



# Behavior Driven Development (BDD)

By Nabeel Ibrahim



# About Me

- Quality Engineer at Slalom Consulting
- 8 years testing experience
- Experience with Web and Mobile automation
- Test strategy creation
  
- Love soccer
- Love to travel
- Summer guy

# Outline

- What is BDD?
  - TDD overview
  - Three amigos
  - Ubiquitous language
  - Gherkin (Given When Then)
- How do I switch to BDD?
  - Automation
  - Three Amigos meeting
- Advantages and Challenges
- Cucumber
- SpecFlow
  - Feature Files
  - Step Definitions
  - Reports
- Living documentation - Pickles



## What is BDD?

” BDD is a second-generation, **outside-in**, pull-based, multiple-stakeholder, multiple-scale, **high-automation**, agile methodology. It describes a cycle of interactions with **well-defined outputs**, resulting in the delivery of working, tested software that matters.” –Dan North

# Test Driven Development

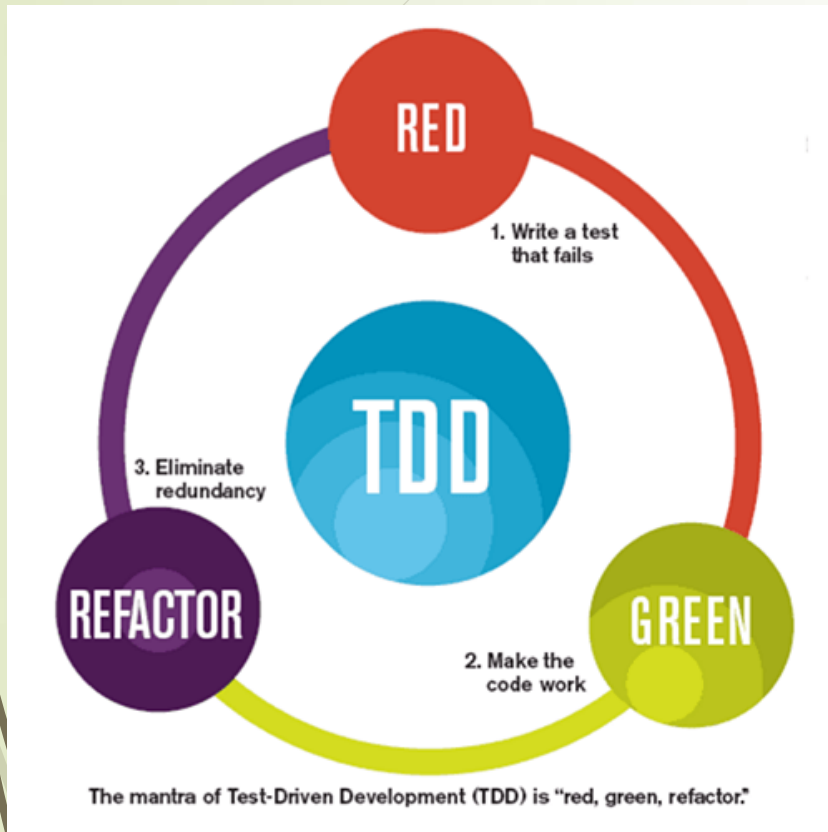


Figure 1: TDD <http://lewandowski.io/2017/02/thre-levels-of-tdd-1/>

- What is TDD?
  - Define a test set for the feature/unit *first*
  - Make the tests fail;
  - Then implement the feature/unit;
  - Finally verify that the implementation of the unit makes the tests succeed
- Non specific
  - Tests written as high level requirements OR
  - Low level technical details
- Cost of translation

# Behavior Driven Development

- Tests specified in terms of **desired behavior**
  - Desired behavior – High level business requirements
- Provide scenarios/real world examples
  - Illustrate behavior in an ubiquitous language
  - Gherkin syntax
  - Describe the **what** and not the **how**
- Automate scenarios



## Three Amigos

Product  
owner/Business  
analyst

- Determine value of features

Developers

- Feature detail and complexity

QA

- Look for flaws in the system



## User Story (Traditional)

### **Feature:** Add or remove items from cart

As a customer,

I want to be able to view the items in my cart  
so that I know for sure what I'm purchasing

### **Acceptance criteria**

- Display the name of each item in the shopping cart.
- Display the quantity of each item in the shopping cart.
- Allow the user to remove any items in the shopping cart.



# User Story (BDD style)

## Feature: Add or remove items from cart

As a customer,

I want to be able to view the items in my cart  
so that I know for sure what I'm purchasing

### Scenario 1: User is able to add items to cart

**Given** there are no items in the cart

**And** I am on the clothing page

**When** I add the following items to cart:

Product Name	Quantity
BDD XL Shirt	1

Then there should be 1 item in the cart named 'BDD'

### Scenario 2: User is able to remove items from the cart

**Given** the following items are in the cart

Product Name	Quantity
BDD XL Shirt	1
TDD XL Shirt	5
Jeans	6

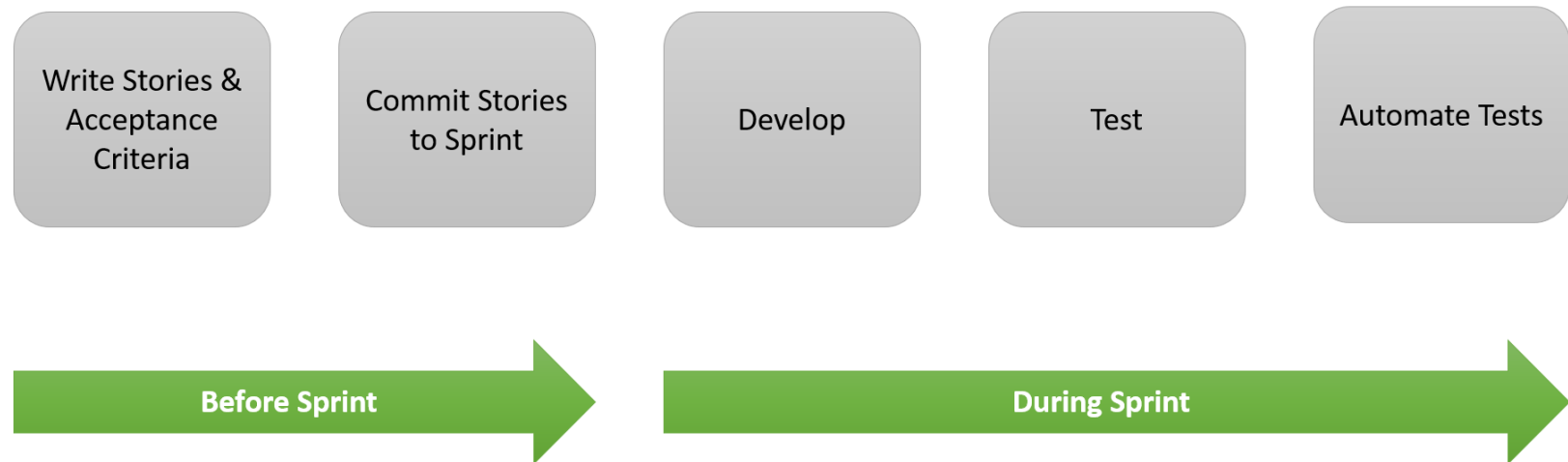
**When** I remove all the items named 'Jeans'

**Then** I should have 6 items in the cart

**And** there should be no items named 'Jeans'

# How do I switch to BDD?

## A Traditional Sprint



# Traditional Sprint Issues

Cost of translation

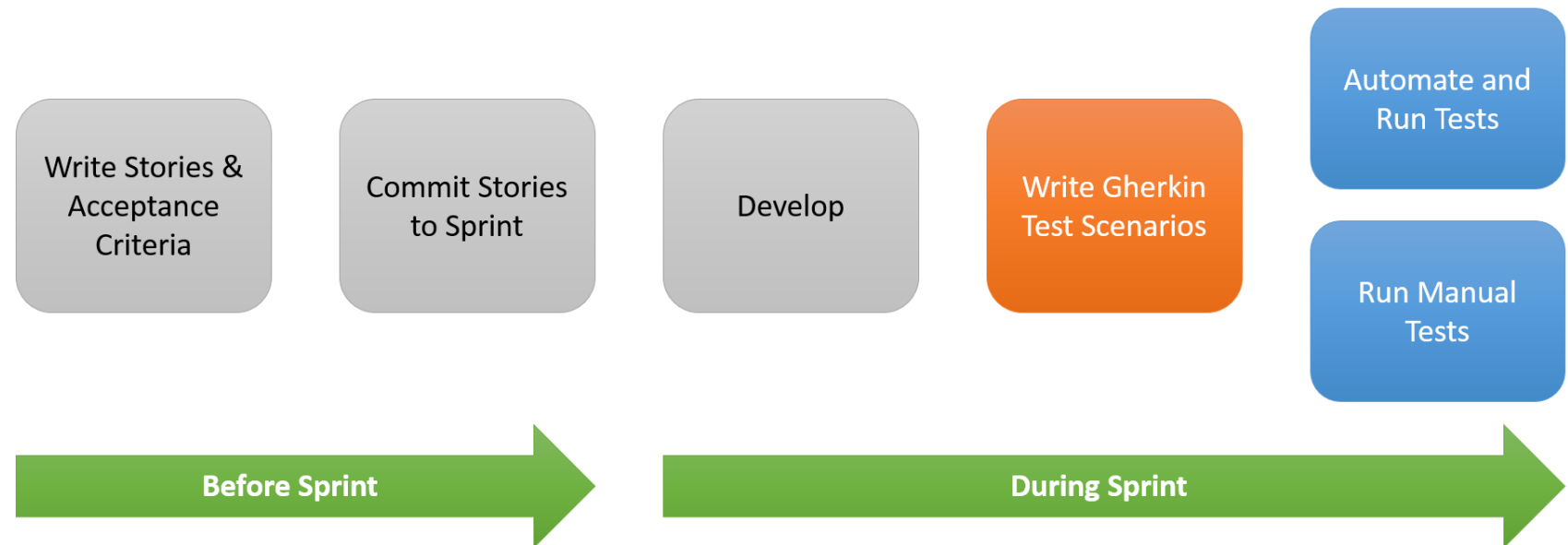
- Dev code ~= business thinking
- Refinement stories
- Production delay

Stories sent to QA very late in sprint

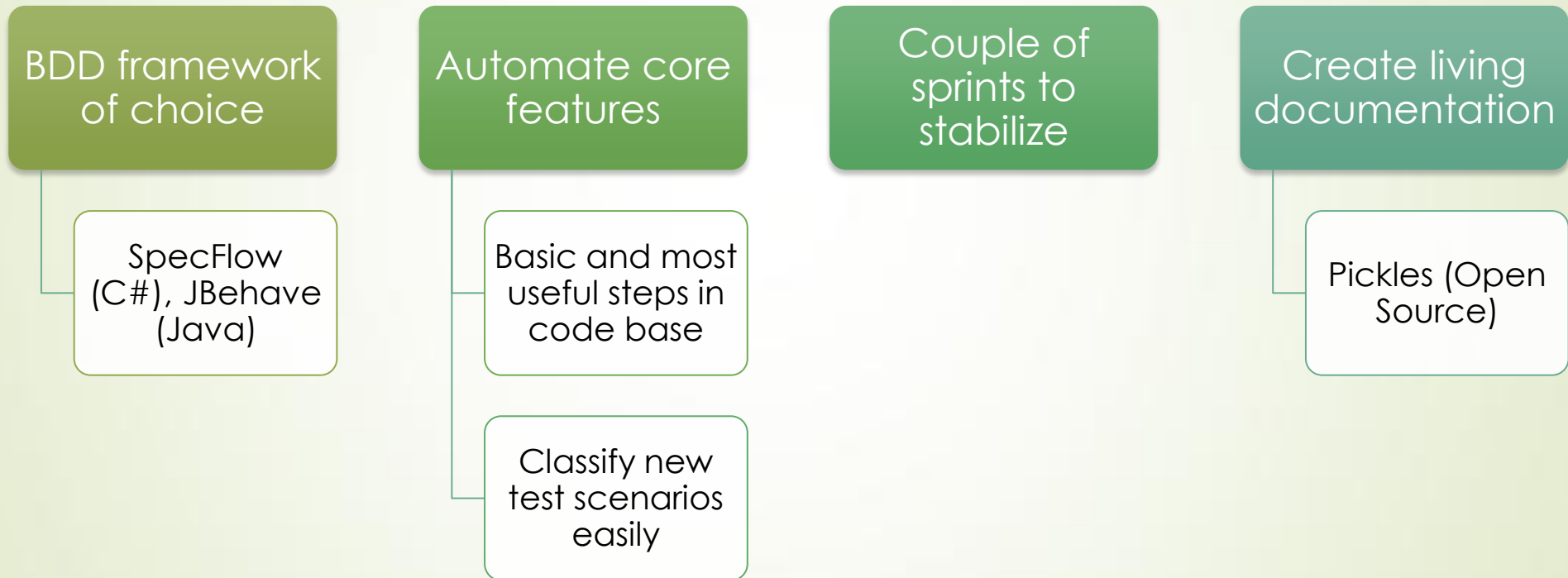
- Automation lags behind
- Stories not completed
- Affects velocity

# Automation

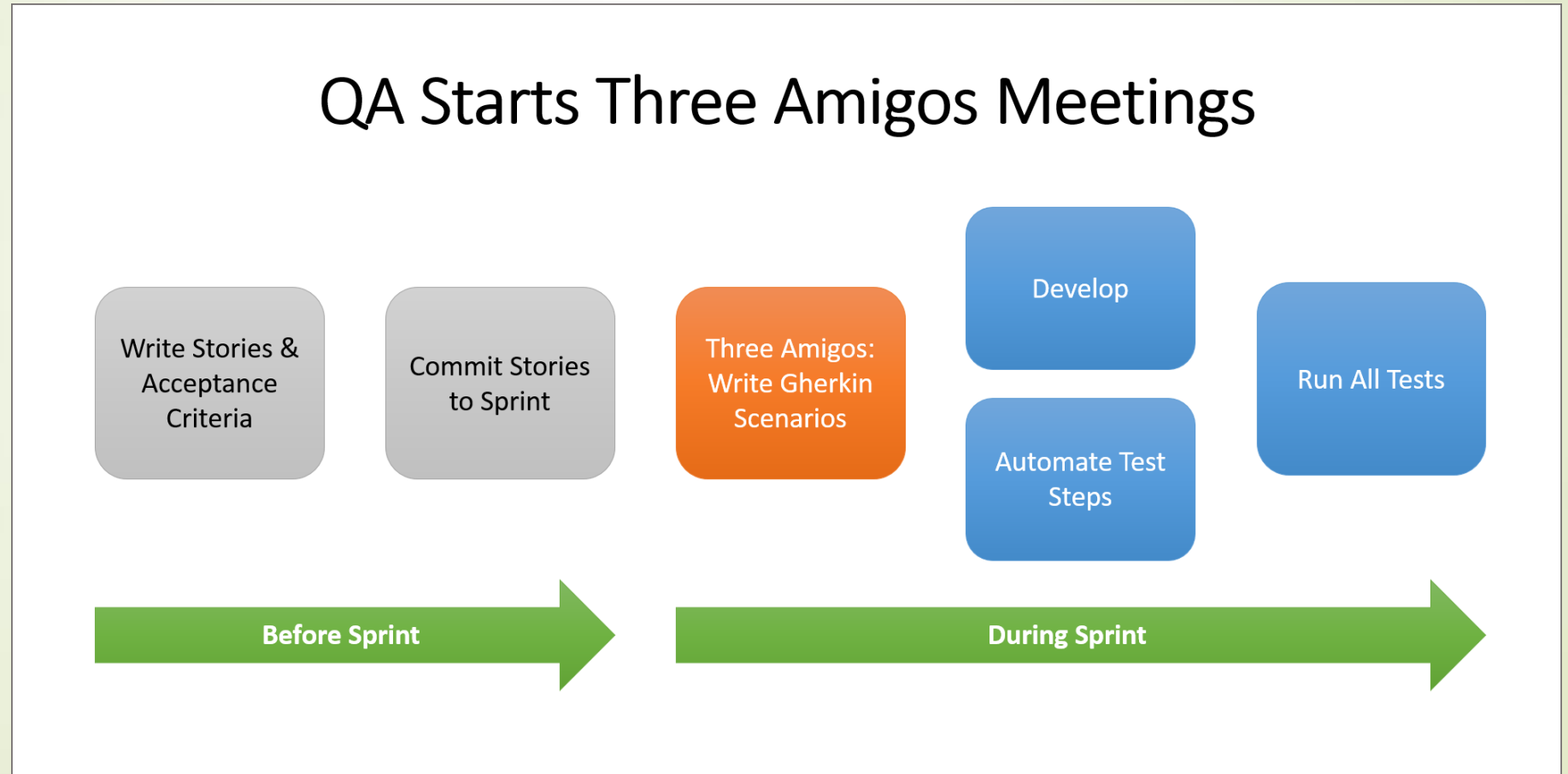
## QA Starts BDD Automation



# Step 1: Automate



## Step 2: Three Amigos meeting



## Step 2: Three Amigos Meeting

Schedule  
Three Amigos  
meeting

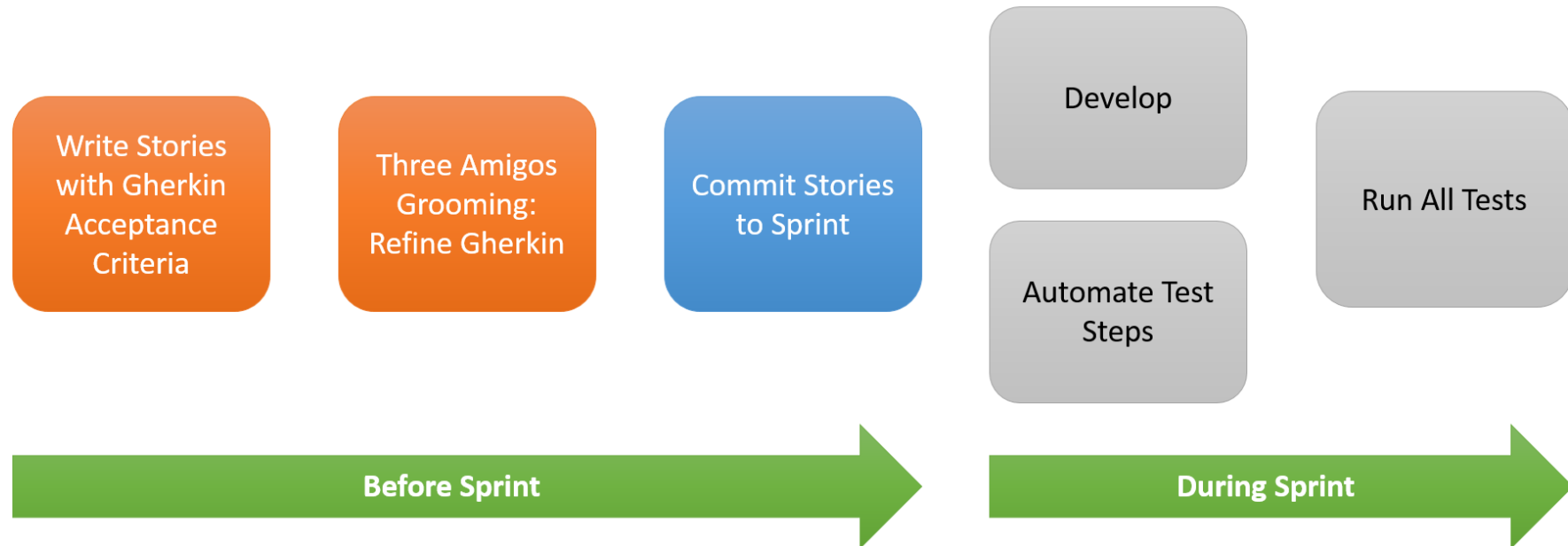
Demo  
automation,  
living doc

Lets all write  
Scenarios!!!!

PO, Dev,  
QA

## Step 3: User stories BDD style

### A Fully Behavior-Driven Sprint







# Advantages of BDD

- Highly collaborative process
  - Entire team constantly talking to each other
  - Solve problems together
  - All input valuable
  - User stories written in a standardized format
  - Good with any Agile Framework i.e. Scrum, Kanban etc.
- Focuses on Behavior
- Minimizes cost of translation



# Challenges of BDD

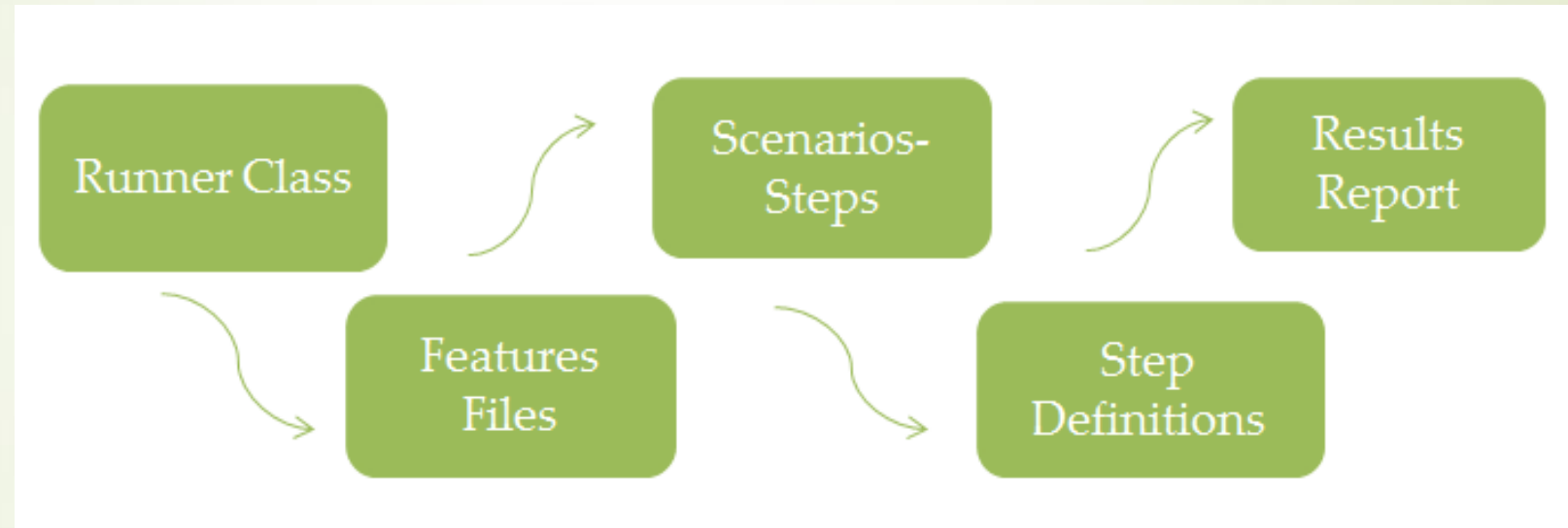
- Change is not easy!
  - Business may not want to learn Gherkin
  - Dev/Other QA learning curve
    - Two extra layers (Feature files + Step definitions)

# Cucumber

- Translates Gherkin steps into executable code
- Open source
- Used in several BDD frameworks
  - SpecFlow
  - JBehave
  - RSpec
- Integrates with:
  - Cloud services (Browserstack, SauceLabs)
  - Test Management tools (TestRail)
  - Bug tracking tools (Jira)



## Cucumber Continued...





# SpecFlow



C#

Reports

Integration

```
1 Feature: Login
2   As a customer
3     I want to be able to login into my bank account
4     So that I can view my balance
5
6 Background:
7   Given the following accounts exist in the database:
8     | Full Name | Account Balance |
9     | John Doe | $1000 |
10  And I am on the Login page
11
12 @web
13 Scenario: User is able to login with correct credentials
14   When I sign in with the following credentials:
15     | username | password |
16     | John Doe | OldPassword1. |
17   Then the user profile is displayed
18   And my account balance is $1000
19
20 @web
21 Scenario: User should not be able to login with incorrect credentials
22   When I sign in with the following credentials:
23     | username | password |
24     | John Doe | a |
25   Then the failed login message should be displayed
26
27 @web
28 Scenario: User is able to successfully logout
29   Given I login as 'John Doe'
30   When I logout
31   Then the user profile is not displayed
```

references | Nabeel Ibrahim, 2 days ago | 1 author, 11 changes

```
public class HomeSteps : Steps
```

```
{
```

```
    private ScenarioContext context;
```

```
    private BaseSteps baseSteps;
```

0 references | Nabeel Ibrahim, 46 days ago | 1 author, 2 changes

```
    public HomeSteps(IWebDriver driver, ScenarioContext context, BaseSteps baseSteps)
```

```
    {
```

```
        context.Set(new HomePage(driver));
```

```
        this.context = context;
```

```
        this.baseSteps = baseSteps;
```

```
    }
```

```
[Given(@"I am on the (.*) page")]
```

```
[When(@"I navigate to the (.*) page")]
```

0 references | Nabeel Ibrahim, 2 days ago | 1 author, 11 changes

```
public void GivenIAmOnThePage(string page)
```

```
{
```

```
    if (page == "Login")
```

```
        context.Set(context.Get<HomePage>().NavigateTo(HomePage.HomePageElements.Login) as LoginPage);
```

```
    else if (page == "Profile")
```

```
        context.Set(context.Get<HomePage>().NavigateTo(HomePage.HomePageElements.Profile) as ProfilePage);
```

```
}
```

```
[Then(@"the user profile is (not displayed|displayed)")]
```

0 references | Nabeel Ibrahim, 45 days ago | 1 author, 1 change

```
public void ThenTheUserProfileIsDisplayed(string option)
```

```
{
```

```
    context.Get<HomePage>().ValidateUserProfile(isDisplayed: option.Equals("displayed"));
```

```
}
```

```
[Then(@"my account balance is \$(.*)")]
```

0 references | 0 changes | 0 authors, 0 changes

```
public void ThenMyAccountBalanceIs(int balance)
```

```
{
```

```
    ScenarioContext.Current.Pending();
```

```
}
```

```
[When(@"I logout")]
```

0 references | Nabeel Ibrahim, 45 days ago | 1 author, 1 change

```
public void WhenILogout()
```

```
{
```

```
    context.Get<HomePage>().Logout();
```

Generated by SpecFlow at 03/09/2017 18:04 (see <http://www.specflow.org/>).

## Summary

Features	Success rate		Scenarios	Success	Failed	Pending	Ignored
4 features	100%	<div></div>	52	52	0	0	0

## Feature Summary

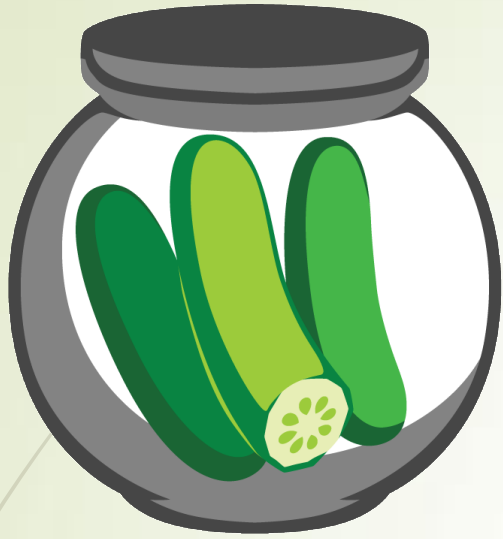
Feature	Success rate		Scenarios	Success	Failed	Pending	Ignored
<a href="#">[x] Calculate Brochure (TopProduct) with Envelope</a>	100%	<div></div>	22	22	0	0	0
<a href="#">[x] Calculate Brochure (TopProduct) without extra options</a>	100%	<div></div>	16	16	0	0	0
<a href="#">[x] Calculate Brochure (TopProduct) with standard print</a>	100%	<div></div>	12	12	0	0	0
<a href="#">[x] Calculate Folder (TopProduct) with bundling 25 pieces</a>	100%	<div></div>	2	2	0	0	0

## Feature Execution Details

Feature: [\[x\] Calculate Brochure \(TopProduct\) with Envelope](#)

Scenario	Status	Time(s)
Calculate Brochure (TopProduct) with Envelope	success	5.704
Calculate Brochure (TopProduct) without extra options	success	1.243
Calculate Brochure (TopProduct) with standard print	success	0.988
Calculate Folder (TopProduct) with bundling 25 pieces	success	0.977
Calculate Folder (TopProduct) with full 1 page gold and printwork 1 page partial no	success	0.974
Calculate Folder (TopProduct) without extra options	success	1.014





# Pickles

## Living Documentation

- 3 Formats: HTML, Excel, Word
- Windows Package manager (chocolatey) , GUI
- Open Source
- CI Integration - TeamCity

- 00 Basic Gherkin
- 01 Test Runner
- 02 Tags And Hooks
- 03 Scenario Outline
- 031 Scenario Context
- 032 Feature Context
- 04 Background
- 05 Tables And Assist
- 06 Compare To Assist
- 07 Localization
- 08 Attribute Overloading
- 09 Calling Steps From Steps
- 10 Step Transformation
- 11 Context Injection
- 12 Nested Folders
- 13 Multiline Text
- 14 Markdown Example
- 15 Pickles
- Workflow



# Arithmetic



In order to avoid silly mistakes  
As a math idiot  
I want to be able to perform arithmetic on the calculator

When  $a \neq 0$ , there are two solutions to  $(ax^2 + bx + c = 0)$  and they are  $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ .

@arithmetic @fast

## Add two numbers

$50 + 70 = 120$

**In the DHTML version, the description will be rendered with mathematical formulas if the experimental features are enabled.**

**Given** I have entered 50 into the calculator

**And** I have entered 70 into the calculator

**When** I press add

**Then** the result should be 120 on the screen

@arithmetic @fast

## Subtract two numbers

**Given** I have entered 50 into the calculator

**And** I have entered 70 into the calculator

**When** I press subtract

**Then** the result should be -20 on the screen

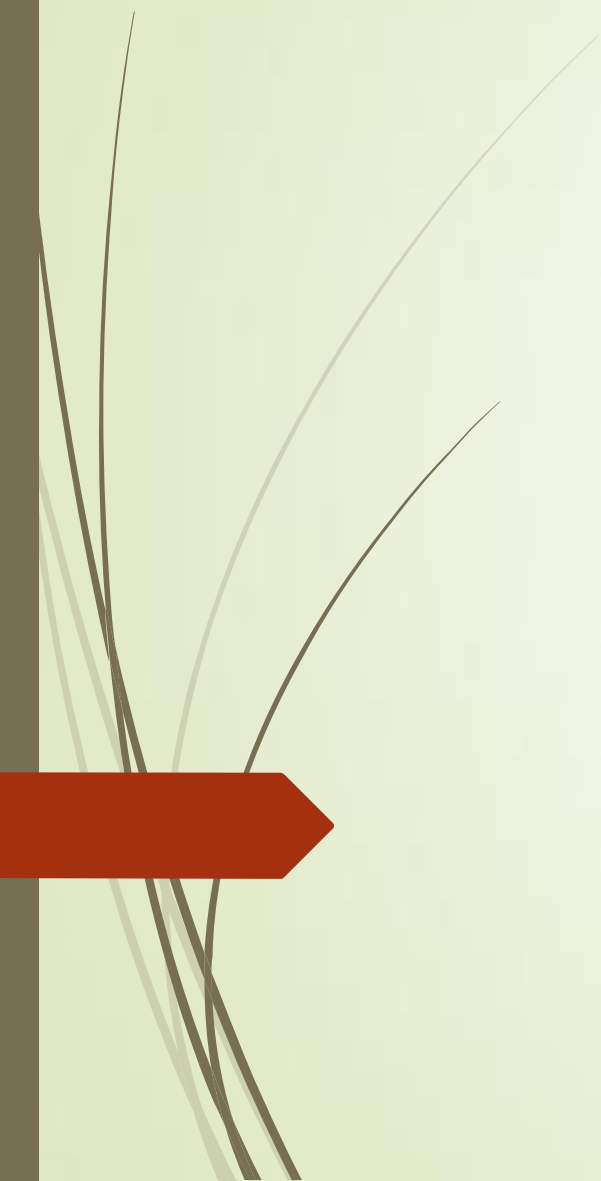
@arithmetic @fast

## Multiply two numbers

**Given** I have entered 50 into the calculator

**And** I have entered 70 into the calculator

**When** I press multiply



# References

1. Who Should Lead BDD? (2017, June 22). Retrieved June 13, 2018, from <https://automationpanda.com/2017/06/22/who-should-lead-bdd/>
2. BDD: Learn about Behavior Driven Development. (2018, February 13). Retrieved June 13, 2018, from [https://www.agilealliance.org/glossary/bdd/#q=~\(filters~\(postType~\(~'page~'post~'aa\\_book~'aa\\_event\\_session~'aa\\_experience\\_report~'aa\\_glossary~'aa\\_research\\_paper~'aa\\_video\)\)~tags~\(~'bdd\)\)~searchTerm~'~sort~false~sortDirection~'asc~page~1\)](https://www.agilealliance.org/glossary/bdd/#q=~(filters~(postType~(~'page~'post~'aa_book~'aa_event_session~'aa_experience_report~'aa_glossary~'aa_research_paper~'aa_video))~tags~(~'bdd))~searchTerm~'~sort~false~sortDirection~'asc~page~1))
3. D. (2016, August 03). Behaviour Driven Development. A better Agile? – The Reading Room – Medium. Retrieved June 13, 2018, from <https://medium.com/the-reading-room/behaviour-driven-development-a-better-agile-778d2d2a7ab5>
4. Rombauts, D. (n.d.). Pickles - the open source Living Documentation Generator. Retrieved June 13, 2018, from <http://www.picklesdoc.com/>