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Tree in the Forest: Managing Details in BDD Scenarios

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Today…

- Super brief BDD intro
- Scenarios as Tests
- Scenarios as Specification
- Types of Details
- Implicit Context
- Wrap-up, Q&A

BDD in 3 minutes...

BDD scenario: bridge between requirements and the solution


```
Scenario: User votes up a question
Given a question asked with 2 votes
And the user is authenticated
When the user votes up the question
Then the votes should be changed to 3
```

make requirements testable

make tests understandable

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Behaviour Driven Development is about

understanding, documenting & validating

business requirements

through illustrative scenarios

Scenarios are discovered through examples…

"Examples" are a lightweight form of describing the "scenario"

They fit better for collaborative discussions

Another question contains the same word
- Questions:
  1) What is SpecFlow
  2) What is Cucumber
* Start asking: "Best SpecFlow practices"
=> Suggested: 1)

discovery

formulation

Having discussions based on such complex scenarios is hard…

```
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?    |
```

BDD Practices

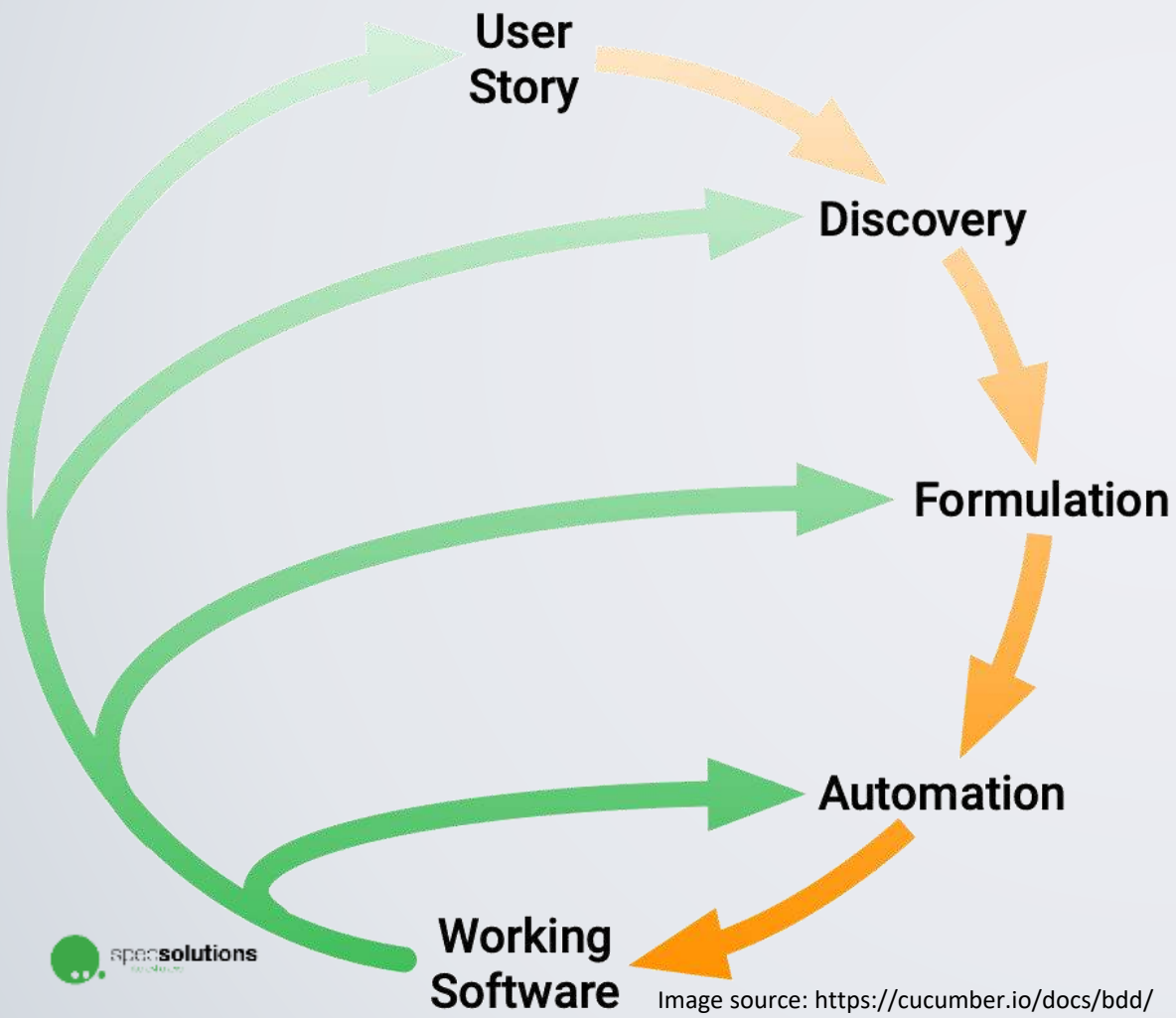


Image source: https://cucumber.io/docs/bdd/

Discovery

Shared understanding is established through collaboration and structured conversations

Formulation

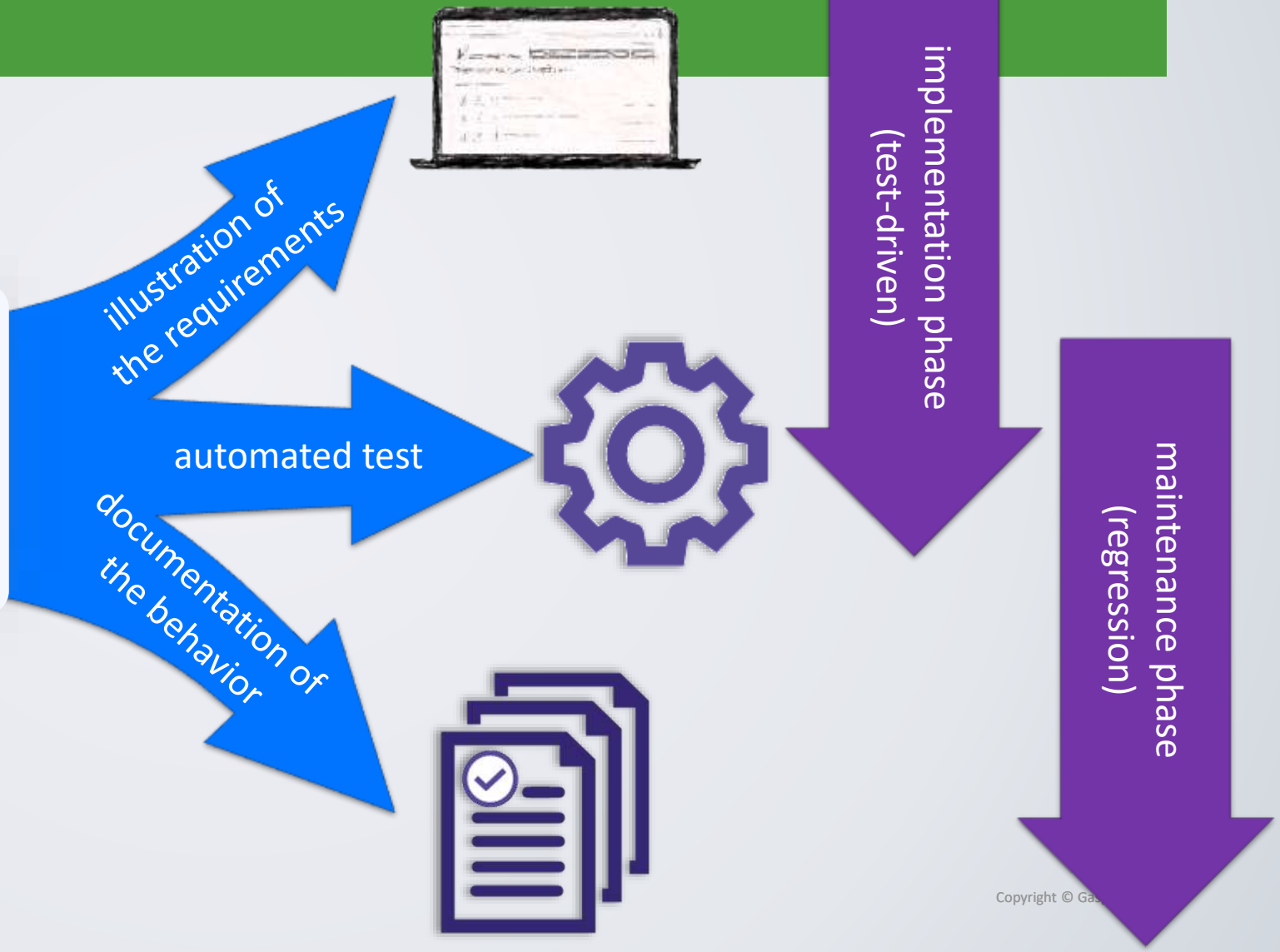
The examples of system behaviour are documented as scenarios

Automation

Scenarios are automated to be able to verify the behaviour of the system

Purposes of scenarios

```
Scenario: The one where…
Given some context
When perform an action
Then the outcome happens
```



BDD is not (only) testing!

Scenarios as Tests

In order to use scenarios as tests…

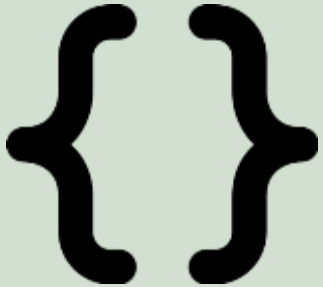
- Executable – In order to gain trust in that we deliver what was agreed
- Objective – the execution should always be performed in the same way, otherwise we are not testing the same thing
- Concrete – at the end the application has to be exercised based on the scenarios with concrete details

All *details* that are required for exercising the application has to be available *during execution* latest

This brings up a couple of interesting questions…

- What are those *details*? What kind of details we should consider?
- How do we agree on those details?
- Whare do we document (store/code) those details?

Where to document the details?



In the text of the **scenario** in the feature file

In the automation **code**

In **external** sources (Excel, existing data, etc.)

managed by code

The details are not removed from the scenario, but **pushed down** to the code

ONLINE POLL:
Pro / Con analysis for details

Scenario

VS

Code

Details in Gherkin

Pro

- Visible
- Easier test result analysis (debugging)

Con

- Makes scenario hard to read
- Maintainability problems

Details coded or processed by code

Pro

- Easy to reuse
- Different abstractions can be defined
- Maintainable
- Visible during execution (dynamic visibility)

Con

- Harder to see details in code (static visibility)
- Code is not a shared asset

Without details, how do we know what data was used for testing?

```
# Including question and user details...
Scenario: The user votes up a question
Given there is a question asked as
  | title                            | body        | votes |
  | How to write better BDD scenarios? | I need help | 2     |
And the user "Marvin" is authenticated with password "1234"
When the user votes up the question
Then the vote count of the question should be changed to 3

# Omitting incidental details
Scenario: The user votes up a question
Given there is a question asked with 2 votes
And the user is authenticated
When the user votes up the question
Then the vote count of the question should be changed to 3
```

```
Given there is a question asked with 2 votes
Question: Title: T8f43d0a6410141e ..., Votes: 2, AskedBy: Jeltz
-> done: QuestionStepDefinitions.GivenThereIsAQuestionAskedWithVotes(2)...
And the user is authenticated
Perform Login: Input: Name: Marvin, Password: 1234
-> done: AuthStepDefinitions.GivenTheUserIsAuthenticated() (0.0s)
When the user votes up the question
Perform VoteQuestion: Input: (16b5df88-0311-4b9d-bb86-2bf617c11cdf, Up)
-> done: QuestionVotingStepDefinitions.WhenTheUserVotesUpTheQuestion(Up)
(0.0s)
Then the vote count of the question should be changed to 3
-> done: QuestionVotingStepDefinitions.ThenTheVoteCountOfTheQuestion...
```

It is easier to manage details in code,
but we need to work extra for visibility

Scenarios as Specification

How to make scenarios to good specification

- Easy to read, review & discuss
  - Not too long (brief)
  - Free of “noise”
  - Business language (ubiquitous language)
- Should only change when the requirement changes
  - No technical/solution details
  - Focus on the what (intention) and not the how (steps to achieve)
- Concrete, so that the validity can be checked
  - Contain essential (relevant) details
  - Contain real/concrete data
  - Should focus on a single business rule

6 BRIEF principles of good scenarios

- **B**usiness language — Business terminology aids cross-discipline collaboration
- **R**eal data — Using actual data helps reveal assumptions and edge cases
- **I**ntention revealing — Describe the desired outcomes, rather than the mechanism of how they are achieved
- **E**ssential — Omit any information that doesn't directly illustrate behaviour
- **F**ocused — Each scenario should only illustrate a single rule

- Brief — Shorter scenarios are easier to read, understand and maintain

What details are essential?

There are no fixed guidelines to decide on this… and the answer might be context specific…

- The details that influence the outcome (=Then steps)
- The details that are relevant for the “rule” (=AC, business rule, requirement) the scenario illustrates (“focuses on”, purpose)

Deciding on essential details in scenarios without clear outcome and purpose is not possible

You need to fix those first

Types of Details

EXERCISE:
Identify different detail types

- Work in pairs or 3 people mini-groups
- Find at least one example of the detail types on the right
- Is that particular detail necessary in the scenario?

Many details are unnecessary

```
Rule: Dispatched orders cannot me modified in the app

Scenario: Customer attempts to modify a dispat
Given the Earth is spinning
And there is electricity for the servers
And the system has been started
And the system has been initialized
And the system is not in maintenance mode
And there are the following products
  | name         | unit price | status |
  | Flipchart    | 250        | active |
  | Sticky Notes | 18         | active |
And there is a customer
  | name           | user name | pa
  | Agile Alliance | agall     | Sc
And the customer "Agile Alliance" l
  | street               | city
  | 18 Holyrood Park Road | Edinbu
And the customer "Agile Alliance" :
And the customer "Agile Alliance" l
  | status  | payment method | issu
  | created | bank_transfer  | 7/25
And the order "0293445" has an iter
  | item id | product   | quantity
  | 743268  | Flipchart | 13
```

```
Rule: Dispatched orders cannot me modified in the app

Scenario: Customer attempts to modify a dispatched order
Given there is a customer with a dispatched order
When the customer attempts to start changing in the order
Then the changes should fail with "error-cannot-modify-
dispatched-orders"
```

The data is not always unnecessary!

```
Rule: The countries we cannot ship ("no-ship") cannot be selected

Scenario: Customer attempts to select a no-ship country
Given a customer started an order
When they select "North Pole" as shipping country
Then the country selection should fail with "no-ship-country"
```

Detail types

Scenario Related

1. Entity property
2. Entity existence
3. Hierarchical data
4. Technical details
5. Contextual details (scenario execution context)

Implicit Context Related

6. Baseline
7. Workflow steps
8. System status

Note: Not necessary a complete list and there are overlaps

1. Entity property

```
Given the customer has an order
  | status  | payment method | issue date | due date  |
  | created | bank_transfer  | 7/25/2023  | 8/24/2023 |
```

used defaults

```
Given the customer has an order
```

defaults can be overridden

```
Given the customer has a dispatched order
```

```
Given the customer has an order
  | status     |
  | dispatched |
```

- Many properties of the entity might not be relevant for the scenario
- These properties change and extended independently of the scenario
- Push down: maintain a default (test) values for the properties of the entities in code

2. Entity existence

```
Given there is a customer
And the customer has an address
  | street                | city      |
  | 18 Holyrood Park Road | Edinburgh |
```

```
Given there is a customer
```

pre-populate with default address

required prerequisites

```
Given there is a customer
And there is an order of the customer
```

```
Given there is an order
```

ensure customer prerequisite

- The existence of some entities might be required for execution, but not relevant for the outcome (e.g. address record of a customer; customer for an order)
- These requirements might change independently of the scenario
- Push down:
  - populate the records with defaults automatically
  - ensure that all prerequisite is created

3. Hierarchical data

```
Given there is a customer "AA“
And the customer "AA“ has an order "0293445“
And the order "0293445" has an item
  | item id | product   | quantity |
  | 268     | Flipchart | 13       |
And the order item "268“ has a comment “…“
```

relevant details only

```
Given the is an order with
  | product   | quantity | comment |
  | Flipchart | 13       | ...     |
```

- Some tests require a hierarchical set of data
- Complex data hierarchies are hard to understand, so should be simplified
- Push down:
  - ensure that prerequisite is created
  - build up hierarchy as a story by relevant steps
  - use custom format to express (e.g. yaml)
  - use internal IDs

4. Technical details

```
When the user clicks on button
        "//*[@id="orders_0293445"]/td[3]/a"
```

identified business action

```
When the user attempts to start changing in
the order
```

- Technical details and steps might be needed to execute a particular business action (e.g. enter the name to a textbox with ID “tb1234”)
- These details are bound to the implementation, not the specification
- Documenting this details in scenarios requires intensive maintenance
- Push down:
  - Identify & express business needs or actions
  - Translate these to the technical details in code (reusable!)

5. Contextual details (scenario execution context)

```
Given there is a customer "AA"
And the customer "AA" has an order "0293445"
When the customer "AA" changes
                    the order "0293445"
```

refer to context

```
Given the customer has an order
When they change the order
```

can use more explicit form as well

```
Given the customer has an order
When the customer changes the order
```

- The “story” that the scenario explains might need to introduce details that are referred in later steps – they are part of the scenario execution context
- Duplicating these details makes the scenario verbose and hard to understand
- Push down:
  - Store these contextual details in scenario-lifetime storage provided by the BDD framework (World, ScenarioContext)
  - Resolve the references to these details from the storage

Detail types

Scenario Related

1. Entity property
2. Entity existence
3. Hierarchical data
4. Technical details
5. Contextual details (scenario execution context)

Implicit Context Related

6. Baseline
7. Workflow steps
8. System status

Note: Not necessary a complete list and there are overlaps

Implicit Context

Anatomy of a scenario

- Given -> Context
- When -> Action (triggering action)
- Then -> Outcome

The “Given” step(s) specify the context (preconditions, system state) that is required to specify in order to perform the action and verify the outcome.

Do we always have a context?

```
Given the Earth is spinning
And the system has been started
And there are the following products
  | name          | unit price |
  | Flipchart     | 250        |
  | Sticky Notes  | 18         |
And there is a customer with a dispatched order
```

Assumed	Needs automation actions	Make it implicit?
Yes	No	Yes, always
Yes	Yes	Yes, always
Maybe	Yes	Depends…
No	Yes	Never

Implicit

VS

Explicit

Context

Pro

- Maintained by code
- Can hide technical details

Con

- Requires team agreement & knowledge to understand the scenarios
- Tracking the dependencies in code might be more complex

Context

Pro

- Can be used to declare essential details
- Highlights the necessity of the prerequisite

Con

- Might cause unnecessary duplication in scenarios
- Scenarios require more maintenance
- Makes scenarios longer and harder to understand

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Implicit context is always present

Whether you make it explicit is a team decision, that you might need to document

Detail types

Scenario Related

1. Entity property
2. Entity existence
3. Hierarchical data
4. Technical details
5. Contextual details (scenario execution context)

Implicit Context Related

6. Baseline
7. Workflow steps
8. System status

Note: Not necessary a complete list and there are overlaps

6. Baseline

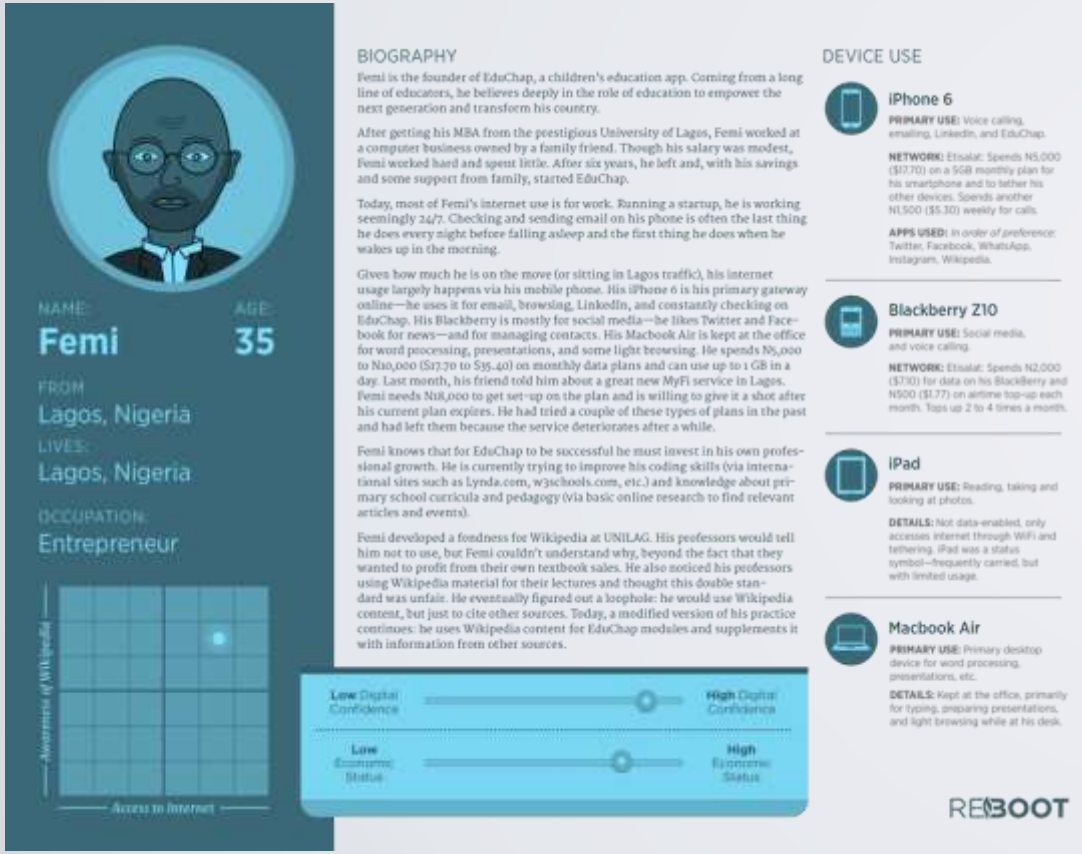
```
Given there are the following products
  | name          | unit price |
  | Flipchart     | 250        |
  | Sticky Notes  | 18         |
And the is an order with
  | product    | quantity |
  | Flipchart  | 13       |
```

Flipchart and Sticky Notes are always there

```
Given the is an order with
  | product    | quantity |
  | Flipchart  | 13       |
```

- The scenarios of a product might need "usual" data for expressing the examples
- Many team has an implicit agreement to use the same data over and over, so it might became noise
- Push down:
  - Make a team agreement of "default" test data and make sure those can be used without explicitly listing them
  - Special scenarios can still override
  - There might be multiple baseline sets

Personas in “Baseline” details



Picture source: Wikipedia

- A persona is a fictional character created to represent a user type that might use a […] product in a similar way. (Wikipedia)
  - Well known to the team
  - Helps discussions as it saves time of explaining the context
- Similarly you might have fictional, well-known data that we use in discussions
  - Jenny Martin refers to these as “Data Personas” (https://jennyjmar.com/2016/04/15/data-personas/)
- Personas and Data Personas are also useful for specification & testing!

7. Workflow steps

```
Given the customer has logged in
And the customer dismissed the newsletter
subscription
And the customer started to create an order
And the customer added the line to the order
  | product   | quantity |
  | Flipchart | 13       |
And the customer has placed the order
```

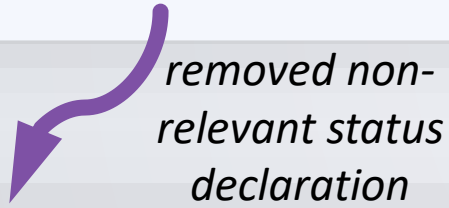
removed non-relevant workflow steps

```
Given the customer has placed an order with
  | product   | quantity |
  | Flipchart | 13       |
```

- The different user or workflow steps might also represent details that are not relevant
- Keeping these details in the scenario causes maintainability issues once the workflow changes
- It is better to state the intentions and the relevant steps only
- Push down:
  - Express intention revealing steps and ensure the state by repaying the necessary steps or by applying a shortcut in the automation code

6. System status

```
Given there is a customer
And the customer is not blocked
```




```
Given there is a customer
```

- The details might be shown as declaration of the system or entity statis
- Declaring “normal” status makes the scenarios harder to understand
- Push down:
  - Remove unnecessary status declarations from the scenario
  - Optionally add precondition checks to different actions to make sure that the system is in the expected state

Wrap-up

We covered…

- That scenarios need details for execution, but you don’t necessarily need to store those in the scenario itself, but push down to automation code
- That in order to use scenarios as specification, we need to make them focused and express only essential details in the steps
- That there are different detail types, watch for them and apply the mentioned “push-down” strategies if required
- That context is specified by the “Given” steps, but there are always implicit context too

Be aware of the details

Push them down

Make a team agreement on implicit details

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given.when.then.

Thank you!

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