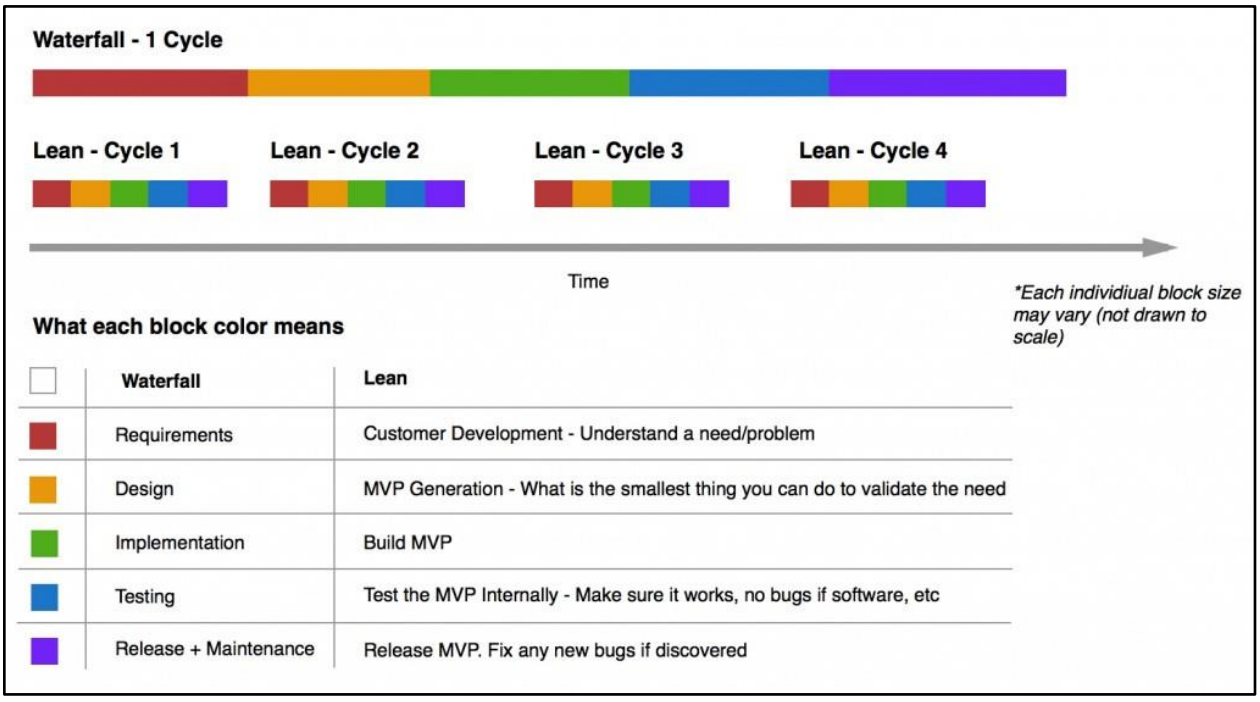
Systems engineering life cycle models:

The life cycle model is one of the key concepts of systems engineering (SE). A life cycle for a system generally consists of a series of stages regulated by a set of management decisions that confirm that the system is mature enough to leave one stage and enter another.

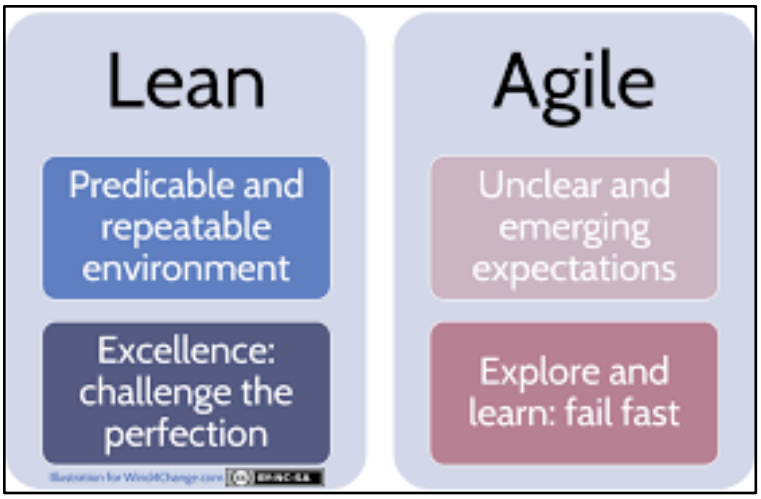
Categories of Life Cycle Model:

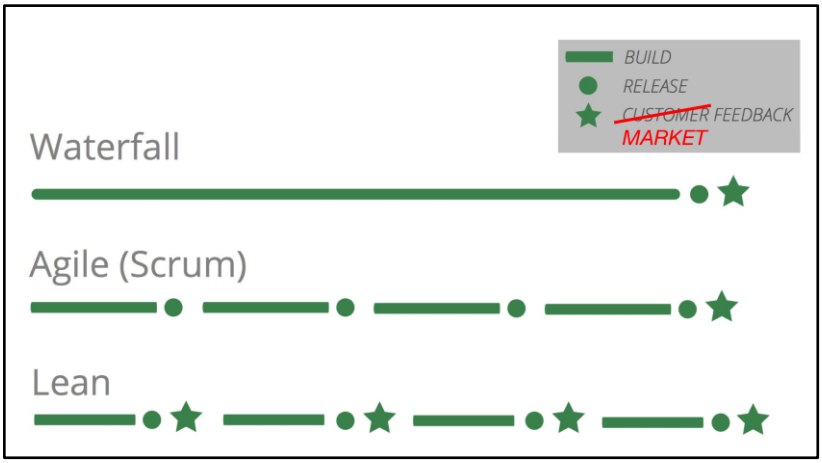
There are a large number of potential life cycle process models. They fall into three major categories:

1. primarily pre-specified and sequential processes (e.g. the single-step waterfall model)
2. primarily evolutionary and concurrent processes (e.g. lean development, the agile unified process, and various forms of the vee and spiral models)
3. primarily interpersonal and emergent processes (e.g. agile development, scrum, extreme programming (XP), the dynamic system development method, and innovation-based processes)

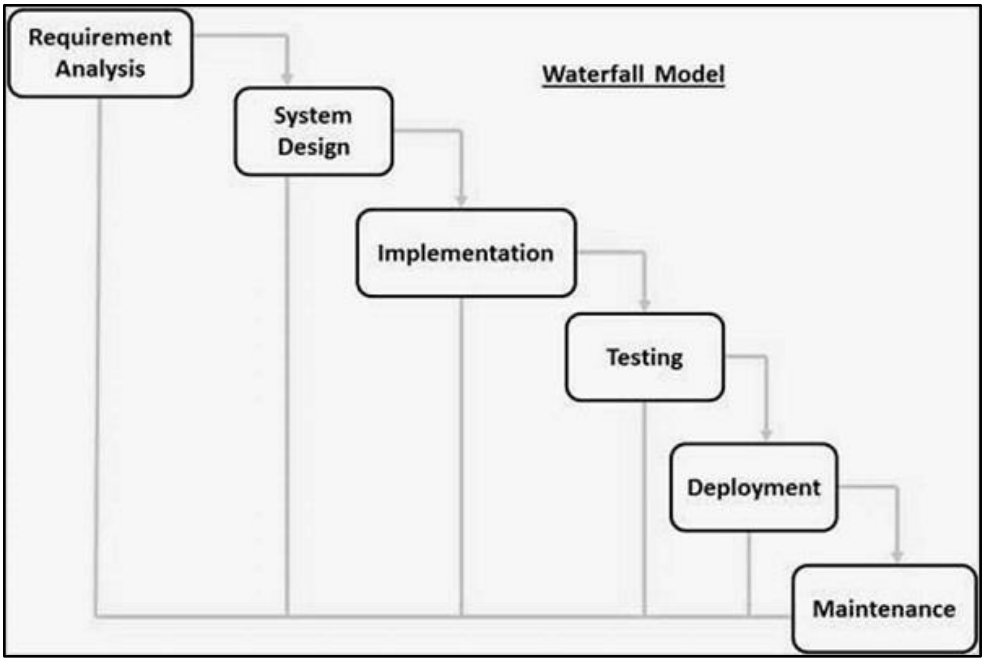


	Waterfall	Lean
	Requirements	Customer Development - Understand a need/problem
	Design	MVP Generation - What is the smallest thing you can do to validate the need
	Implementation	Build MVP
	Testing	Test the MVP Internally - Make sure it works, no bugs if software, etc
	Release + Maintenance	Release MVP. Fix any new bugs if discovered

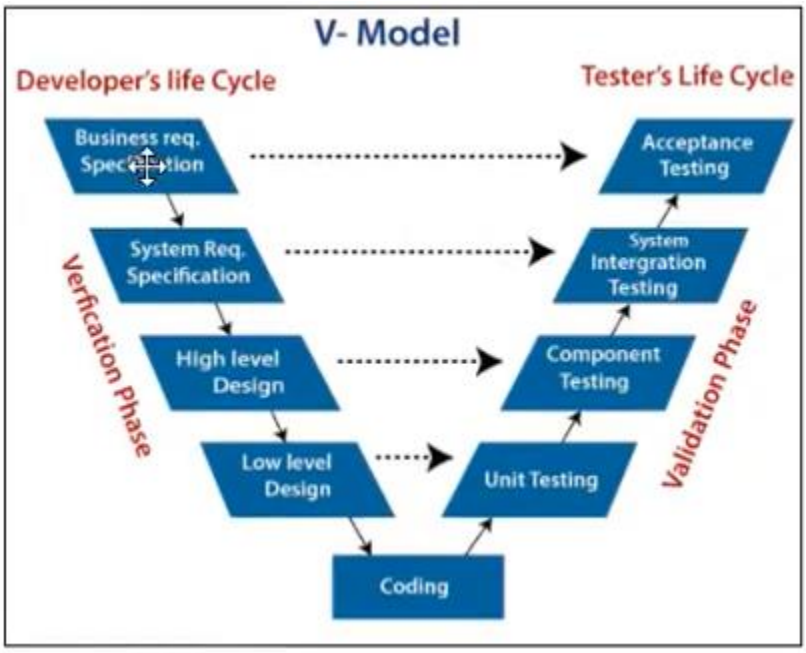




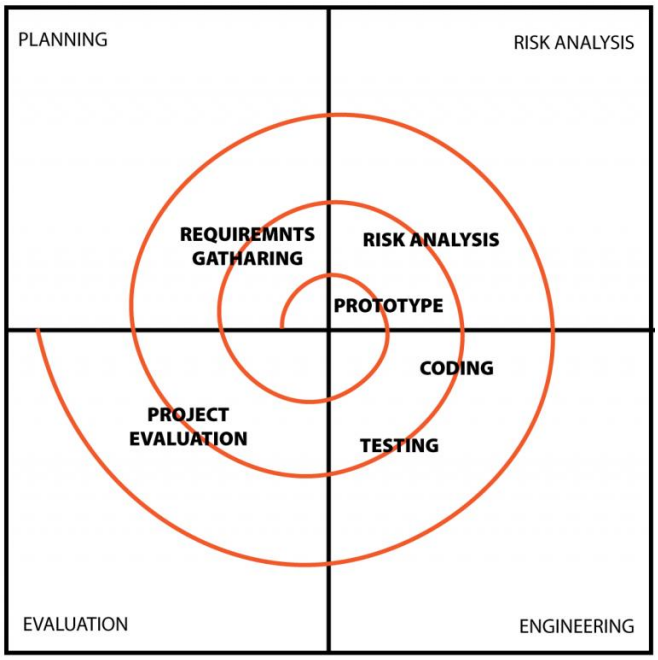
Waterfall Model:



V-Model:



Spiral Model:



Basic Characteristic of Lifecycle Process Models

All the activities of a product are included in the Lifecycle processes. From the idea of developing a business model to its development and usage, all form a part of the Lifecycle process. However, there are different models that can be used in software engineering. All such models have adapted to the development

process required for the successful development and use of products. The two most common models are mentioned below.

Sequential Model – Here one activity follows the other activities resulting in a sequence of activities. Here, each activity is dependent on the previous activity. The waterfall model is a well-known example of a sequential model.

Evolutionary Model – It includes parallel execution of all the activities along with the requirement. Here, all the activities are independent of the other activity. The spiral model is a well-known example of an evolutionary model.

Software processes:

1. Personal Software Process:

Personal Software Process (PSP) is the skeleton or the structure that assists the engineers in finding a way to measure and improve the way of working to a great extend. It helps them in developing their respective skills at a personal level and the way of doing planning, estimations against the plans.

Objectives of PSP:

The PSP helps software engineers to:

- Improve their approximating and planning skills.
- Make promises that can be fulfilled.
- Manage the standards of their projects.
- Reduce the number of faults and imperfections in their work.

Levels of Personal Software Process:

Personal Software Process (PSP) has four levels-

PSP 0

The first level of Personal Software Process, PSP 0 includes Personal measurement, basic size measures, coding standards.

PSP 1

This level includes the planning of time and schedule.

PSP 2

This level introduces personal quality management, design, and code reviews.

PSP 3

The last level of the Personal Software Process is for the Personal process evolution.

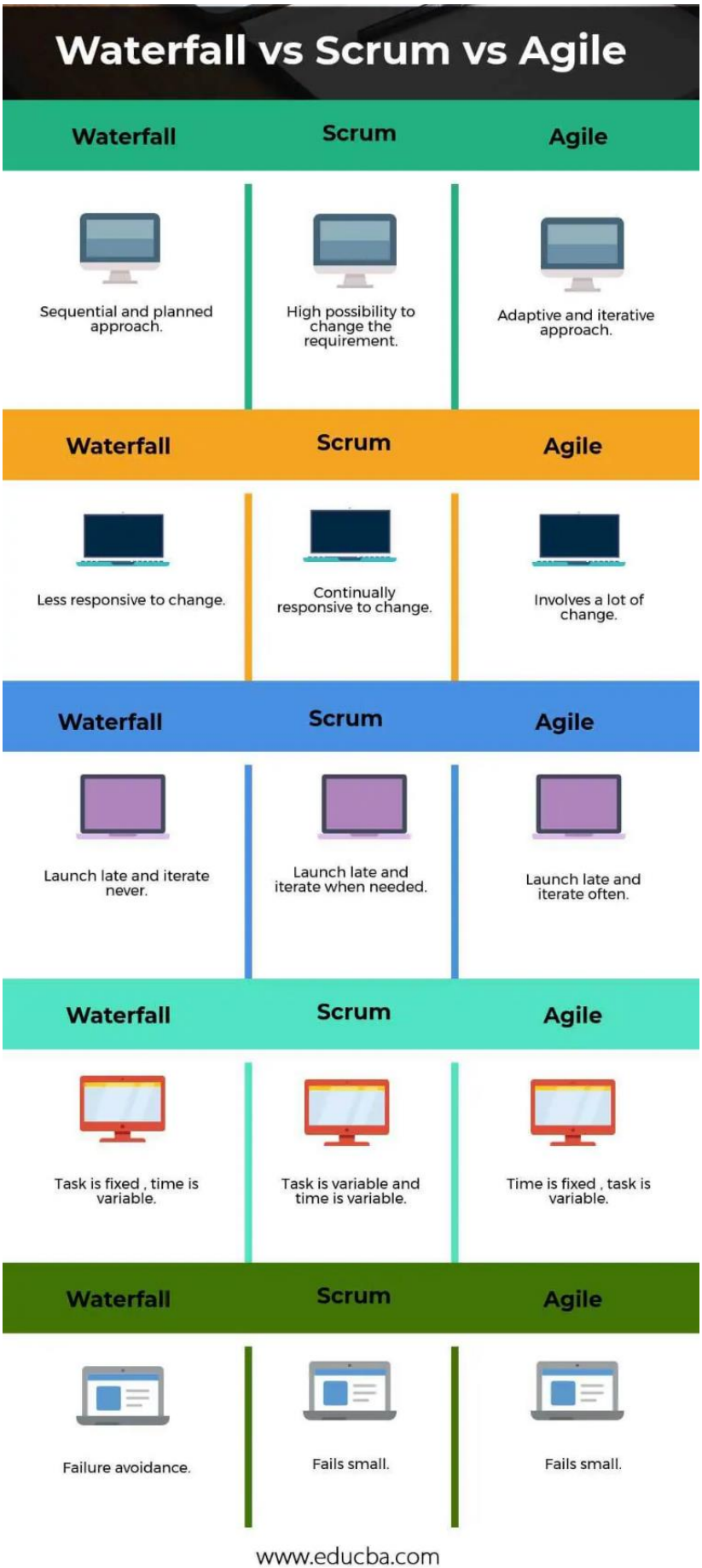
2. Team Software Process:

The success of an organization that produces software-intensive systems mainly depends on a well-managed software development process.

Objectives of TSP:

A self-directed team should have these qualities:

- Understands product and business goals
- Produces their own plans for addressing the goals
- Makes their personal commitments
- Directs their own projects
- Consistently uses processes and methods that they select
- Manages quality.


Waterfall vs Scrum vs Agile
Waterfall
Scrum
Agile
Sequential and planned approach.
High possibility to change the requirement.
Adaptive and iterative approach.
Waterfall
Scrum
Agile
Less responsive to change.
Continually responsive to change.
Involves a lot of change.
Waterfall
Scrum
Agile
Launch late and iterate never.
Launch late and iterate when needed.
Launch late and iterate often.
Waterfall
Scrum
Agile
Task is fixed , time is variable.
Task is variable and time is variable.
Time is fixed , task is variable.
Waterfall
Scrum
Agile
Failure avoidance.
Fails small.
Fails small.
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