IMPROVE
Quality Services

How to test a tunnel?

Jeanne Hofmans

SLUISKIL TUNNEL

Goals

The Project

The customer

- BV Kanaalkruising Sluiskil (KKS)
  - Acting on behalf of local government
  - 30 people
- Responsible for
  - Schedule and budget
  - Stakeholder management
- KKS has hired test expertise
  - During the RfP
  - During execution

The supplier

- Combination BAM TBI (CBT)
  - Provisional partnership
  - Koninklijke BAM Groep NV
  - TBI Holding NV

- Responsible for
  - Design, build, code, mount, test and maintain (3 years)

- Several Disciplines & Expertises
  - Line and process management
  - Civil & technical (design) Engineers

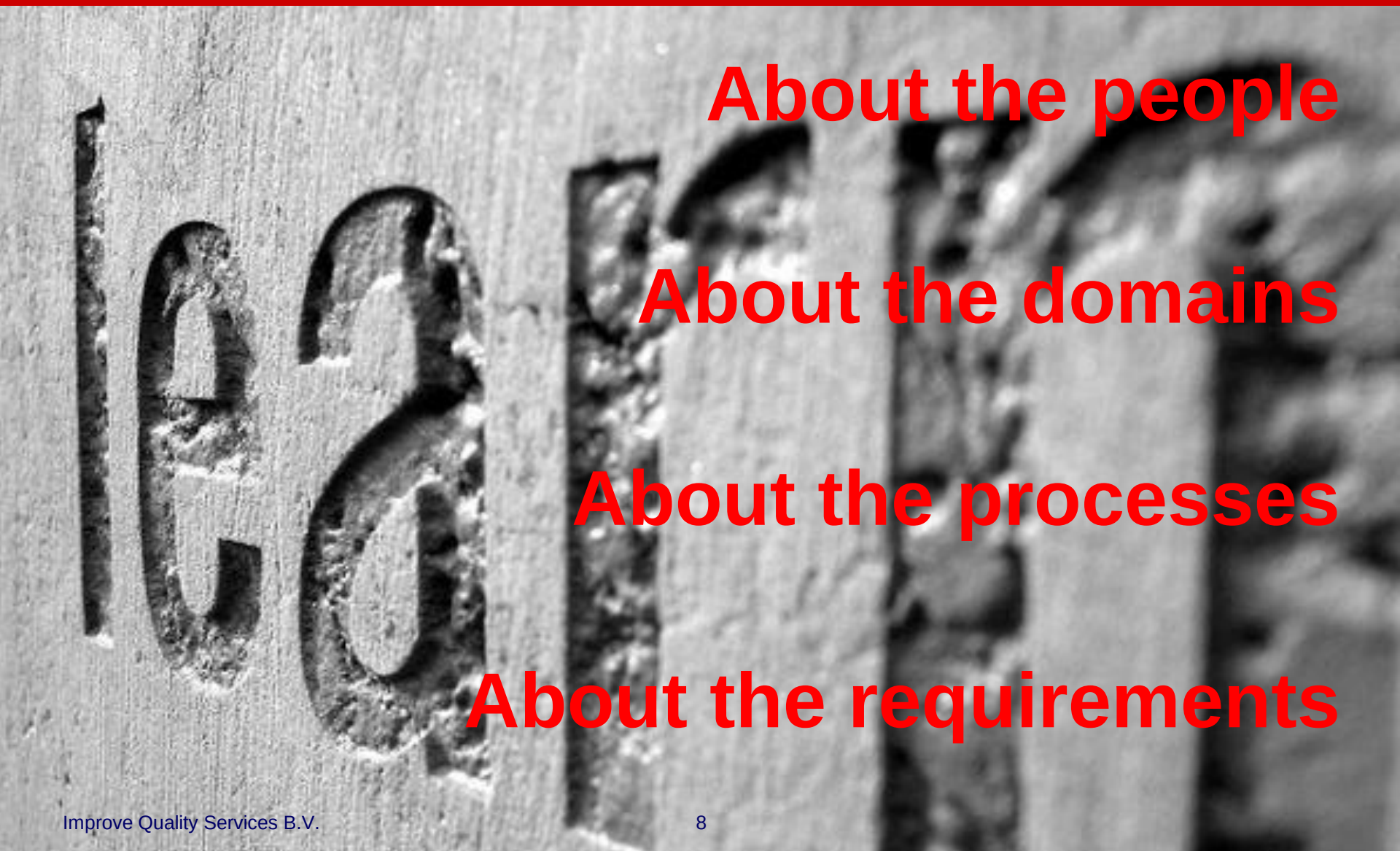
Why..

- .. an IT test consultant?
  - Many tunnels delivered late and over budget due to major issues in quality
  - Quality issues related to VTTI & integral system
  - A counterpartner for the customers testmanager was required
- .. did I agree?
  - Fun domain
  - After doing some audits it was time to do it myself

My assignment

- Help us deliver **quality right from the start**
- Have an integral point of view
- Be pragmatic
- Use TMap Next as a test methodology

My approach



About the people

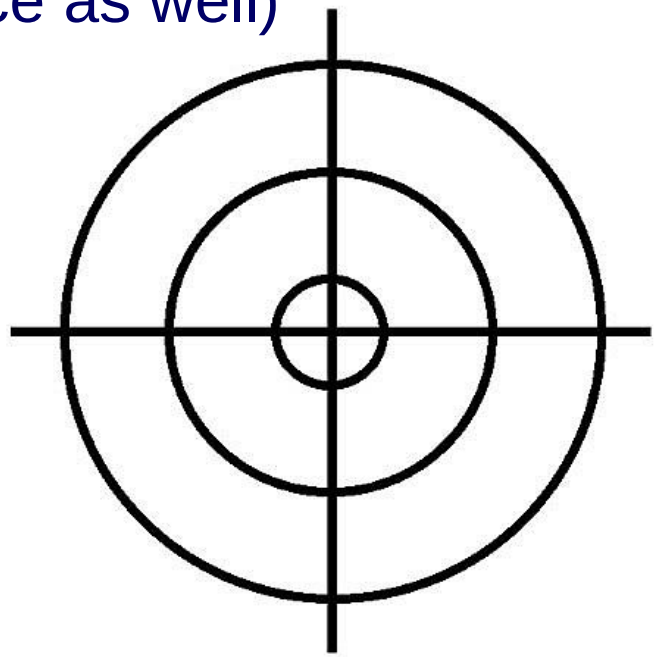
About the domains

About the processes

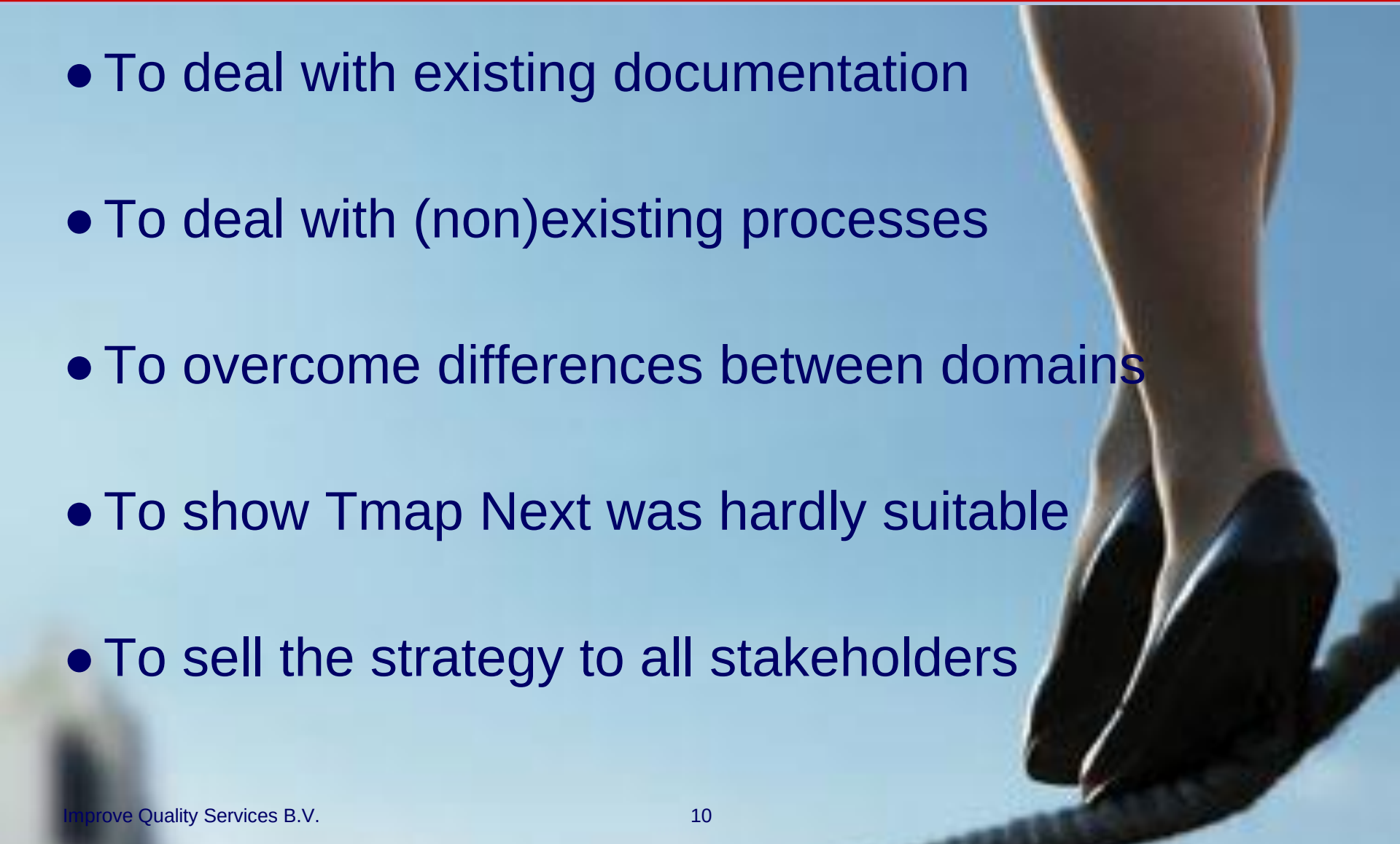
About the requirements

My goals

- To use existing processes and products
  - Systems Engineering Processes
  - FMECA (Failure Mode, Effects and Criticality Analysis)
  - Design documentation (enhance as well)
- To test risk based
- To minimize bureaucracy

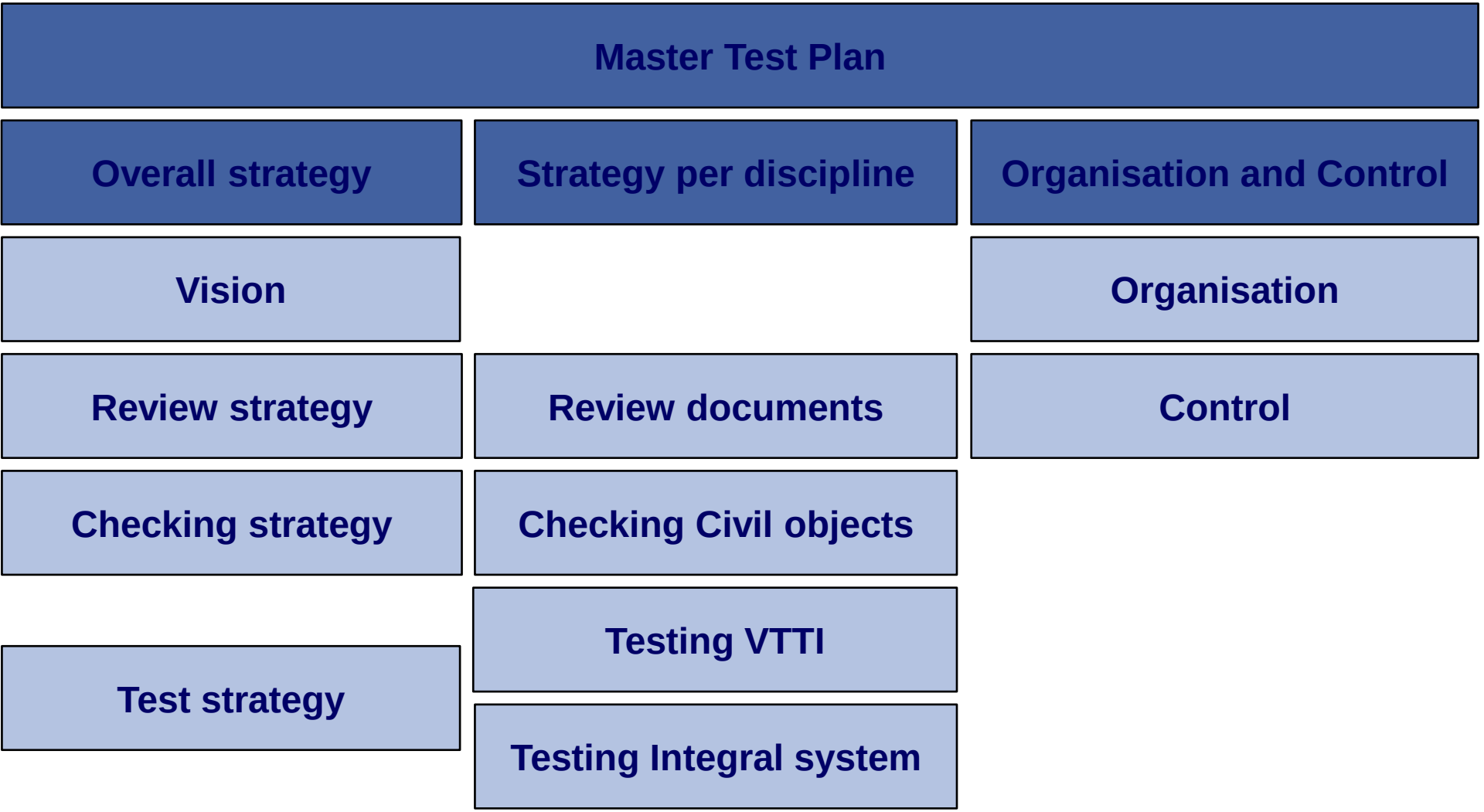


My challenges



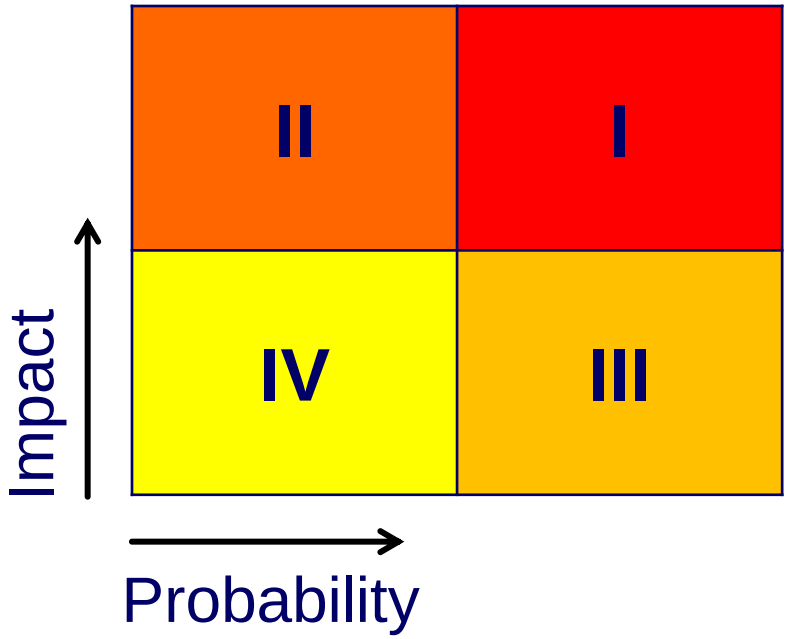
- To deal with existing documentation
- To deal with (non)existing processes
- To overcome differences between domains
- To show Tmap Next was hardly suitable
- To sell the strategy to all stakeholders

My strategy


Master Test Plan
Overall strategy
Strategy per discipline
Organisation and Control
Vision
Organisation
Review strategy
Review documents
Control
Checking strategy
Checking Civil objects
Testing VTTI
Test strategy
Testing Integral system

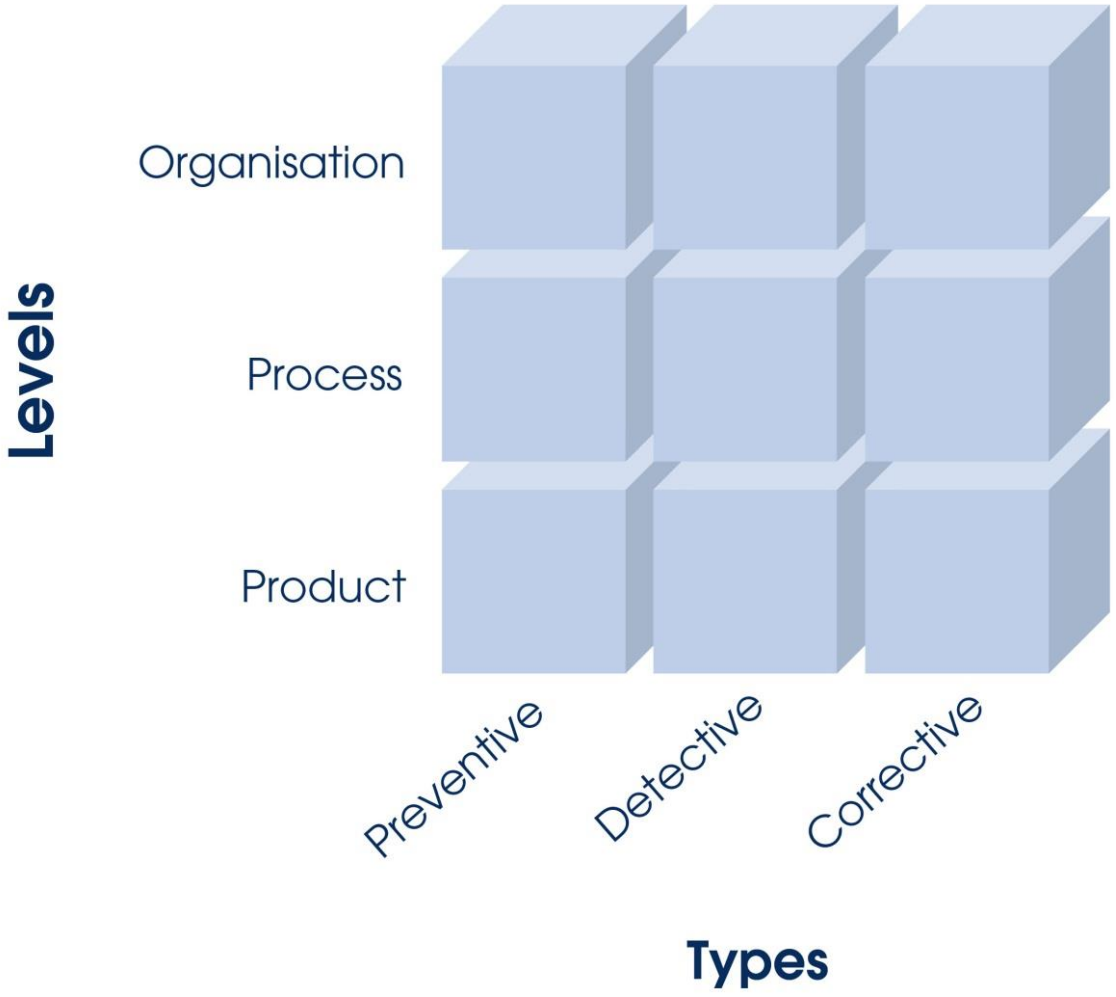
Risks at system level

System	Risk
30 Waterafvoersysteem	-
31 Pompinstallatie hoofdkelder	IV
32 Pompinstallatie middenkelder	II
33 Pompinstallatie hoofdkelder schoonwater	IV
35 Ventilatiesysteem	-
36 Tunnelventilatie	II
37 Meting van luchtkwaliteit	III
38 Overdrukinstallaties pompkelders/ kabelkoker	IV
39 Ventilatie dwarsverbindingen	II
40 Verkeerssysteem	-
41 Rijstrooksignalering	I
42 SDS/Verkeersdetectie	I



Risk	Test phase							
	Prototype	FAT-HW	FAT-SW	iFAT	CT	SAT	SIT	GIT
II	'-'	X	X	XXX	X	XX	X	i

Quality Level Management



The project is still in progress

Ton Stanowicki

My conclusion about the project

- In a joint effort with KKS & CBT we set up
  - an effective and efficient strategy
  - covering all disciplines;
  - satisfying all stakeholders.

- I loved doing something completely new and innovative

- I learned a lot and they did too!

Civil vs VTTI

- Verification
- Validation
- Safety
- Lifecycle

- Terminology
- Mentality
- History