the customer's requirements.***
  - What change will be brought with the system?
  - What are the factors that are distributing organizational structure?
  - Which are the new skills that are required for improvement in operations?

- ❑Economic Feasibility:

This kind of feasibility study is done for cost (or) benefit analysis. In this study the benefits of the proposed system are identified and the corresponding costs are determined.

- ❑Management Feasibility:

The management feasibility means checking whether the management will accept the project (or) not.

- ❑Legal Feasibility:

The legal feasibility means finding out whether the proposed project is legally acceptable (or)not.

- ❑Time Feasibility:

The time feasibility means identifying whether the proposed project will be completed with the stipulated time (or) not.

- ❑Social Feasibility:

Whether the project will be accepted by the people or not is called social feasibility.

➢Requirements Elicitation and analysis

Requirements elicitation is the process of *gathering information about the needs and expectations of stakeholders for a software system.* This is the first step in the requirements engineering process and it is critical to the success of the software development project.

- ❑**Interviews:** These are *one-to-one conversations with stakeholders* to gather information about their needs and expectations.
- ❑**Surveys:** These are *questionnaires that are distributed to stakeholders* to gather information about their needs and expectations.
- ❑**Focus Groups:** These are *small groups of stakeholders* who are brought together to discuss their needs and expectations for the software system.
- ❑**Observation:** This technique *involves observing the stakeholders* in their work environment to gather information about their needs and expectations.
- ❑**Prototyping:** This technique involves creating a *working model of the software system, which can be used to gather feedback from stakeholders* and to validate requirements.

➢ Requirements specification (or) software requirement specification:

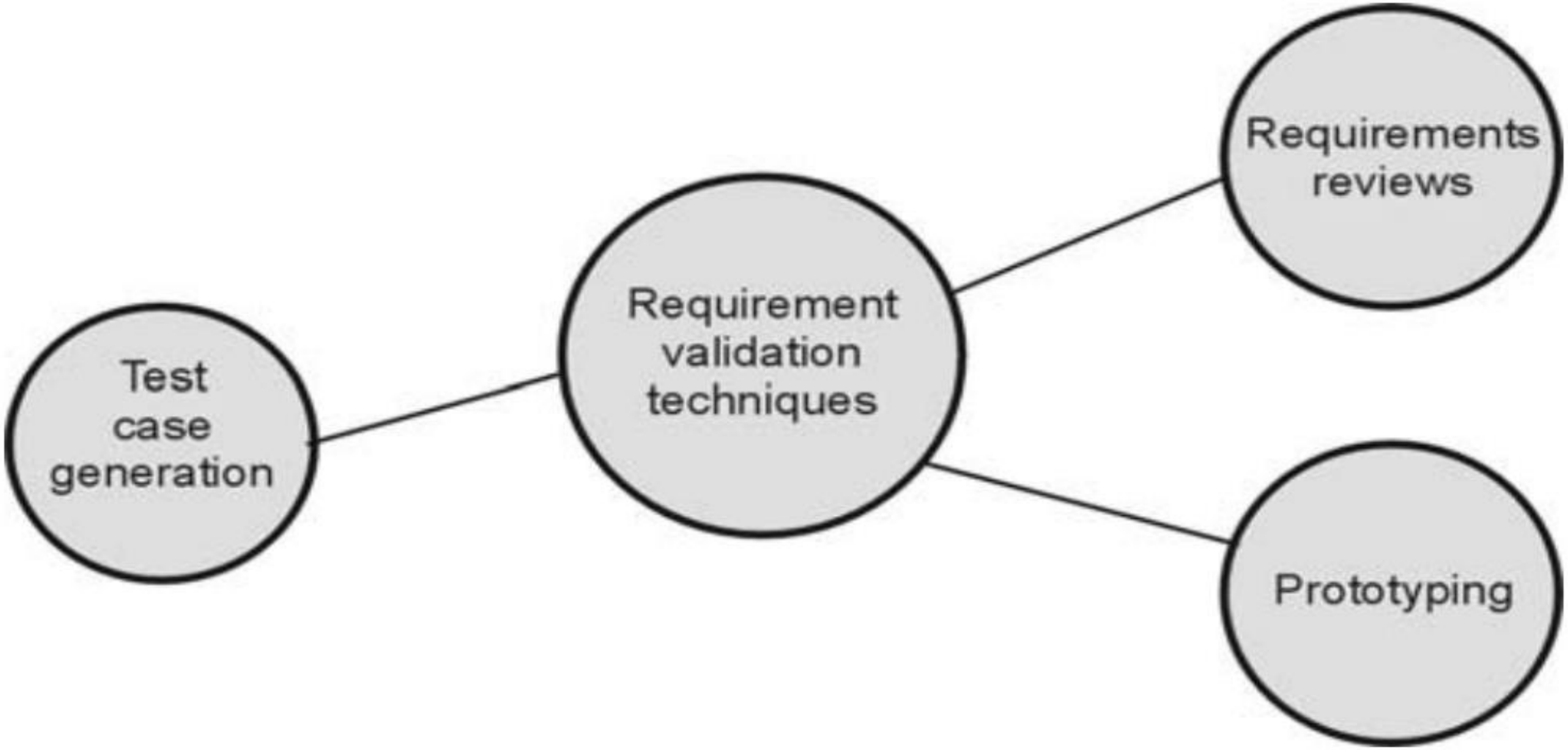
- ❑This activity is used to produce formal software requirement models. All the *requirements including the functional as well as the non-functional requirements and the constraints are specified by these models in totality*. During specification, more knowledge about the problem may be required which can again trigger the elicitation process.

- ❑ The models used at this stage include *ER diagrams*, *data flow diagrams(DFDs)*, *function decomposition diagrams(FDDs)*, *data dictionaries*, *etc*.

- ❑The goal of this step is to *create a clear and comprehensive document that describes the requirements for the software system*. This document should be *understandable by both the development team and the stakeholders.*

➢Requirement Validation:

- Requirement validation is a process in which it is checked that whether the gathered requirements represent the same system that customer really wants.
- Requirement checking can be done in following manner
  - ✓**Validity**: does the system provide the functions which best support the customers needs?
  - ✓**Consistency:** Are there any requirements conflicts?
  - ✓**Completeness:** Are all functions required by the customer included?
  - ✓**Realism:** Can the requirements be implemented according to budget and technology?
  - ✓**Verifiability:** Can the requirements be checked?



Requirement Validation Technique

- Requirements validation techniques

1.Requirements reviews : Requirement review is a systematic manual analysis of the requirements.

- The requirement review should be taken only after formulation of requirement definition. And both the *customer and contractor staff* should be involved in reviews.
- Reviews may be formal (with completed documents) or informal.
- Good communications should take place between developers, *customers and users.* Such a healthy communication helps to resolve problems at an early stage.

2. Prototyping : The requirements can be checked using executable model of system.

3. Test-case generation : In this technique, the various tests are developed for requirements. The requirement check can be carried out with –

- **Verifiability :** Is the requirement realistically testable ?
- **Comprehensibility** : Is the requirement properly understood ?
- **Traceability** : Is the origin of the requirement clearly stated ?
- **Adaptability** : Can the requirement be changed without a large impact on other requirements ?

➢Requirements Management:

Requirements management is the process of *managing changing requirements* during the requirements engineering process and system development.

Enduring and Volatile requirements:

❑Enduring Requirements:

These are the stable requirements that are derived from the core activity of the organization.

Eg: For banking system, transfer of money from one account to another is the enduring requirement.

❑Volatile requirements:

volatile requirements are requirements that are *likely to change during the development lifecycle or even after the system has been deployed.* These changes can be due to various reasons such as evolving business needs, market changes, new regulations, or stakeholder feedback.

Types of Volatile requirements

1. Mutable Requirements:

If due to change in the environment, if the requirements get changed then such requirements are called as mutable requirements.

Eg: In the library system , if the traditional library is turned into a digital library then requirements for the library automation software will be changed.

2. Consequential requirements:

Requirements that get changed due to introduction of computer based systems, such requirements are called consequential requirements.

Eg: Online ticket booking facilities requirements get changed.

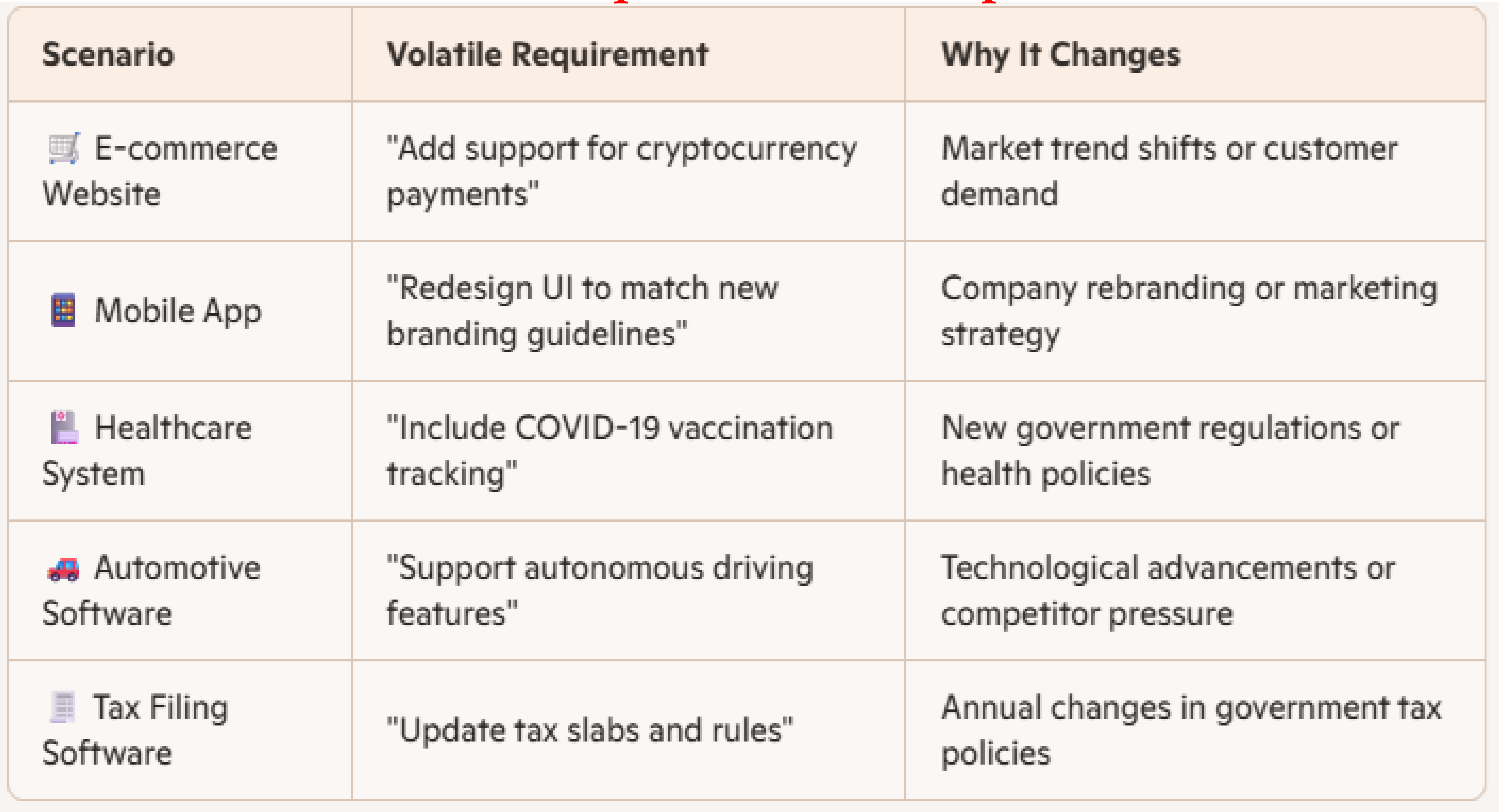
3. Emerged requirements:

Due to customers understanding of the system during the development stage certain requirements may get changed. Such types of requirements are called emerged requirements.

4. Compatibility requirements:

Requirements which depend upon the specific software/ business process in an organization are called compatible requirements.

Volatile requirements Examples



Scenario	Volatile Requirement	Why It Changes
🛒 E-commerce Website	"Add support for cryptocurrency payments"	Market trend shifts or customer demand
📱 Mobile App	"Redesign UI to match new branding guidelines"	Company rebranding or marketing strategy
🏥 Healthcare System	"Include COVID-19 vaccination tracking"	New government regulations or health policies
🚗 Automotive Software	"Support autonomous driving features"	Technological advancements or competitor pressure
🧾 Tax Filing Software	"Update tax slabs and rules"	Annual changes in government tax policies