



Gáspár Nagy

Breaking down problems with Example Mapping

@gasparnagy

Warmup

Form 2-3 people groups

- Everyone in the group:
- Introduce yourself to the others
- Roll with 3 story cubes
- Tell a short story based on the cubes to your group mates
 - Bonus if the story is related to software testing

About me



Gáspár Nagy

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asparnagy

Agenda

- Short introduction to BDD
- Stories, rules and scenarios
- Example Mapping
- Wrap-up

BDD Intro

This is a BDD scenario

Automated test

Illustration of the requirement

Documentation of the behaviour

Scenario: Discount is applied when item added to the

Given a user without submitted order

And they selected a book that costs €50

When the user adds the book to the cart

Then the cart sub-total should be €45

BDD is not only about testing!

Behaviour Driven Development is about
understanding, documenting & validating
business requirements
through illustrative examples

What is BDD?



Discovery

Shared understanding is established through collaboration and structured conversations

Formulation

Examples of system behaviour are documented as scenarios

Automation

Scenarios are automated to be able to verify the system's behaviour

*Let's play
discovery!*

This is an example!

*Nice, but how
can I discover
that?*

Item added to cart

- *User not ordered yet*
 - *Adds €50 book to cart*
 - *Check cart*
- ⇒ Cart sub total €45*

*And how do
I know from
this what to
implement?*

Stories, Rules and Examples

We need structure for the examples of a story

Where are we now?

Is this all?

Another question contains the same word

- Questions:
 - 1) What is SpecFlow
 - 2) What is Cucumber
- * Start asking: "Best SpecFlow practices"
- => Suggested: 1)

*In order to avoid posting duplicated questions
As a user
I want to get suggestions about similar questions I am about to ask*

The same word is in different fields

- Questions:
 - 1) Title: What is SpecFlow
 - 2) Title: Q2, Body: I'm using SpecFlow
 - 3) Title: Q3, Tags: SpecFlow
- * Start asking: "Best SpecFlow practices"
- => Suggested:
 - What is SpecFlow
 - Q2
 - Q3

Word "is" is ignored

- Questions:
 - 1) What is SpecFlow
 - 2) What is Cucumber
- * Start asking: "What is the best SpecFlow practice"
- => Suggested: 1) and not 2)

Do I need at least 3 words?

Case is case insensitive

- Questions:
 - 1) What is SpecFlow
 - 2) Who is the best SpecFlow contributor
- * Start asking: "Best SPECFLOW practices"
- => Suggestion order: 2) 1)

A question has two common words

- Questions:
 - 1) What is SpecFlow
 - 2) Who is the best SpecFlow contributor
- * Start asking: "Best SpecFlow practices"
- => Suggestion order: 2) 1)

We need structure for the scenarios too...

What are the requirements, really?

```
Scenario: Another question contains the same word
Given there are questions asked as
| title |
| What is SpecFlow? |
| What is Cucumber? |
And the user is authenticated
When the user starts asking a question as
| title |
| Best SpecFlow practices |
Then the suggestions list should be
| title |
| What is SpecFlow? |
```

Feature: Question suggestions

The user receives a suggested list of related questions while entering a new question in order to avoid posting a duplicate.

```
Scenario: The same word is in different fields
Given there are questions asked as
| title | body | tags |
| What is SpecFlow? | Body 1 | |
| Question 2 | I'm using SpecFlow | |
| Question 3 | I'm using SpecFlow | SpecFlow |
And the user is authenticated
When the user starts asking a question as
| title |
| Best SpecFlow practices |
Then the suggestions list should be
| title |
| What is SpecFlow? |
| Question 2 |
| Question 3 |
```

```
Scenario: Word match is case insensitive
Given there are questions asked as
| title |
| What is SpecFlow? |
And the user is authenticated
When the user starts asking a question as
| title |
| Best SPECFLOW practices |
Then the suggestions list should be
| title |
| What is SpecFlow? |
```

```
Scenario: A question has two common words
Given there are questions asked as
| title |
| What is SpecFlow? |
| Who is the best SpecFlow contributor? |
And the user is authenticated
When the user starts asking a question as
| title |
| Best SpecFlow practices |
Then the suggestions list should be
| title |
| Who is the best SpecFlow contributor? |
| What is SpecFlow? |
```

```
Scenario: Word "is" is ignored
Given there are questions asked as
| title |
| What is SpecFlow? |
| What is Cucumber? |
And the user is authenticated
When the user starts asking a question as
| title |
| What is the best SpecFlow practice |
Then the suggestions list should be
| title |
| What is SpecFlow? |
```

Story

*In order to encourage new users to buy in our shop
As a shop owner
I want to offer them a 10% discount on their first order*

Goal

Rule

*Discount is applied
when items added
to cart*

What, Scope

Example/scenario

Item added to cart

- *User not ordered yet*
 - *Adds €50 book to cart*
 - *Check cart*
- ⇒ Cart sub total €45*

```
Scenario: Another question contains the same word
Given there are questions asked as
| title |
| What is SpecFlow? |
| What is Cucumber? |
And the user is authenticated
When the user starts asking a question as
| title |
| Best SpecFlow practices |
Then the suggestions list should be
| title |
| What is SpecFlow? |
```

Understanding

Rule = Acceptance Criteria = Requirement = Checkable rules

*As a potential customer
I want to collect books in
a shopping cart
So that I can order
several books at once*

*Books can be
added to shopping
cart*

*Shopping cart
should be empty
when entering the
shop*

*The same book can
be added multiple
times to the
shopping cart*

*Books can be
removed from
shopping cart*

...

*What would
you check?*

Understand rules by examples

The same book can be added multiple times to the shopping cart

Illustrate rule

Simple, but concrete

Not only text

- *Shopping cart: 1 pcs of "Clean Code"*
- *Browse "Clean Code"*
- *Add again*

⇒ *Shopping cart: 2 pcs of "Clean Code"*

Could you give me an example for this?

Examples will be formulated (documented) as scenarios

- *Shopping cart: 1 pcs of "Clean Code"*
- *Browse "Clean Code"*
- *Add again*

⇒ *Shopping cart: 2 pcs of "Clean Code"*

Scenario: The same book can be added multiple times to the shopping cart

Given my shopping cart contains 1 copy of "Clean Code"

When I add the book "Clean Code" to my shopping cart

Then my shopping cart should contain 2 copies of "Clean Code"

Exercise – Collect rules

Work in pairs or 3 people mini-groups

- Collect rules for the ATM PIN change
- Write them down
- If you run out of things to talk about, move on to another scenario

ATM PIN Change

- Imagine a standard PIN change process:
enter old pin and the new pin twice
- e.g.: “The two new PINs should be the same”

A few ATM PIN Change rules

Change PIN

*Should be able to
change PIN*

*The two new PINs
should be the same*

*The old PIN should
be correct*

*An SMS notification
is sent to the user
upon successful PIN
change*

*The new PIN
should be 4 digits*

*The new PIN should
contain at least 2
different digits*

*The user should be
able to cancel the
transaction any
time*

*The entered PINs
should not be
visible on the ATM
screen*

Example Mapping

Example Mapping

Interactive, collaborative requirement workshop facilitation technique

Good intro for BDD scenarios

Read more

- Matt Wynne: Introducing Example Mapping
<https://cucumber.io/blog/2015/12/08/example-mapping-introduction>
- Book: Discovery – Explore behaviour using examples
<http://bddbooks.com/discovery>



Ok, but let's see it in action!

Change PIN

Should be able to change PIN

PIN change is successful

- Enter old PIN
 - Enter new PIN twice
 - Confirm
- ⇒ Success message

PIN change is rejected

- Enter old & new PIN
 - PIN change not possible
 - Confirm
- ⇒ Error message
⇒ Offer retry

The old PIN should be correct

Old PIN is correct

- PIN is 1234
 - Enter old PIN: 1234
 - Change PIN
- ⇒ PIN changed

Old PIN is incorrect

- PIN is 1234
 - Enter old PIN: 1111
 - Change PIN
- ⇒ PIN change is rejected

The two new PINs should be the same

New PINs different

- Enter old PIN
 - Enter new PIN: 1234
 - Enter new PIN again: 1111
 - Change PIN
- ⇒ PIN change is rejected

The new PIN should be 4 digits

Only 3 digit is entered

- Enter old PIN
 - Enter new PIN: 123
- ⇒ ... move to next step

Incorrect old PIN increases invalid PIN counter

Successful PIN change resets invalid PIN counter

Shall the PIN change process time out when the user does not confirm within some time?

Examples

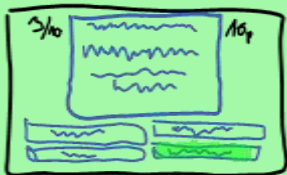
→ PIN change is rejected

- Enter old & new PIN
- PIN change not possible
- Confirm
- ⇒ Error message
- ⇒ Offer retry

Old PIN is incorrect

- PIN is 1234
- Enter old PIN: 1111
- Change PIN
- ⇒ PIN change is rejected

Question screen



HUF cash rounding

Example	Amount	Cash
Round	50	50
Round 5	55	55
Round down	52	50
Round up	53	55
On edge	52.5	55

- Examples consist of
 - Context
 - Triggering action
 - ⇒ Outcome
- Title – makes the example easier to remember or refer to
 - Friends episodes: “The one where **PIN change is rejected**”
- The elements of the example can refer to other examples to avoid duplication
- The format of the example can be different, depending on the problem we are discovering
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Discover more with examples

There are different techniques you can apply to think about other examples that might be important

- Helps to get closer to completeness
- Not all of them applicable for every rule type
- See: <http://gasparnagy.com/2019/04/example-mapping-5-tips-to-avoid-forgotten-requirements/>

1. Challenge data
2. Challenge context (preconditions)
3. Positive/negative example
4. Find additional outcomes for the same context
5. Find different contexts that lead to the same outcome

Exercise – Collect examples for rules

Work in pairs or 4-5 people groups

- Choose a Product Owner and a Facilitator
- Write the rules on “blue” cards and collect 1-2 examples for them on “green” cards
- Try to give a title for each example
- Separate the context, the action and the outcome in the examples

Hints

- Collect as many examples as needed for good understanding (we might need to test more, but that is not our goal now)
- Unsure if example would be useful? Capture it! You can still throw it away if it is not useful...
- Cannot agree? Let everyone write an example that illustrates their point! It will be easier to decide if you see the concrete examples.

Review – Check rules and examples of other groups

- Leave your example mapping visible!
(Don't worry if you are unfinished)
- Check the example map of the other groups around you!
- Do you like their rules and examples?
- Anything you learn from them?
- *Note: It can happen that they've understood the rules differently... That's not a problem, they work for another bank!*

Rules review – Which one is better?

A

The new PIN must
contain at least
2 different digits

B

Different digits

Examples review – Which one is better?

A

All digits are the same

- Changing PIN
 - Enter new PIN as 3333
 - Confirm
- ⇒ PIN change rejected

C

- Enter card
- Select change PIN
- Enter old PIN: 2344
- Enter new PIN: 3333
- Enter new PIN again: 3333
- Error message is displayed
- Retry button enabled

B

All digits are the same

User visits ATM and provides valid credentials to change PIN. The PIN change is selectable on the screen, so the user enters their old PIN and specifies 3333 as new PIN. After that user clicks confirm and gets an error message on the screen.

D

- 3333
- ⚡

Wrap-up

BDD Activities



Discovery

Shared understanding is established through collaboration and structured conversations

*This is what
we have
practiced!*

Formulation

Examples of system behaviour are documented as scenarios

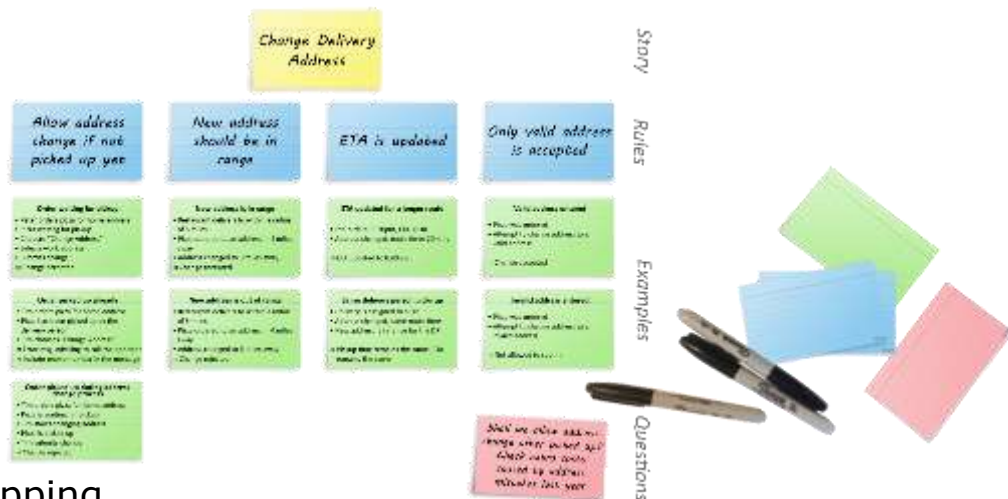
Automation

Scenarios are automated to be able to verify the system's behaviour

Example Mapping

Interactive, collaborative requirement workshop facilitation technique

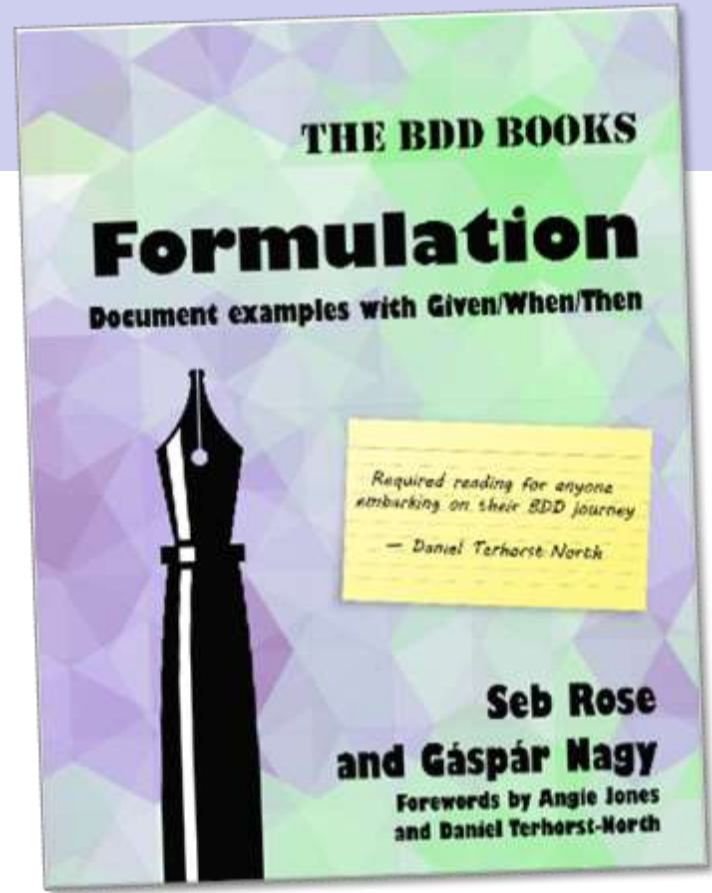
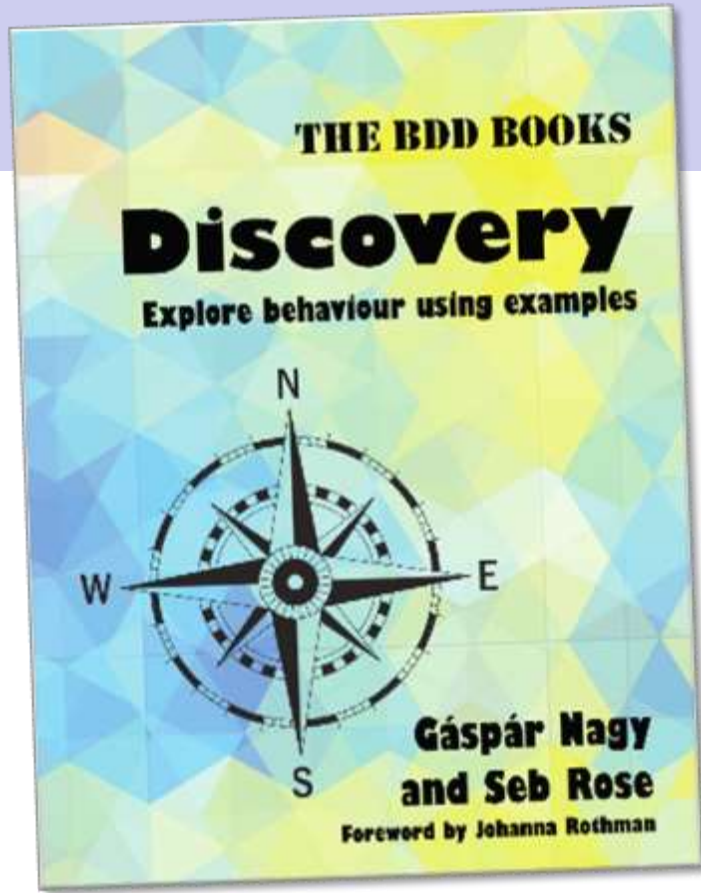
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You cannot enforce collaboration.
You have to enable it.



Find it on Amazon & Leanpub through <http://bddbooks.com!>

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Thank you!

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