Introduction, the Waterfall Model, and Unified Process

Development of Large Systems
Contract based Development

Fall 2016

Agenda

- Who are we
- Paradigms and more
- Waterfall disciplines
- Unified Process I
- Use cases

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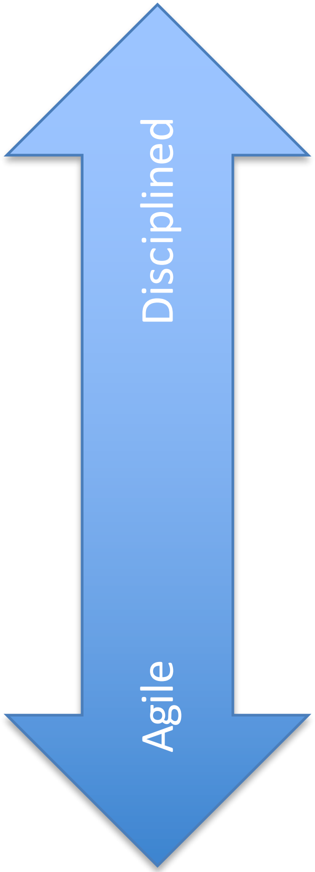
- PhD in Computer Science from ITU

Paradigms



- Predictive
  - Waterfall
- Iterative (and incremental)
  - Unified Process
- Adoptive
  - Scrum and XP

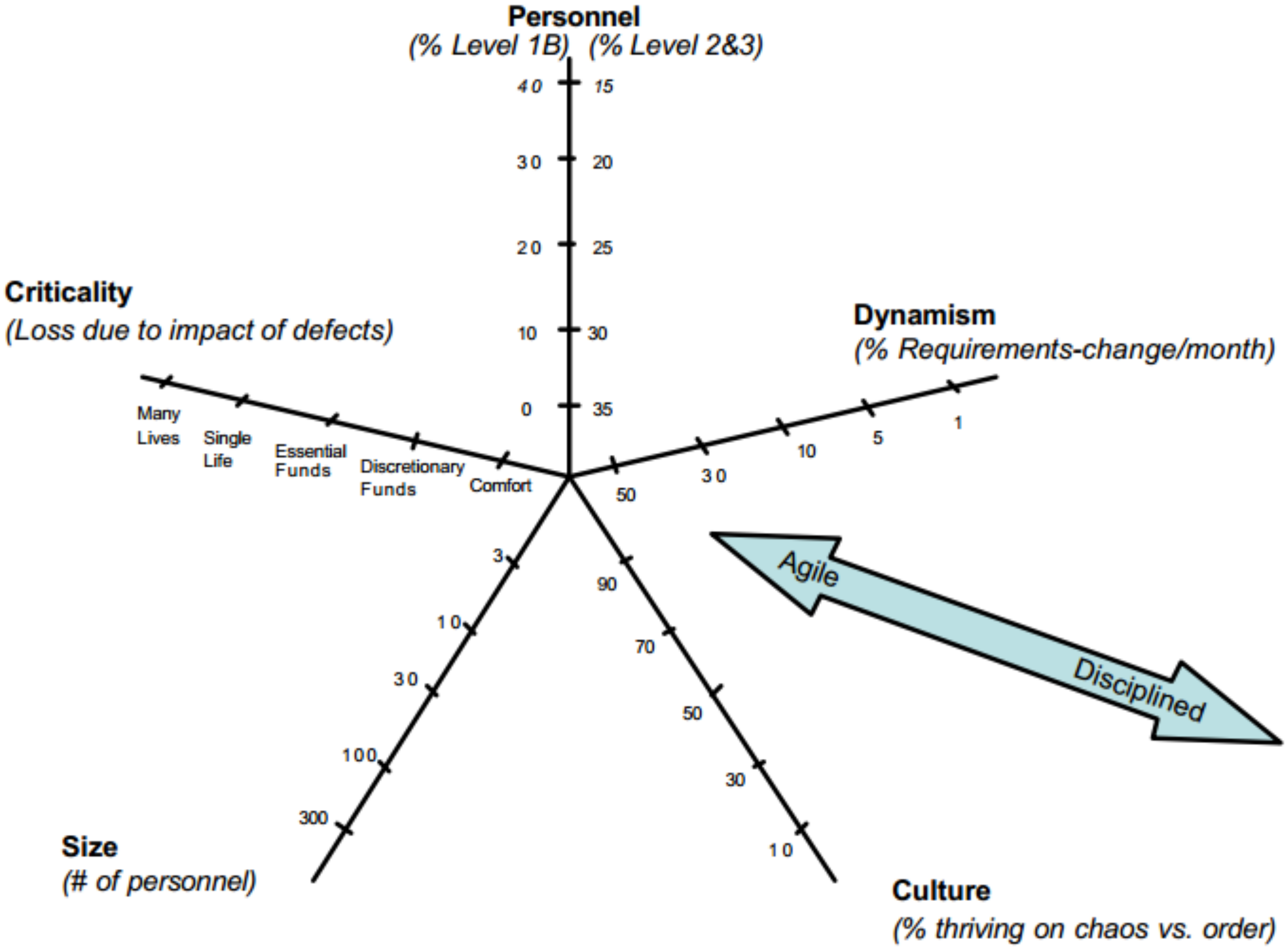
Decision Theory

- Economic man
  - Knows everything
  - Always makes the perfect decisions
- Administrative man
  - Knows a lot
  - Makes qualified decisions
- Muddling through
  - Knows little
  - Can determine whether decisions go in the right direction.

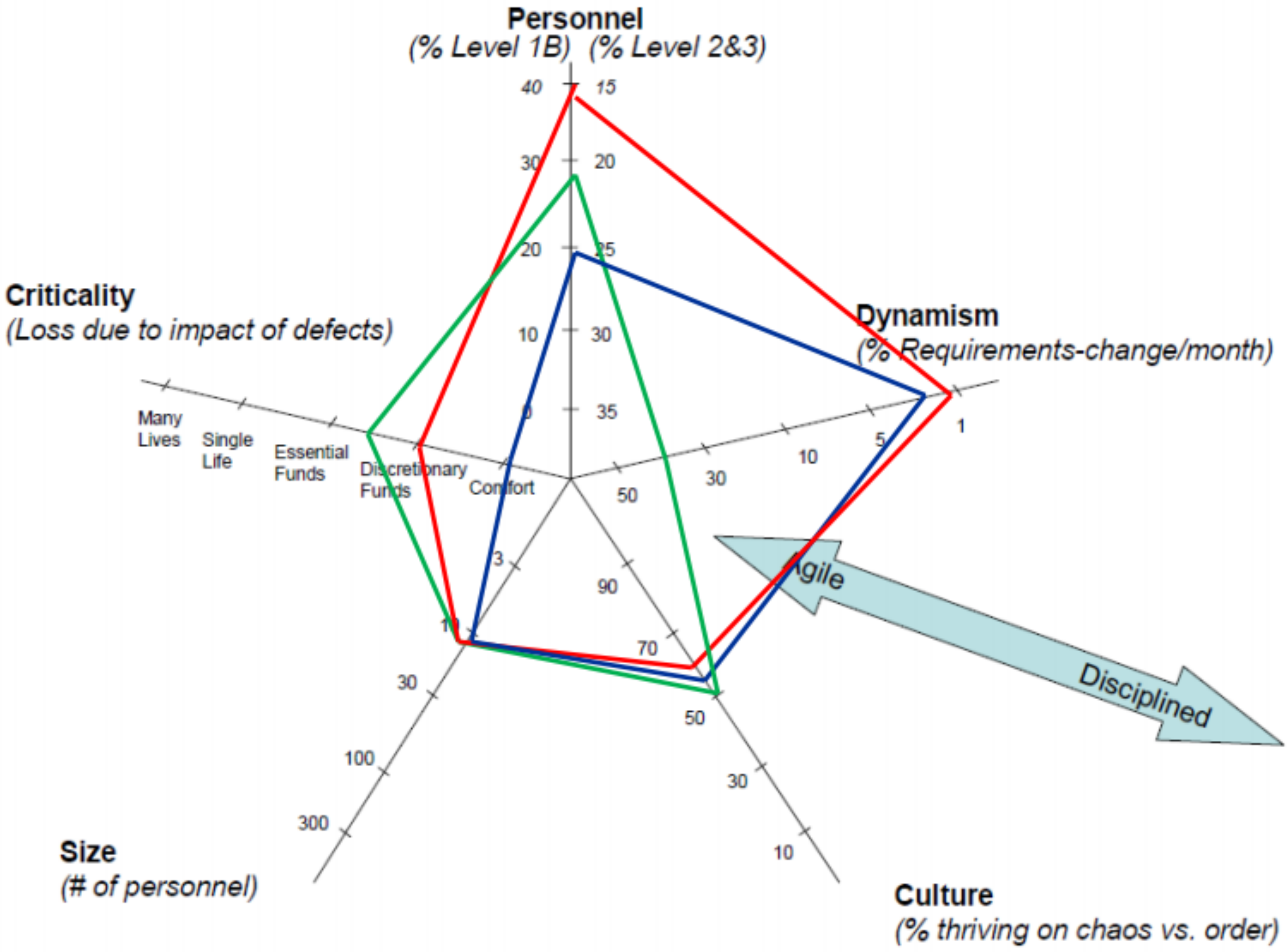
Uncertainty

- Routine
  - Known problem and known solution
- Problem solving
  - Known problem but Unknown solution
- Problem definition
  - Unknown problem and unknown solution

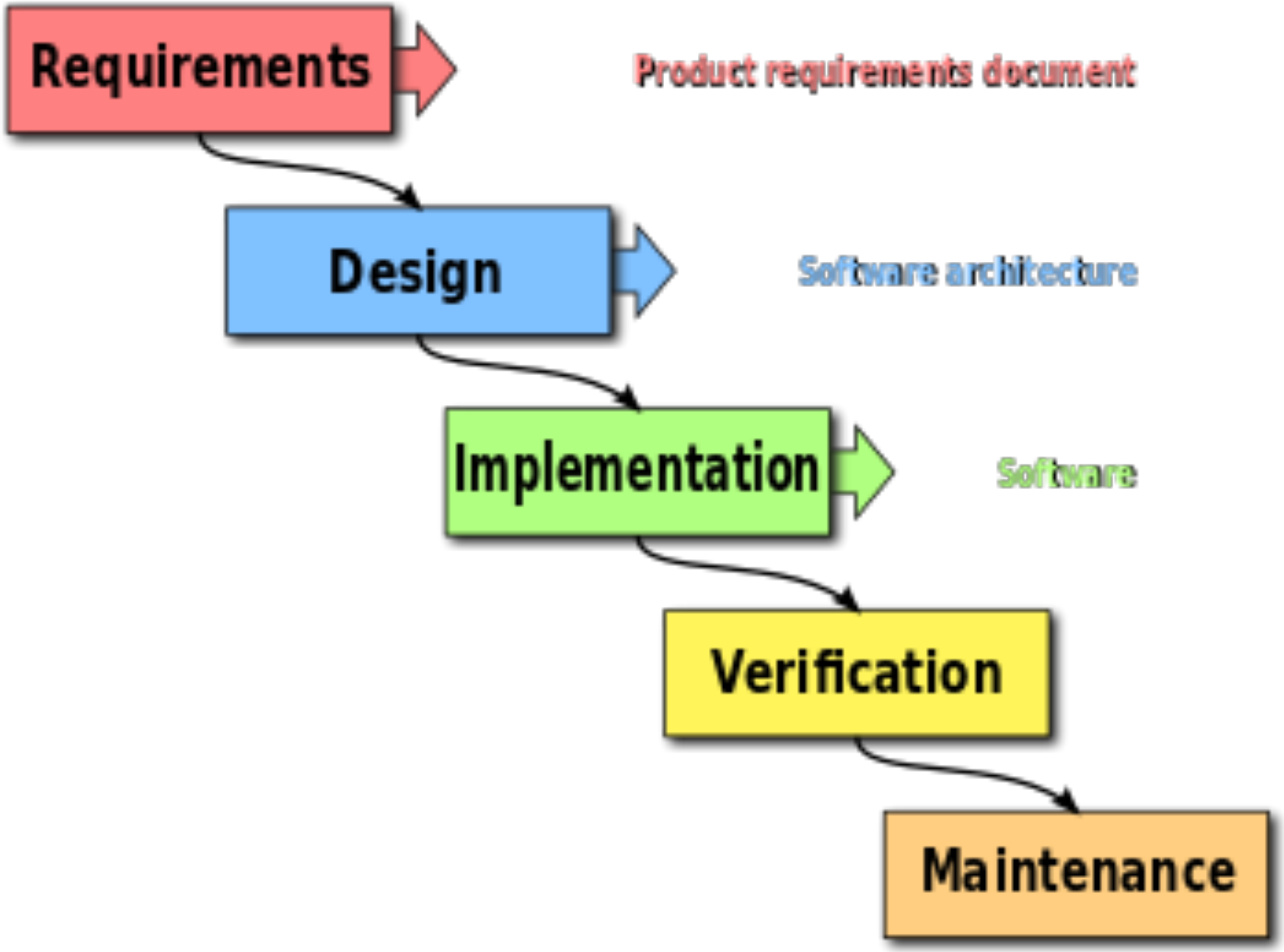
Boehm’s spider web



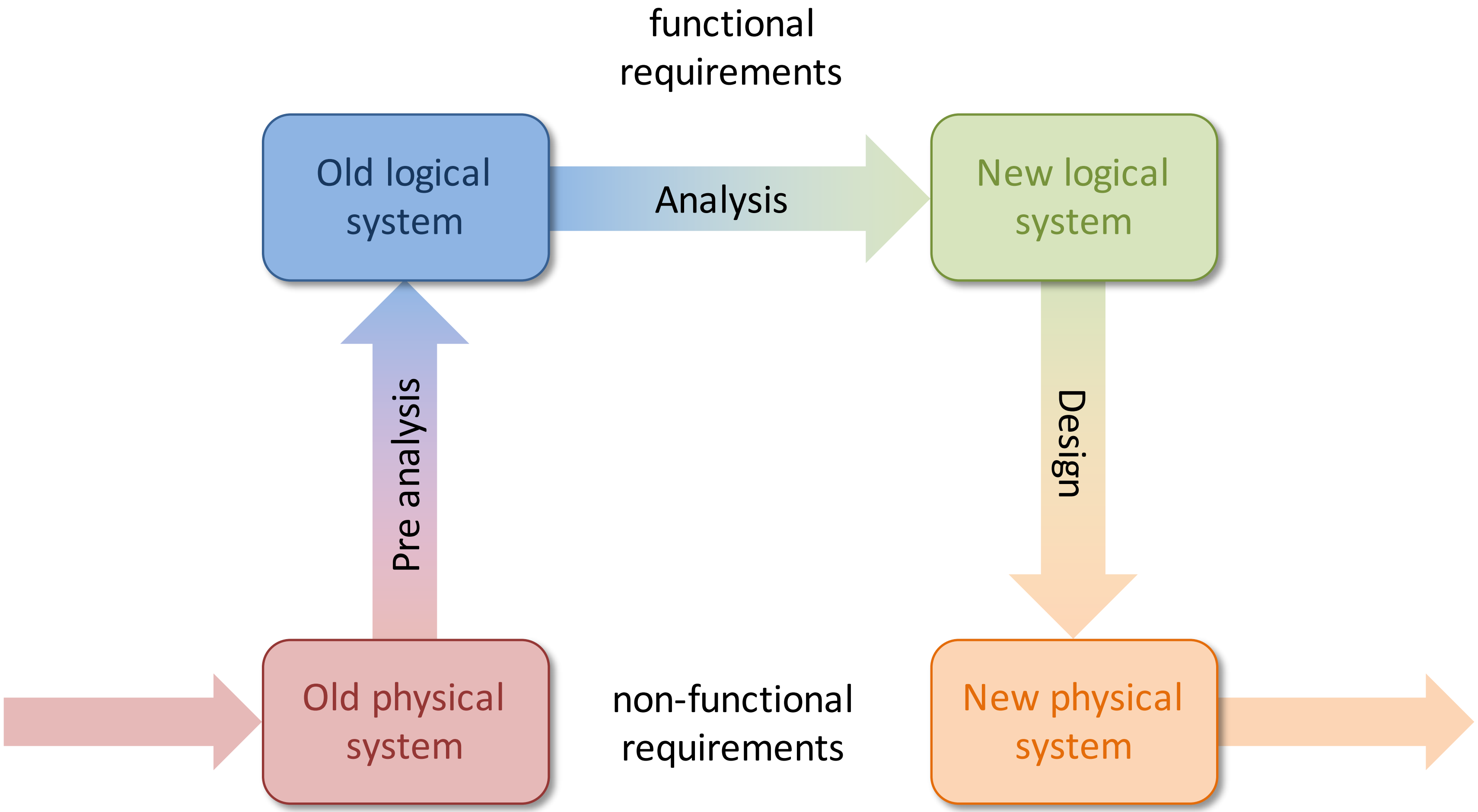
Example


Personnel
(% Level 1B) (% Level 2&3)
40
15
30
20
20
25
10
30
0
35
Dynamism
(% Requirements-change/month)
1
5
10
30
50
Culture
(% thriving on chaos vs. order)
90
70
50
30
10
Size
(# of personnel)
3
10
30
100
300
Criticality
(Loss due to impact of defects)
Many Lives
Single Life
Essential Funds
Discretionary Funds
Comfort
Agile
Disciplined

Waterfall Model



Requirements



functional requirements

Old logical system

Analysis

New logical system

Pre analysis

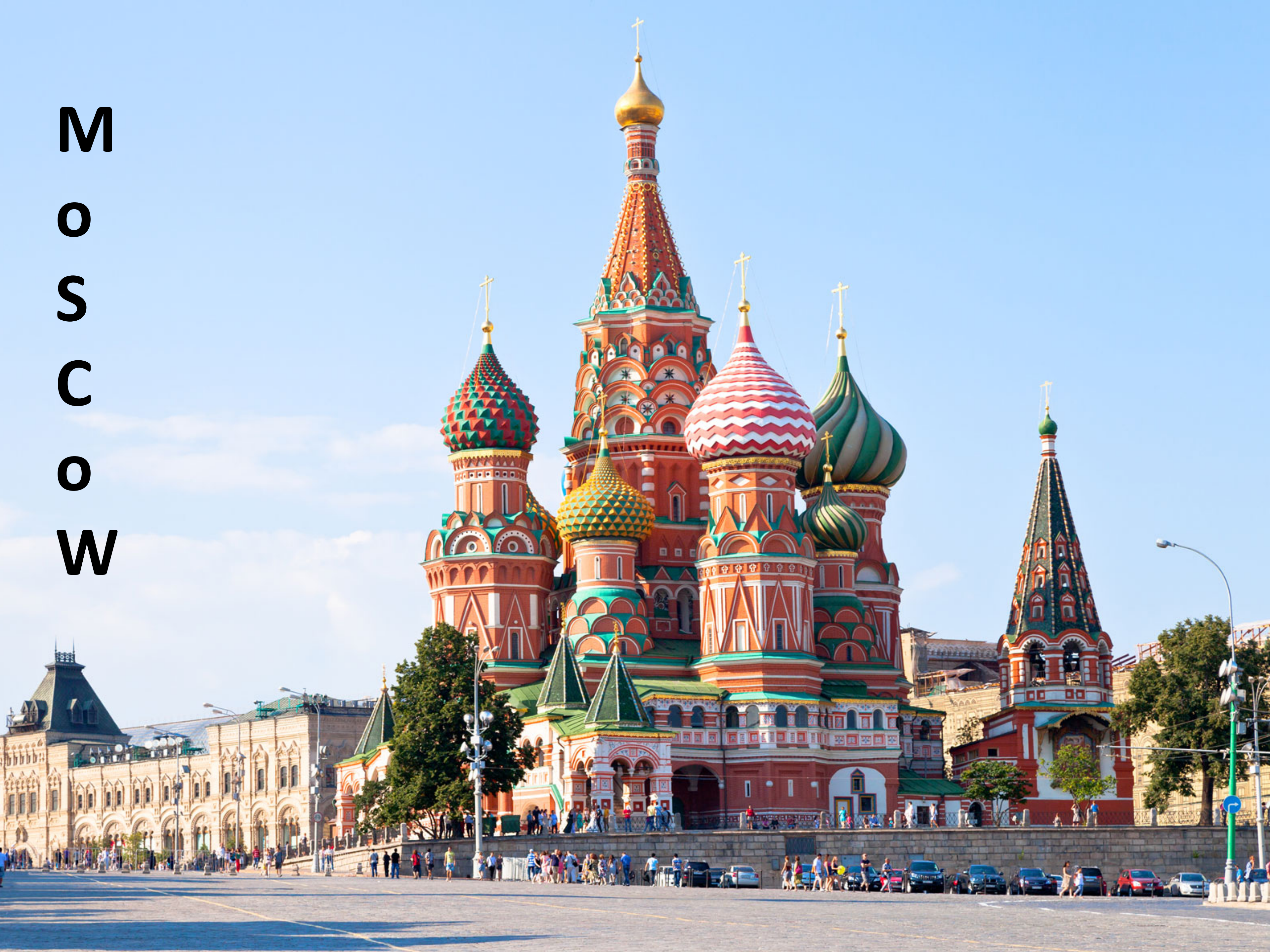
Design

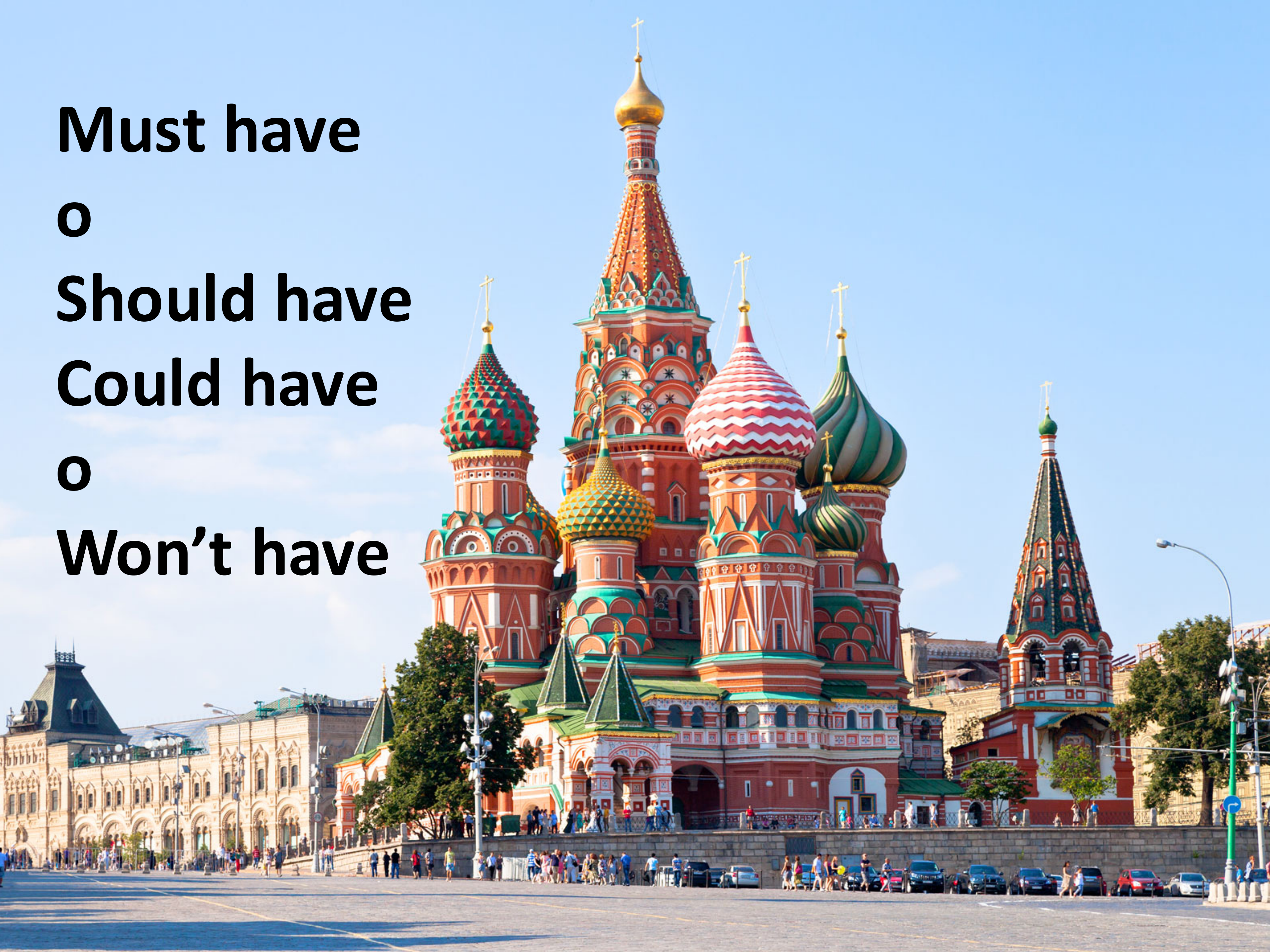
Old physical system

non-functional requirements

New physical system

Moscow





Must have
o
Should have
Could have
o
Won’t have

Requirements - risks

- Requirements are about **what** is required
- Functional requirements
- Nonfunctional requirements
- The right system
- The right requirements
- Incomplete requirements
- Wrong requirements
- Missing requirements

- Business Modelling and LEAN Value Stream Analysis may be used to develop the right system
- When do we estimate and submit the tender

Analysis & Design

- The analysis helps understanding the required system and the production of necessary documentation
- A requirement/design matrix can be used to manage that all requirements are met and that all design is based on a requirement
- Design is about **how** the requirements may be fulfilled

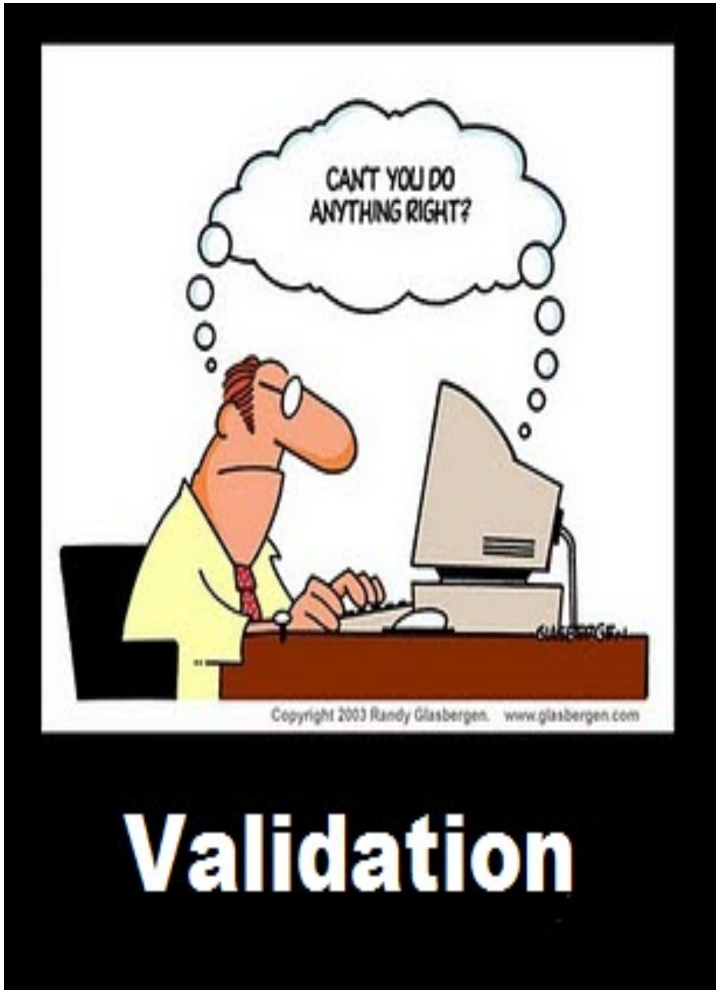
Implementation

- Is the architecture in place
- Is the code standard in place
- Is the proper use of design patterns in place
- Are the test cases in place
- Then code ☺

- Are development and test environments in place

Test and Verification

- Do the test cases cover all scenarios and requirements
- Can all test cases be run without errors
- Are all the system requirements fulfilled
- Can the system be used
- Did we cater for all activities (and not just 40%)



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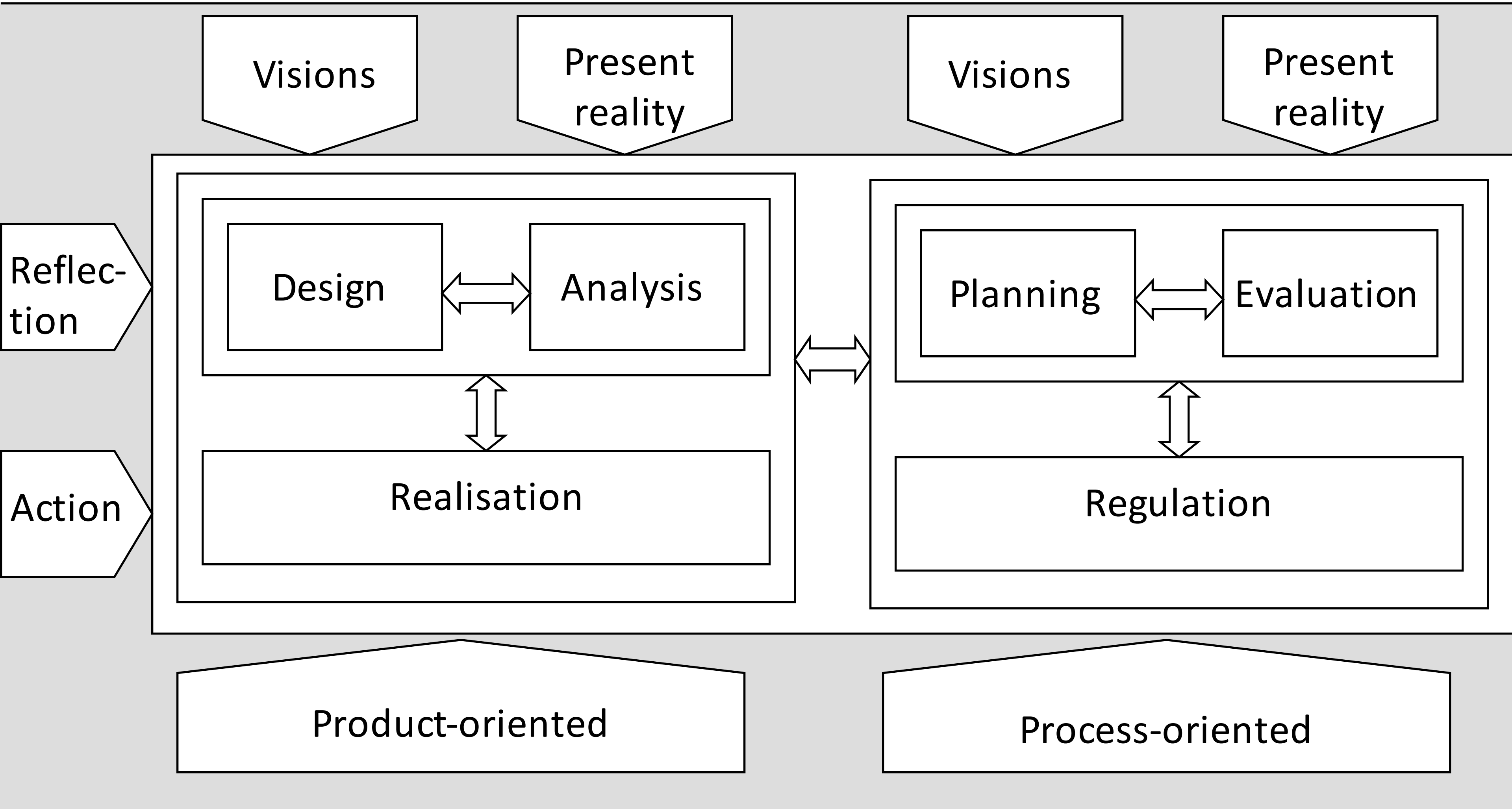
Waterfall disadvantages

- One Big Bang delivery
- Perhaps after very long time
- New or changed requirements will lead to considerable rework
- New technologies are not considered
- User's needs or requirements may have changed when the product is delivered

Where does Waterfall fit?


Visions
Present reality
Visions
Present reality
Reflec-tion
Action
Design
Analysis
Realisation
Planning
Evaluation
Regulation
Product-oriented
Process-oriented