Week 1 - Life cycles and waterfall

Life Cycles Examples

These are abstractions of the structure of software engineering projects.

- Waterfall
- Agile
- V-Model
- Spiral

Waterfall

Works in stages, where each stage is completed before moving on to the next

1. Requirements definition
2. System and software design
3. Implementation and unit testing
4. Integration and system testing
5. Operation and maintenance

Requirements definitions

Quotes from Software Processes Chapter

> "The system's services, constraints, and goals are established by consultation with system users. They are then defined in detail and serve as a system specification"

Finding out the requirements of the finished output. Including:

- What should the system do?
- What are the user needs?
- The needs of the host organisation?
- Needs of existing systems?

Both the functional elements (what the system should do) as well as the qualities of the system such as security and ease of use should be considered here.

System and software design

> "The systems design process allocates the requirements to either hardware or software systems by establishing an overall system architecture. Software design involves identifying

> and describing the fundamental software system abstractions and their relationships."

Covers what objects, databases, servers and services that should be created. How these elements are constructed into a system.
This step helps to decide where to place requirements in the project. How each part of the system will interact as well as how tasks will be allocated to team members.

Implementation and unit testing

> "During this stage, the software design is realized as a set of programs or program units. Unit testing involves verifying that each unit meets its specification."

How the code will be written, includes associated elements:

- code sharing
- api
- versioning
- automated testing
- documentation and training material

Integration and system testing

> "The individual program units or programs are integrated and tested as a complete system to ensure that the software requirements have been met. After testing, the software system is delivered to the customer."

- Checking whether the software complies with the requirements, and demonstrating that it meets specifications
- Checking that the system additionally meets the needs of customers and stakeholders.

Its possible that a software project can meet requirements but fail to meet the needs of customers and stakeholders (were the requirements correct to begin with?)

Operation and maintenance

> "Normally (although not necessarily), this is the longest life cycle phase. The system is installed and put into practical use. Maintenance involves correcting errors which were not discovered in earlier stages of the life cycle, improving the implementation of system units and enhancing the system’s services as new requirements are discovered."

Going back over and supporting the project once it has been released. This step can mean going over every one of the previous steps.