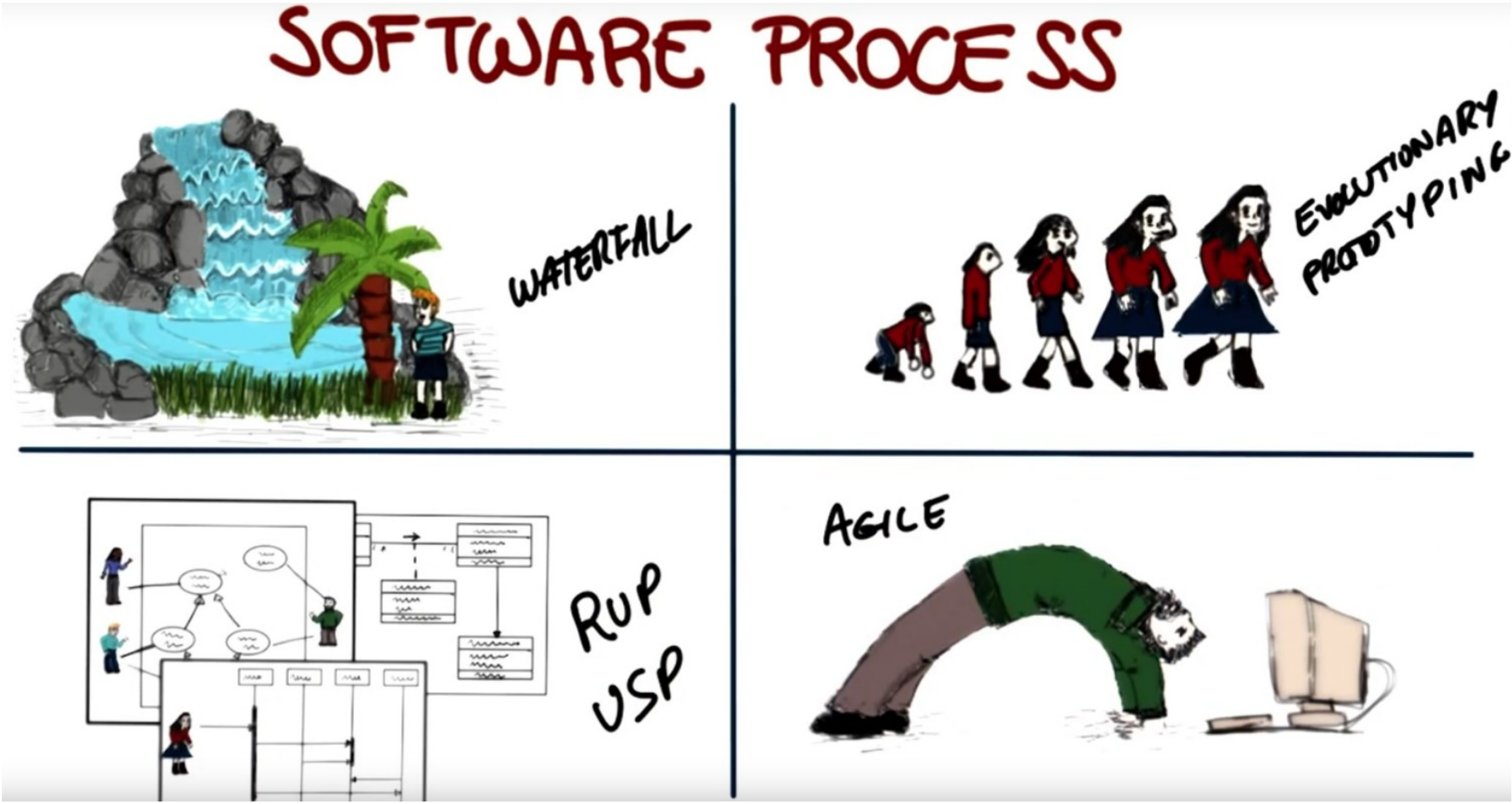
Lifecycle Models

What software lifecycle models define

- The economics of the project
- Project risk management
- The nature and scope of the project (size, timing, risks)
- Product maintainability
- Project architecture
- Error detection/removal rates
- Product completeness degree



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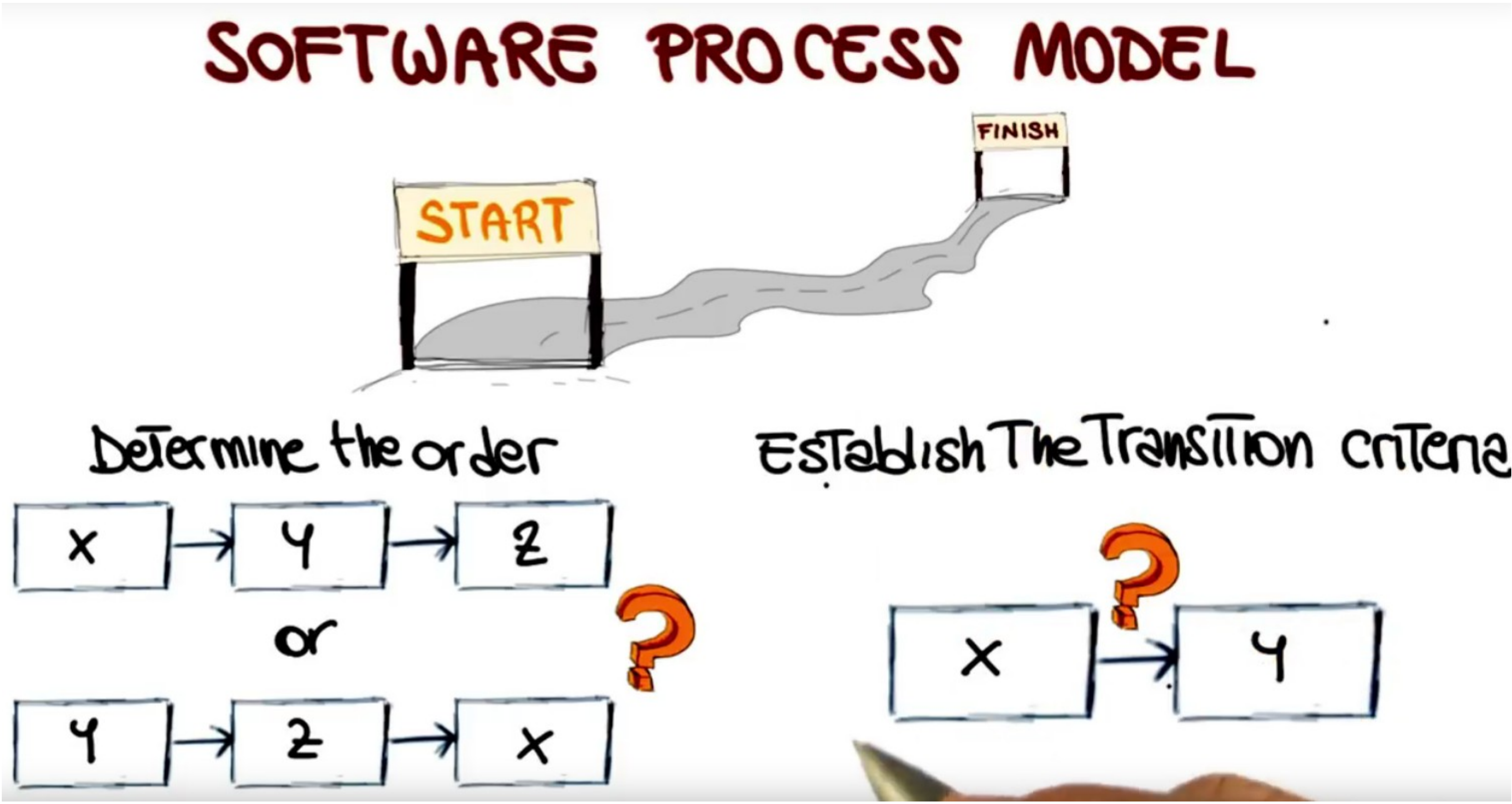

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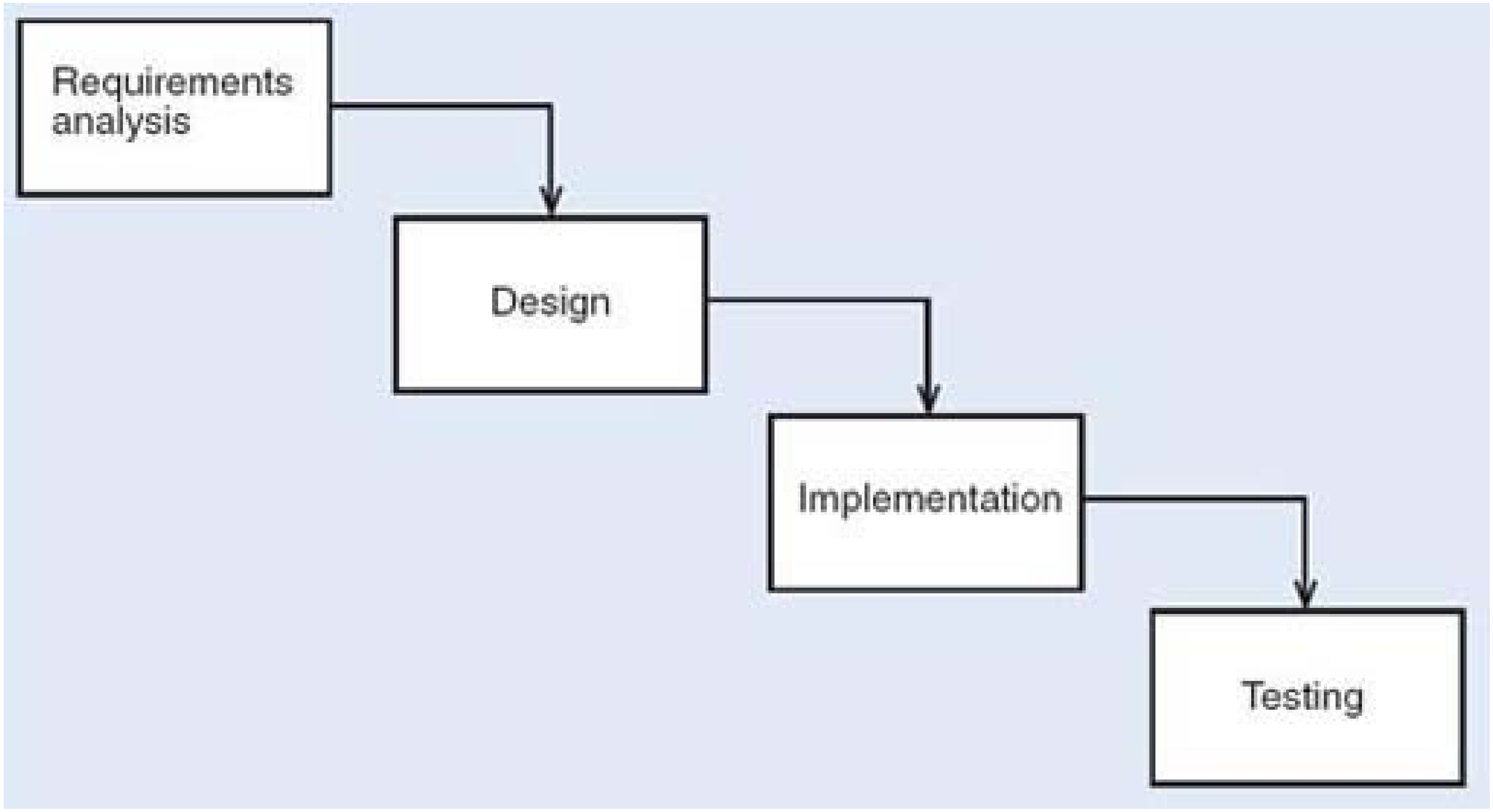
Lifecycle Models

Lifecycle models

- Agile models:
  - Build-and-Fix model
  - Incremental model
  - Spiral model
  - Rapid prototyping model
  - Stabilization and synchronization model
- Waterfall model
- Object-oriented model

Waterfall Model



Waterfall Model features

- Sequential change of all lifecycle phases
- Software Quality Assurance (SQA)group verifies/tests results after phase (sometimes client side participates)
- Feedback with earlier lifecycle phases

Benefit

Cost reduction for software correction (due to feedback)

Drawbacks

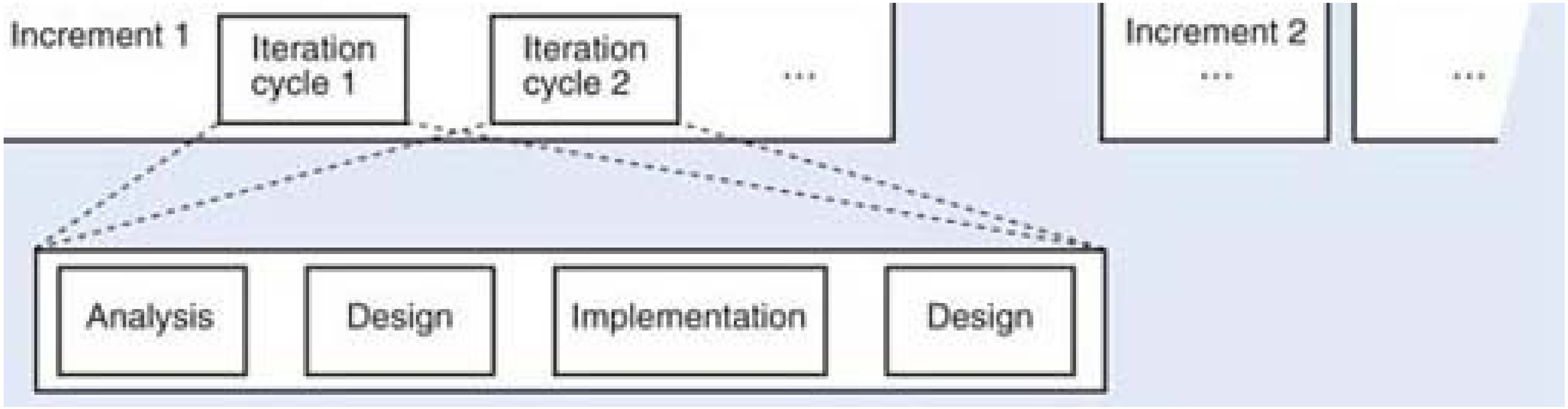
Requires technically «literate» client to create satisfactory specifications

Under high risks, should be combined with rapid prototyping

Waterfall Model

- Clear project discipline
- Document-driven model
- The software may not meet the customer's requirements
- Changes become complicated: terminated phases get «frozen»
- Does not include iterations and evolution

Incremental Model



Incremental Model

Benefits

- The maximal earliest return on investments
- It facilitates the maintainability

Disadvantages

- It requires an open architecture
- It can generate into Build-and-Fix

Incremential Model

- Product decomposition to sequential releases (each development cycle gives an operational product)
- Operational product at every development step
- Flexible introduction of the new functionality at the client's site
- Easy maintenance due to «straightforward expanding» of the major product modules

Rapid prototyping Model

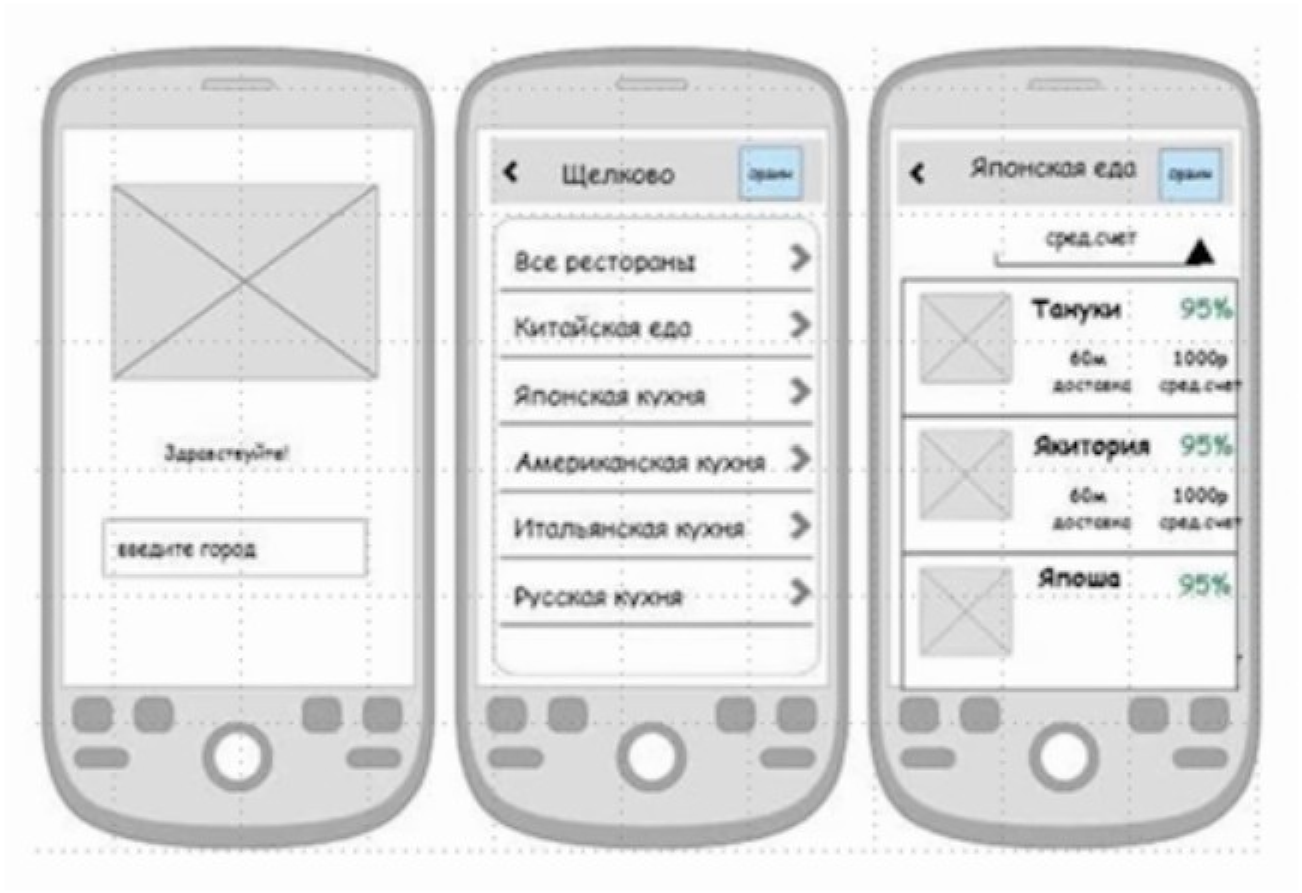
Jim Highsmith offered three life cycle phases:

- Speculation
- Collaboration
- Learning

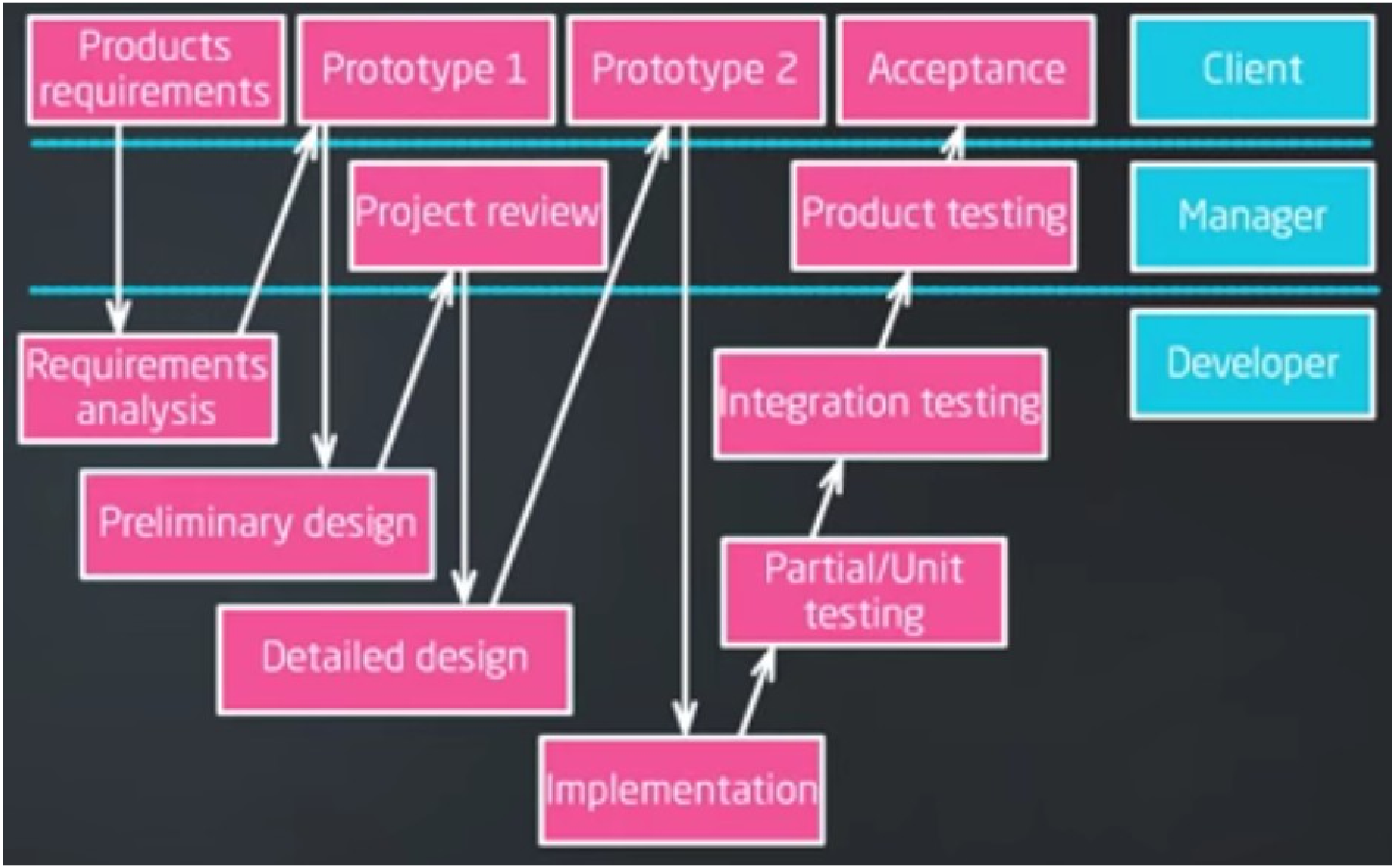
Features

- Rapid prototype has limited functionality and reliability/performance
- Client has not technical knowledge to discuss requirements
- Requirement analysis and specifications are generally possible before coding and testing

Rapid prototyping Model



Rapid prototyping Model



Rapid prototyping Model

Rapid prototyping should be used in conduction with some other models

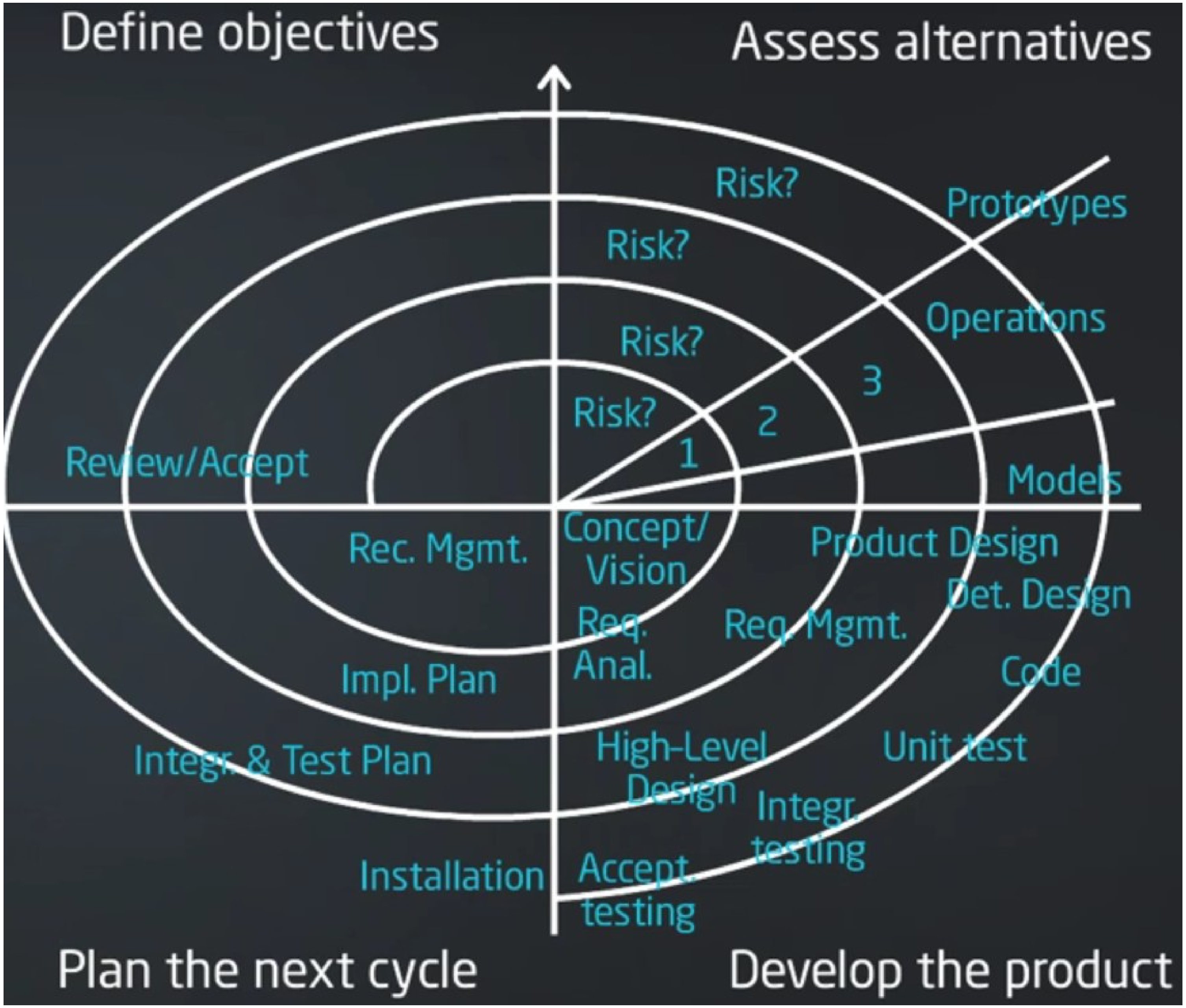
Benefit

- Rapid prototyping ensures compliance with customer requirements

Drawback

- User confusion of prototype and finished system

Spiral Model



Spiral Model

Features

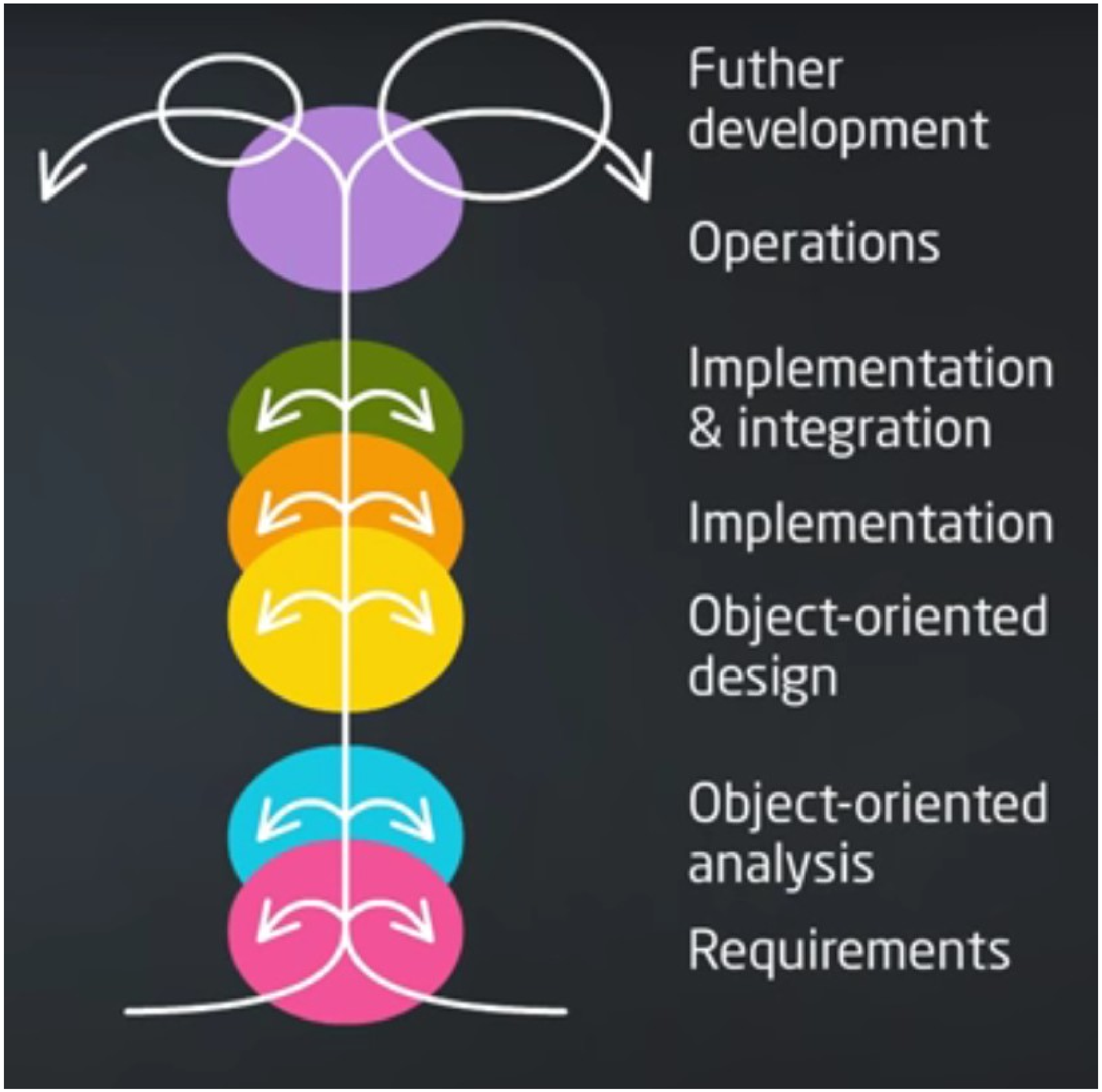
- Rapid prototyping advantages application to the entire lifecycle
- Based on waterfall model and risk analysis
- Risk analyzed at the start of each phase (detection and mitigating of the most serious project risks)
- Project terminated if risks cannot be eliminated
- Several prototyping steps and unlimited iterations number allowed

Object-Oriented Model

Features

- Intensive interaction between lifecycle phases
- Iterative lifecycle phases change
- Phases interlap
- Object Oriented Design (OOD) usually include Object Oriented Analysis (OOA) phases
- Backtrack to earlier phases is possible

Object-Oriented Model



Object-Oriented Model

Benefit

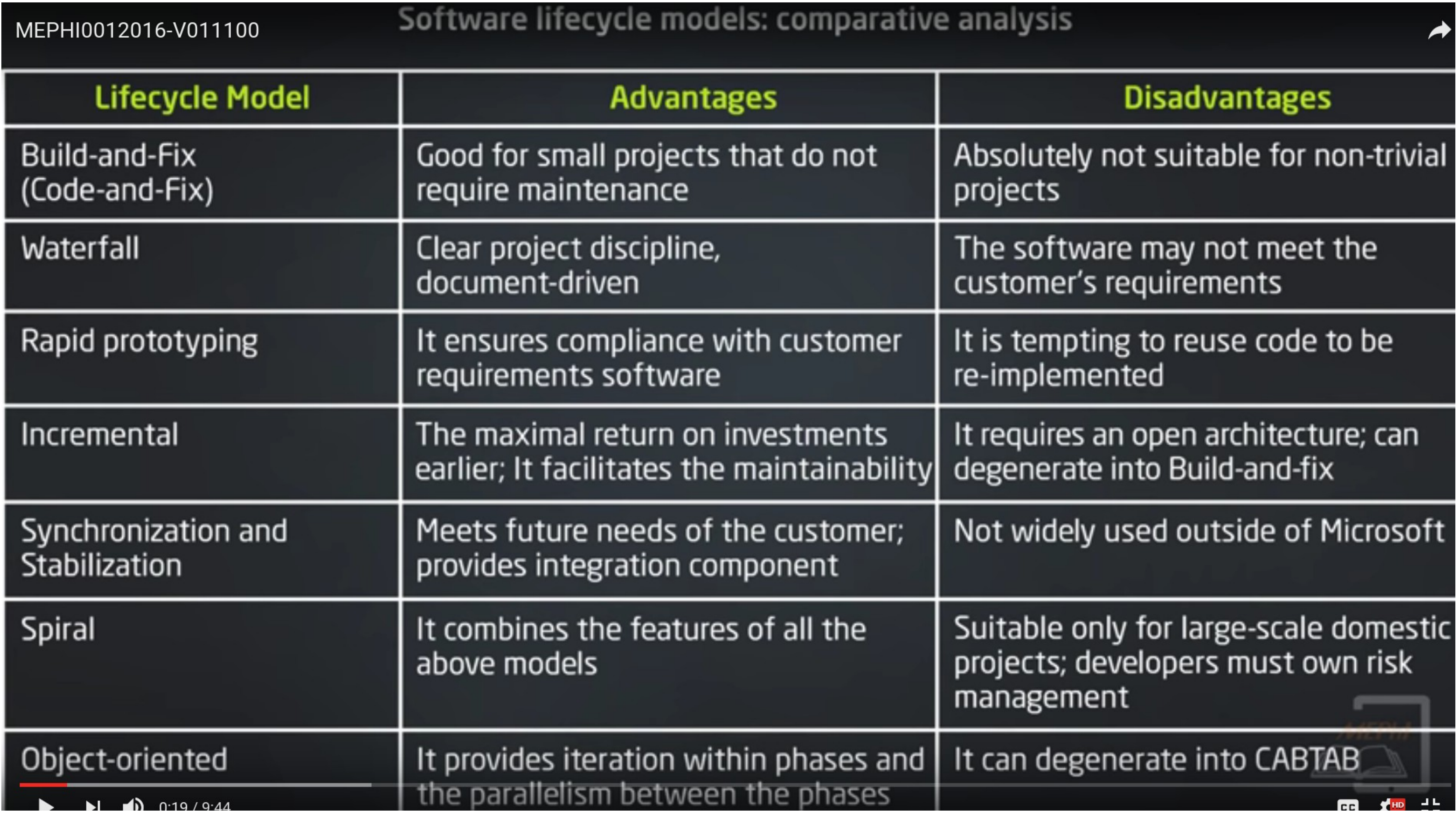
- It provides interaction and parallelism between the phases

Disadvantage

- It can degenerate into CABTAB (Code a bit, test a bit) Build-and-Fix

Similarities of software lifecycle models

- Include all stages of the software lifecycle (except Build-and-Fix)
- It involves several iterations of project development
- Software lifecycle stage is clearly distinguishable (except OO)
- Related to the design methodology
- Require a high organizational maturity and project development team discipline (can degenerate into CABTAB)



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Software lifecycle models: comparative analysis

Lifecycle Model	Advantages	Disadvantages
Build-and-Fix (Code-and-Fix)	Good for small projects that do not require maintenance	Absolutely not suitable for non-trivial projects
Waterfall	Clear project discipline, document-driven	The software may not meet the customer's requirements
Rapid prototyping	It ensures compliance with customer requirements software	It is tempting to reuse code to be re-implemented
Incremental	The maximal return on investments earlier; It facilitates the maintainability	It requires an open architecture; can degenerate into Build-and-fix
Synchronization and Stabilization	Meets future needs of the customer; provides integration component	Not widely used outside of Microsoft
Spiral	It combines the features of all the above models	Suitable only for large-scale domestic projects; developers must own risk management
Object-oriented	It provides iteration within phases and the parallelism between the phases	It can degenerate into CABTAB

CHOOSING A SOFTWARE PROCESS MODEL

Requirements Understanding

Expected lifetime

Risk

Schedule Constraints

Interaction with management/customers

Expertise

CLASSIC MISTAKES: PEOPLE

Heroics

Work environment

People management

CLASSIC MISTAKES: PROCESS

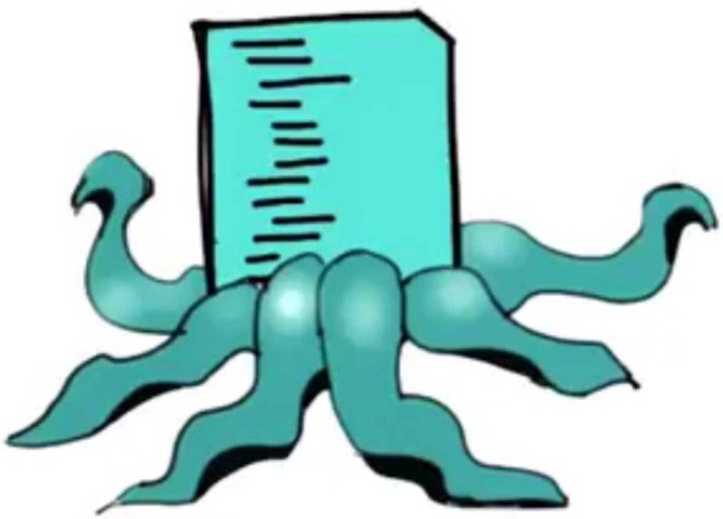
Scheduling issues

Planning issues

Failures

CLASSIC MISTAKES: PRODUCT

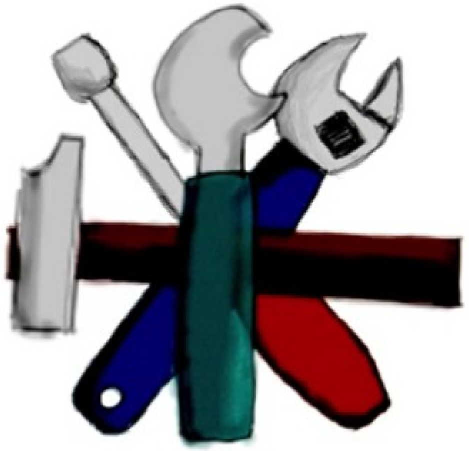
Gold plating


Feature creep

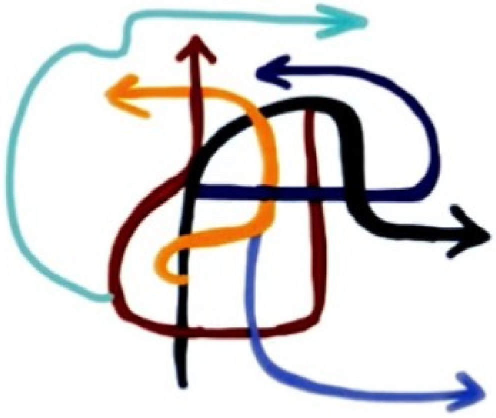
Research ≠ Development

CLASSIC MISTAKES: TECHNOLOGY

silver-bullet syndrome



switching tools



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