Succevolle testautomatisering?
Geen kwestie van geluk maar van wijsheid!

TestNet Voorjaarsevent 2013

Ruud Teunissen
Polteq

Testautomatisering

- Testautomatisering is het gebruik van speciale software (naast de software die wordt getest) om
  - testen voor te bereiden en uit te voeren
  - actuele en voorspelde resultaten te vergelijken

- Testautomatisering kan
  - binnen een reeds bestaand proces bestaande, routinematige en noodzakelijke testen te automatiseren
  - additionale testen toe te voegen die manueel moeilijk uit te voeren zijn

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Testautomatisering – Initieel

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Testautomatisering – “Bevindingen”

- Management verwacht onmiddelijk R.O.I.
- Doel: “Automatiseer alles”
- Het bepalen van de impact van testautomatisering is niet mogelijk
- Communicatie
- Huidig testproces: ad-hoc & ungedocumenteerd
- Tool-gericht in plaats van doel-gericht
- Focus op het testen van componenten
- “One tool to rule them all”
- We hebben geen automatiseringsplan nodig

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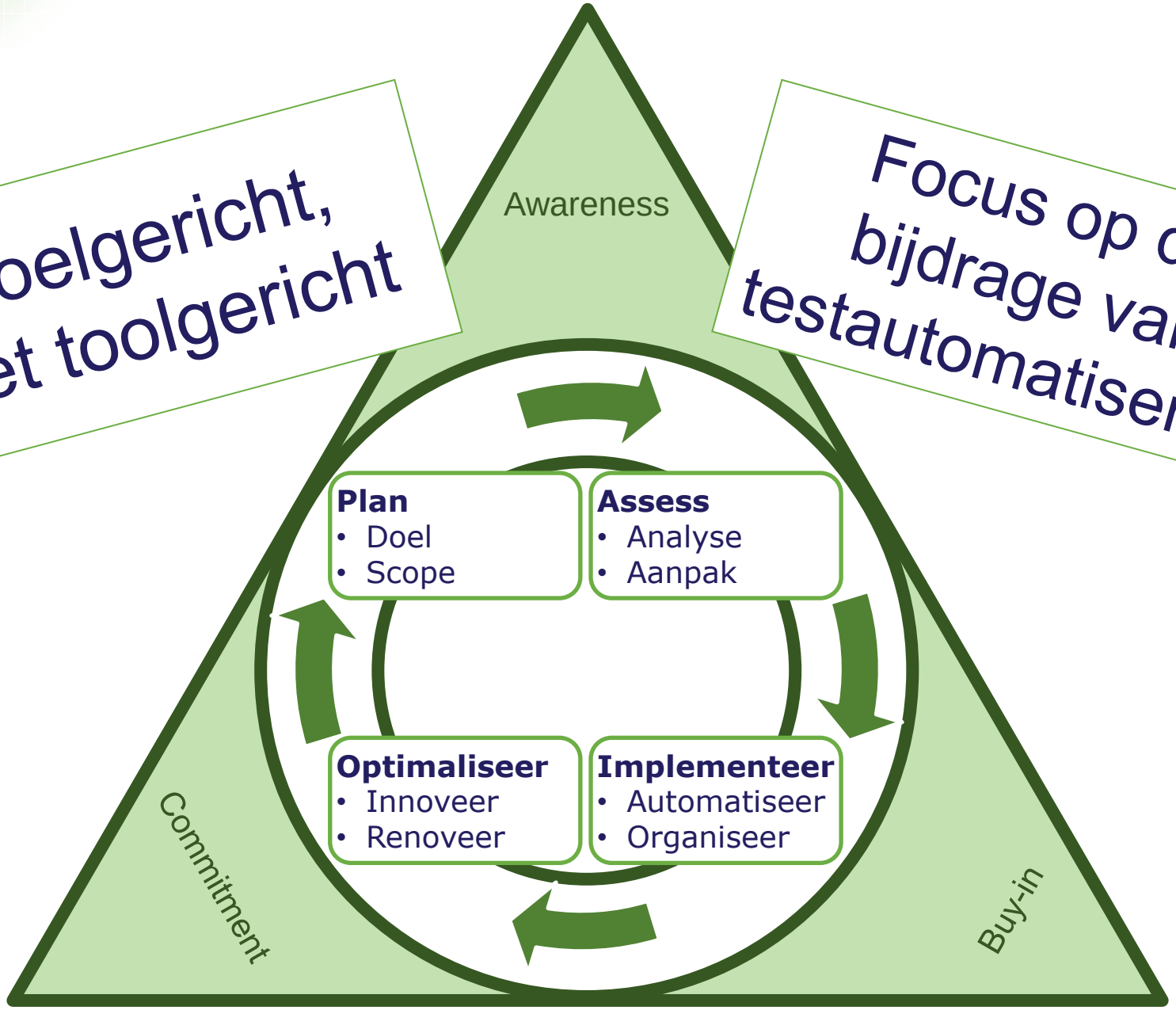
Testautomatisering = Automatisering van het testen

- Fit for purpose
  - Realistische doelstellingen
- Fit for context
  - Haalbaar in de huidige context
- Doel-gericht, niet tool-gericht
- Focus op de bijdrage van testautomatisering

Testautomatisering met TI*4Automation*

Doelgericht, niet toolgericht

Focus op de bijdrage van testautomatisering



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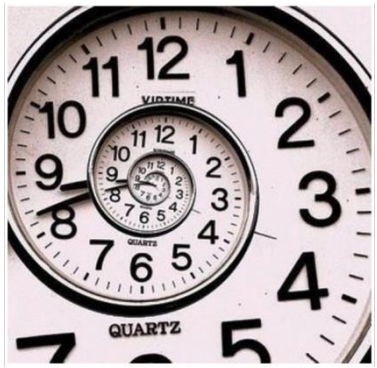
Awareness – Commitment – Buy-in



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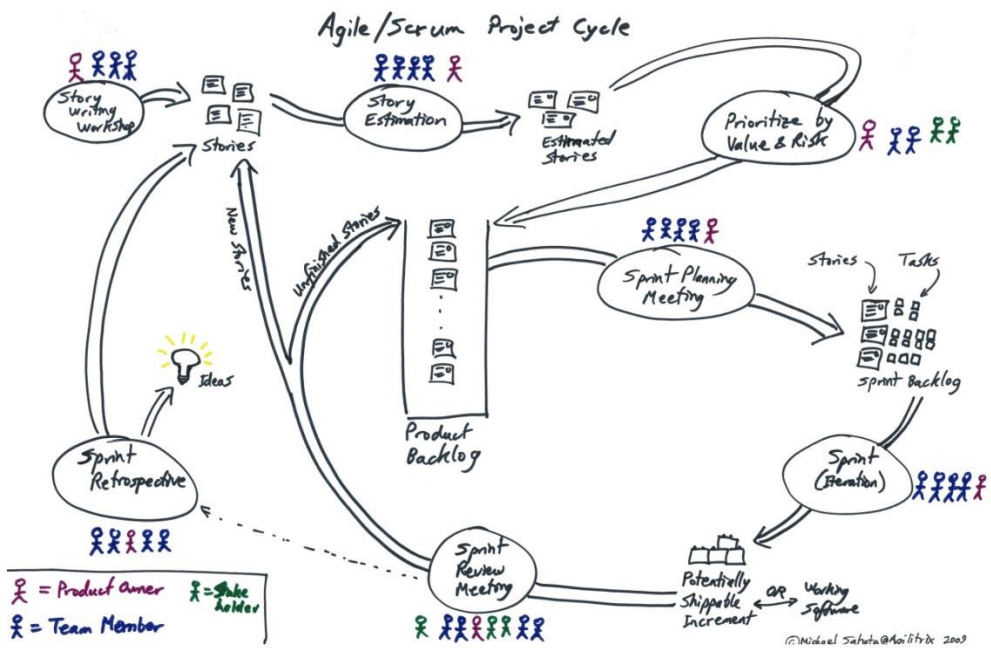
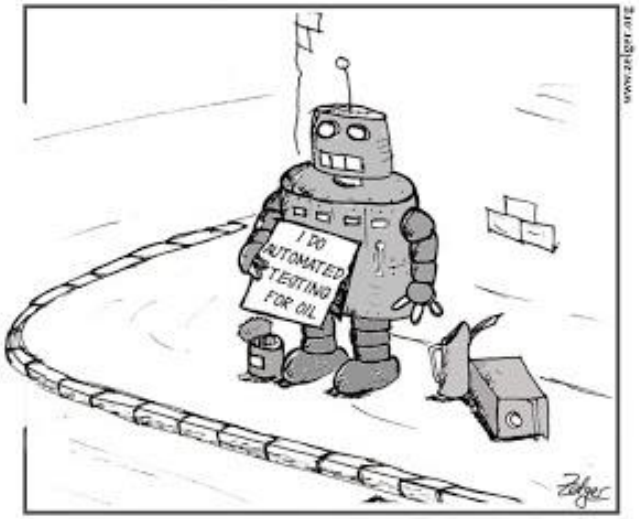
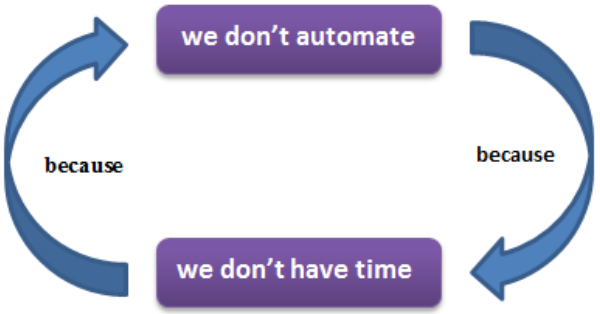
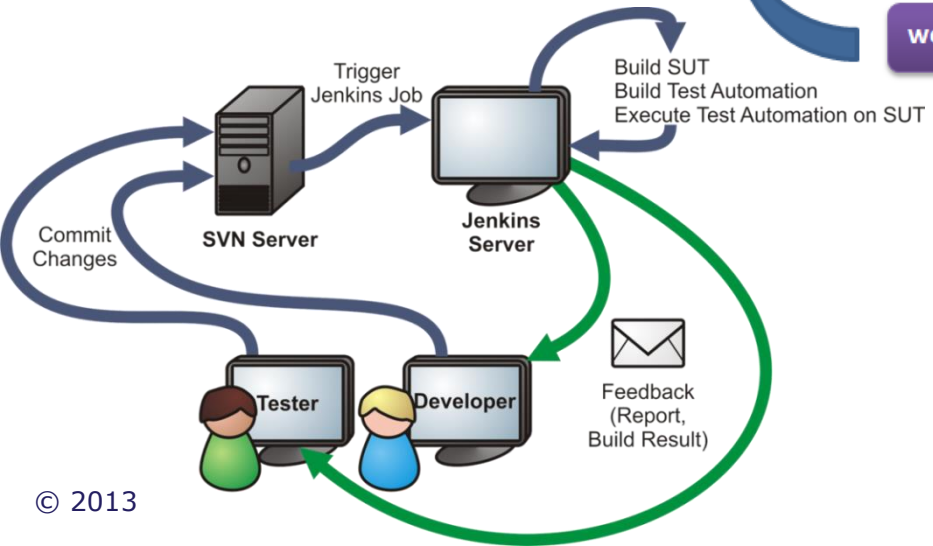
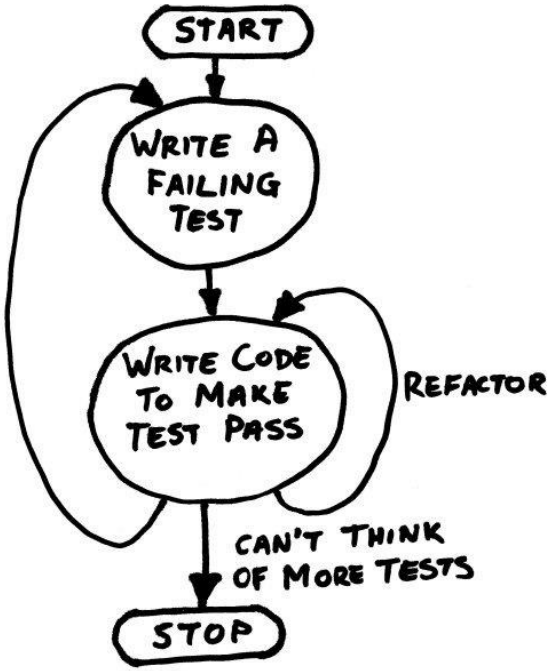




It was a shock to his master when he realized, robots need maintenance, too







Commitment & Buy-in

- Stel realistische doelen
- Bepaal & bewaak de business case voor testautomatisering
- (H)Erken de toegevoegde waarde op lange termijn

- Stel in voldoende mate de juiste resources beschikbaar
- Maak het benodigde budget vrij
- Lever de toegezegde middelen

- Pas software ontwikkeling en/of het testproces aan om testautomatisering te versnellen

Without involvement, there is no commitment.
Mark it down, asterisk it, circle it, underline it
Stephen Covey

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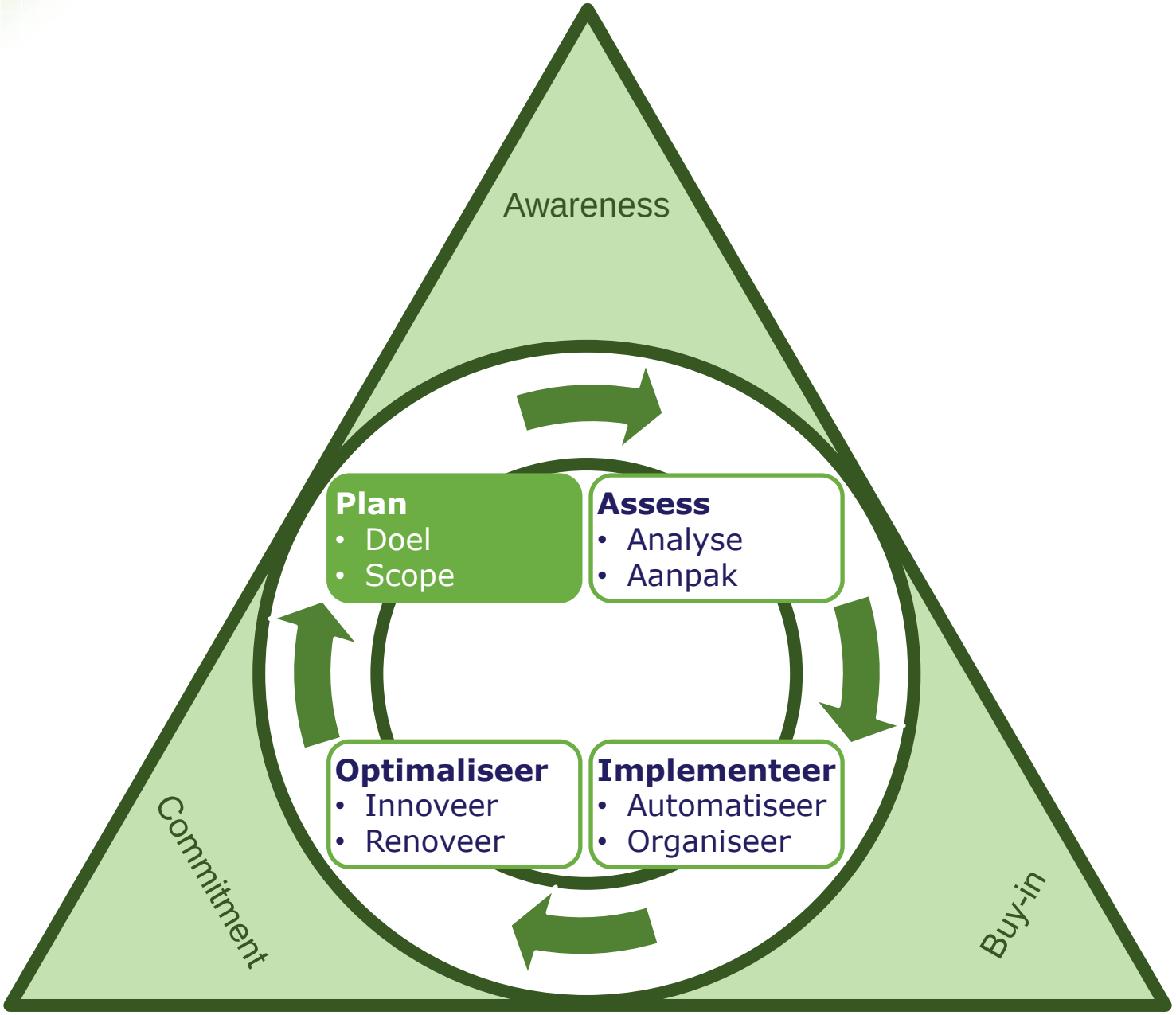
Testautomatisering met TI*4Automation*



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Testautomatisering met TI*4Automation*

- Stel realistische doelen
  - Wat kan en moet bereikt worden?
  - Op welke termijn?
  - Met welke middelen?

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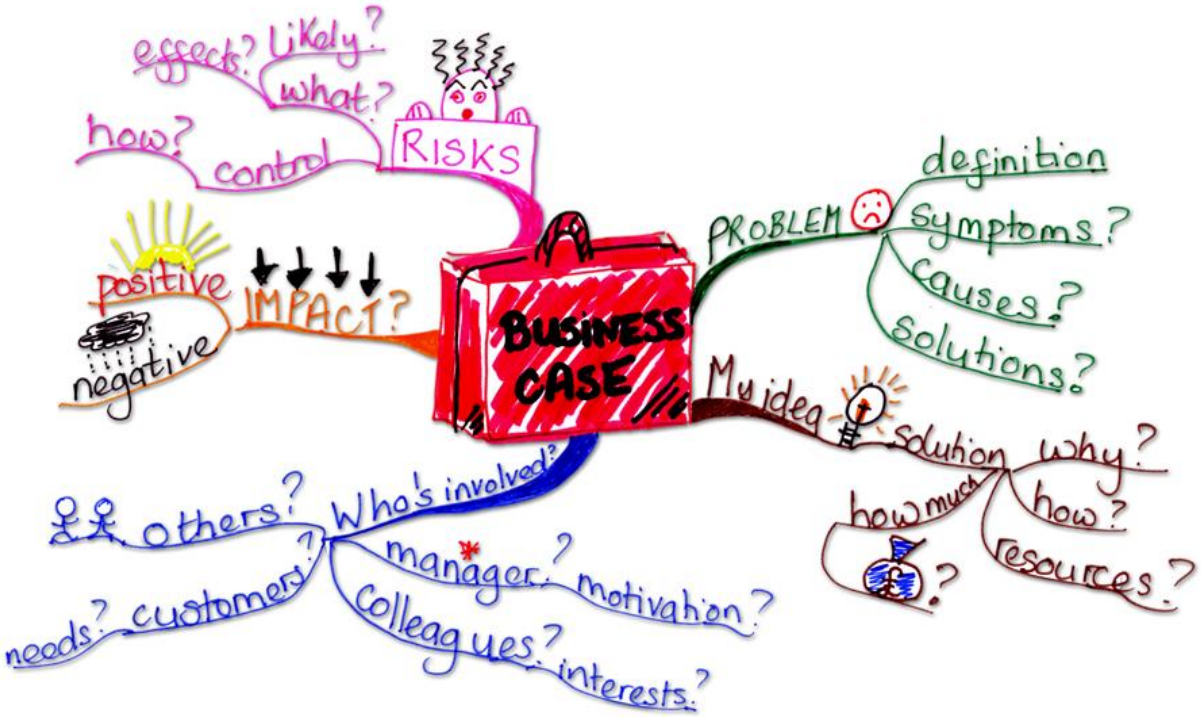
Testautomatisering met TI*4Automation*

- Stel realistische doelen
- Bepaal de business case
  - In hoeverre draagt testautomatisering bij aan het bereiken van de afgesproken doelen, nu en in de toekomst?



Voorbeeld

Business Case - Inspanning

Task	Polteq	Customer
Create Test Automation Platform		
S3270 (consolidation of PoC results)	3,0	0,5
Selenium WebDriver	7,0	1,0
JDBC	8,0	2,0
Integration with “reporting” (Hudson)	2,0	0,5
Integration with “registration” (JIRA, including workflow)	4,0	2,0
Test Automation Platform available and integrated	24,0	6,0
Reorganize and migrate test scripts Backend	15,0	3,5
Reorganize and migrate test scripts Frontend	15,0	3,5
Test scripts and cases “automatable”	30,0	7,0
Train & coach the Customer Test Organization	6,0	3,0
Test Automation Backend	120,0	6,0
Test Automation Frontend	120,0	6,0
Test scripts / cases automated / sustainable by Customer	246,0	15,0
Project Management	24,0	6,0
Total man days	**324,0**	**34,0**

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Voorbeeld

Business Case – Testinspanning (zonder)

System	# Tests	Effort
Back-end	2.350	
Business		49,0
IT-staff		30,0
Total Back-end	2.350	79,0
Front-end	2.150	
Business		45,0
IT-staff		30,0
Total Front-end	2.150	75,0
Total per test period	**4.500**	**154,0**
Total per year	**9.000**	**308,0**

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Voorbeeld

Business Case – Testinspanning (met)

System	# Tests	Effort
Back-end (70% automated after sanitizing)	1.250	
Business (manual)	375	8,0
IT-staff (manual)		5,0
Update Test set (10%)		5,0
Update Test automation		3,0
Total Back-end	1.625	21,0
Front-end (80% automated after sanitizing)	1.250	
Business (manual)	250	5,0
IT-Staff (manual)		3,5
Update Test set (10%)		5,0
Update Test automation		3,0
Total Front-end	1.500	16,5
Total per test period	**3.125**	**37,5**
Total per year (2 rounds)	**6.250**	**75,0**

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Voorbeeld

Business Case - Conclusie

Tasks	Current costs	Future costs	Savings
Invest in automation (once)		358,0	-358,0
Total investment			**-358,0**
Total Backend	79,0	21,0	+58,0
Total Frontend	75,0	16,5	+58,5
Total per test period	**154,0**	**37,5**	**+116,5**
Return on investment after 1 year	**308,0**	**433,0**	**-125,0**
Return on investment after 2 years	**616,0**	**508,0**	**+108,0**
Return on investment			
per addtional test period	154,0	37,5	+116,5
per year (2 test periods)	308,0	75,0	+233,0

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Voorbeeld

Bijkomende “voordelen”

- Minder (doorloop)tijd besteed aan testuitvoering
  - “Continuous testing through CI”
  - Minder inspanning voor regressietesten
  - Minder inspanning voor UAT
  - Verkorte doorlooptijd
- Herhaalbaarheid geautomatsieerde testen is 100%
  - Kwalitiet van de testuitvoering is een constante factor
  - Gekozen dekking is altijd bereikt
- Mogelijkheden om additionele testen uit te voeren
  - Focus op integrateie van en met business processen
- Meerdere releases per jaar

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Testautomatisering met TI*4Automation*

- Stel realistische doelen
- Bepaal de business case
- Definieer de scope
  - Project? Projecten? Organisatie?
  - Testsoorten/types/levels/…?

Scope

- Leverancier
  - Focus op “works as designed”
  - Componenten
  - Services
  - Bottom-up

- Business / Afnemer
  - Focus op “fit for purpose”
  - End-to-End
  - Business processen
  - Top-down

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TI4*Automation* – Objective & Scope

Objective

- To support the Agile way of working the regression test approach needs to be improved, and complimented with automated testing.
- Aim is to reduce the duration (time), reduce the effort (cost) and improve the quality of regression testing within an agile sprint.

Scope

- Set up the automated test environment
- Automate at least 175 test cases of which
  - 20% is considered “simple”
  - 45% considered “medium”
  - 35% considered “complex”

Out of scope

- Development testing
- Interface testing
- User acceptance testing

Timeline

- Delivery within 3 – 4 months (or sooner)

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Testautomatisering met TI*4Automation*

- Stel realistische doelen
- Bepaal de business case
- Definieer de scope
- Spreek af wat en hoe wordt gemeten

Voorbeeld

TI4*Automation* – Measurements

Defect Detection Percentage

$$DDP = \frac{\#\ \text{Defects found before go-live}}{(\#\ \text{Defects found before go-live} + \#\ \text{Defects in production})}$$

- DDP increase implies higher quality in production

Test automation rate

% scripts automated

- Tracking progress

Regression testing

% scripts automated & executed

- % increase implies less “manual” effort a.k.a. cost reduction
- % increase implies reduction of test execution time

% (end-to-end) business processes covered

- % increase implies higher quality in production

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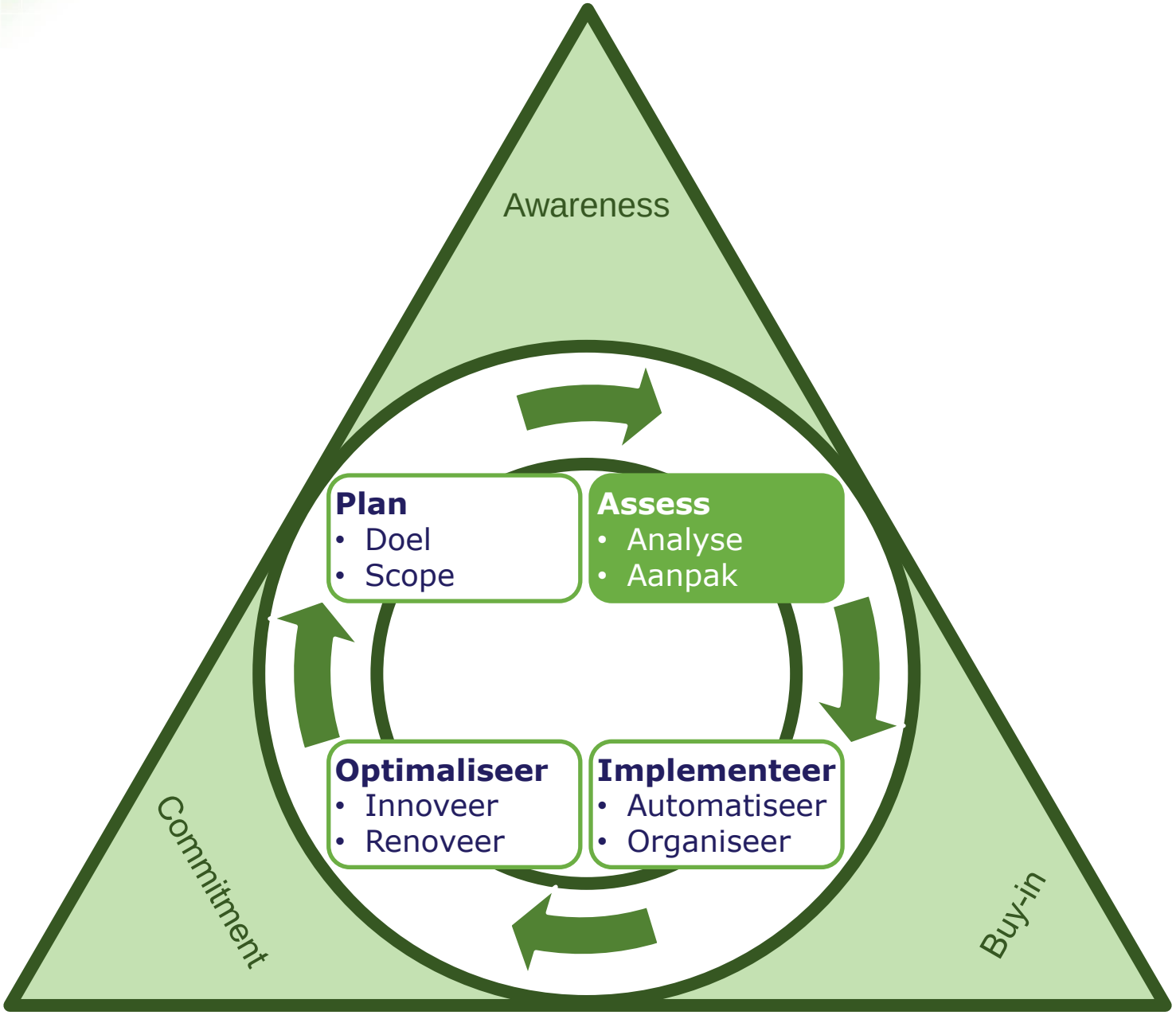
Testautomatisering met TI*4Automation*



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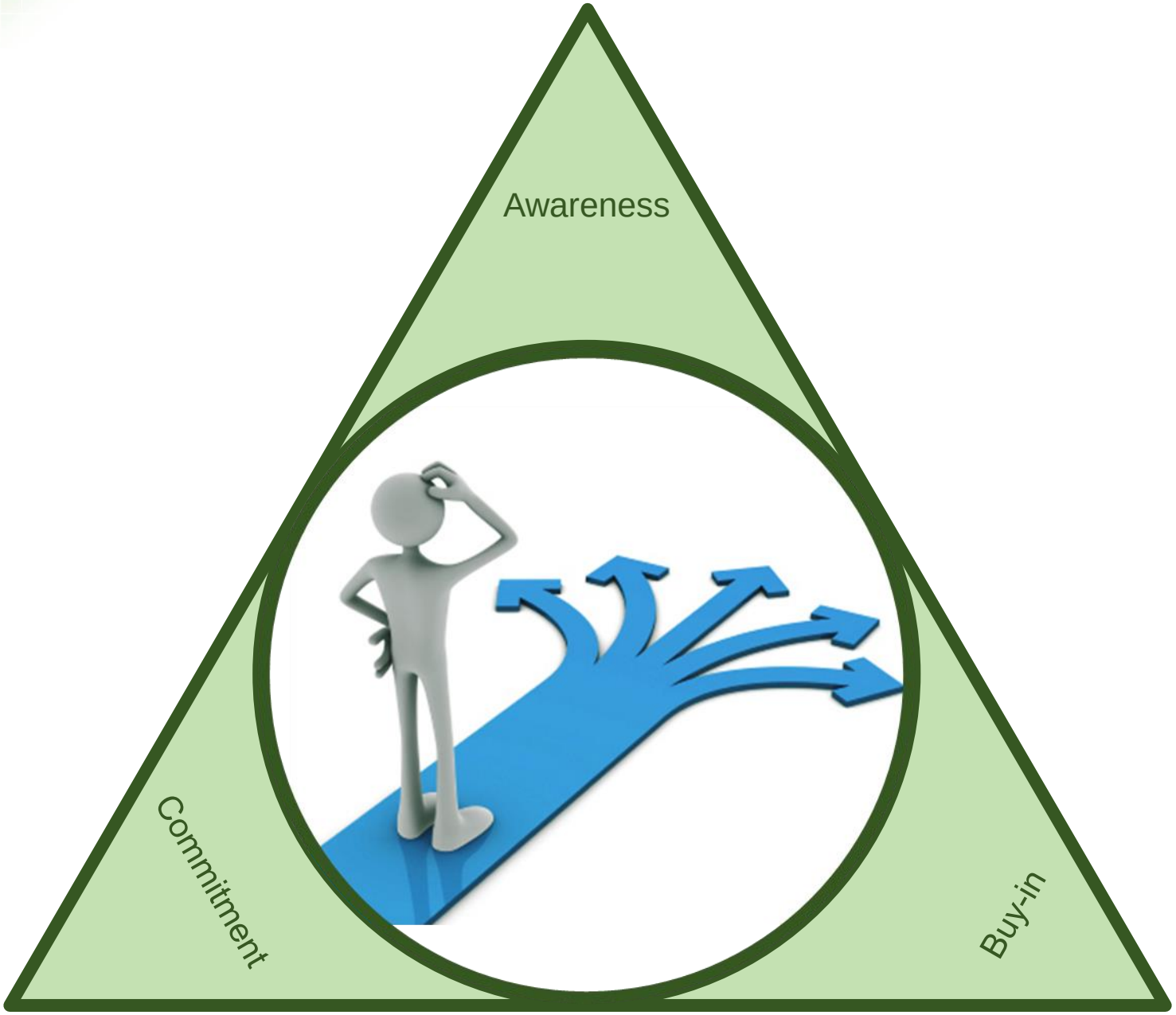
Context testautomatisering



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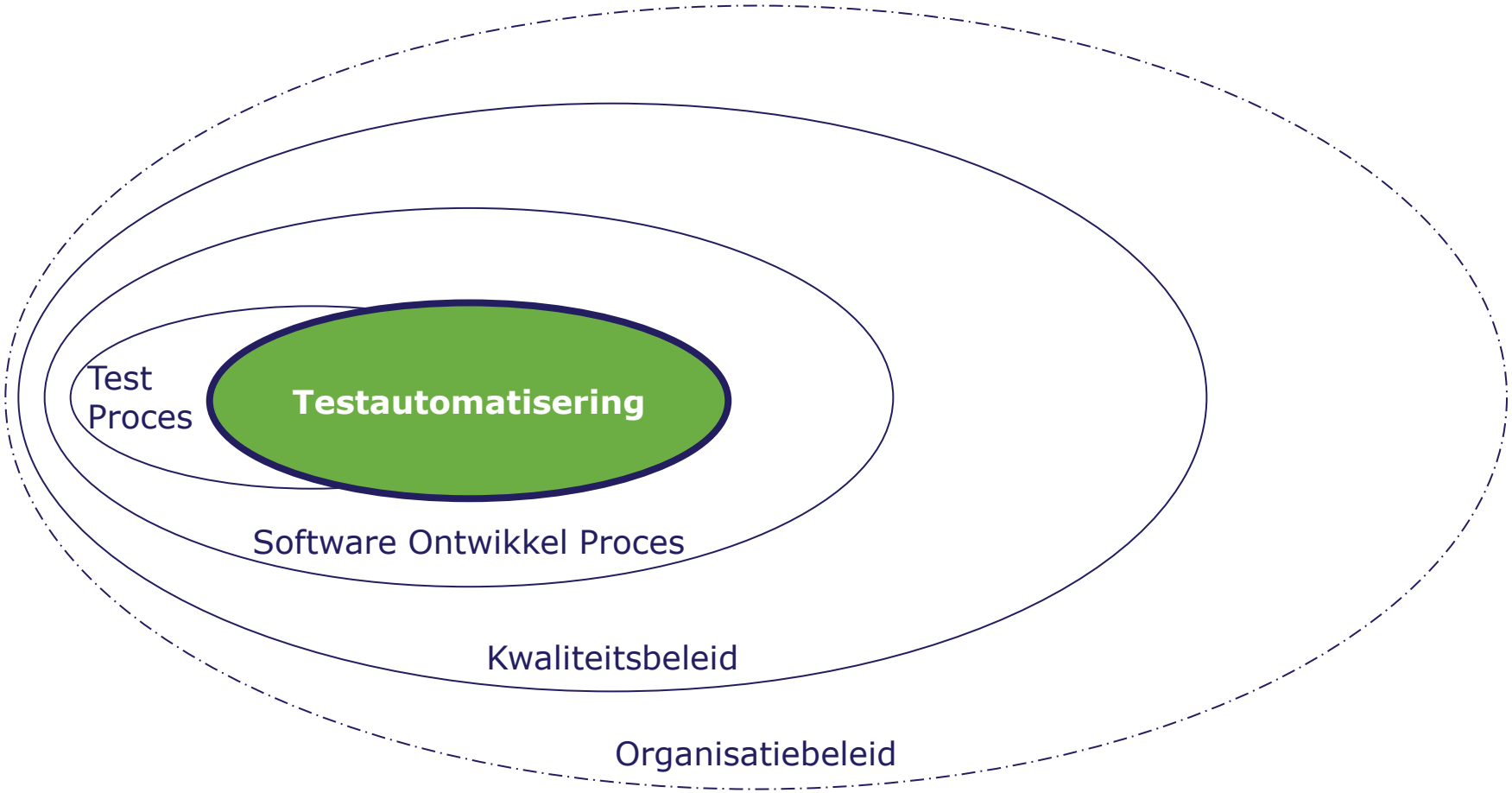
Testautomatisering met TI*4Automation*

- Context testautomatisering



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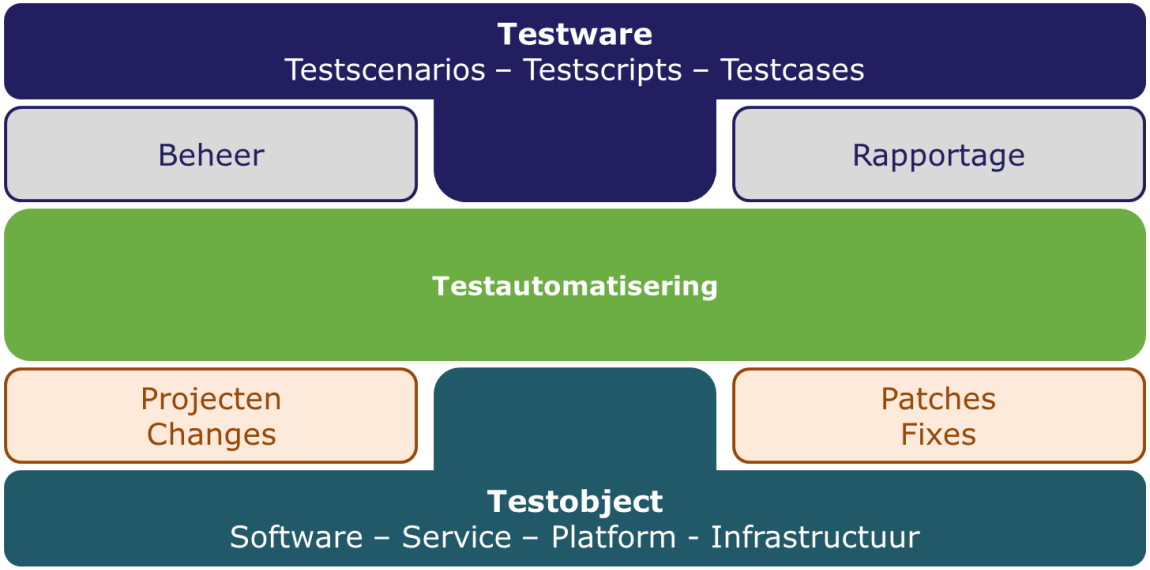
Testautomatisering met TI*4Automation*

- Context testautomatisering
  - Testen, Ontwikkeling, Onderhoud
  - Projecten, Changes, Fixes
  - Patches, Updates
  - Beheer (Configuratie, Bevindingen, Requirements, …)
  - Rapportage (Project, Test, Systeem, …)



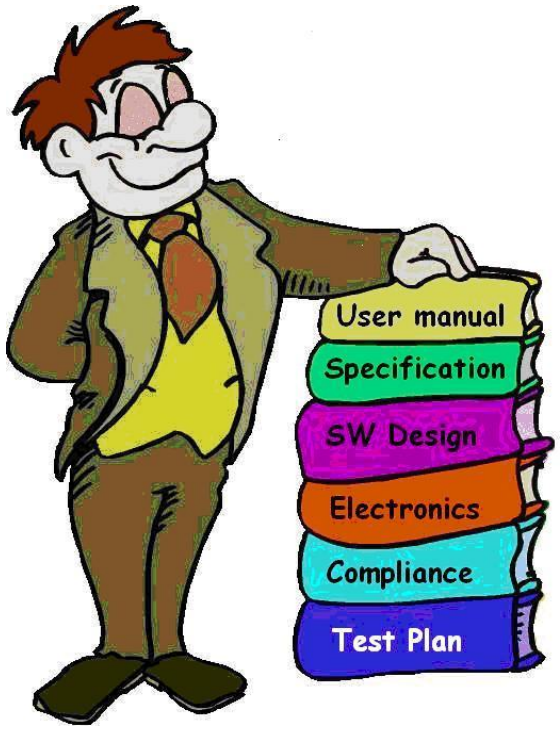
Testautomatisering met TI*4Automation*

- Context testautomatisering
- Analyseer - Interviews

Wie	Onderwerp
Processpecialist	complexiteit en samenhang van de processen en systemen
Testers	huidige testaanpak
Infrastructuur en tool specialisten	huidig en toekomstig systeemlandschap
Management	welke factoren zijn de sleutel tot succes?

Testautomatisering met TI*4Automation*

- Context testautomatisering
- Analyseer - Documentatiestudie
  - Test- en projectplannen
  - Testware (specificaties, scripts, cases)
  - Test- en ontwikkelrichtlijnen
  - Requirements
  - Systeemarchitectuur
  - Testomgeving
  - Huidige tooling
  - Bevindingen-, configuratie-, change-, release-, requirements-, versie-, …-beheer
  - “Good practices”



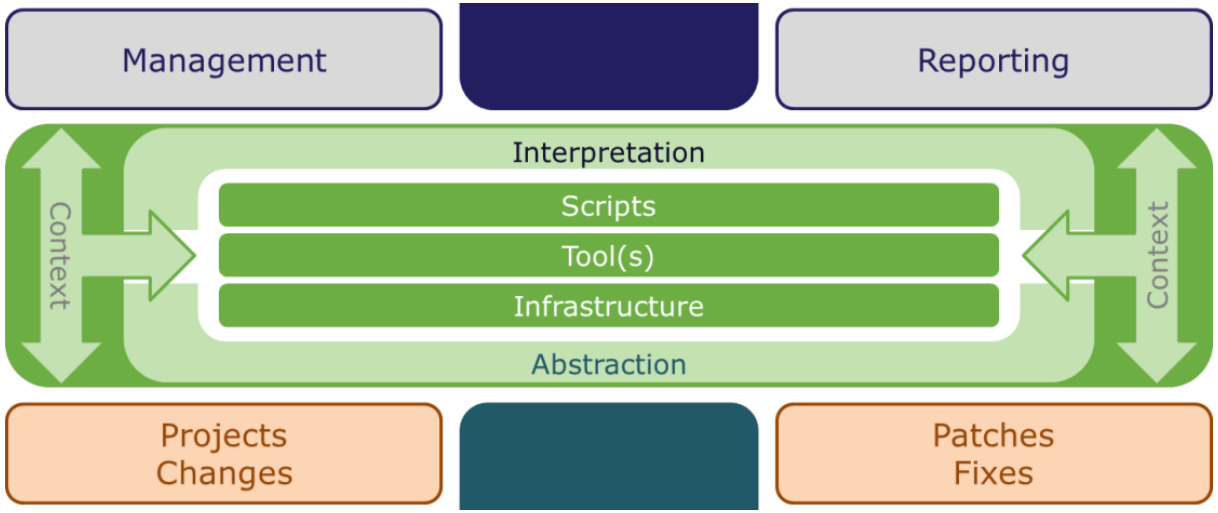
Testautomatisering met TI*4Automation*

- Context testautomatisering
- Analyseer
- Referentiekader

Automation architecture

The term automation architecture is used to denote three concepts:

- the high level structure of automation
- the discipline of creating and maintaining such a high level structure
- the documentation of this high level structure



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Automation scripts

- A test script is – according to ISTQB - a document specifying a sequence of actions for the execution of a test
- An automation script is – based on this definition – an executable sequence of automated actions that execute a test

```
1   <?xml version="1.0" encoding="UTF-8"?>
2   <!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-strict.dtd">
3 - <html xmlns="http://www.w3.org/1999/xhtml" xml:lang="en" lang="en">
4 - <head profile="http://selenium-ide.openqa.org/profiles/test-case">
5   <meta http-equiv="Content-Type" content="text/html; charset=UTF-8" />
6   <link rel="selenium.base" href="https://www.google.com/" /><title>New Test</title></head>
7 - <body>
8 - <table cellpadding="1" cellspacing="1" border="1">
9   <thead><tr><td rowspan="1" colspan="3">New Test</td></tr></thead>
10 - <tbody>
11 - <tr><td>open</td>
12     <td>/</td>
13     <td></td></tr>
14 - <tr><td>click</td>
15     <td>css=td.gsib_a</td>
16     <td></td></tr>
17 - <tr><td>clickAndWait</td>
18     <td>css=#gb_2 &gt; span.gbts</td>
19     <td></td></tr>
20 - <tr><td>clickAndWait</td>
21     <td>css=#gb_12 &gt; span.gbts</td>
22     <td></td></tr>
23 - <tr><td>clickAndWait</td>
24     <td>css=#gb_8 &gt; span.gbts</td>
25     <td></td>,</tr>
26 - <tr><td>clickAndWait</td>
```

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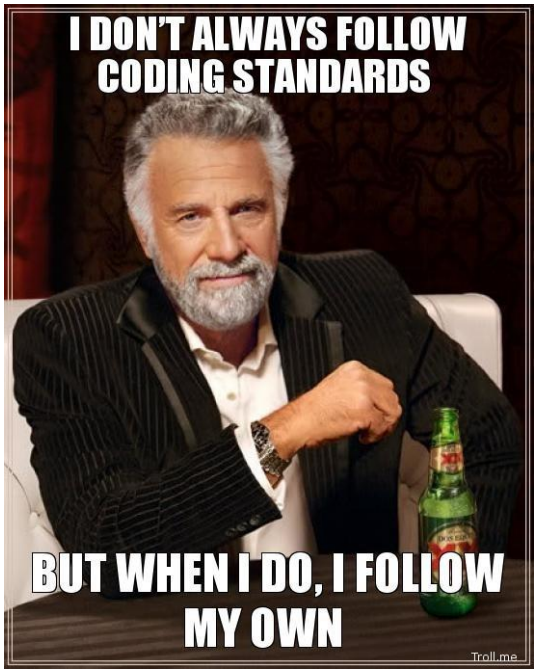
Automation standards

- Test automation is software. Treat it as such.



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Tooling

- Tooling is the platform on which the test automation solution will run
  - This includes all necessary software and tools

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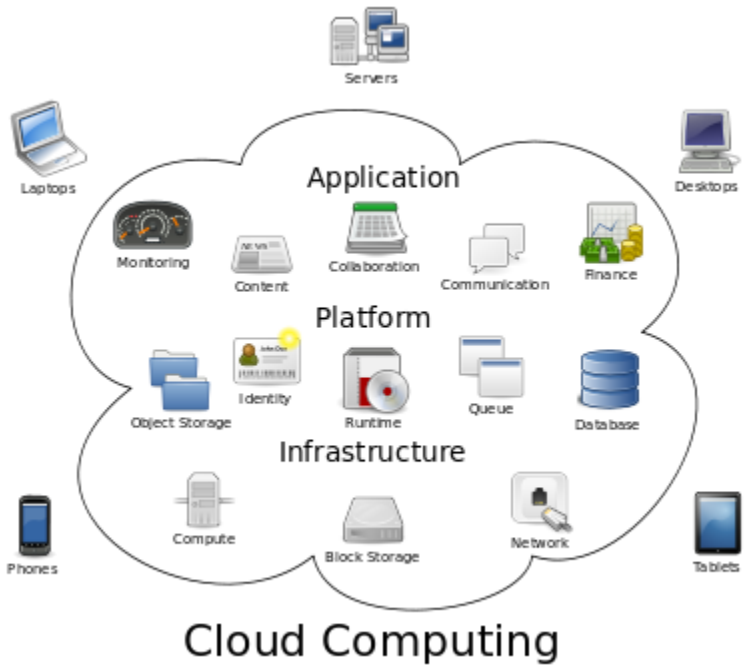
Test environment

- An environment containing hardware, instrumentation, simulators, software tools, and other support elements needed to conduct automated testing [After IEEE 610]



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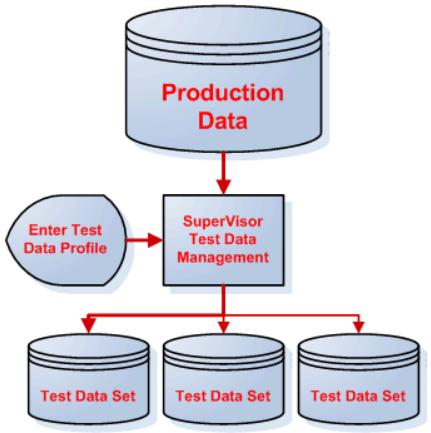
Test data

- Test data is data which has been specifically identified for use in tests

- Test data may be used
  - in a confirmatory way to verify that a given set of inputs produces an expected result
  - to challenge the ability of the program to respond to unusual, extreme, exceptional, or unexpected input



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Tool integration

- Test automation tooling is able to integrate with reporting and defect management tooling to be more efficient
- Test automation tooling is able to integrate with change and configuration management tooling to be more effective

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Test automation team

- Includes the required skills for testing, design and development
- Strives for continuous improvement
- Participates proactively in the software development life cycle

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Automation strategy

- The automation strategy ensures that the goals are efficiently and transparently achievable

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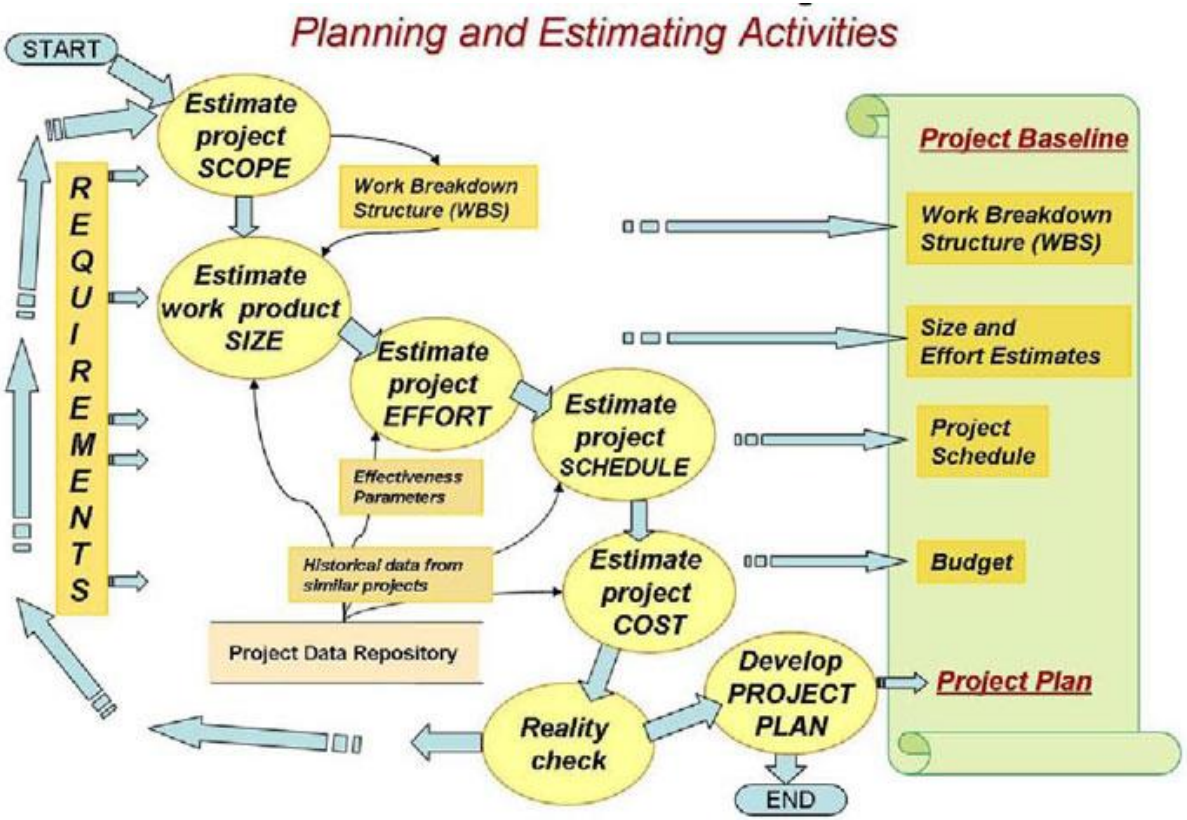
Planning & Estimation

- Test automation activities need to be planned and estimated; monitoring progress and regular evaluation are key in setting and achieving realistic objectives



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TI*4Automation* referentiekader

- Automation architecture
- Automation scripts
- Automation standards

- Tooling

- Test environment
- Test data

- Tool integration

- Test automation team
- Automation strategy
- Planning and estimation

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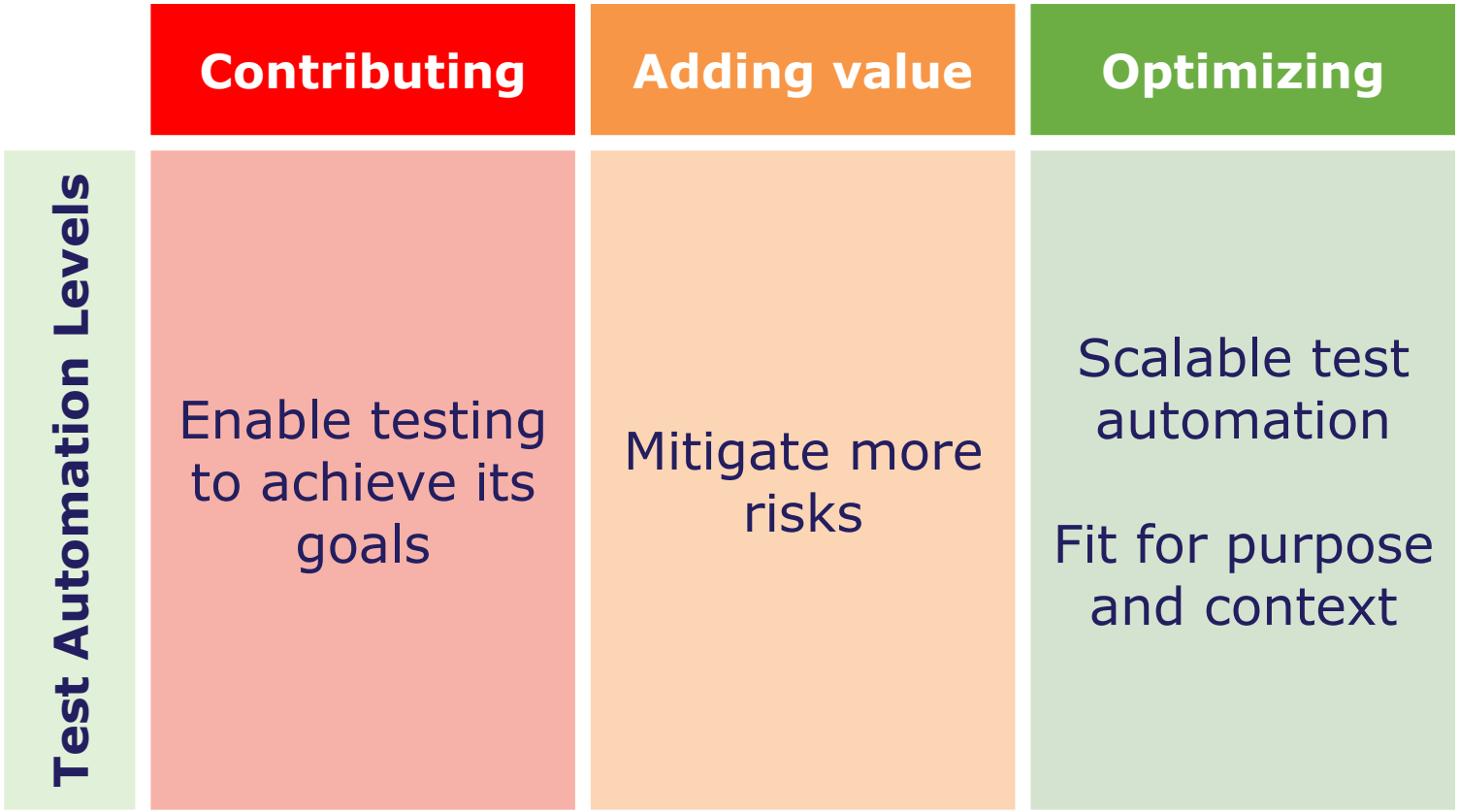
Testautomatisering met TI*4Automation*

- Context testautomatisering
- Analyseer
- Referentiekader



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TI4*Automation* - Contributing

Key area	Contributing
Automation architecture	The automated tests can easily be re-run
Automation scripts	The tooling enables creation of automated test scripts that can run unattended; facilities to compare results are incorporated
Automation standards	The automated tests can easily be re-run
Tooling	The tooling enables creation of automated test scripts that can run unattended; facilities to compare results are incorporated
Test environment	A test environment is available to enable the execution of automated testing
Test data	Test data is available and supports the execution of automated testing
Tool integration	Automation tooling enables import and customizable export
Test automation team	The test automation team incorporates test and development knowledge and experience to understand what is to be automated how
Automation strategy	The automation strategy defines the objectives, scope and sets the priorities for test automation
Planning & Estimation	Test automation activities are planned and estimated

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TI4*Automation* – Adding value

Key area	Adding value
Automation architecture	The automation architecture provides understandable test output and an abstraction layer is implemented
Automation scripts	Next to what commonly is referred to as data-driven test automation, conditional execution of automated tests is included
Automation standards	Measures are taken to assure maintainable automation and test automation is treated as software development
Tooling	The tooling is able to handle unexpected events (defects) as well as expected failures (known defects). Reporting status and defect information is facilitated by detailed logging
Test environment	Each automated test level is supported by a test environment that is continuously available
Test data	Test data is structured to enable efficient automated testing and consistent across multiple applications/systems/components
Tool integration	Defect logging and configuration management is centralized
Test automation team	The test automation team strategically incorporates domain knowledge and is valued by other skill groups
Automation strategy	The automation strategy covers all test automation levels and includes the risks for automation
Planning & Estimation	Planning and estimation are detailed and used for tracking progress and monitoring test automation

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TI4*Automation* – Optimizing

Key area	Optimizing
Automation architecture	The automation architecture supports continuous integration and enables continuous improvement
Automation scripts	Automation scripts are set up in an object oriented way to reduce maintenance effort
Automation standards	Do not try to be as clever as possible when coding, try to write code that is as simple as possible Continuous improvement and continuous integration is practiced Continuous improvement and continuous integration is practiced
Tooling	The tooling can be customized to meet specific test automation goals and requirements.
Test environment	The test environment is "fit for purpose" and supports testing end-to-end business processes across platforms
Test data	Test data is automatically restored or recreated, kept up-to-date and it's validity is regularly checked; it is "fit for purpose"
Tool integration	Defect handling and reporting is fully automated
Test automation team	The test automation team strives for continuous improvement and proactively participates in the software development life cycle
Automation strategy	The test automation strategy strives for continuous improvement and added value at business level
Planning & Estimation	Continuous improvement and incorporating lessons learned are part of test automation planning and estimation

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Concretiseer de doelstellingen

- Realistische doelen
- Business case
- Scope
- Metingen

- Gebaseerd op:
  - Huidige situatie
  - Wat kan en mogelijk is

- Rekening houdend met:
  - Quick wins
  - Commitment and buy-in
  - Kosten
  - Zichtbaarheid
  - …

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TI4*Automation* – Target situation

	Contributing	Adding value	Optimizing
Test Automation Levels	Enable testing to achieve its goals	Mitigate more risks	Scalable test automation Fit for purpose and context

- Short term (3-4 months)
  - Contributing
- Long term
  - Adding Value
    - Supporting Agile, broader then regression testing
    - Extendable towards Load & Performance

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TI4Automation: where are we and where do we want to be?

Key area		Contributing				Adding value				Optimizing			
1	Automation architecture	1	2	3		1	2	3	4	1	2	3	
2	Automation scripts	1	2	3	4	1	2	3	4	1	2	3	
3	Automation standards	1	2	3		1	2	3	4	1	2	3	
4	Tooling	1	2	3	4	1	2	3	4	1	2	3	4
5	Test environment	1	2	3	4	1	2	3	4	1	2	3	4
6	Test data	1	2	3		1	2	3	4	1	2	3	4
7	Tool integration	1	2	3		1	2	3	4	1	2	3	
8	Test automation team	1	2	3		1	2	3	4	1	2	3	
9	Automation strategy	1	2	3	4	1	2	3	4	1	2	3	
10	Planning & Estimation	1	2	3	4	1	2	3	4	1	2	3	
		Enable testing to achieve its goals				**Mitigate more risks**				**Scalable, fit for purpose and context**			

Current situation

Target situation

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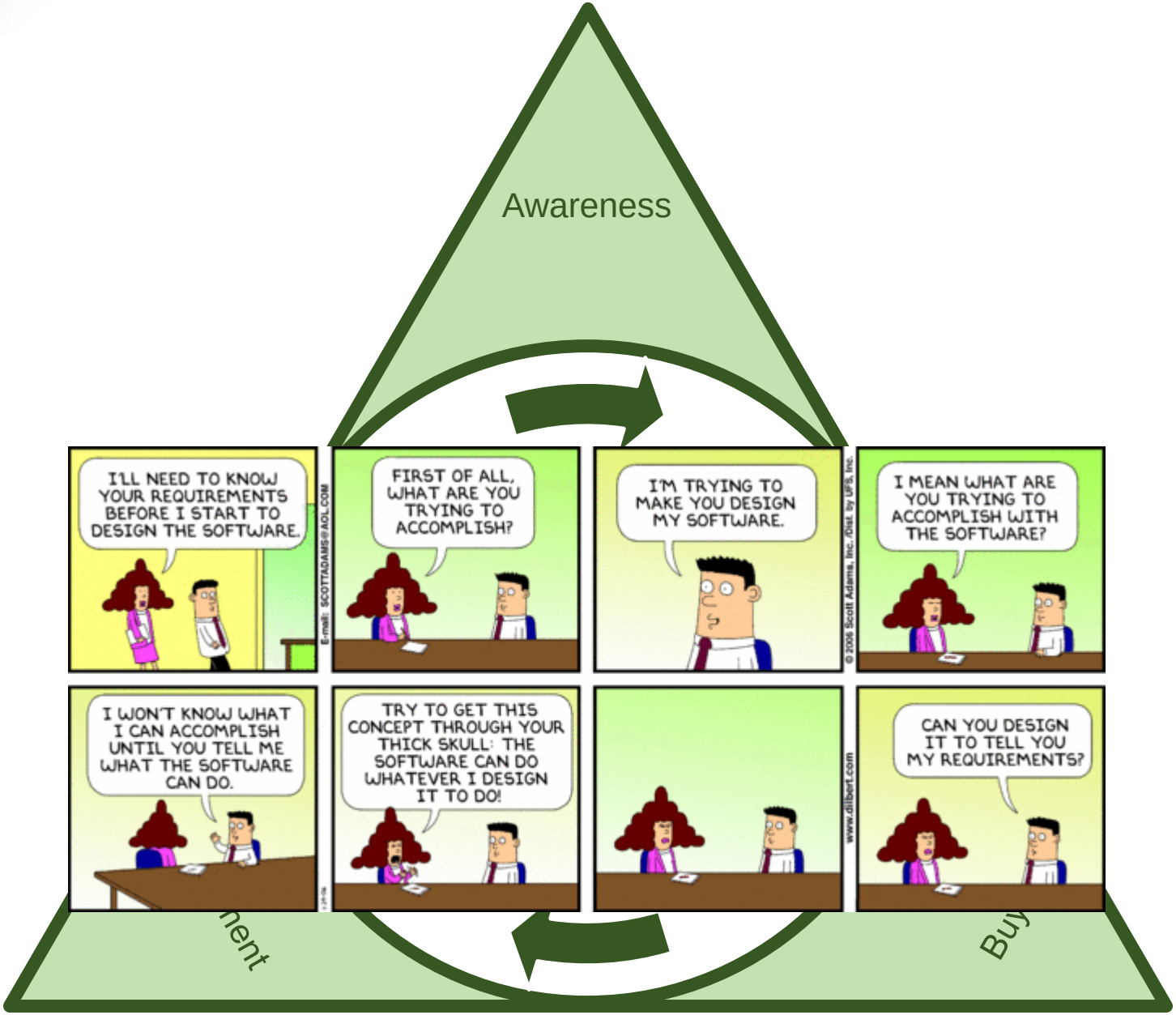
TI4*Automation* Roadmap



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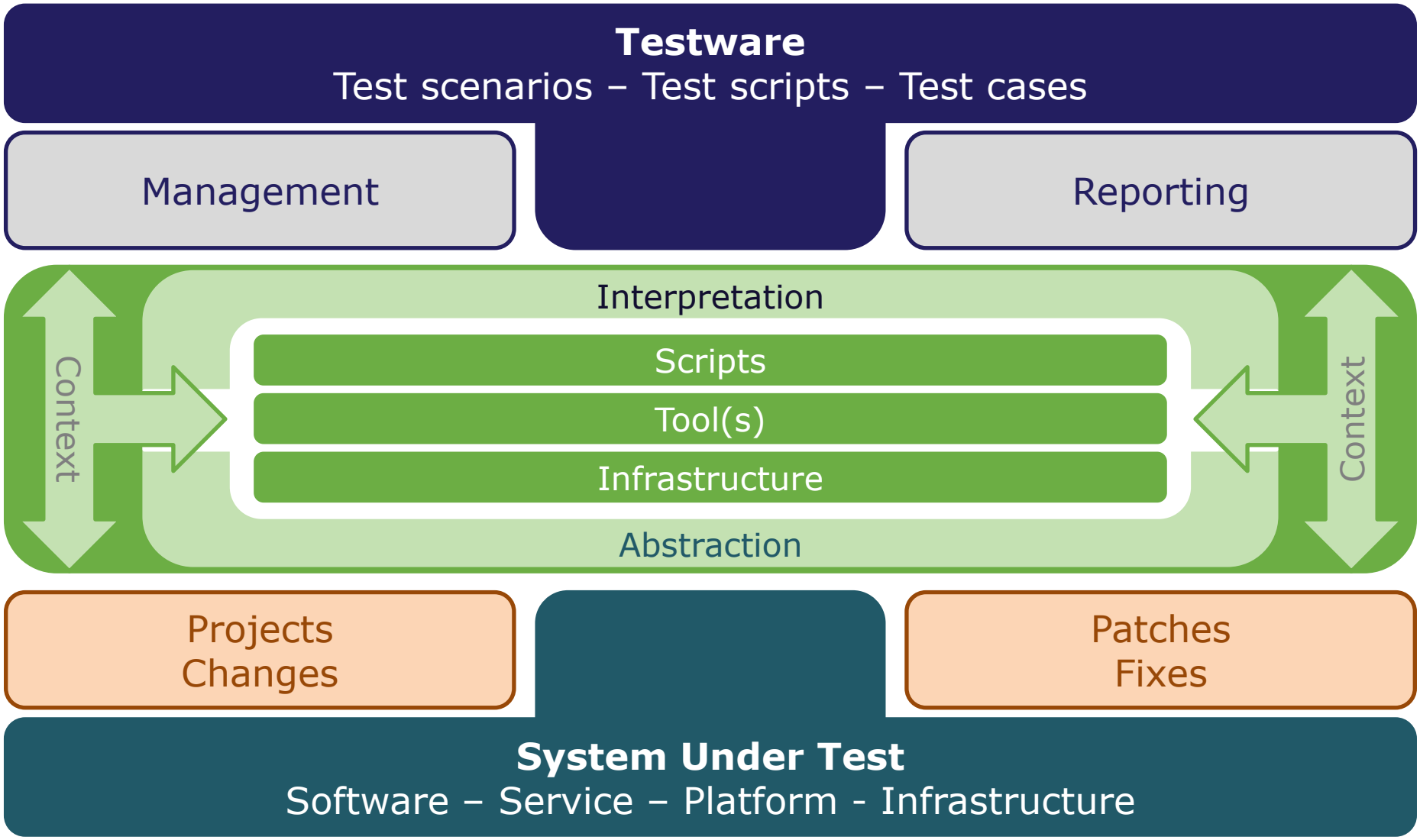
Automation architecture



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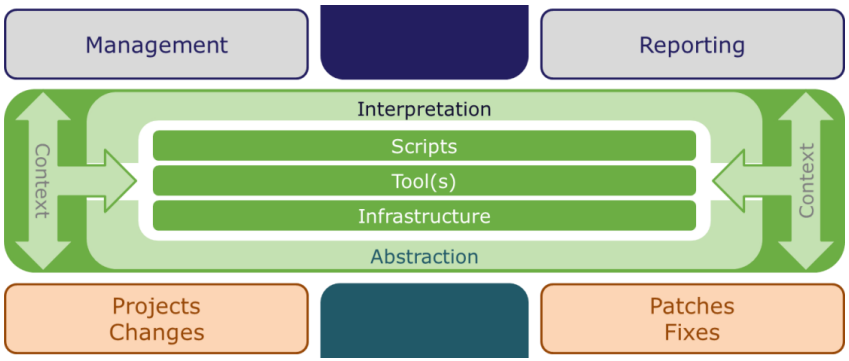
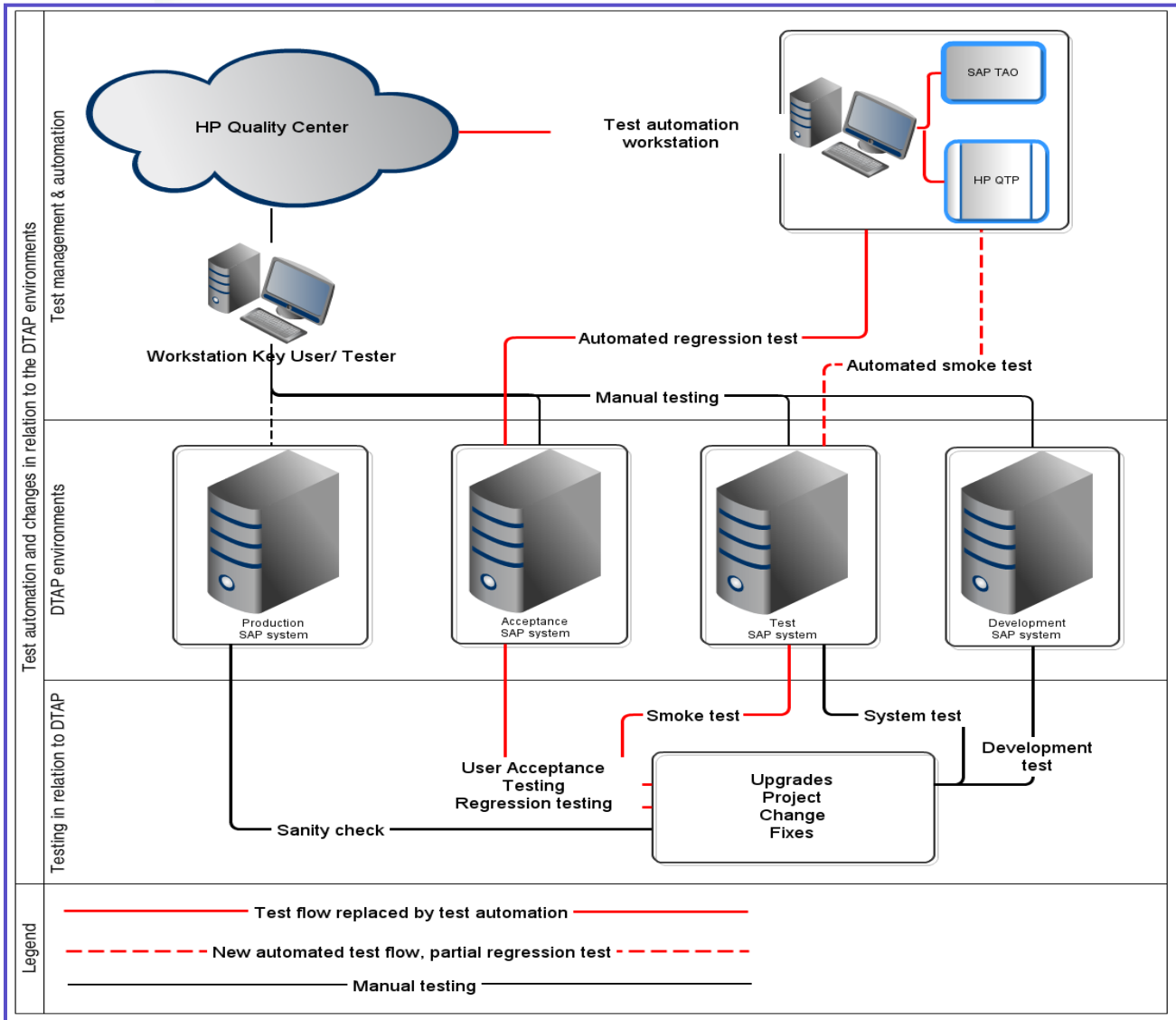
Architectuur eisen

- Waar gaan we automatiseren?
  - Business Process level, Application level, API level, …
- Welk test level?
  - E2E, UAT, FAT, SIT, ST, UIT, UT, …
- Gebruik en onderhoud van de testcases?
  - (Eind)gebruikers, testers, ontwikkeling, test automation team, …
- Onderhoud van de architectuur
  - Testteam, Development, In-house, Near/Off-shore, …
- Beschikbare / selecteerbare tooling
  - “Every tool has it’s goal”



Testautomatiseringslandschap



S = Sandbox
D = Development
T = Test
A = Acceptance
P = Production

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Toolselectie

- Doelstellingen
- Architectuur
- Beschikbaar budget
- Integratie met bestaande tooling
  - Beheer (Configuratie, Bevindingen, Requirements, …)
  - Rapportage(Project, Test, System, …)
- "Fit" met huidige test-, ontwikkel- en onderhouds-aanpak
- "Fit" met systeemlandschap

Common criteria

- System requirements
- Supported environments
- Installation
- Ease of use
- Integration with other tools
- Support
- Manuals
- Tool customization

ORACLE
PEOPLESOFT
Google
hp
Microsoft Dynamics

Specific criteria

- Scripting language facilities
- Object recognition
- Object mapping
- Data driven testing
- Data base testing
- Checkpoints
- Recovery scenario
- Test results analysis

Bepaal aanpak

- Verbeteringen en/of implementatie
  - Test automation plan
  - Testware aanpassing/verbetering
  - Software aanpassing/verbetering
  - Organisatie
  - Vereiste skills?

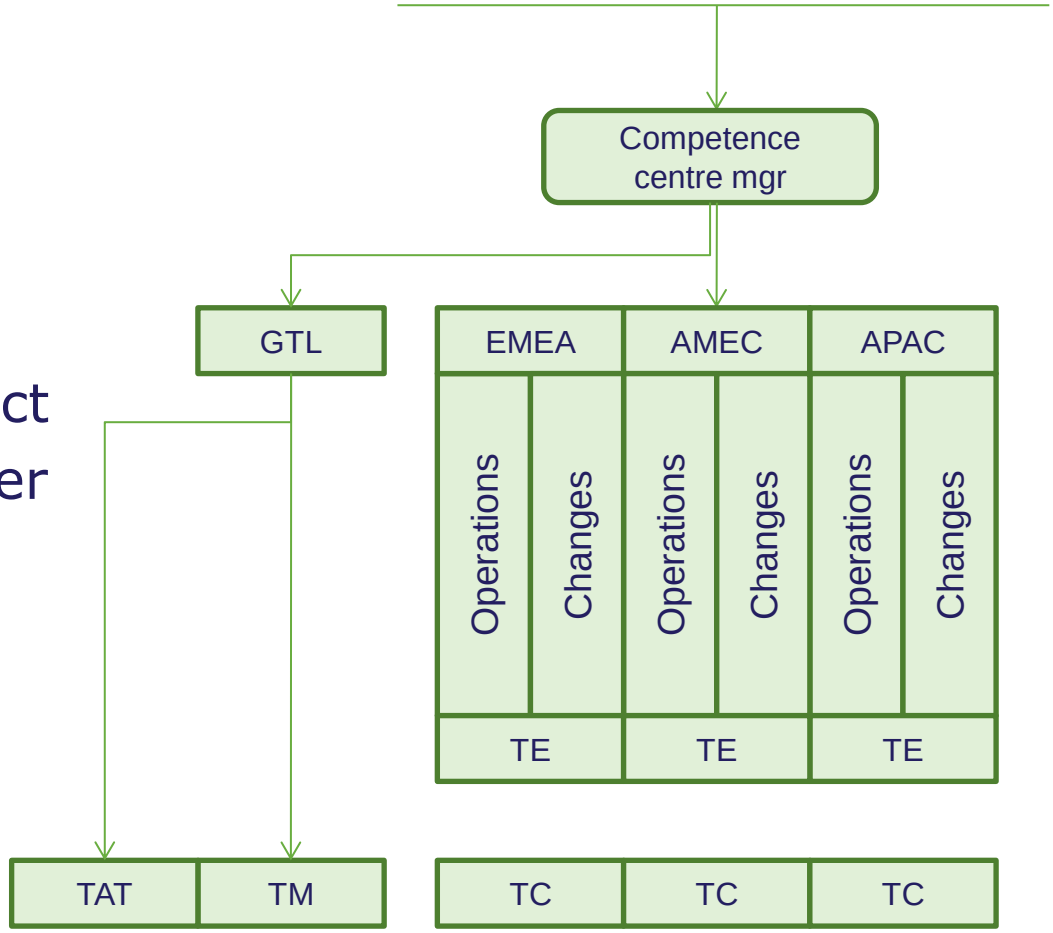
Test Automation Plan

- Sanity check
  - Doel-gericht, niet tool-gericht
  - Test & Software Process Improvement

Voorbeeld

Nieuwe rollen, taken en skills

- Global Test Lead
- Test Manager
- Test Coordinator
- Test Engineer
- Test Automation Team
  - Test Automation Lead
  - Test Automation Architect
  - Test Automation Engineer



Test Automation Plan

- Goal & Scope
- Business case
- Approach
- Input
- Deliverables
- Measurements
- Potential/essential Test Process Improvement (TPI)
- Potential/essential Software Process Improvement (SPI)
- Resources
  - Budget
  - People
  - Material
- Schedule

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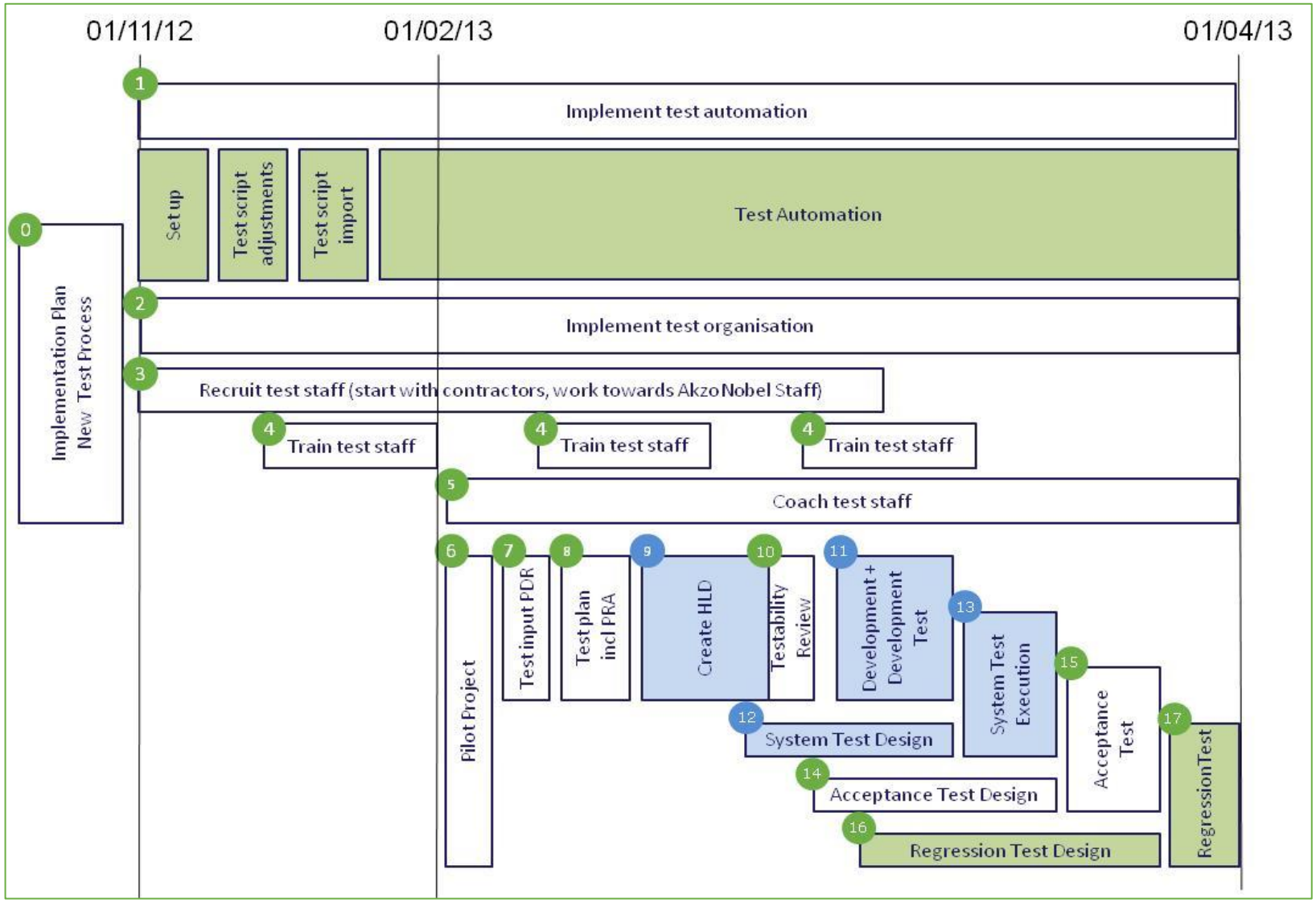
Voorbeeld

Stepwise improvement



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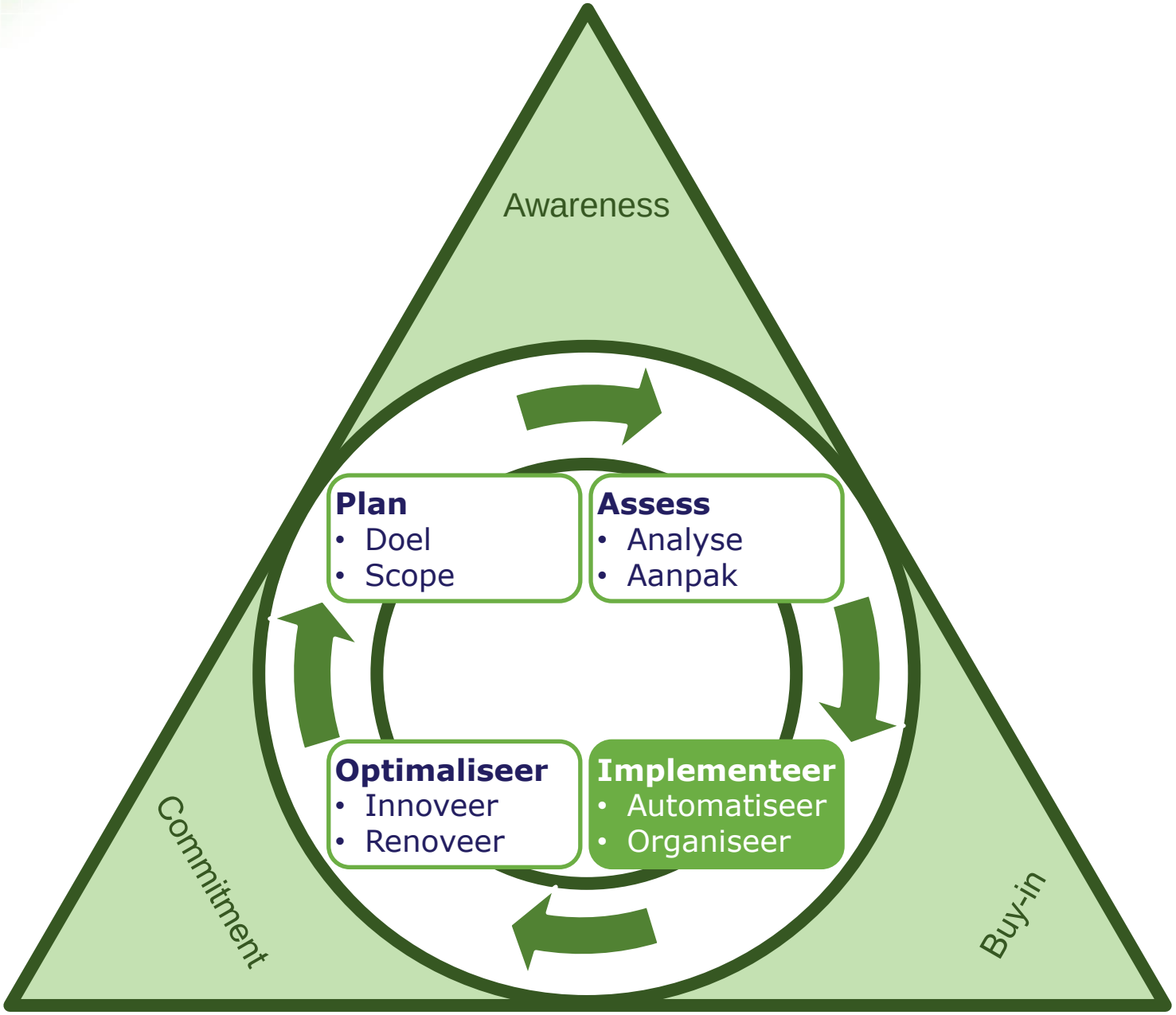
Testautomatisering met TI*4Automation*



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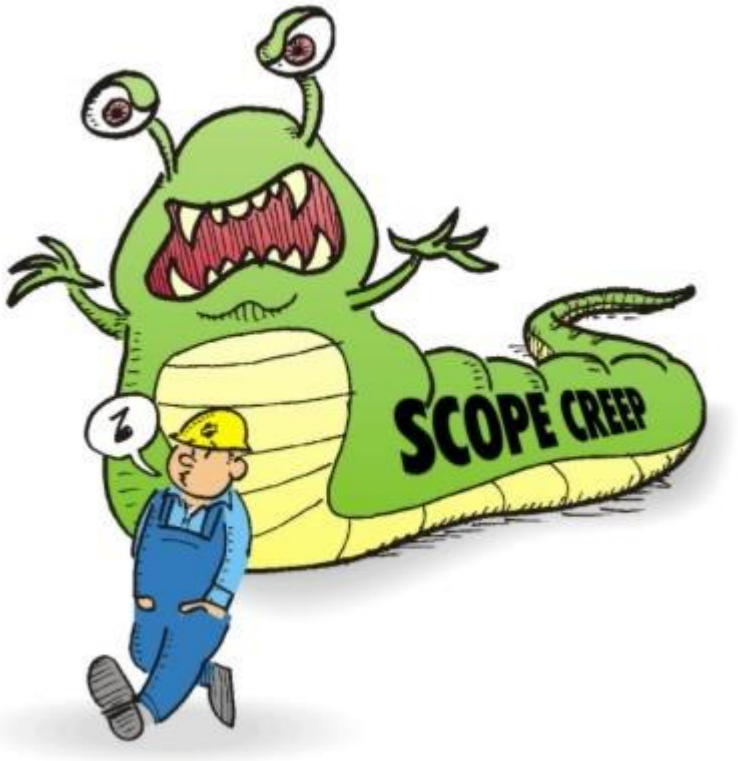
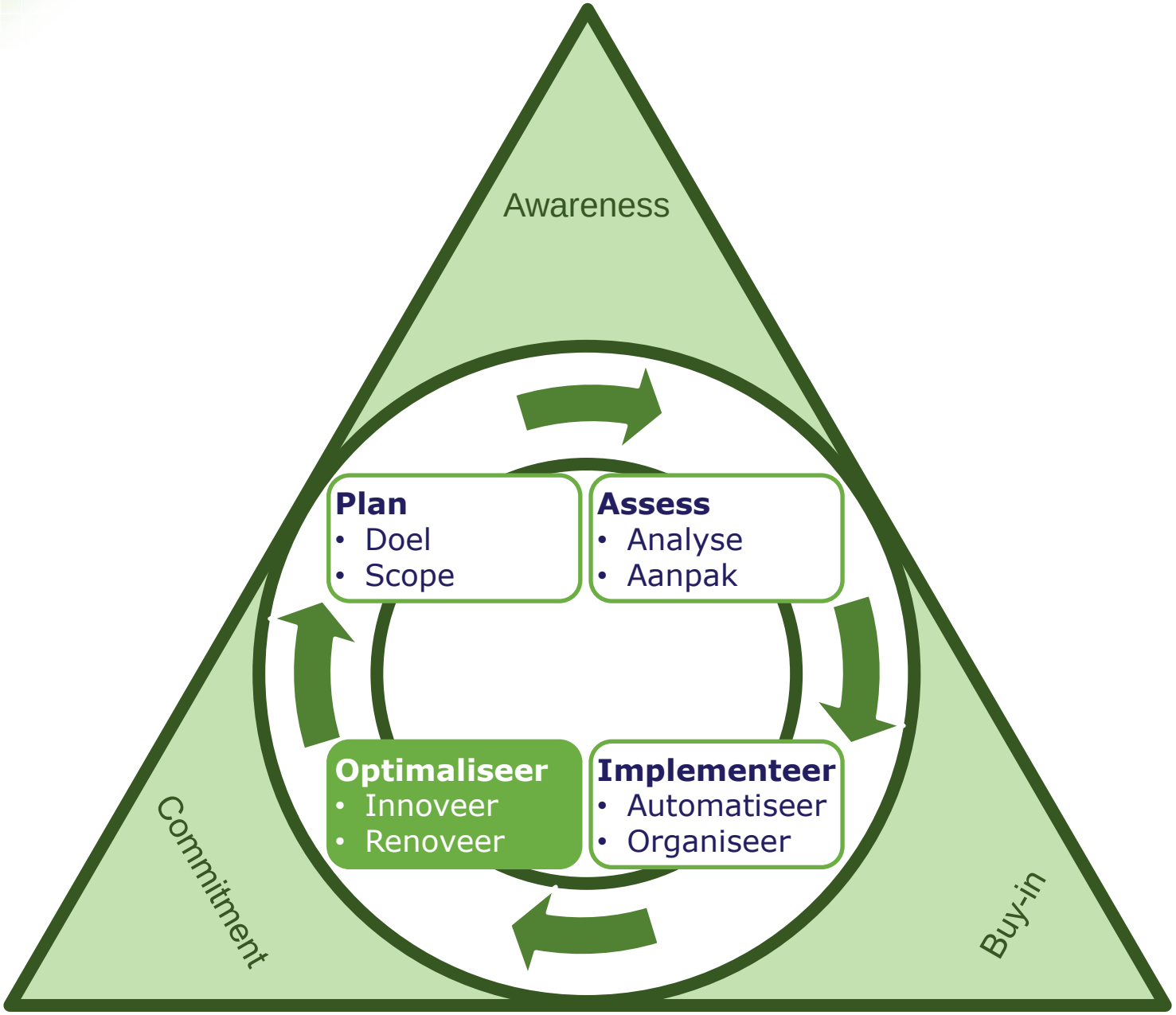
Implementeer

- Automatiseer en organiseer
  - Onderhoudbaar, overdraagbaar
  - Zorg dat de vereiste skills beschikbaar zijn



- Sanity check
  - Fit for context
  - Fit for purpose

Testautomatisering met TI*4Automation*



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Optimize

- Innoveer en renoveer
  - Changes, Updates, Patches, Fixes
  - Redesign, Refactor, Rewrite

- Sanity check
  - Stay “Up-and-running”
  - Growing maturity within the context
  - Continuously contribute, add value

Test object

- The application, software or service to be tested
- This is an accelerator or disabler for test automation

- Related software work products
  - System Architecture, Functional & Technical Design, User stories, …

Software Development is an enabler
Software Process Improvement Models like SPI, CMM, CMMi, … can help improvement

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Test object as an accelerator or disabler

- Considerations:
  - Inputs and output of the test object are defined
  - The expected behavior of the test object is known
  - The test object is technically operational
  - The test object contains recognizable and accessible objects, elements, controls and properties for test automation
  - Development is willing and able to adjust style guides and programming standards to enhance test automation

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Testware as an accelerator

- Artifacts produced during the test process
- This could be an accelerator for test automation
- Testware
  - Test scenarios
  - Test scripts
  - Test cases

Manual

Test Process is an enabler
Test Process Improvement Models like TPI (Next), TMM, TMMi, TI*4AGILE* … can help improvement

Testware

- Considerations:
  - The test scripts and cases are available
  - Test cases contain – at least – a description of a) initial situation, b) change process = test actions to be performed and c) predicted result
  - The test scripts contain details about the order in which test cases need to be run
  - The test scripts and test cases provide insight into which specific system behavior is tested
  - Test scripts and cases are prioritized to enable risk based selection of test scripts and/or cases to be executed

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James Bach on Test Automation

"I love test automation, but I rarely approach it by looking at manual tests and asking myself 'how can I make the computer do that?' Instead, I ask myself how I can use tools to augment and improve the human testing activity. I also consider what things the computers can do without humans around, but again, that is not automating good manual tests, it is creating something new."

Rule #1	A good manual test cannot be automated.
Rule #1B	If you can truly automate a manual test, it couldn't have been a good manual test.
Rule #1C	If you have a great automated test, it's not the same as the manual test that you believe you were automating.

Succevolle testautomatisering?
Geen kwestie van geluk maar van wijsheid!

TestNet Voorjaarsevent 2013

Ruud Teunissen
Polteq