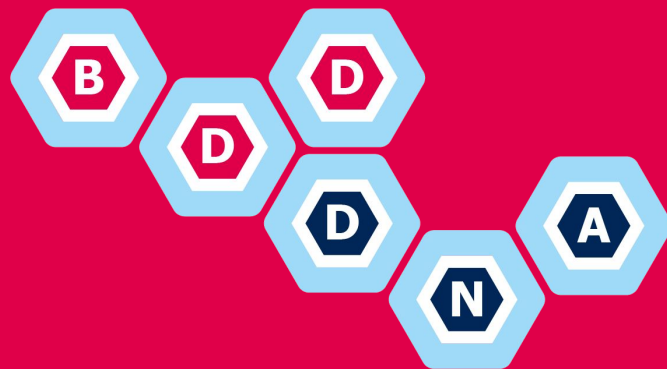




**UC** Leuven  
Limburg  

---

**MOVING MINDS**



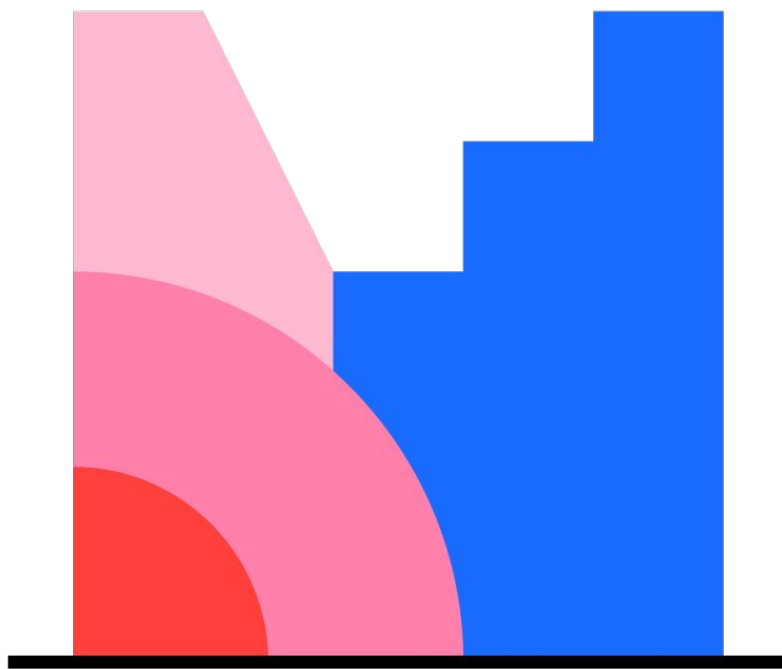
**WELCOME  
BDD seminar**



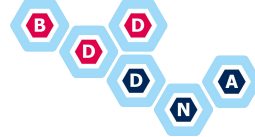
# SCHEDULE



09:15-10:15	TETRA project First Time Right
10:15-10:50	Guest keynote by De Agile Testers
10:50-11:05	Coffee break
11:05-11:40	Guest keynote by Tobania Testing
11:40-12:15	Guest keynote by Craftworkz
12:15-12:50	Guest keynote by A.C.A. IT-Solutions
12:50-14:05	Lunch
14:05-14:40	BDDdna
14:40-15:15	Guest keynote by Brightest
15:15-15:50	Guest keynote by Quality@Speed
15:50-16:05	Coffee break
16:05-16:40	Guest keynote by Smartbear
16:40-17:10	What will be your BDDdna?



**Mentimeter**



## Once upon a time ...

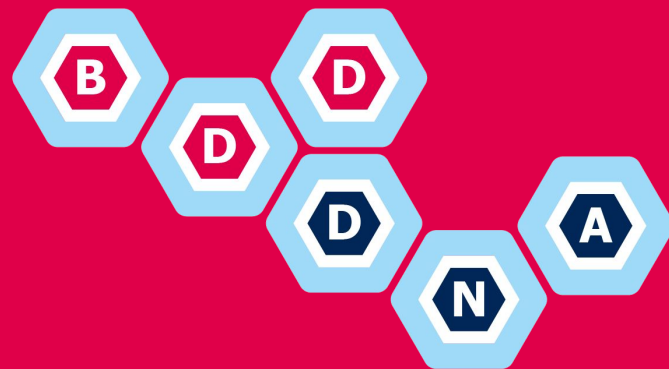
- Zijn we gestart met JUnit and Selenium de opleiding te brengen
  - maar studenten schrijven niet graag testen ... :-)
- Dus besloten we om te zoeken naar tools om het schrijven van testen leuker te maken
  - we vonden Cucumber en gelijkaardige tools ...
- Dus ontdekten we Behaviour Driven Development (BDD) ...
  - we zagen dat de focus meestal op automatiseren van testen lag ...
- Maar BDD is zoveel meer dan dat ...
  - dat was de start van het ...



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**MOVING MINDS**



**TETRA project**  
**First Time Right**



# First Time Right

- Gesubsidieerd door het Vlaams Agentschap Innoveren en Ondernemen (VLAIO)
- Co-funded door de leden van de gebruikersgroep
- Looptijd: 2 jaar (2018-2020)



Wannas  
Fransen



Mieke  
Kemme



Nicolas  
Lauwereys



Elke  
Steegmans



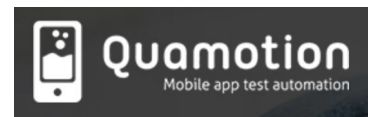
Frederik  
Thielemans



David  
Vandebroeck



# Leden van de gebruikersgroep



**CRAFTWORKZ**





# Research methods



- **Desk research & Literature study**
- Interviews
- Case studies



# Desk research & Literature study





# Project details - First Time Right

## Problem statement

presence of ambiguities and misunderstandings due to the communication gap between the technical (e.g. developers) and the non-technical (e.g. customer, BA) persons.

## Solution

Behaviour-Driven Development (BDD) ⇒ **The starting point**





# Behaviour-Driven Development?



Dan  
North

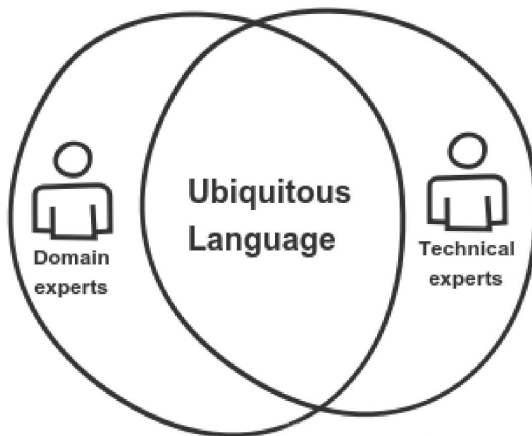
Agile Expert and Originator of BDD





# The core of BDD

- Communication!
- Ubiquitous language (Gherkin + Domain Specific Language)
- Closing the communication gap
  - So that technical experts can communicate with domain experts and vice versa





# Solution



Bridging the communication gap between business and IT with Behaviour-Driven Development.

Core benefits of Behaviour-Driven Development:

#1 Enabling communication

#2 Enabling collaboration

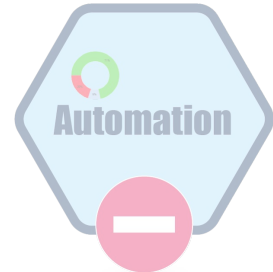
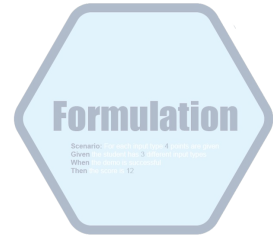
⇒ #3 Creating a shared understanding



# #1 Enabling communication

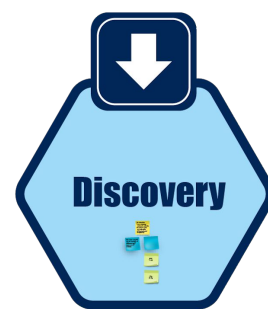
Between technical and nontechnical project members

- **Exemplifying** expected behaviour in a **domain specific language**
  - Example mapping sessions



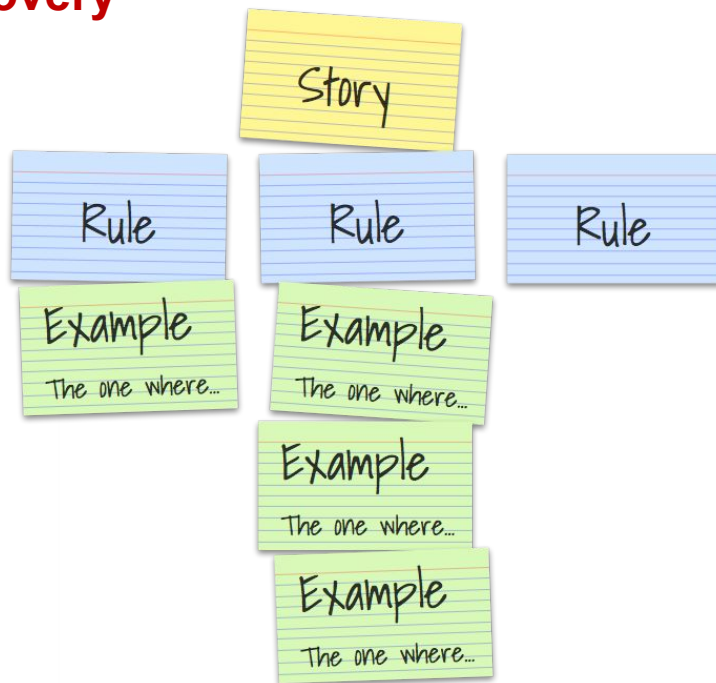


# #1 Enabling communication



## HOW? – Phase 1: Discovery

- Three amigos
- Example mapping





# BMI example

Add new  
examination

The examination  
is registered as a  
new examination  
of the patient

The one where a new  
examination is added to the  
patient with SSN 93051822361

=> The following details are given  
length: 180  
weight: 74500  
Last examination date:  
2020-10-05

=> examination added

The length  
must be  
between 30  
and 300 cm

The one where length is  
invalid

length: 29

=> invalid length (30 and  
300)  
=> examination NOT added

The one where length is  
invalid

length: 301

=> invalid length (30 and  
300)  
=> examination NOT added

The one where length is  
invalid

length: 0

=> invalid length (30 and  
300)  
=> examination NOT added

The weight  
must be  
between 1000  
and 100000 gr

The one where weight is  
invalid

weight: 999

=> invalid weight (1000 and  
1000000)  
=> examination NOT added

The one where weight is  
invalid

weight: 1000001

=> invalid weight (1000 and  
1000000)  
=> examination NOT added

The one where weight is  
invalid

weight: -20000

=> invalid weight (1000 and  
1000000)  
=> examination NOT added

The  
examination  
date may not  
be in the  
future

The one where the examination  
date is in the future

examination date: 05-12-2020

=> invalid examination date (not  
in the future)  
=> examination NOT added

The examination  
date must be  
after the last  
examination  
registered

The one where the examination  
date is before the last  
examination registered

last examination on 30-09-2020

examination date: 29-09-2020

=> invalid examination date (not  
after last examination)  
=> examination NOT added

The  
examination  
date can only be  
registered once  
for this patient

The one where there is already an  
examination registered for this patient  
on this examination date

existing examination on 30-09-2020

examination date: 30-09-2020

=> invalid examination date (already an  
examination for this date registered)  
=> examination NOT added



## #2 Enabling collaboration

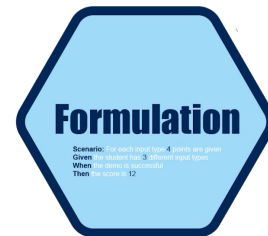
Between technical and nontechnical project members

- Coincides with **communication**
- Documenting in a **ubiquitous language**
  - Gherkin
- **Feedback**





## #2 Enabling collaboration



### HOW? – **Phase 2: Formulation**

- Writing scenarios in Gherkin (GWT) by QA + Developer
- **Review** by PO/client



**Given** some context  
**When** some action is carried out  
**Then** a particular set of observable consequences should obtain



# BMI example



**Rule:** The list of the social security numbers for all registered patients is given

**Scenario:** Caretaker gets the list of all social security numbers

**Given** there are patients registered

**When** Martha requests to get all patients

**Then** Martha should be able to get the list of all social security numbers of the registered patients



# AssertThat

Add feature

Name\*

Unique name of the feature

Description

Brief description of the feature

Save

Cancel

	Steps						Scenarios			Feature	
	Passed	Failed	Skipped	Pending	Undefined	Total	Passed	Failed	Total	Duration	Status
View all patients	5	0	0	0	0	5	1	0	1	7s 064ms	PASSED

Feature: View all patients



# AssertThat

# Jira Software

Add scenario

Mode **AUTOMATED**

Name\*

Unique name of the scenario

Steps

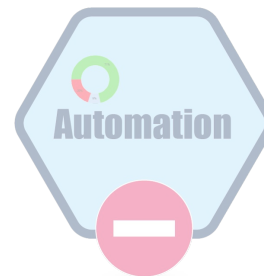
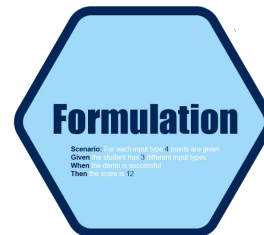
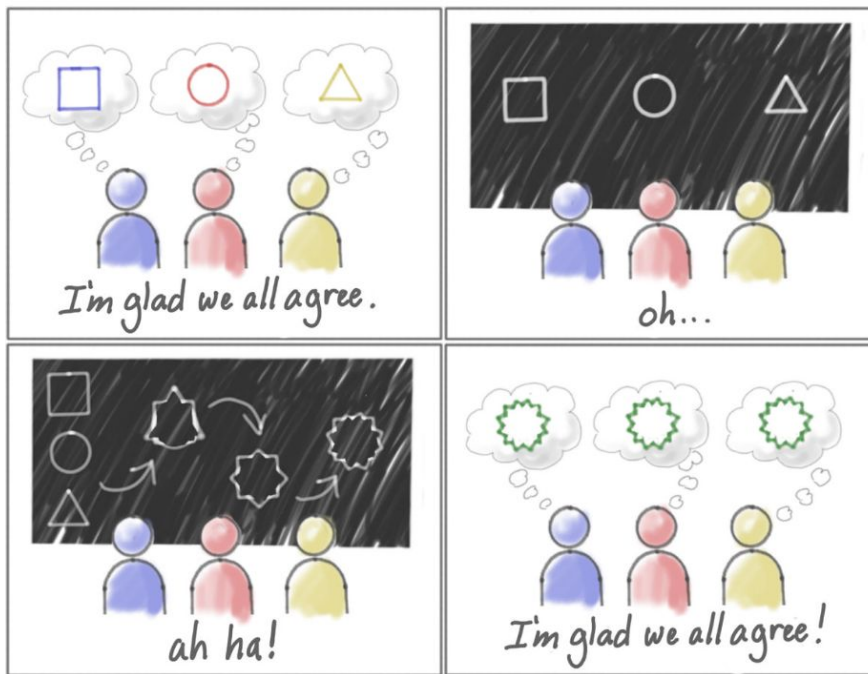



Save



# #3 Creating a shared understanding

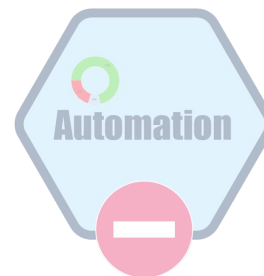
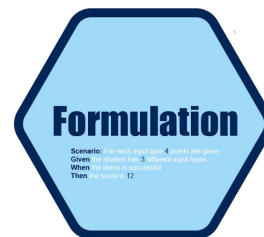
Between technical and nontechnical project members





# #3 Creating a shared understanding

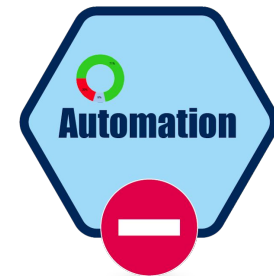
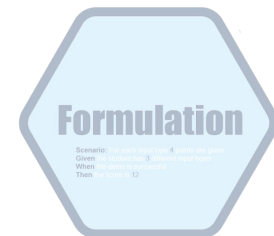
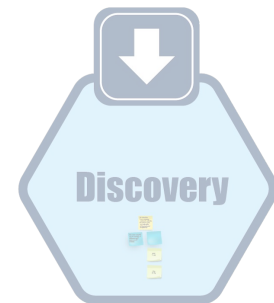
Between technical and nontechnical project members





## #4 Automation and Living Documentation

- Automation
  - scenarios are automated in order to verify the system's behaviour
- Living Documentation
  - reports are generated in order to see the state of the system's behaviour





# BMI example Automation



Cucumber Open

Rule: The list of the social security numbers for all registered patients is given

Scenario: Caretaker gets the list of all social security numbers  
Given there are patients registered  
When Martha requests to get all patients  
Then Martha should be able to get the list of all social security numbers of the registered patients

```
@After
public void tearDown() {
    context.getWebDriverConfig().shutdownDriver();
}

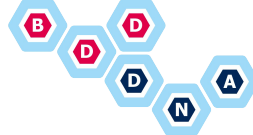
@Given("there are patients registered")
public void there_are_patients_registered() {
    context.setPatients(patientRepository.findAll());
}

@When("Martha requests to get all patients")
public void martha_requests_to_get_all_patients() {
    new PatientsOverviewPage(context.getWebDriverConfig(), navigateTo: true);
}

@Then("Martha should be able to get the list of all social security numbers of the registered patients")
public void martha_should_be_able_to_get_the_list_of_all_social_security_numbers_of_the_registered_patients() {
    PatientsOverviewPage page = new PatientsOverviewPage(context.getWebDriverConfig(), navigateTo: false);

    List<String> expectedSsns = new ArrayList<>();
    context.getPatients().forEach(patient -> expectedSsns.add(patient.getSocialSecurityNumber()));

    assertEquals(expectedSsns, page.getDisplayedSsns());
}
}
```



Discovery



Formulation

Scenario: Caretaker gets the list of all social security numbers  
Given there are patients registered  
When Martha requests to get all patients  
Then Martha should be able to get the list of all social security numbers of the registered patients

Automation





# BMI example Cucumber Living Documentation



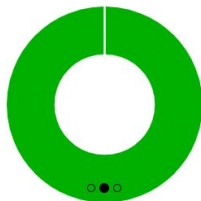
Features Tags Steps Failures

Project	Number	Date
bmi-app	1	26 Nov 2020, 09:36

## Features Statistics

The following graphs show passing and failing statistics for features

Scenarios



Feature	Steps						Passed
	Passed	Failed	Skipped	Pending	Undefined	Total	
View all patients	3	0	0	0	0	3	1
	3	0	0	0	0	3	1
	100.00%	0.00%	0.00%	0.00%	0.00%		100.00%

## Feature Report

Feature	Steps						Scenarios			Features	
	Passed	Failed	Skipped	Pending	Undefined	Total	Passed	Failed	Total	Duration	Status
View all patients	3	0	0	0	0	3	1	0	1	3.183	Passed



### Feature View all patients

As a caretaker

I want to get the list of all patients

In order to consult the data of a certain patient

Tags: @UI

Scenario Caretaker gets the list of all social security numbers 3.183

Hooks >

Steps v

Given there are patients registered	0.132
When Martha requests to get all patients	3.014
Then Martha should be able to get the list of all social security numbers of the registered patients	0.037

Hooks >





# BMI example Serenity Living Documentation



Overall Test Results | Requirements | Capabilities | Features | Report generated 13-02-2020 22:37

### Test Results: All Tests

69 test scenarios (including 58 rows of test data) | Download

Summary | Test Results

Scenario Results (including rows of test data)			Automated
Passing	66	96%	
Pending	1	1%	
Ignored	0		
Skipped	0		
Unsuccessful			
Failed	2	3%	
Broken	0		
Compromised	0		
<b>Total</b>	<b>69</b>		

Execution Time	Clock Time	Fastest Test	Slowest Test	Average Execution Time
10s	17s	27ms	706ms	382ms

### Functional Coverage Overview

Features

Feature	Scenarios	% Pass	Result	Coverage
Manual tests	17	18%	✗	<div style="width: 18%;"></div>
New examination	37	95%	ⓘ	<div style="width: 95%;"></div>
Register patient	26	100%	✓	<div style="width: 100%;"></div>
Viewing patient details	8	25%	ⓘ	<div style="width: 25%;"></div>

### Test Failure Overview

Most Frequent Failures | Most Unstable Features

Assertion error	2	New examination	2%
-----------------	---	-----------------	----

## Functional Coverage Overview

### Features

Feature	Scenarios	% Pass	Result	Coverage
Manual tests	17	18%	✗	<div style="width: 18%;"></div>
New examination	37	95%	ⓘ	<div style="width: 95%;"></div>
Register patient	26	100%	✓	<div style="width: 100%;"></div>
Viewing patient details	8	25%	ⓘ	<div style="width: 25%;"></div>

### Stakeholders

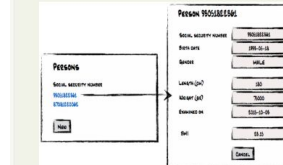
Stakeholder	Scenarios	% Pass	Result	Coverage
Developer	5	40%	ⓘ	<div style="width: 40%;"></div>
Doctor	6	50%	ⓘ	<div style="width: 50%;"></div>
Nurse	1	100%	✓	<div style="width: 100%;"></div>

## Feature: [ISSUE-487] Viewing Patient Details

ISSUE-487 (Issue)

Developer (Stakeholder)

In order to check on the health of a patient  
As a caretaker  
I want to consult his/her personal details



Specifications | Test Results

Scenarios



# BMI example

## Pickles Living Documentation



Home «

Add new examination ✓

Register new patient ✓

View all patients ✓

View patient details ✓

### Add new examination ✓

As a caretaker I want to register the data of a new physical examination in order to update the physical condition of my patient

Tags: @AUTOMATED, @BMI-6, @UI ✓

Caretaker adds new examination to an existing patient ✓

**Given** patient Tom is registered

**When** Martha adds a new examination to the personal details of Tom

**Then** the examination should be added to Tom's examinations

**And** the BMI should be recalculated

Tags: @AUTOMATED, @BMI-6, @UI ✓

The length must be between 30 and 300 cm ✓

**Given** Martha has chosen to add a new examination for Tom

**When** Martha registers as length 29 cm

**Then** the examination should not be added to patient Tom

Tags: @AUTOMATED, @BMI-6, @UI ✓

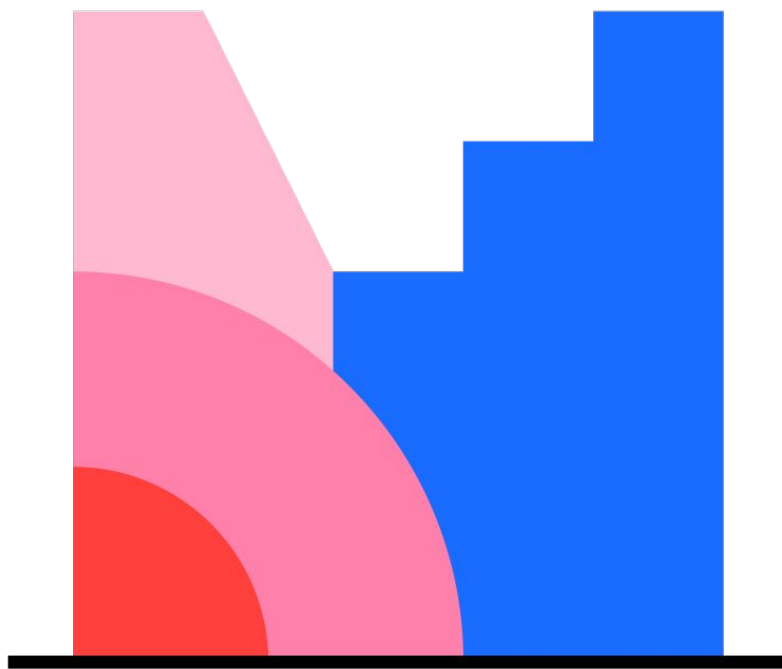
Caretaker tries to register with an invalid weight ✓

**Given** Martha has chosen to add a new examination for Tom

**When** Martha registers as weight 1000001 gr

**Then** the examination should not be added to patient Tom





**Mentimeter**



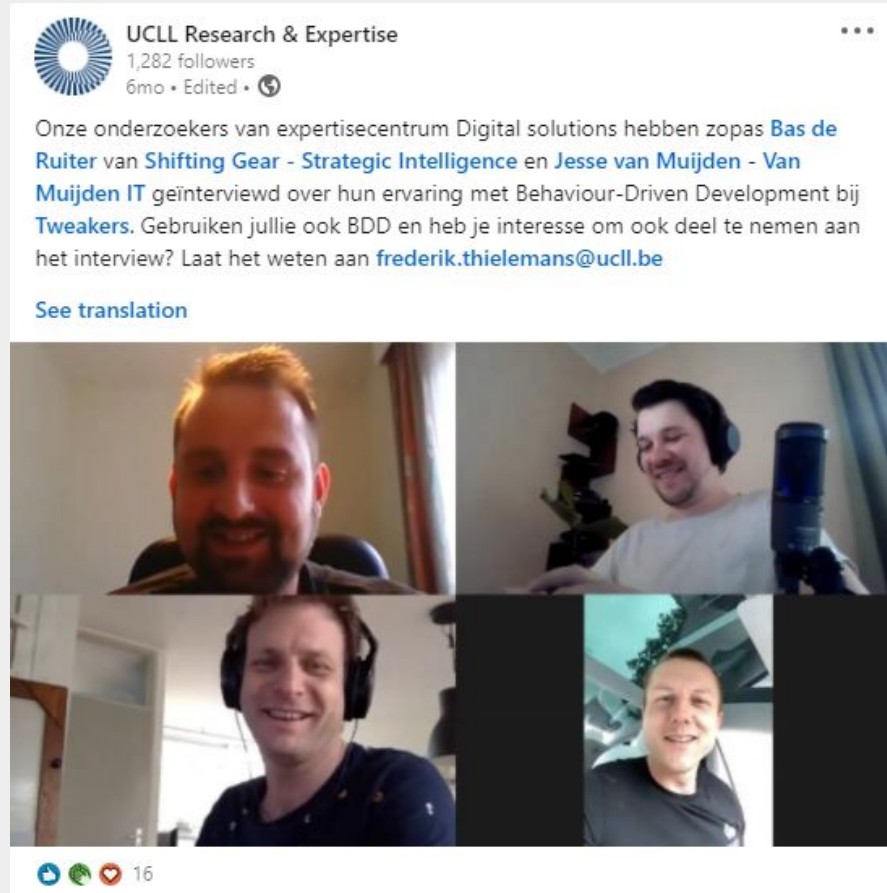
# Onderzoeksmethoden



- Desk research & Literatuurstudie
- **Interviews**
- Case studies



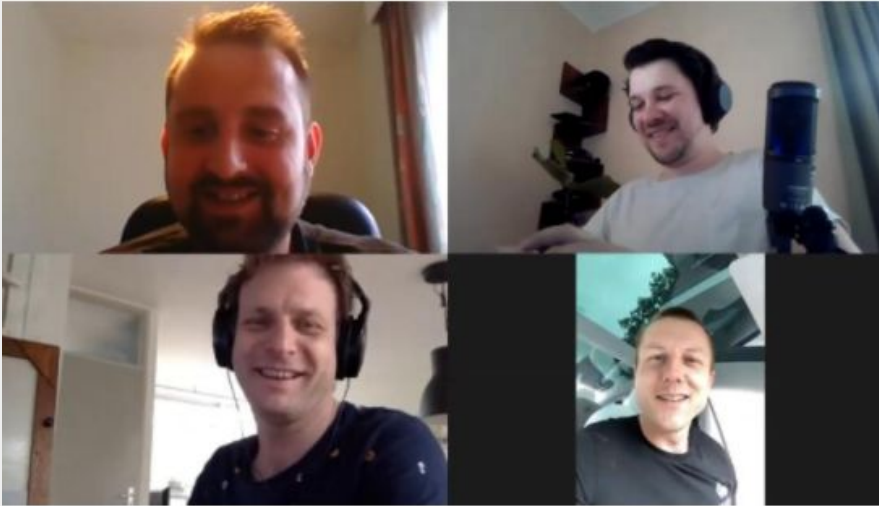
# Interviews



**UCLL Research & Expertise**  
1,282 followers  
6mo • Edited •

Onze onderzoekers van expertisecentrum Digital solutions hebben zopas **Bas de Ruiter** van **Shifting Gear - Strategic Intelligence** en **Jesse van Muijden - Van Muijden IT** geïnterviewd over hun ervaring met Behaviour-Driven Development bij **Tweakers**. Gebruiken jullie ook BDD en heb je interesse om ook deel te nemen aan het interview? Laat het weten aan [frederik.thielemans@ucll.be](mailto:frederik.thielemans@ucll.be)

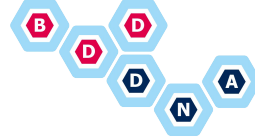
[See translation](#)



16



# Interviews

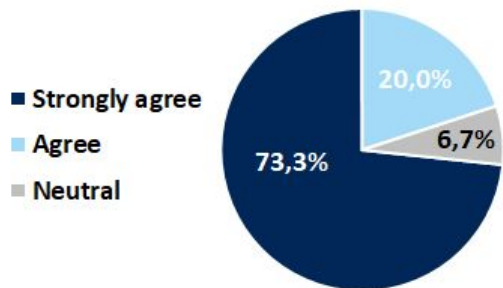


- **Semi-structured interviews**
  - Expert Interviews
  - Stakeholder interviews
- **Objectives:**
  - Provide input for our research on BDD
  - Collect experiences from the field

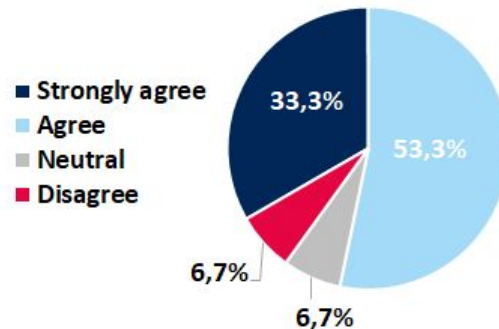




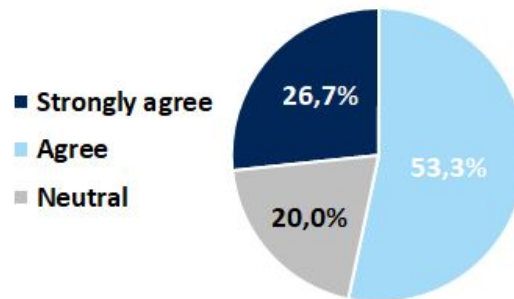
BDD helps to understand the requirements better



BDD helps to improve the communication between team members

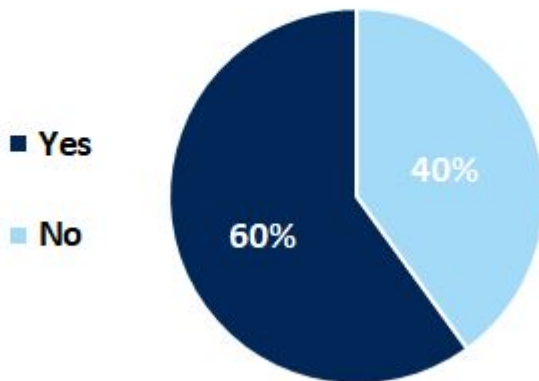


BDD effectively helps to achieve what the product owner wants



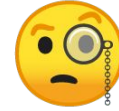


**Did your organisation struggle with team members not being dedicated to use BDD or to see the benefits to use BDD?**





# Observaties tijdens interviews



- **Golden rule:** Do not make assumptions!
- Begin klein en durven doen
- Neuzen in dezelfde richting zetten
- **Samenwerken**
- Uitdaging om iedereen mee te krijgen
- Meer **communicatie**
- Zorgt ervoor dat business meer betrokken is
- **Misverstanden vermijden** door met elkaar te praten
- **Team-effort**
- Cultuur van aanpak



# Observaties tijdens interviews



- Automatisatie mag **niet de focus** zijn
- Het gaat verder dan gebruik maken van Cucumber
- **Te technisch** gaan in scenario's
  - Veel maintenance
- Focus op het technische luik
- BDD wordt enkel gezien als **test automatisatie** tool
  
- In begin gevoel van trager te gaan => Negatieve impact, veel meetings
  - Maar, minder refactoring!!



# Observaties tijdens interviews



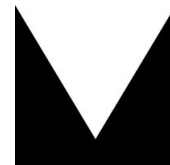
- **Voordeel** als **developer** betrokken wordt in schrijven van scenario's
  - betrokkenheid van in het begin
- **Waarde** zit in de dingen die je nog niet weet
  - **Discovering the unknown**
- Staar je niet blind op de **gherkin** syntax
- **Nood aan een BDD-coach** in de beginperiode
- **Discovery fase** wordt geskipped ⇒ Meest **belangrijkste** fase
- Learning on the job maar **workshops** en **begeleiding** zijn wel nodig



Gert D.



Nick B.





# Onderzoeksmethoden



- Desk research & Literatuurstudie
- Interviews
- **Case studies**



# Case studies





# Case studies



- **Diploma applicatie UCLL**

*“We zijn uitgegaan van een concreet probleem en hebben het stap voor stap geanalyseerd om tot een concrete oplossing te komen. De samenwerking was zeer positief. Er is goed geluisterd naar ons verhaal en naar onze wensen en er werd besproken of het idee mogelijk was of niet. Ideaal voor als je processen met een duidelijke visie en verantwoordelijkheden uitgewerkt wilt zien.”*

*Mira Vermeire - Campus verantwoordelijke UCLL*

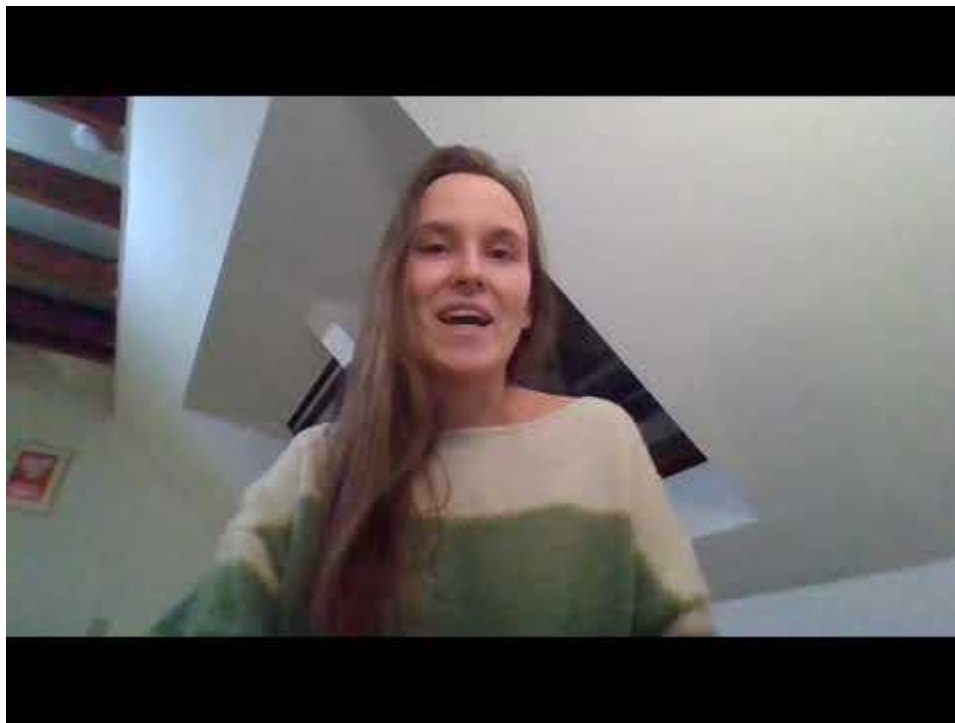
- **Employee recognition tool**

*Lisa Ramaekers - Student UCLL*





Lisa Ramaekers - Student UCLL





# Case studies

- **BMI applicatie**

*“Door BDD toe te passen bij onze cases heb ik ervaren dat je als developer veel kan bijdragen om de communicatie met de klant en binnen het projectteam te verbeteren. Dankzij example mapping, living documentation en 3 amigo meetings kan je een applicatie ontwikkelen die zo goed mogelijk aansluit op de wensen van de klant.”*

*Nicolas Lauwereys - Researcher&Developer UCLL*

- **CACTUS Slim interviewen applicatie**

*“Het stapsgewijs doorlopen van een proces op een gestructureerde manier, waardoor duidelijk wordt hoe de CACTUS-applicatie moet werken. Een prettig divers team met elk hun eigen competenties, die zeggen en doen wat er gedaan moet worden. Bedankt UCLL & het BDDdna team!”*

*Wim Thielemans - Founder dynamo*





# Interview Wim Thielemans

