Université de Paris

Génie Logiciel
Elements of a software project

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Resources: www.sylvainlobry.com/GenieLogiciel

Before we start…

- Absences -> scolarité
- Changement de groupe: voir avec la scolarité + me prévenir
- Activité pendant le TD

Elements of a software project

Wooclap

https://www.wooclap.com/L3GL3

Software Quality

Back to software quality

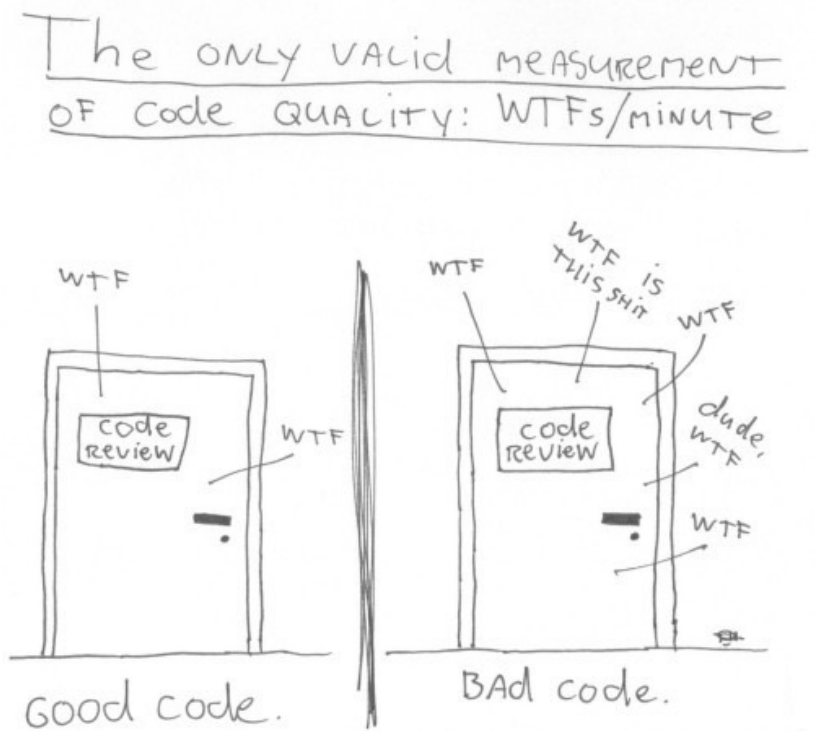
Software Quality

Quality standards – ISO 25010

- Follows ISO 9126
- 8 **product quality characteristics**, each with *sub characteristics*:
  - **Functional suitability**: how well the software provides functions satisfying explicit and implicit needs. *Functional Completeness, Functional Correctness, Functional Appropriateness*
  - **Reliability**: under specific conditions, what functionalities? *Maturity, Availability, Recoverability, Fault tolerance*
  - **Performance Efficiency**: performances vs resources. *Time behaviour, Resource utilization, Capacity*
  - **Usability**: Effort needed for use and assessment of such use by users. *Appropriateness Recognizability, Learnability, Operability, User error protection, UI aesthetics, Accessibility*
  - **Security**: How well the system protects user and data from vulnerabilities. *Confidentiality, Integrity, Non-repudiation, Accountability, Authenticity*
  - **Compatibility**: Degree to which a product, system or component can exchange information with other products, systems or components, and/or perform its required functions while sharing the same hardware or software environment. *Co-existence, Interoperability*
  - **Maintainability**: to which extent the software can be modified to improve it, correct it or adapt it to changes in environment, and in requirements. *Modularity, Reusability, Analysability, Modifiability, Testability*
  - **Portability**: Can the software be transferred from one environment to another? *Adaptability, Installability, Replaceability*

Software Quality

Back to software quality



Elements of a software project

What is a software project?

Definition:

A software project is the complete procedure and activities to achieve an intended software product.

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- Functional objectives
- Technical specifications

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A software project is the complete procedure and activities to achieve an intended software product.

- Functional objectives
- Technical specifications
- Definition of the scope
- Planning
- Development
- Risk analysis
- Management
- Monitoring

Elements of a software project

Some people of a software project

- Maître d'ouvrage (= project owner or client): stakeholder that benefits from the project's results
  - Identifies the needs
  - Defines the goals
  - Finances the project
  - Oversees the project's planning and realization
  - Take general decisions if needed
- Maître d'oeuvre (= contractor): proposes and implements a solution to realize the project

Elements of a software project

Definition of the scope

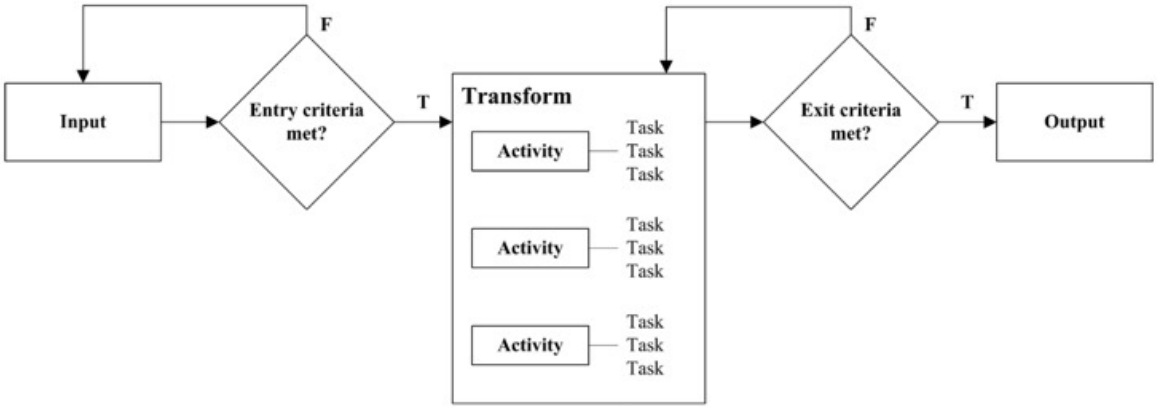
- Scope must be a balance of:
  - Time
  - Cost
  - Quality

Elements of a software project

Software processes

Defintion:

a software process is a set of interrelated activities and tasks that transform input work products into output work products, SWEBOK v3



Elements of a software project

Main software activities

- List of activities to be conducted during a software project
- Each can be seen as a process

Elements of a software project

Main software activities

- Objectives definition
- Requirement analysis
- Feasibility analysis
- Requirements specifications
- Design
- Implementation
- Unit testing
- Integration
- Validation
- Deployment
- Maintenance

Elements of a software project

Main software activities

- Objectives defintion: understanding what will be the usage (in its context) of the software

Elements of a software project

Main software activities

- Requirement analysis: determining the needs of the stakeholders

Elements of a software project

Main software activities

- Feasability analysis: determining which outcomes can be achieved in the specific context of the project

Elements of a software project

Main software activities

- Requirements specifications: formalization of the requirements in the form of a document that can be systematically reviewed, evaluated and approved

Elements of a software project

Main software activities

- Design: precise definition of the components of the software based on the requirements

Elements of a software project

Main software activities

- Implementation: building-up the program following the design and instructions.

Elements of a software project

Main software activities

- Unit testing: verifying individually that each component of your software answer its specification.

Elements of a software project

Main software activities

- Integration: connection of the different sub components of the program.

Elements of a software project

Main software activities

- Validation: validation that the software, as a whole, is answering the initial objectives and expectations from the customer.

- Not to be confused with verification!
- Verification = analysis (often without executing code) during development period to check whether a specific requirement is met

Elements of a software project

Main software activities

- Deployment: activities to make the software available for use.

Elements of a software project

Main software activities

- Maintenance: to modify the application after its deployment to fix bugs, improve performance or improve functionalities

Elements of a software project

Main software activities

- Objectives definition
- Requirement analysis
- Feasibility analysis
- Requirements specifications
- Design
- Implementation
- Unit testing
- Integration
- Validation
- Deployment
- Maintenance

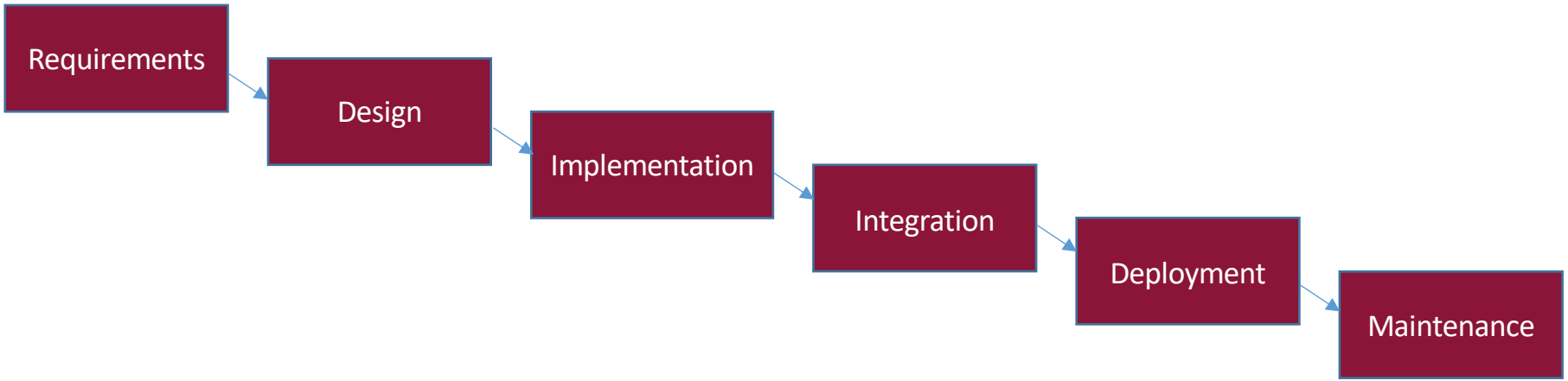
Software Development Life Cycle

- Software Development Life Cycle (SDLC) puts the different processes in order
- Chosen at the start of the project
- Brings discipline to software development
- 4 SDLC models today

Software Development Life Cycle

Waterfall model

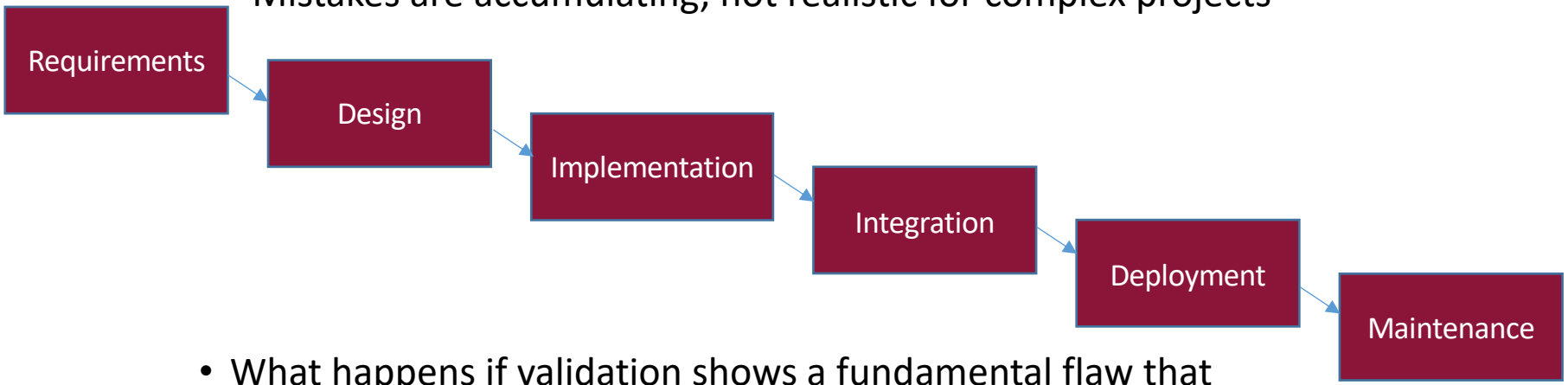
- Simplest SDLC model
- Proposed by Royce in 1970



Software Development Life Cycle

Waterfall model

- + Easy to plan and to follow
- +- Requirements cannot change
- - Mistakes are accumulating, not realistic for complex projects

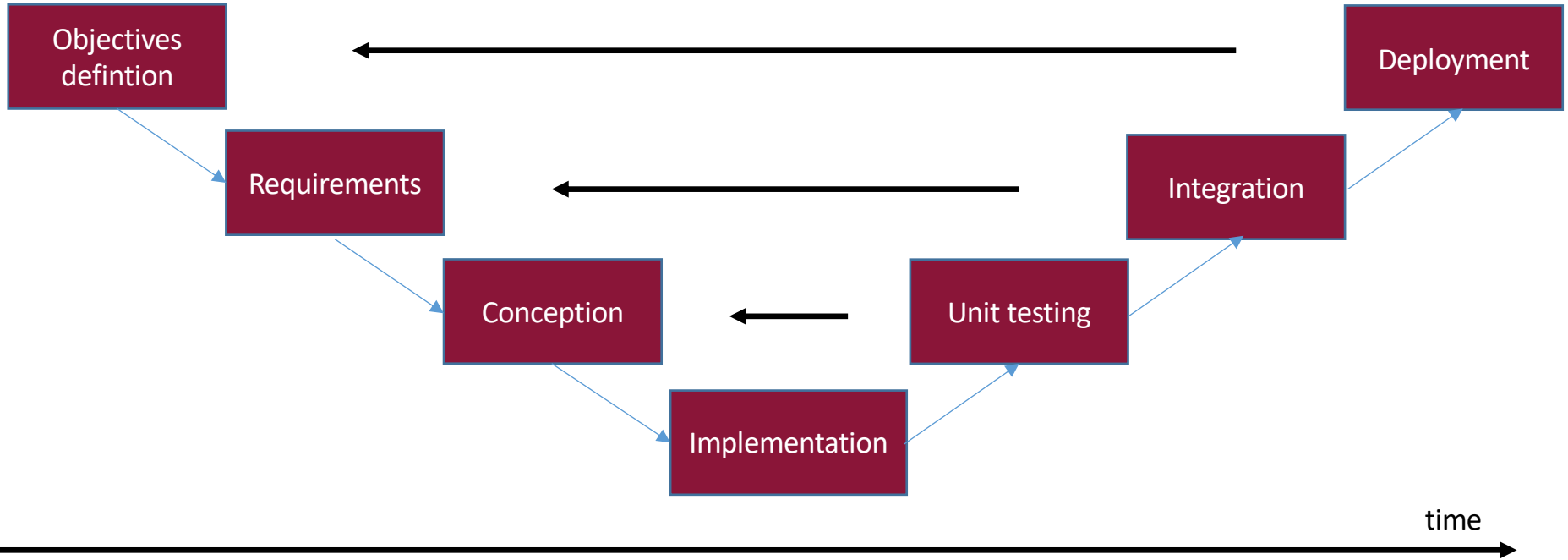


- What happens if validation shows a fundamental flaw that requires a design change ?

Software Development Life Cycle

V-model

- Extension of waterfall



Software Development Life Cycle

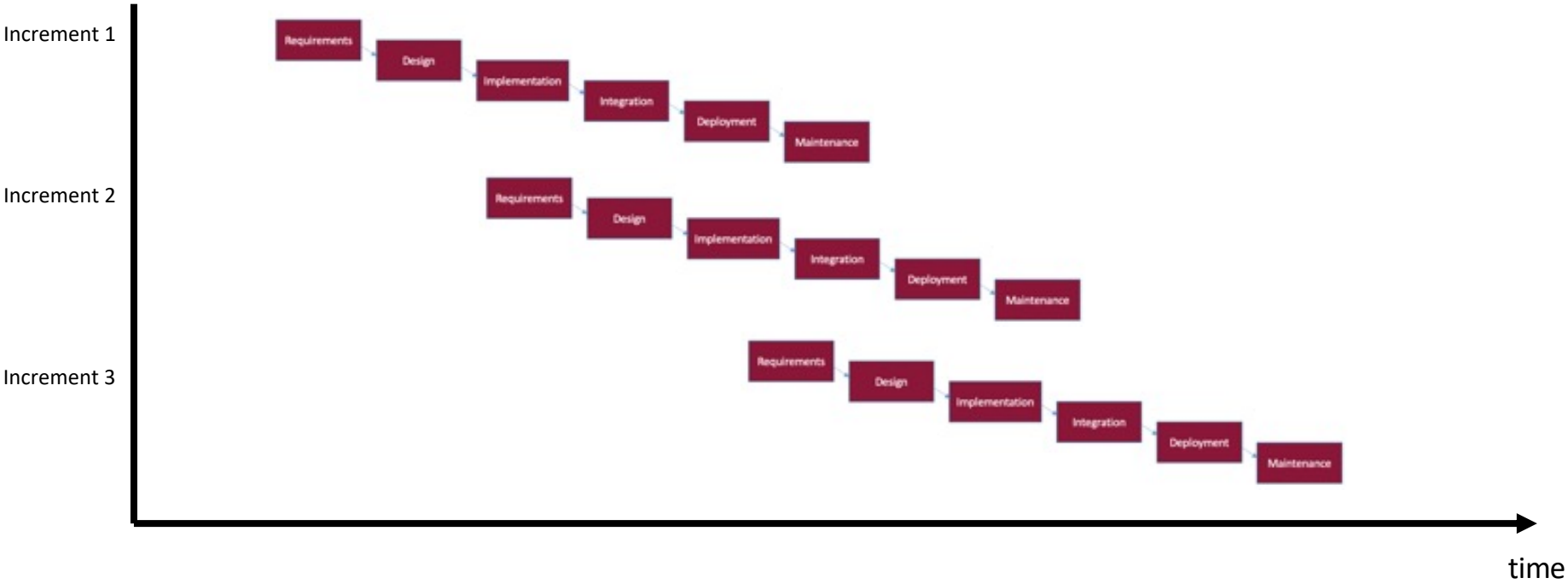
V-model

- Extension of waterfall
- Still simple
- With each components, verification (downward phase) or validation (upward) procedures are defined
- Still not flexible enough for complex projects

- In general, what you have been doing

Software Development Life Cycle

Incremental model



Software Development Life Cycle

Incremental model

- Software broken down in sub-components
- First increment: core functionality
- Subsequent increments take into account feedback

- + Aligns better with the customer needs
- + Fast delivery
- - Fundamental flaws can exist

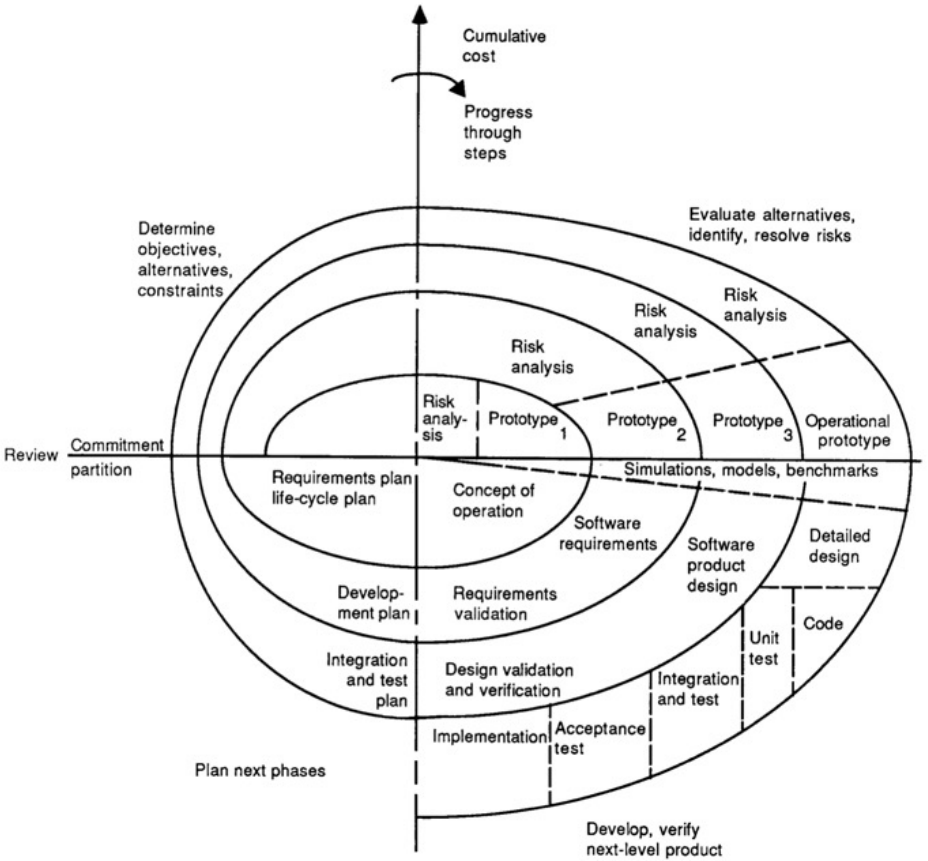
Software Development Life Cycle

Spiral model

Boehm, 1988

- Based on 4 quadrants
- Can be seen as a generalization of previous models
- Risk driven model

- + Suitable for complex projects
- - Requires experience, costly



Software Development Life Cycle

SDLC models

- 4 models
- Different levels of complexity
- Relatively rigid
- Solution since 2000s : Agile (coming up later in this class)