Test Driven Development
Der Kosten-Airbag für Software-Projekte

Henning Koch, Robert Sonnberger

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Tests sind Beispiele, wie sich meine Anwendung verhalten soll.

„Auf der Homepage **sollen** die beliebtesten Produkte erscheinen."

„Auf dem Rechnung-PDF **sollen** Versandkosten und MwSt. ausgewiesen werden"

„Nach der Anmeldung **soll** der Administrator eine Benachrichtigung per E-Mail erhalten"

Automatisierte Tests sagen mir auf Knopfdruck, ob meine Anwendung das tut, was sie soll.

```
Scenario: add an item to the shopping cart
  Given an article with the name "Nintendo Wii"
  When I am on the homepage
  And I follow "Nintendo Wii"
  And I press "Add to cart"
  Then I should see "Item was added to cart"
```

Cucumber
http://cukes.info

```
Scenario: add an item to the shopping cart
  Given an article with the name "Nintendo Wii"
  When I am on the homepage
  And I follow "Nintendo Wii"
  And I press "Add to cart"
  Then I should see "Item was added to cart"

Unknown class "Article"
1 scenario (1 failed)
```

```
Scenario: add an item to the shopping cart
  Given an article with the name "Nintendo Wii"
  When I am on the homepage
  And I follow "Nintendo Wii"
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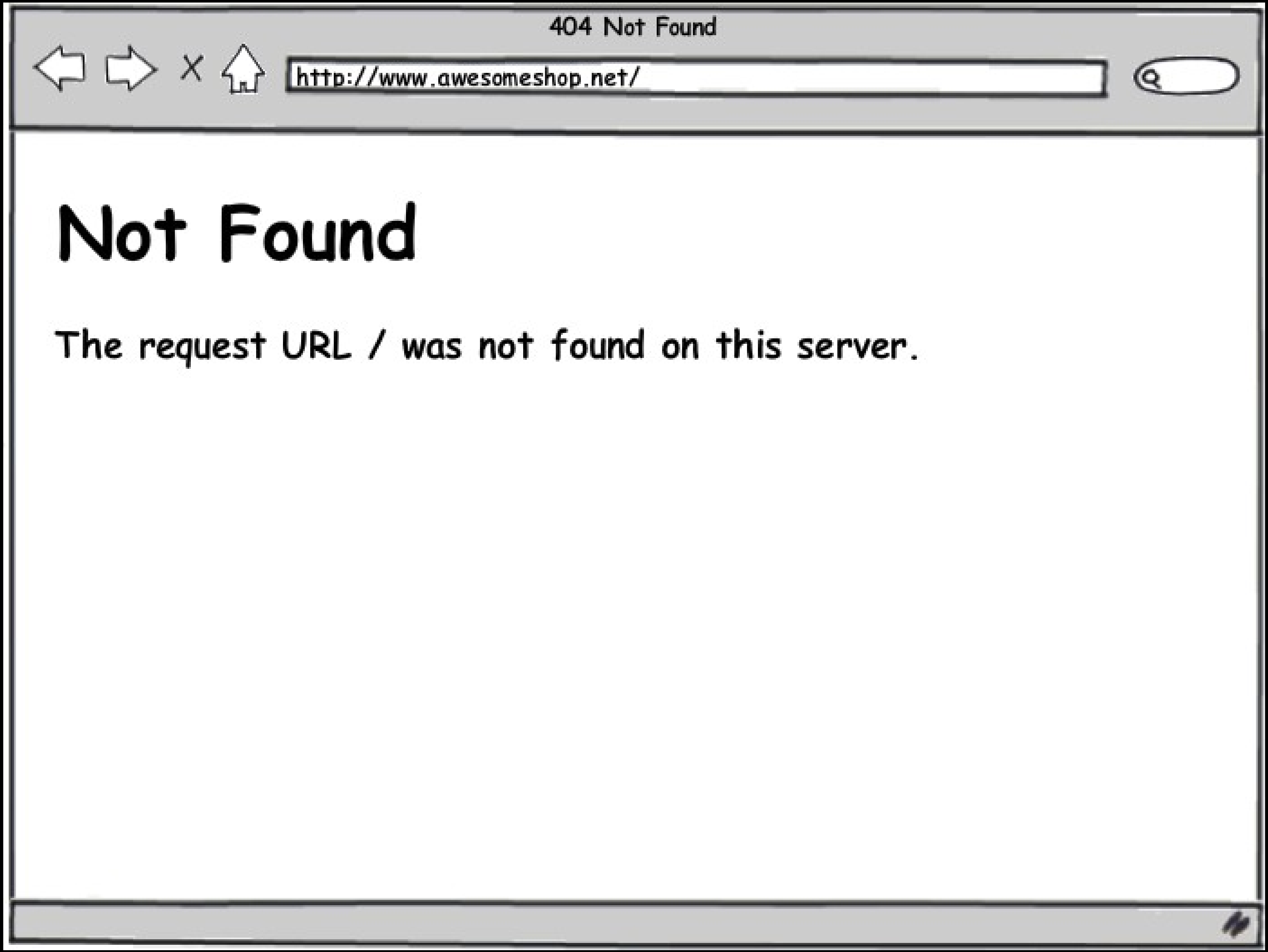
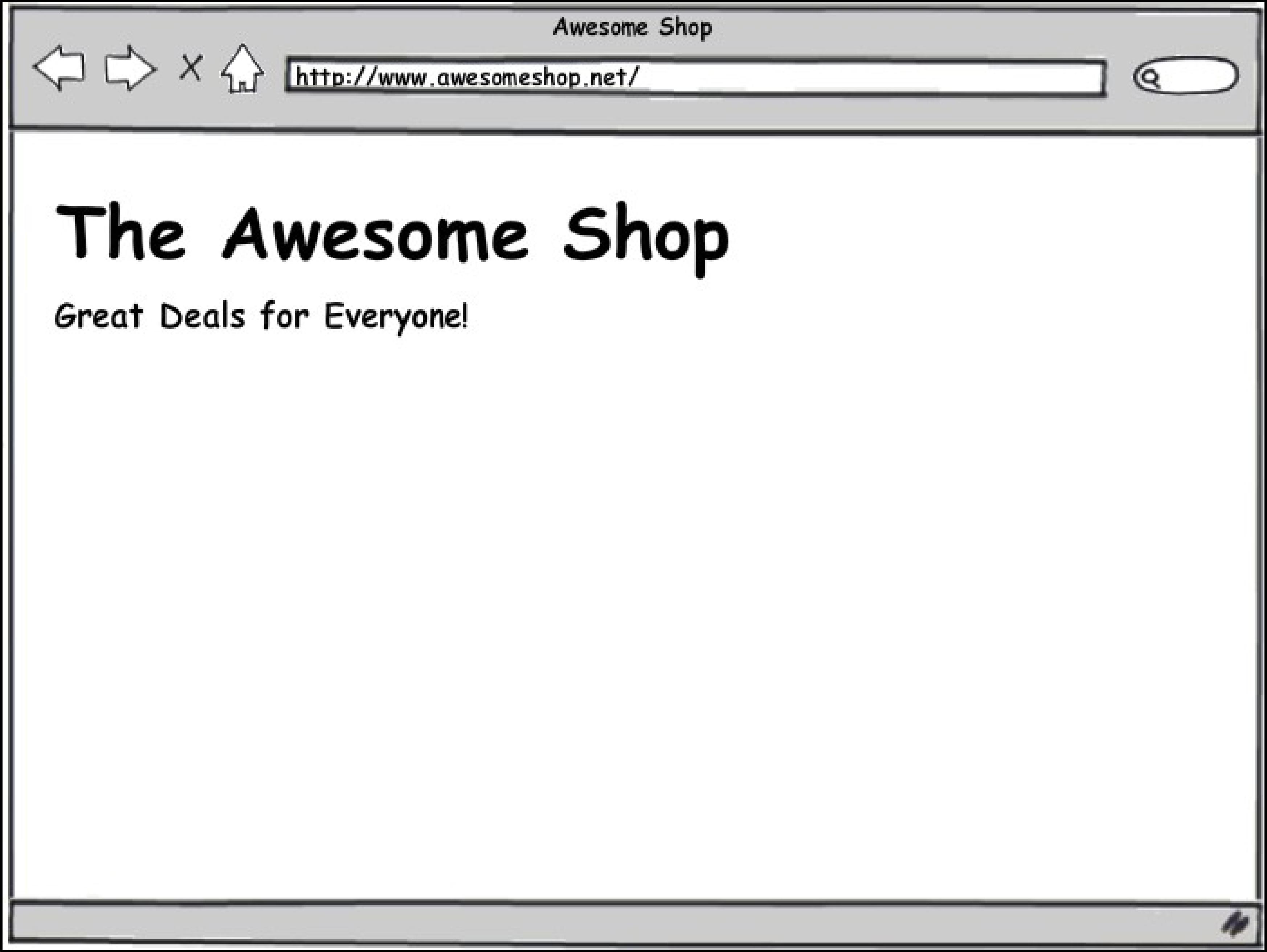
  Then I should see "Item was added to cart"

Error retrieving page (404 not found)
1 scenario (1 failed)
```



Not Found

The request URL / was not found on this server.



The Awesome Shop

Great Deals for Everyone!

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Scenario: add an item to the shopping cart
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  When I am on the homepage
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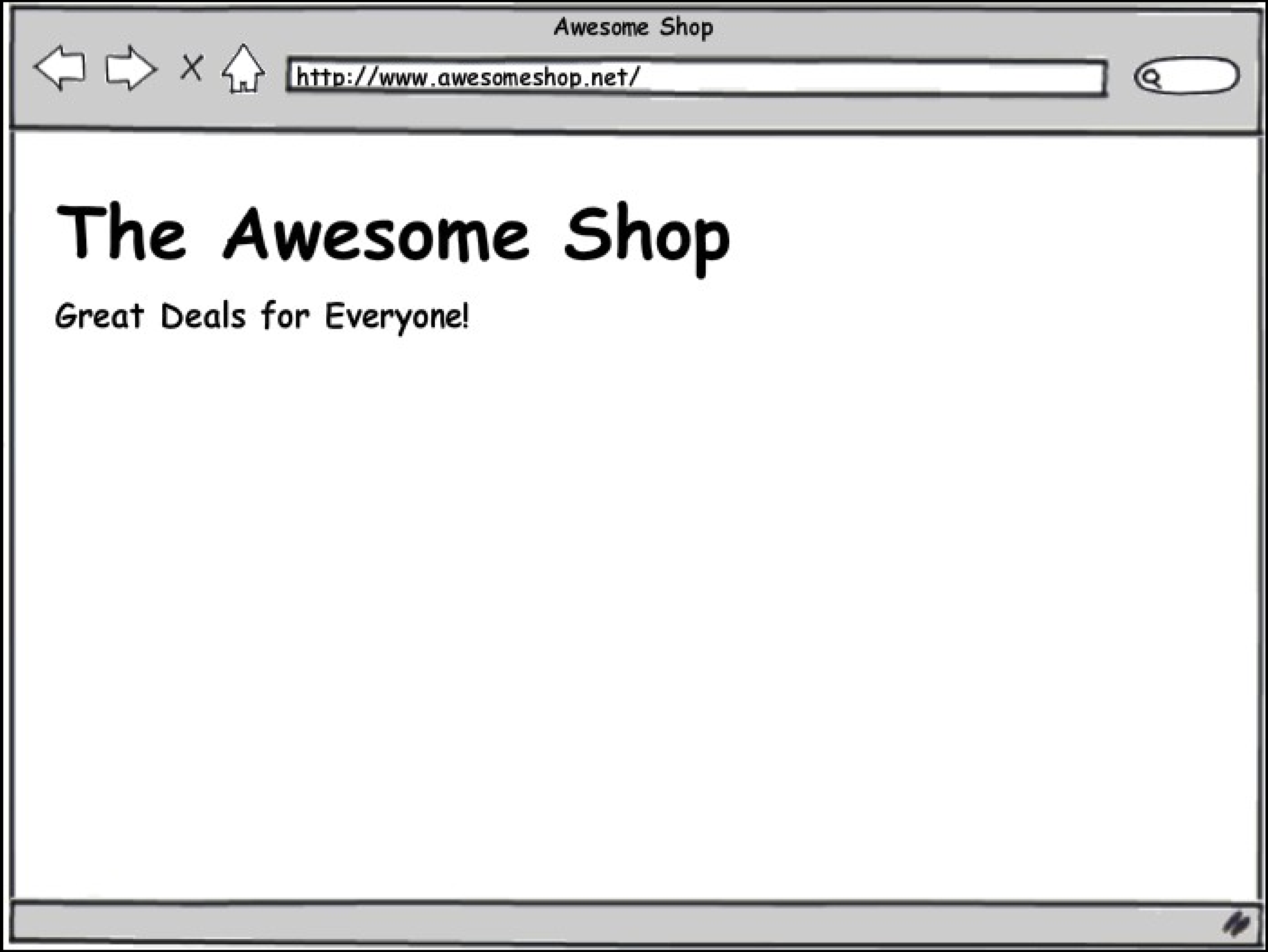
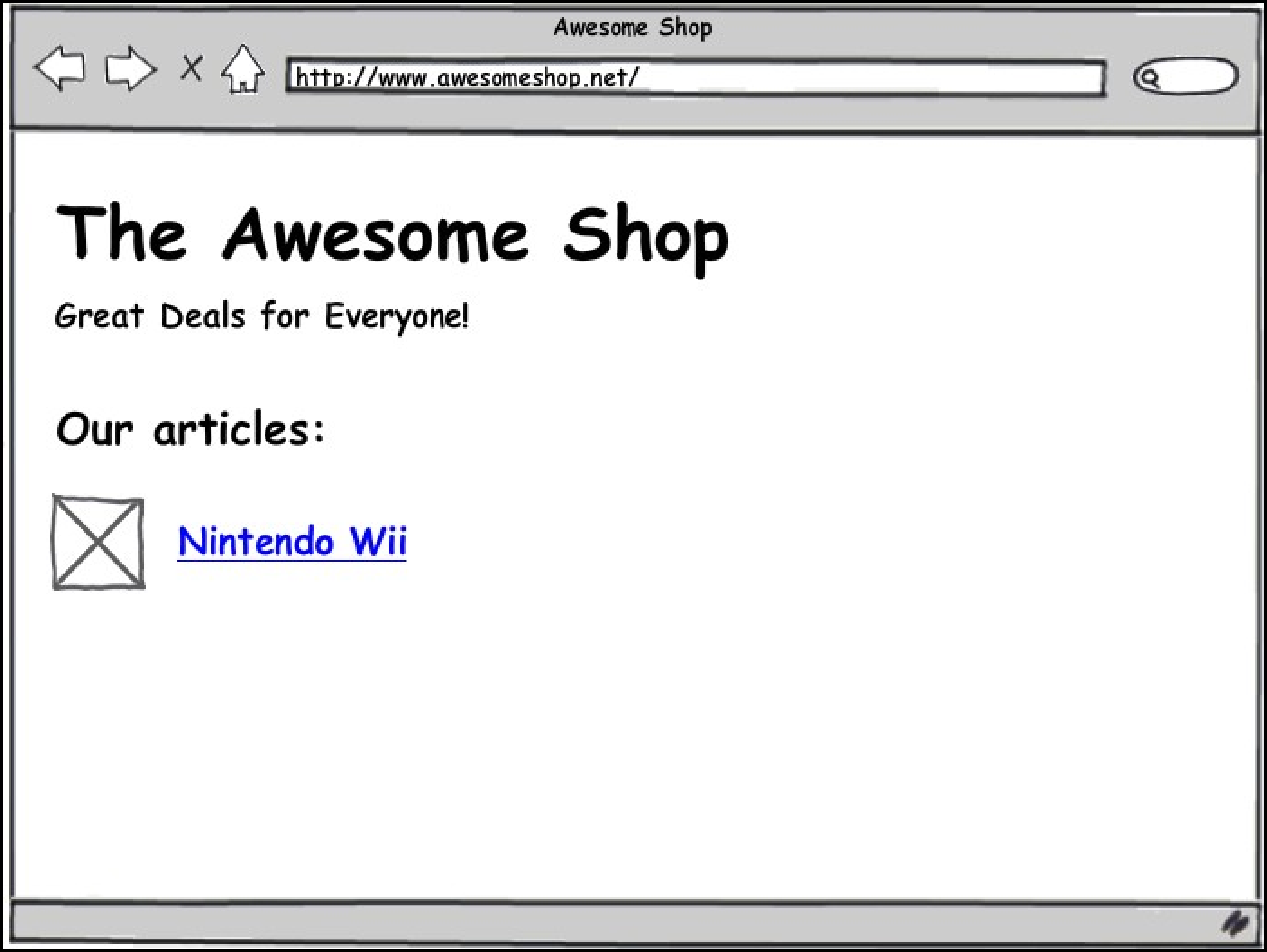
Scenario: add an item to the shopping cart
  Given an article with the name "Nintendo Wii"
  When I am on the homepage
  And I follow "Nintendo Wii"
  And I press "Add to cart"
  Then I should see "Item was added to cart"

No such link "Nintendo Wii"
1 scenario (1 failed)
```



The Awesome Shop

Great Deals for Everyone!

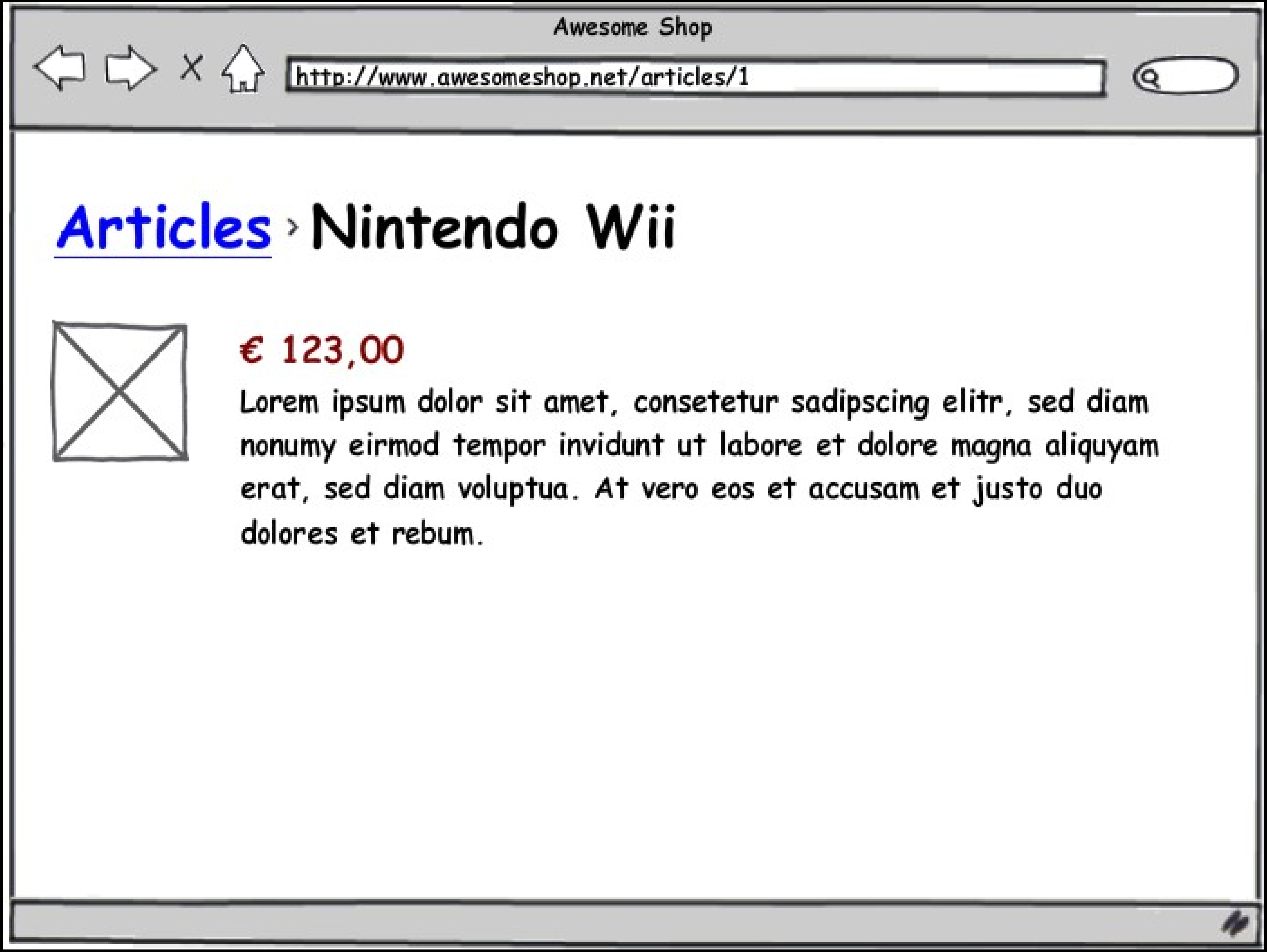


The Awesome Shop

Great Deals for Everyone!

Our articles:

Nintendo Wii



Awesome Shop

http://www.awesomeshop.net/articles/1

Articles › Nintendo Wii

€ 123,00

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No such link "Nintendo Wii"
1 scenario (1 failed)
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  When I am on the homepage
  And I follow "Nintendo Wii"
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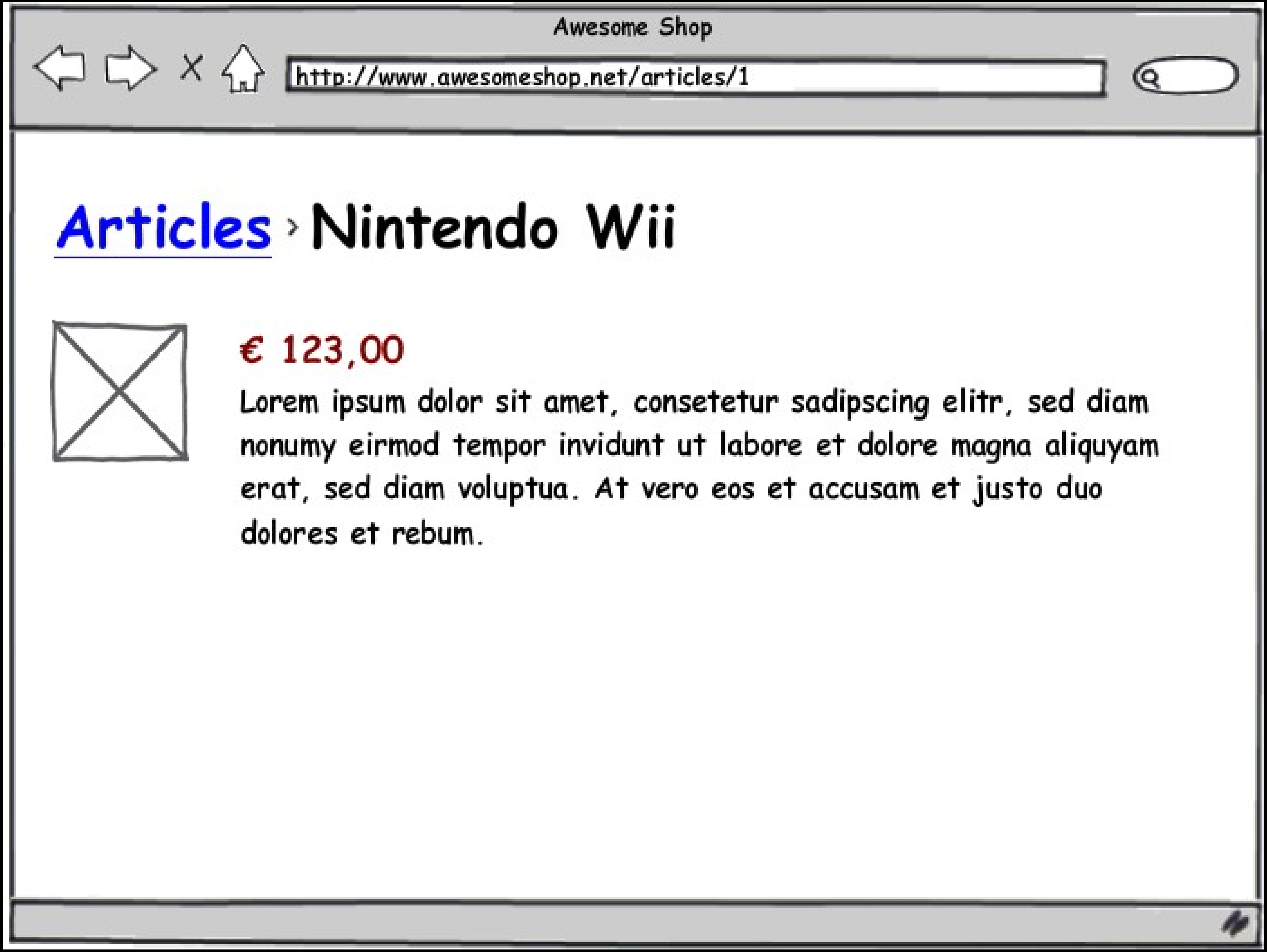
No such button "Add to cart"
1 scenario (1 failed)
```



Articles › Nintendo Wii

€ 123,00

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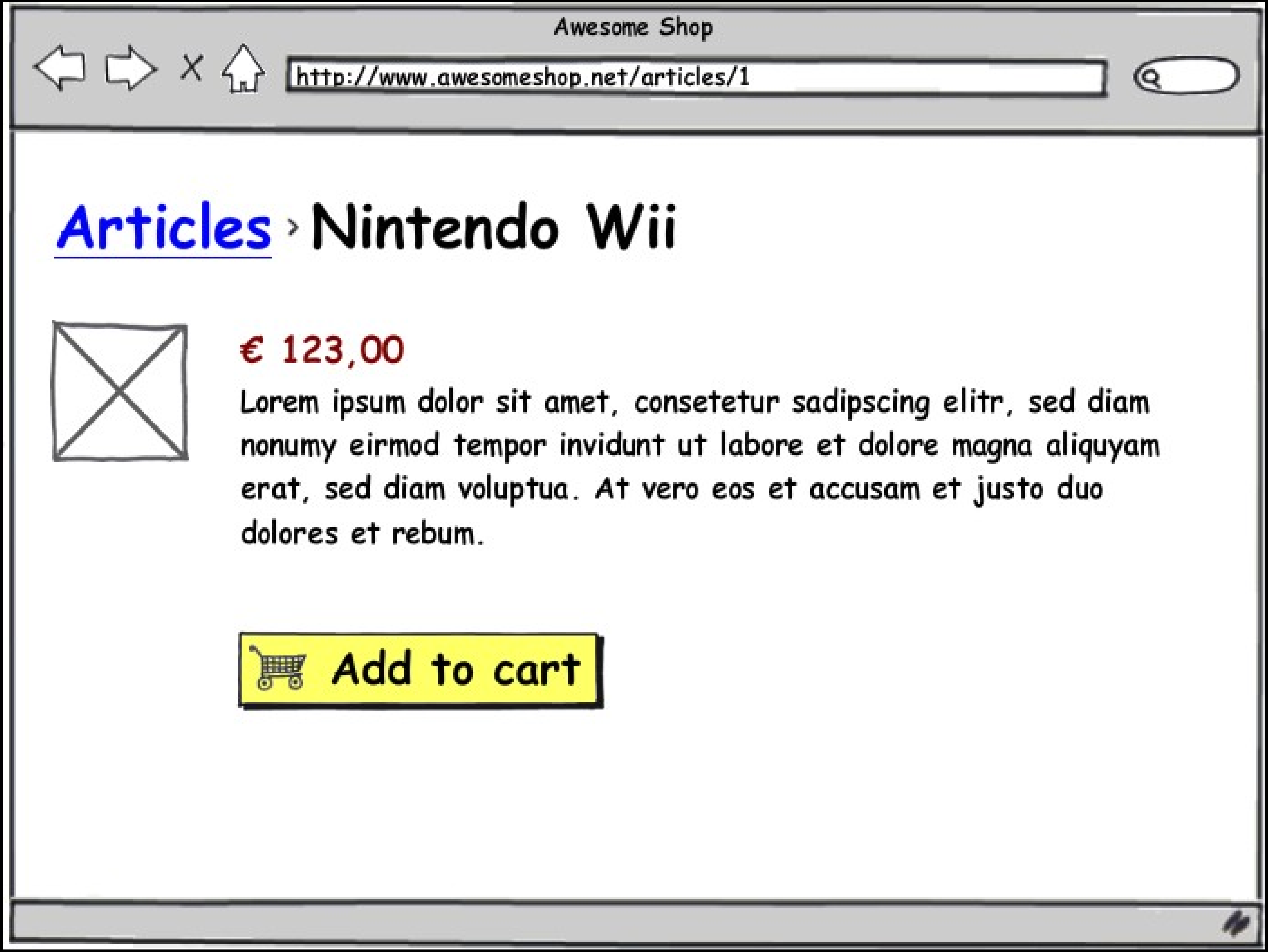

€ 123,00

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No such button "Add to cart"
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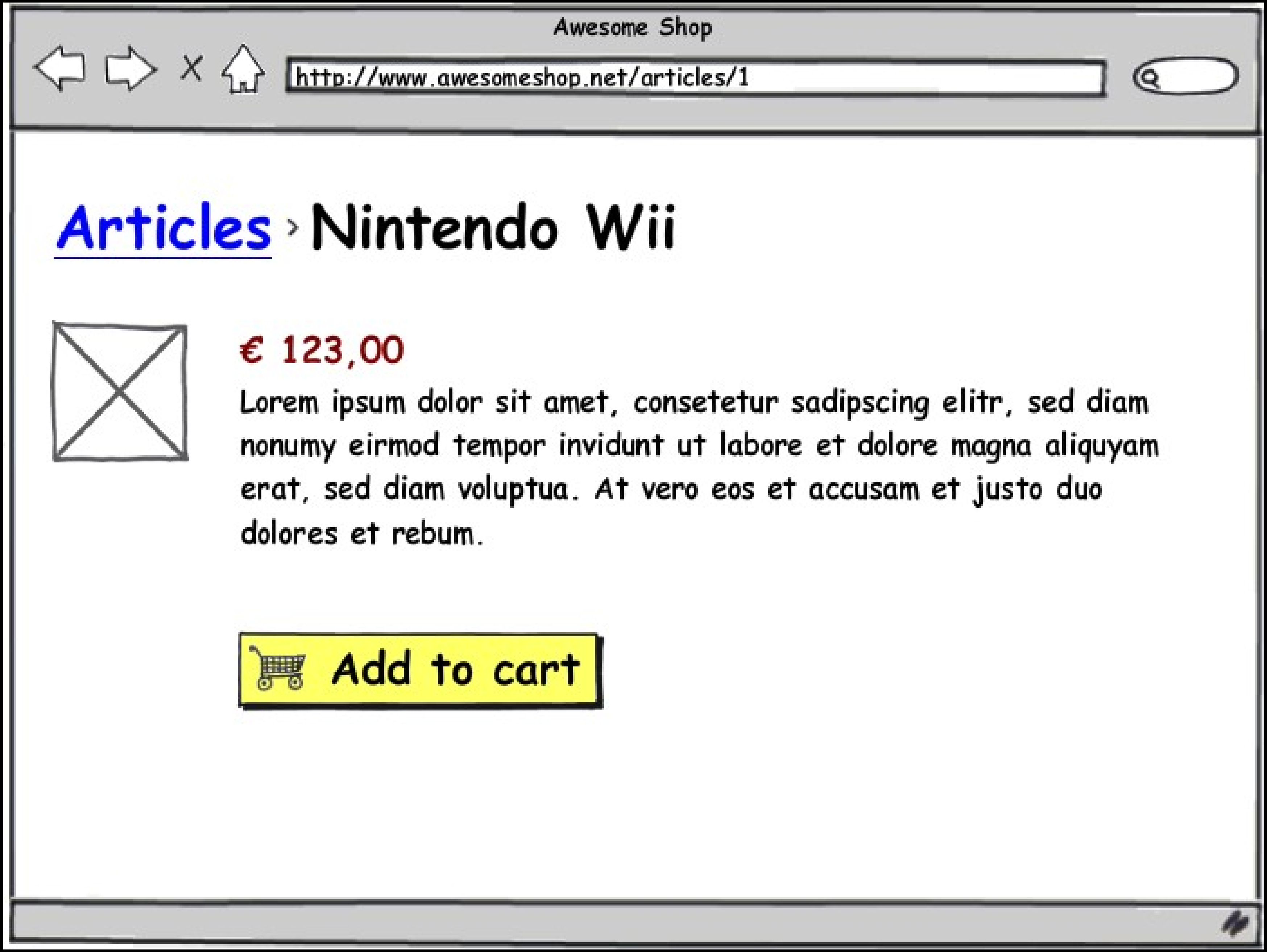
Expected to see "Item was added to cart"
1 scenario (1 failed)
```



Articles › Nintendo Wii

€ 123,00

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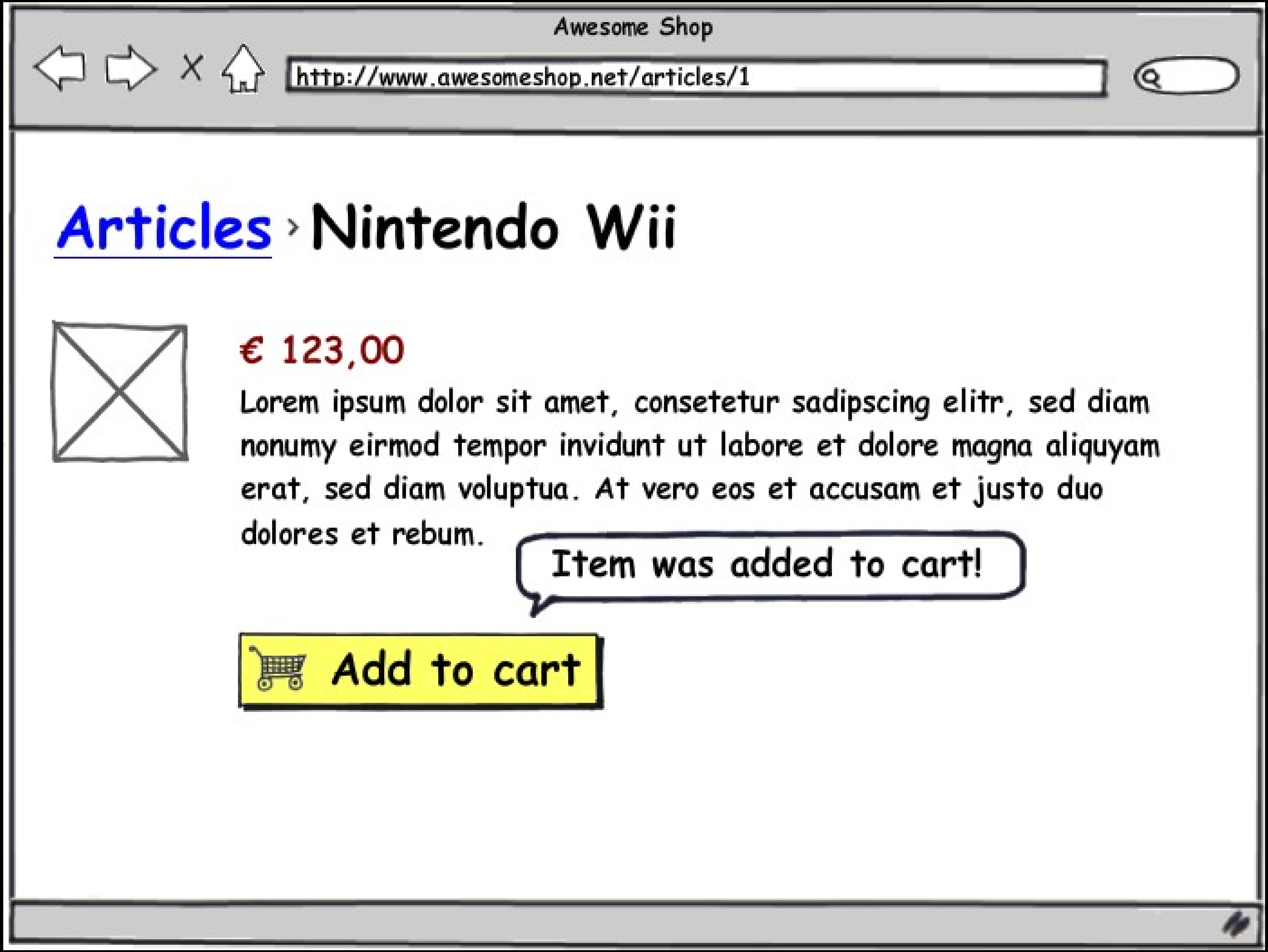

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Item was added to cart!

```
Scenario: add an item to the shopping cart
  Given an article with the name "Nintendo Wii"
  When I am on the homepage
  And I follow "Nintendo Wii"
  And I press "Add to cart"
  Then I should see "Item was added to cart"

Expected to see "Item was added to cart"
1 scenario (1 failed)
```

```
Scenario: add an item to the shopping cart
  Given an article with the name "Nintendo Wii"
  When I am on the homepage
  And I follow "Nintendo Wii"
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  Then I should see "Item was added to cart"

1 scenario (1 passed)
```

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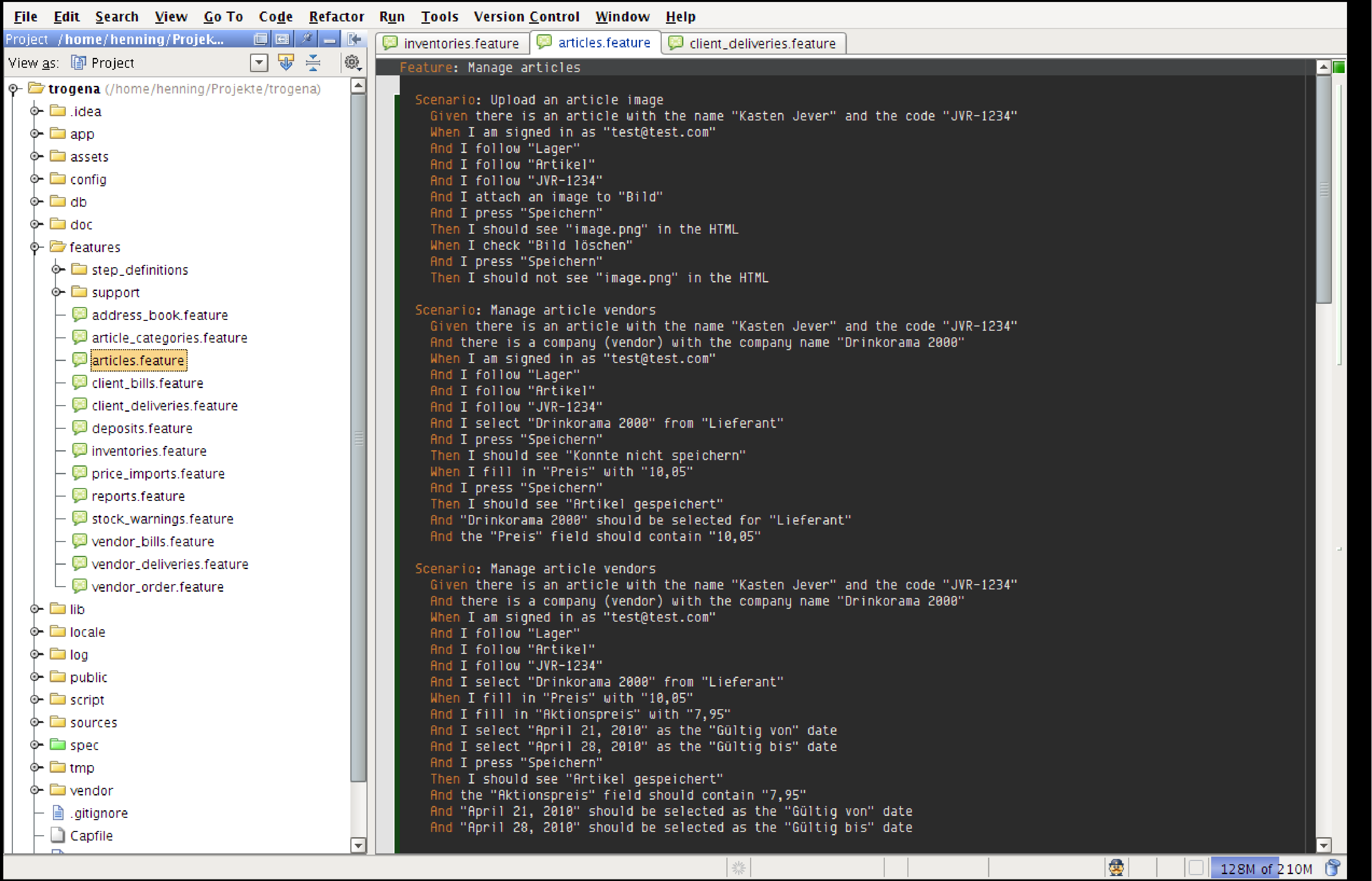
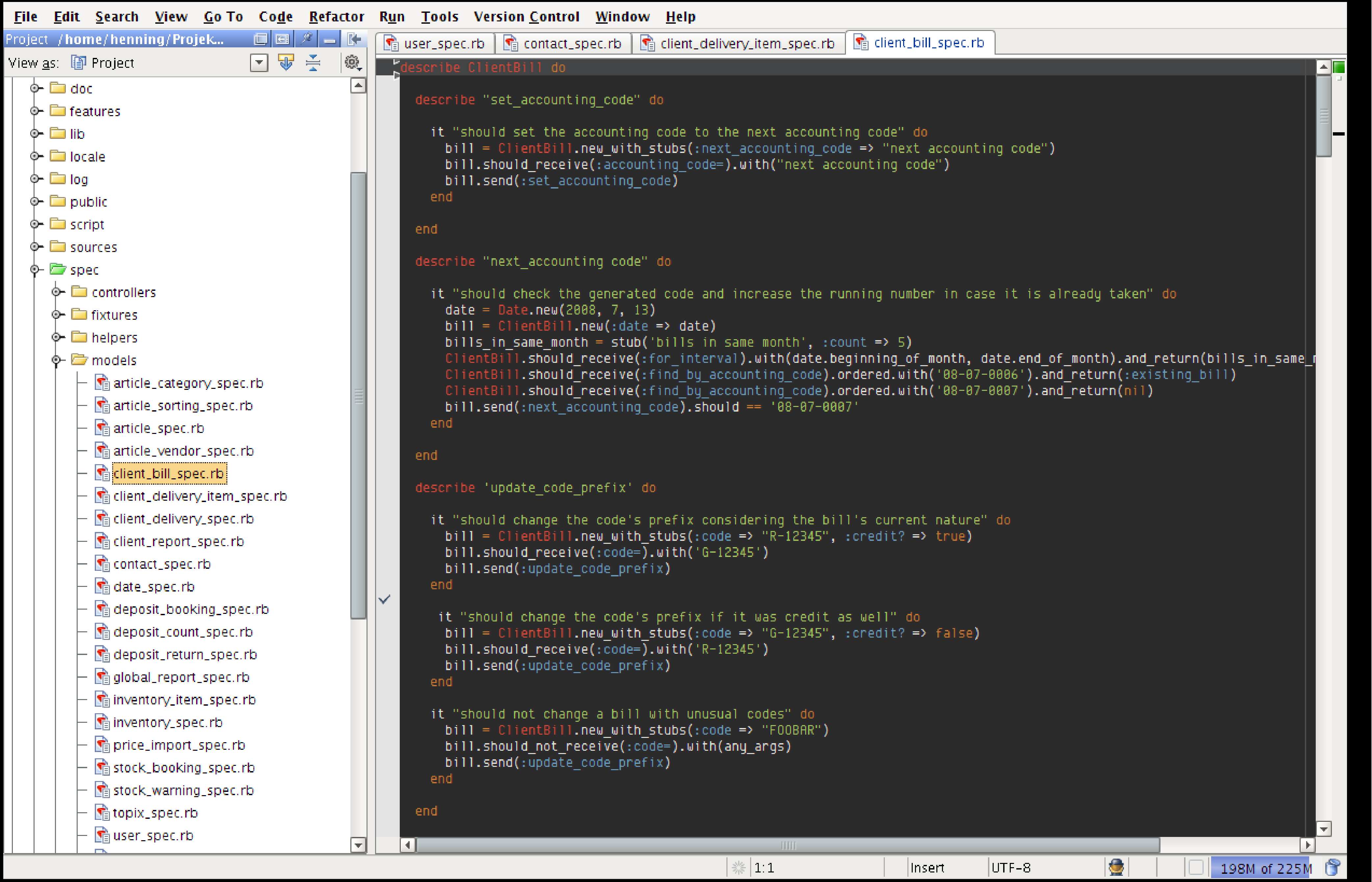


```
Feature: Manage articles

  Scenario: Upload an article image
    Given there is an article with the name "Kasten Jever" and the code "JVR-1234"
    When I am signed in as "test@test.com"
    And I follow "Lager"
    And I follow "Artikel"
    And I follow "JVR-1234"
    And I attach an image to "Bild"
    And I press "Speichern"
    Then I should see "image.png" in the HTML
    When I check "Bild löschen"
    And I press "Speichern"
    Then I should not see "image.png" in the HTML

  Scenario: Manage article vendors
    Given there is an article with the name "Kasten Jever" and the code "JVR-1234"
    And there is a company (vendor) with the company name "Drinkorama 2000"
    When I am signed in as "test@test.com"
    And I follow "Lager"
    And I follow "Artikel"
    And I follow "JVR-1234"
    And I select "Drinkorama 2000" from "Lieferant"
    And I press "Speichern"
    Then I should see "Konnte nicht speichern"
    When I fill in "Preis" with "10,05"
    And I press "Speichern"
    Then I should see "Artikel gespeichert"
    And "Drinkorama 2000" should be selected for "Lieferant"
    And the "Preis" field should contain "10,05"

  Scenario: Manage article vendors
    Given there is an article with the name "Kasten Jever" and the code "JVR-1234"
    And there is a company (vendor) with the company name "Drinkorama 2000"
    When I am signed in as "test@test.com"
    And I follow "Lager"
    And I follow "Artikel"
    And I follow "JVR-1234"
    And I select "Drinkorama 2000" from "Lieferant"
    When I fill in "Preis" with "10,05"
    And I fill in "Aktionspreis" with "7,95"
    And I select "April 21, 2010" as the "Gültig von" date
    And I select "April 28, 2010" as the "Gültig bis" date
    And I press "Speichern"
    Then I should see "Artikel gespeichert"
    And the "Aktionspreis" field should contain "7,95"
    And "April 21, 2010" should be selected as the "Gültig von" date
    And "April 28, 2010" should be selected as the "Gültig bis" date
```



```ruby
describe ClientBill do

  describe "set_accounting_code" do

    it "should set the accounting code to the next accounting code" do
      bill = ClientBill.new_with_stubs(:next_accounting_code => "next accounting code")
      bill.should_receive(:accounting_code=).with("next accounting code")
      bill.send(:set_accounting_code)
    end

  end

  describe "next_accounting code" do

    it "should check the generated code and increase the running number in case it is already taken" do
      date = Date.new(2008, 7, 13)
      bill = ClientBill.new(:date => date)
      bills_in_same_month = stub('bills in same month', :count => 5)
      ClientBill.should_receive(:for_interval).with(date.beginning_of_month, date.end_of_month).and_return(bills_in_same_r
      ClientBill.should_receive(:find_by_accounting_code).ordered.with('08-07-0006').and_return(:existing_bill)
      ClientBill.should_receive(:find_by_accounting_code).ordered.with('08-07-0007').and_return(nil)
      bill.send(:next_accounting_code).should == '08-07-0007'
    end

  end

  describe 'update_code_prefix' do

    it "should change the code's prefix considering the bill's current nature" do
      bill = ClientBill.new_with_stubs(:code => "R-12345", :credit? => true)
      bill.should_receive(:code=).with('G-12345')
      bill.send(:update_code_prefix)
    end

     it "should change the code's prefix if it was credit as well" do
      bill = ClientBill.new_with_stubs(:code => "G-12345", :credit? => false)
      bill.should_receive(:code=).with('R-12345')
      bill.send(:update_code_prefix)
    end

    it "should not change a bill with unusual codes" do
      bill = ClientBill.new_with_stubs(:code => "FOOBAR")
      bill.should_not_receive(:code=).with(any_args)
      bill.send(:update_code_prefix)
    end

  end
```

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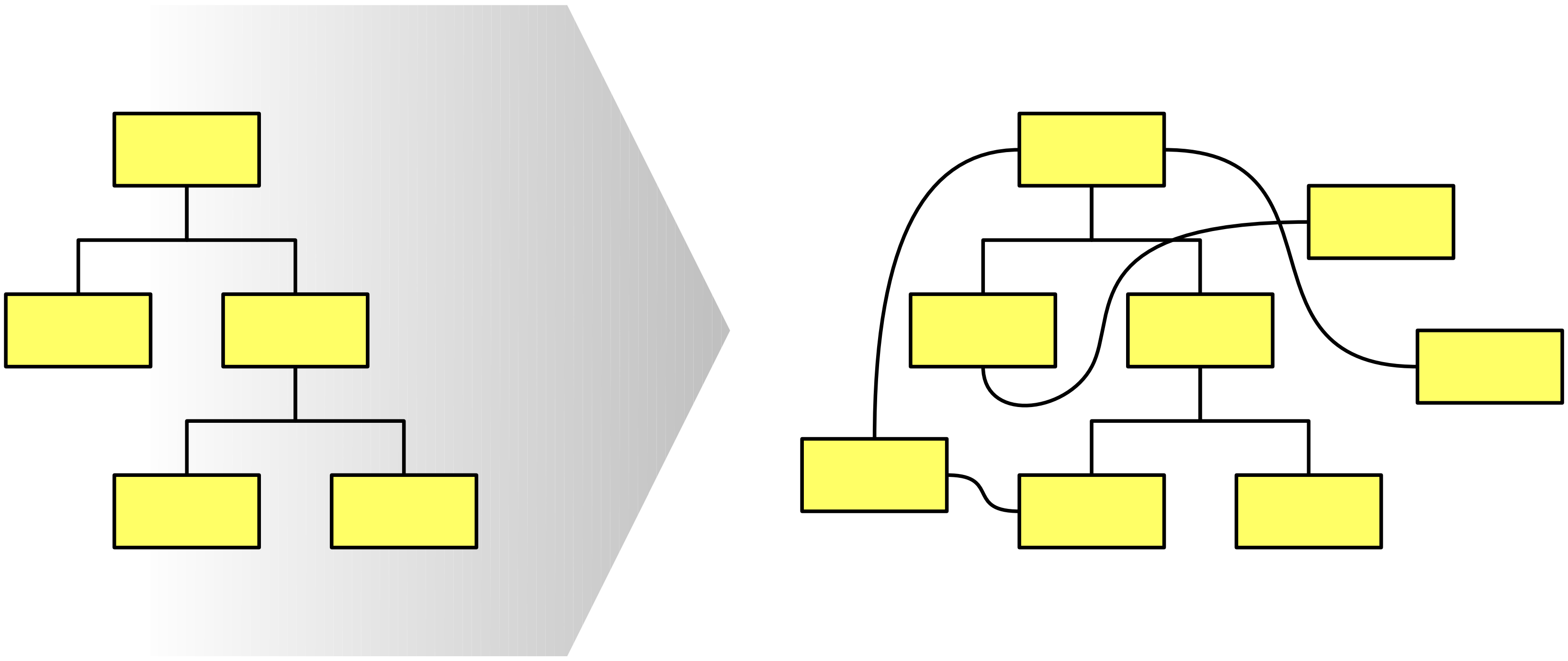
1. Kostenkontrolle
2. Planbarkeit
3. Time to Market

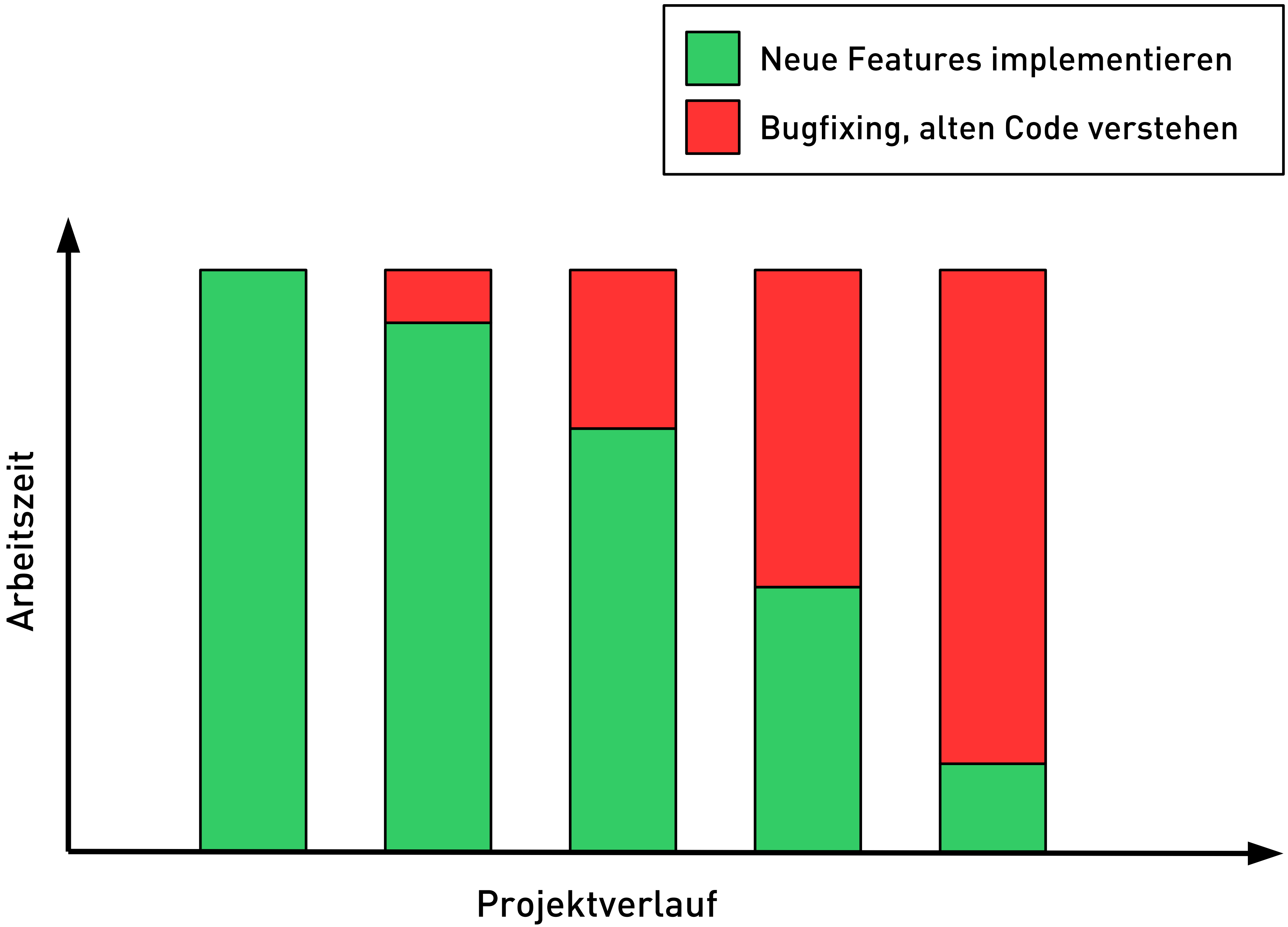
Kostenkontrolle

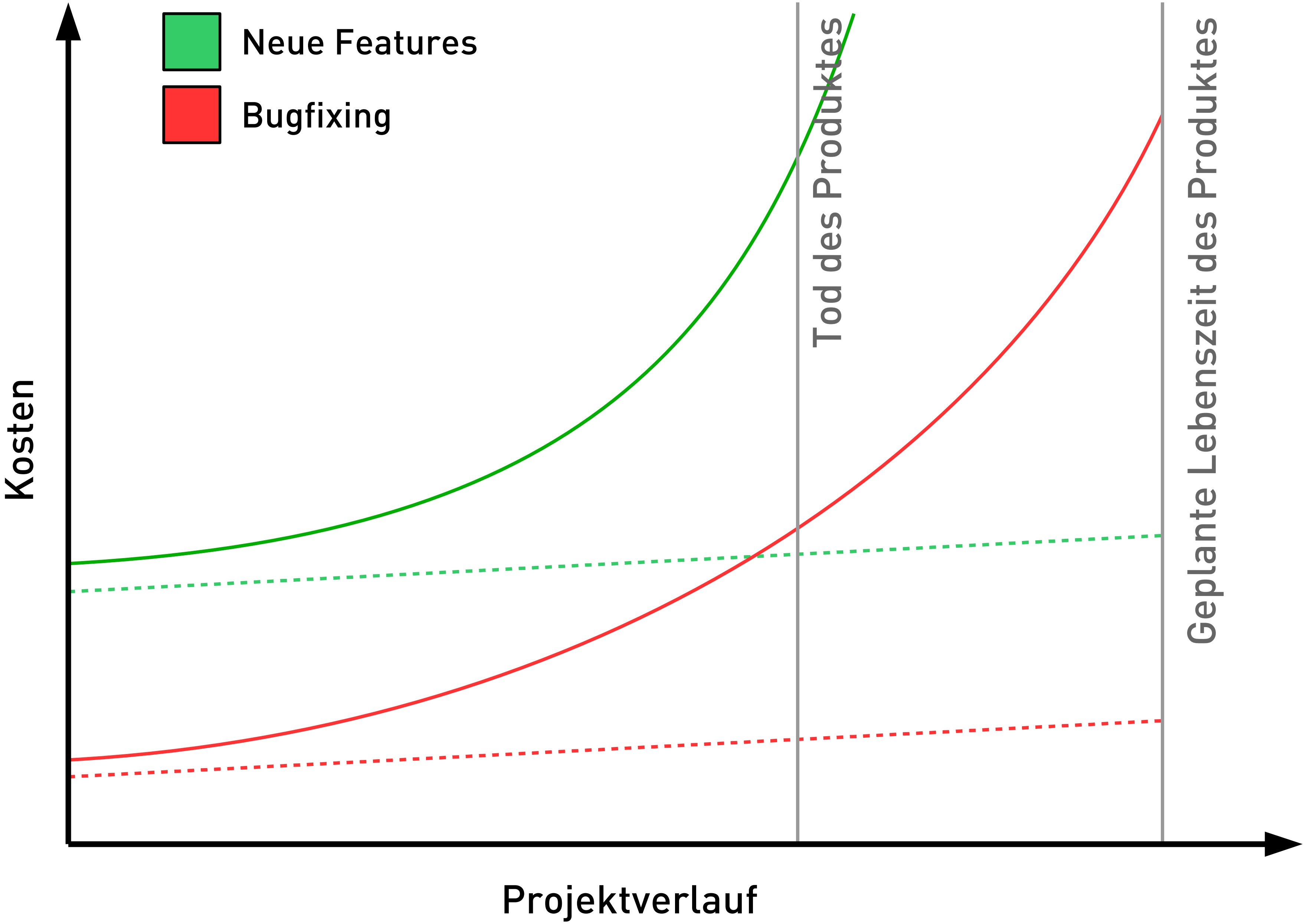


„Man soll auch ohne Anmeldung und Login bestellen können“

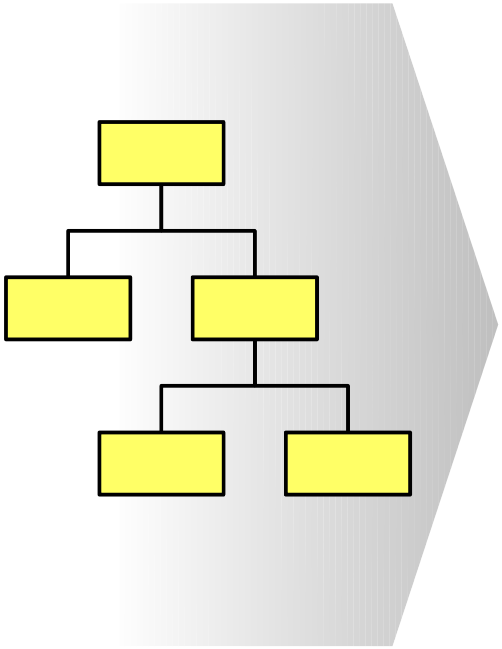
Während dem Projektverlauf häuft sich technische Schuld an

- Der Code wird **komplizierter**
- Die **Fehlerrate steigt**
- **Regressionen**:
  Ein neues Feature bricht ein altes
- **Aufräumarbeiten** im Code sind **risikoreich** für die Entwickler
- Steigende Kosten für Änderungen


🟩 Neue Features implementieren
🟥 Bugfixing, alten Code verstehen
Arbeitszeit
Projektverlauf



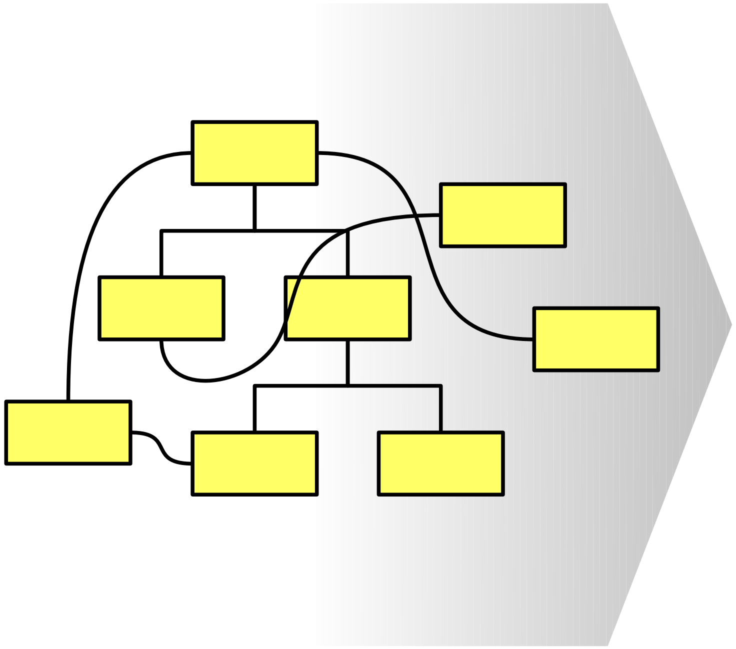
Credits: davenicolette.net



Ursprünglicher Code

Kosten der nächsten Änderung:

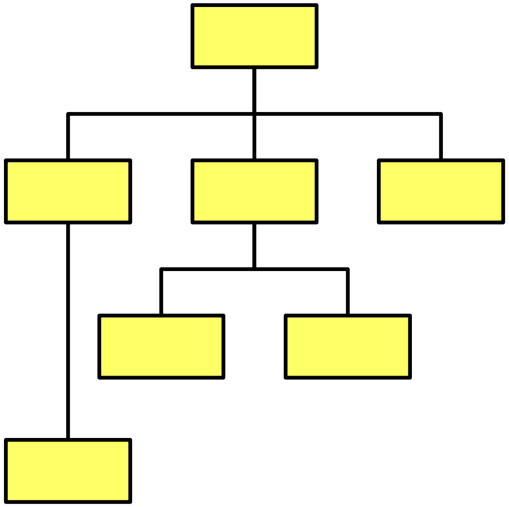
C



Änderung durchgeführt

Kosten der nächsten Änderung:

C + n



Code aufgeräumt

Kosten der nächsten Änderung:

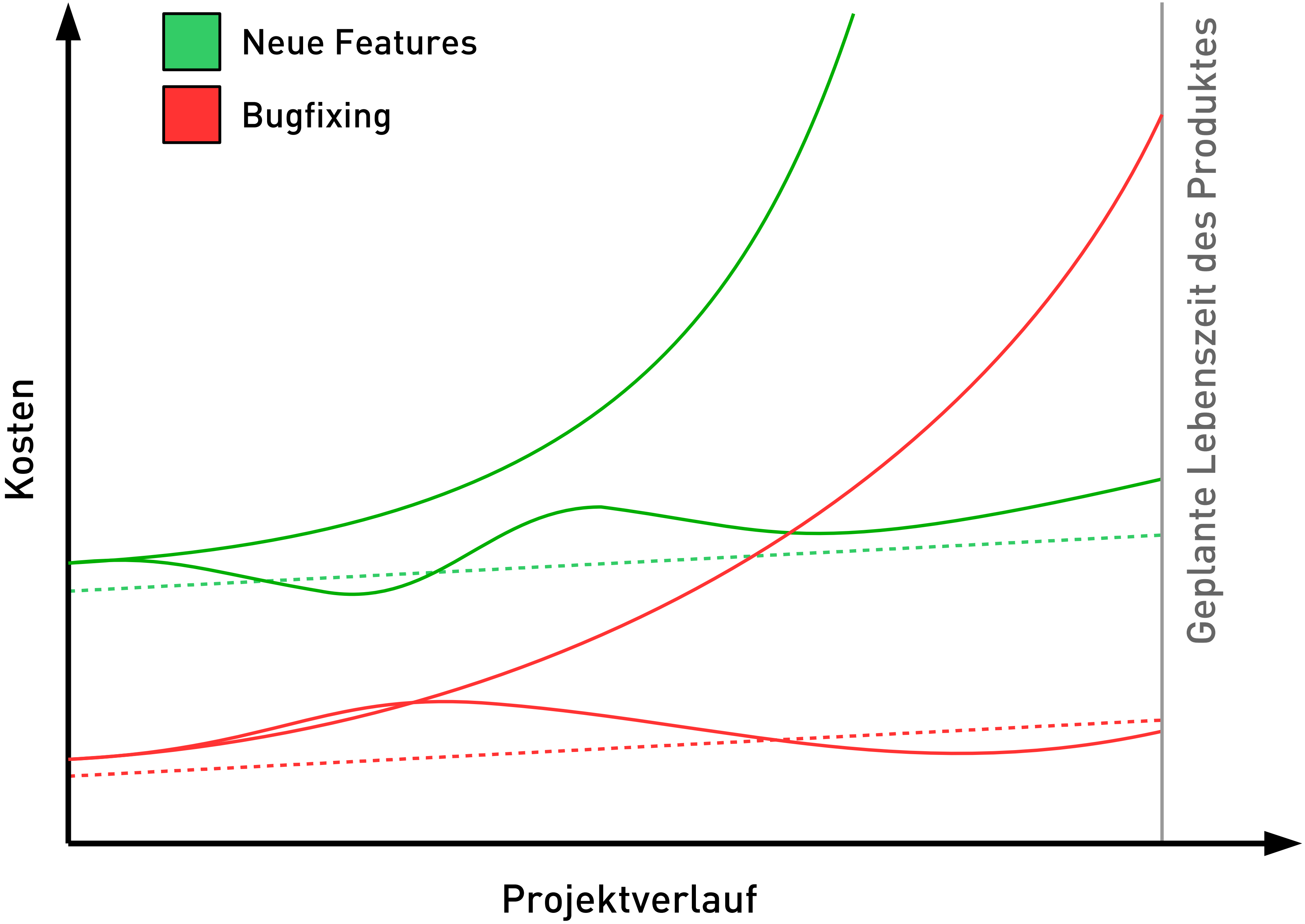
C

Kontinuierlicher Schuldenabbau mit Tests

- Tests machen Verbesserungen am Code einfach und gefahrlos für die Entwickler
- Man zahlt seine technische Schuld in kleinen Raten über den Projektverlauf verteilt zurück
- Probleme werden beseitigt, bevor Sie unwartbar werden

„Unit tests are to refactoring like a drop cloth is to painting. Both feel like more work at first but ultimately save you time by allowing you to move faster.“

Alex Miller


🟩 Neue Features
🟥 Bugfixing
Kosten
Projektverlauf
Geplante Lebenszeit des Produktes

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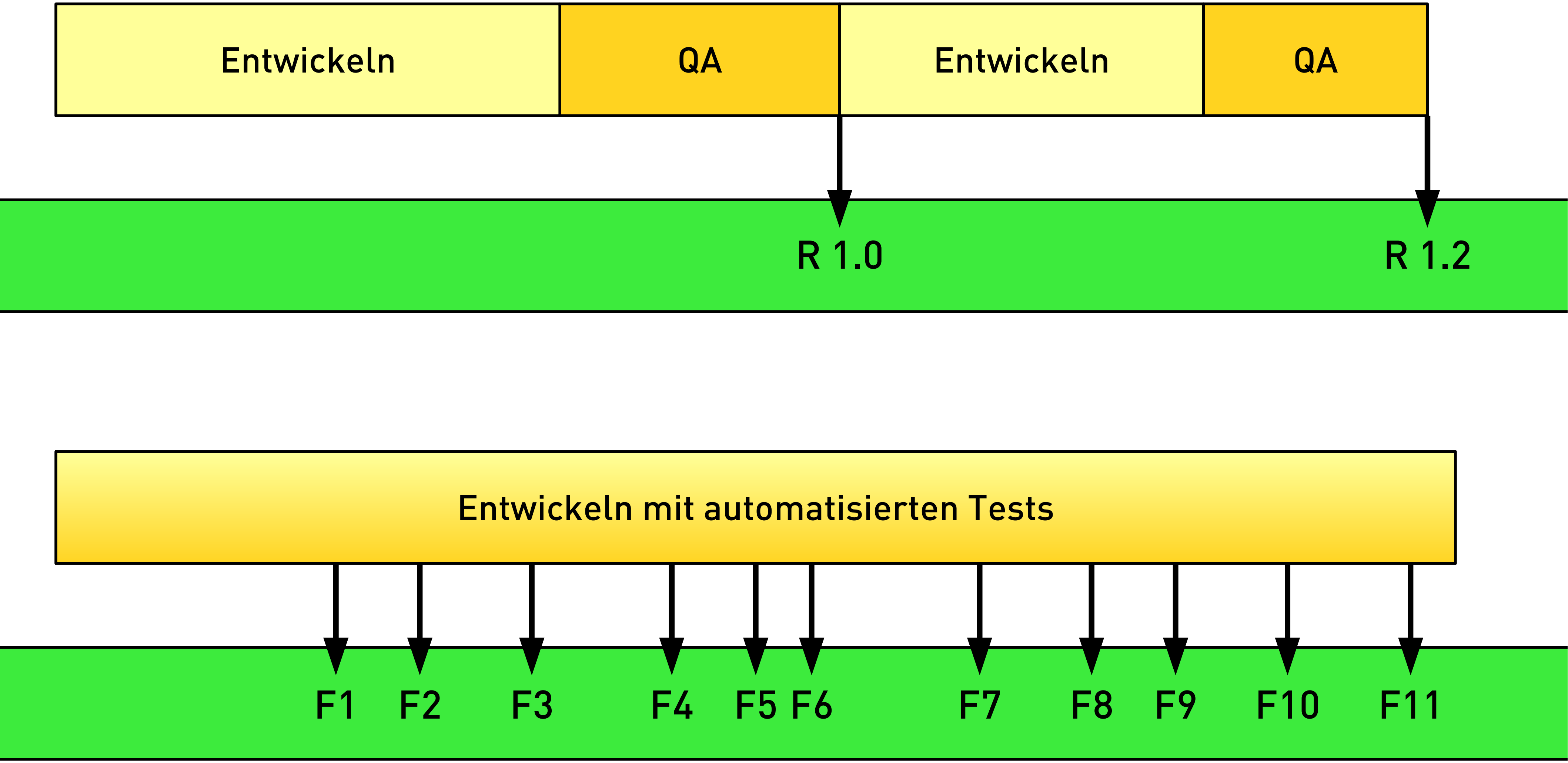
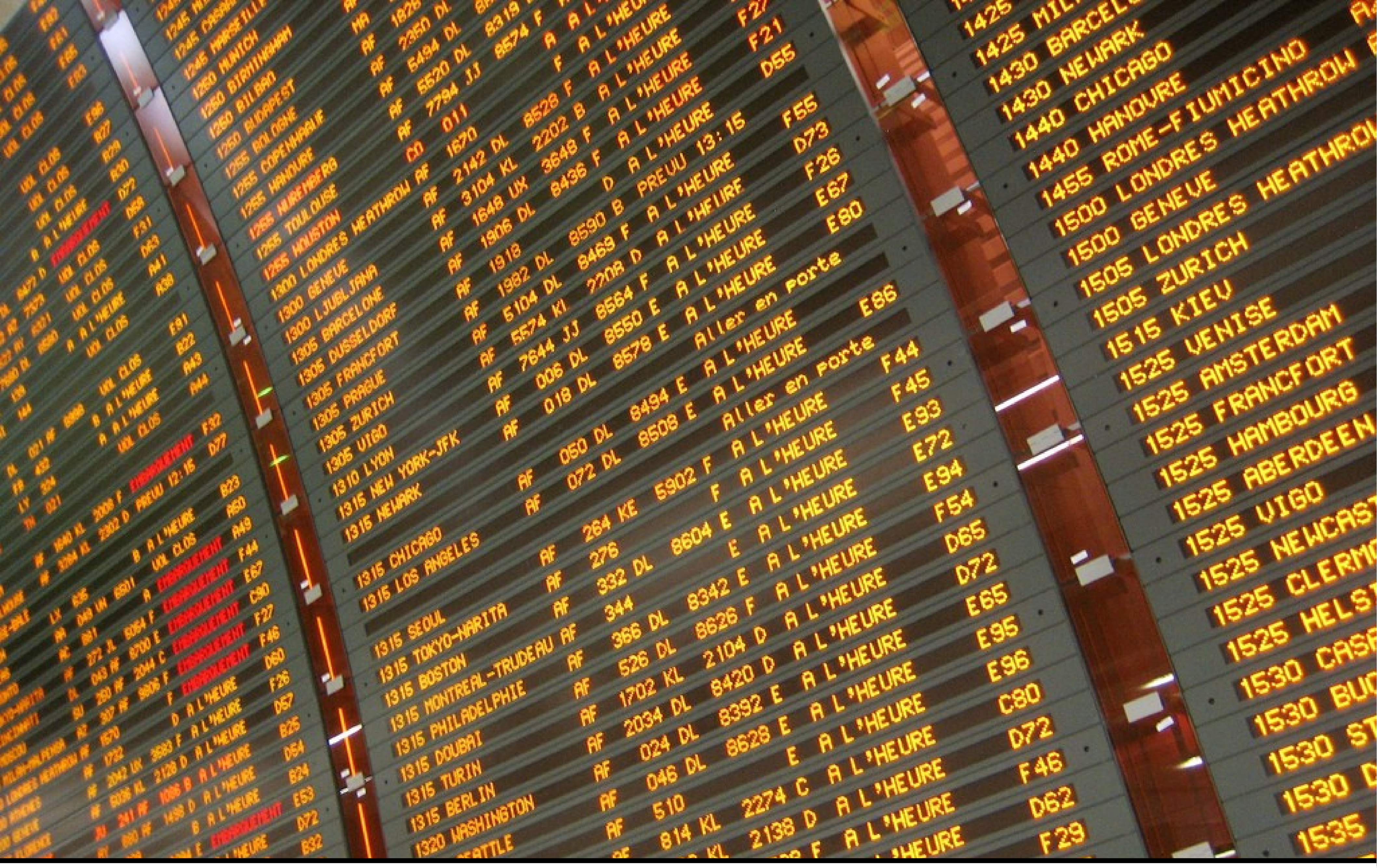
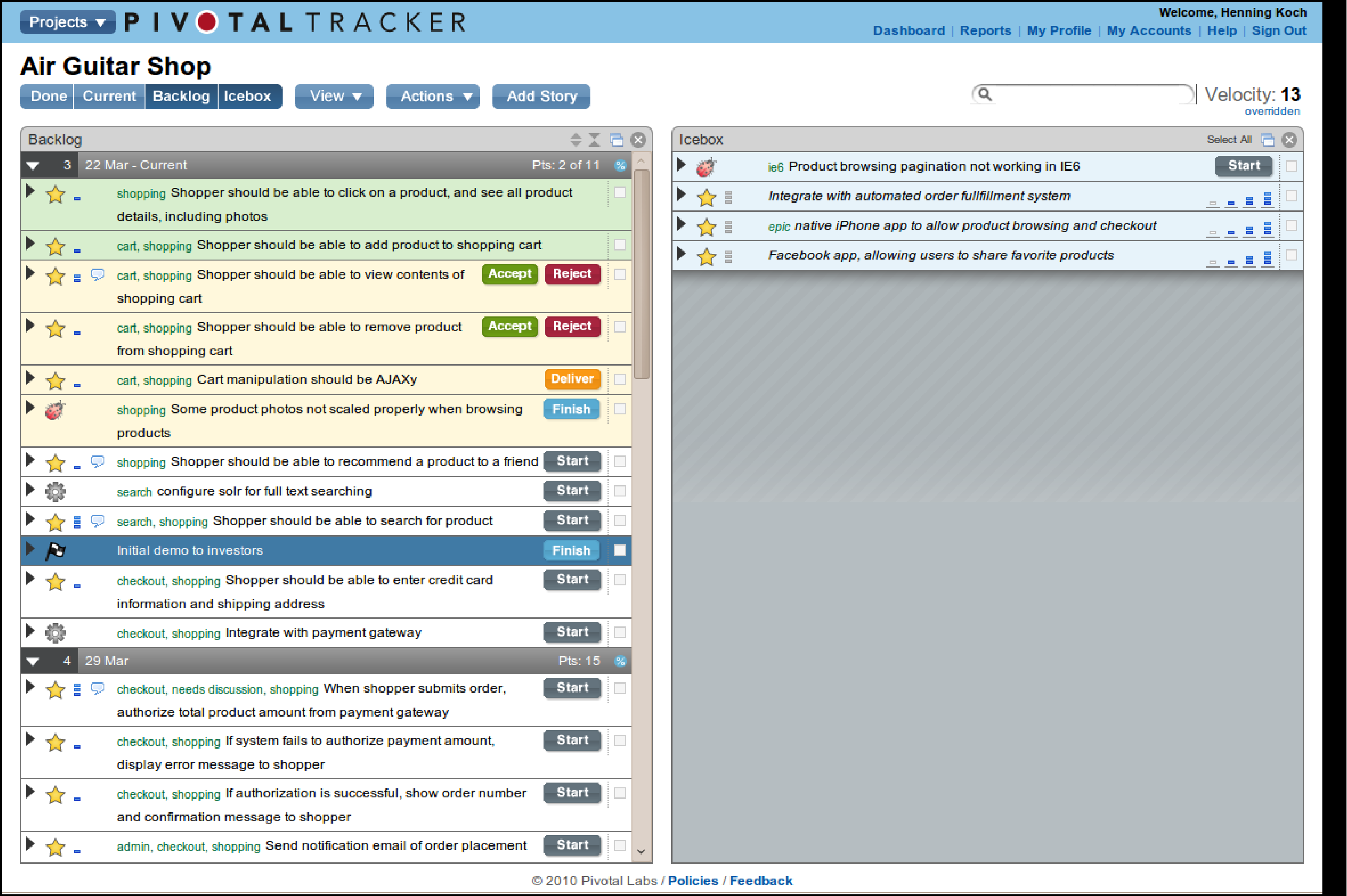

Entwickeln
QA
Entwickeln
QA
R 1.0
R 1.2
Entwickeln mit automatisierten Tests
F1
F2
F3
F4
F5
F6
F7
F8
F9
F10
F11

makandra



Planbarkeit

Produktverwaltung	2
Produkt-Detailseite	2
Warenkorb	1
Bestellvorgang	5
PayPal-Anbindung reparieren	0



Projects ▼
PIVOTAL TRACKER
Welcome, Henning Koch
Dashboard | Reports | My Profile | My Accounts | Help | Sign Out

Air Guitar Shop

Backlog

3 22 Mar - Current Pts: 2 of 11

- shopping Shopper should be able to click on a product, and see all product details, including photos □
- cart, shopping Shopper should be able to add product to shopping cart □
- cart, shopping Shopper should be able to view contents of shopping cart Accept Reject □
- cart, shopping Shopper should be able to remove product from shopping cart Accept Reject □
- cart, shopping Cart manipulation should be AJAXy Deliver □
- shopping Some product photos not scaled properly when browsing products Finish □
- shopping Shopper should be able to recommend a product to a friend Start □
- search configure solr for full text searching Start □
- search, shopping Shopper should be able to search for product Start □
- Initial demo to investors Finish □
- checkout, shopping Shopper should be able to enter credit card information and shipping address Start □
- checkout, shopping Integrate with payment gateway Start □

4 29 Mar Pts: 15

- checkout, needs discussion, shopping When shopper submits order, authorize total product amount from payment gateway Start □
- checkout, shopping If system fails to authorize payment amount, display error message to shopper Start □
- checkout, shopping If authorization is successful, show order number and confirmation message to shopper Start □
- admin, checkout, shopping Send notification email of order placement Start □

Icebox Select All

- ie6 Product browsing pagination not working in IE6 Start □
- *Integrate with automated order fullfillment system* □
- *epic native iPhone app to allow product browsing and checkout* □
- *Facebook app, allowing users to share favorite products* □

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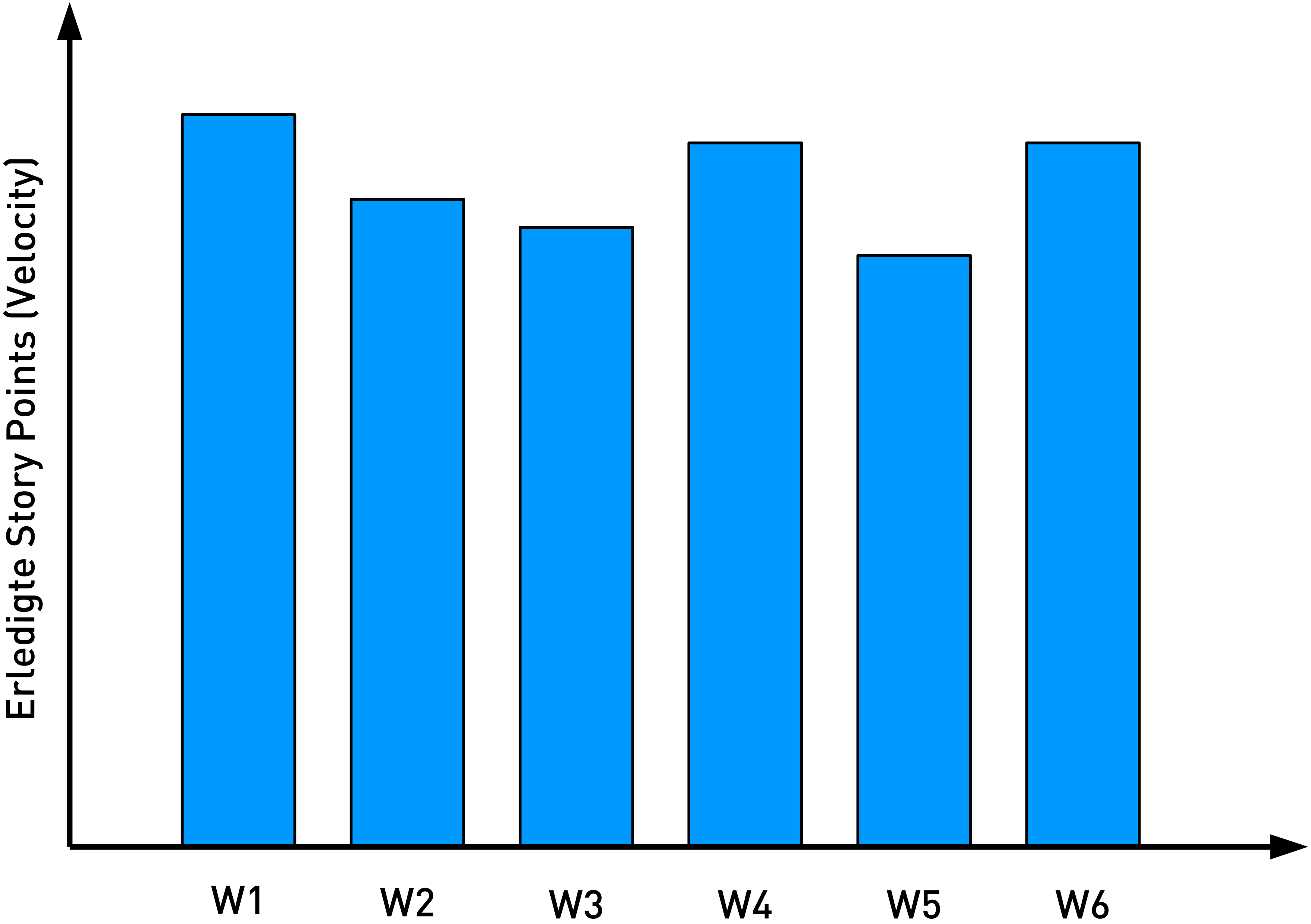
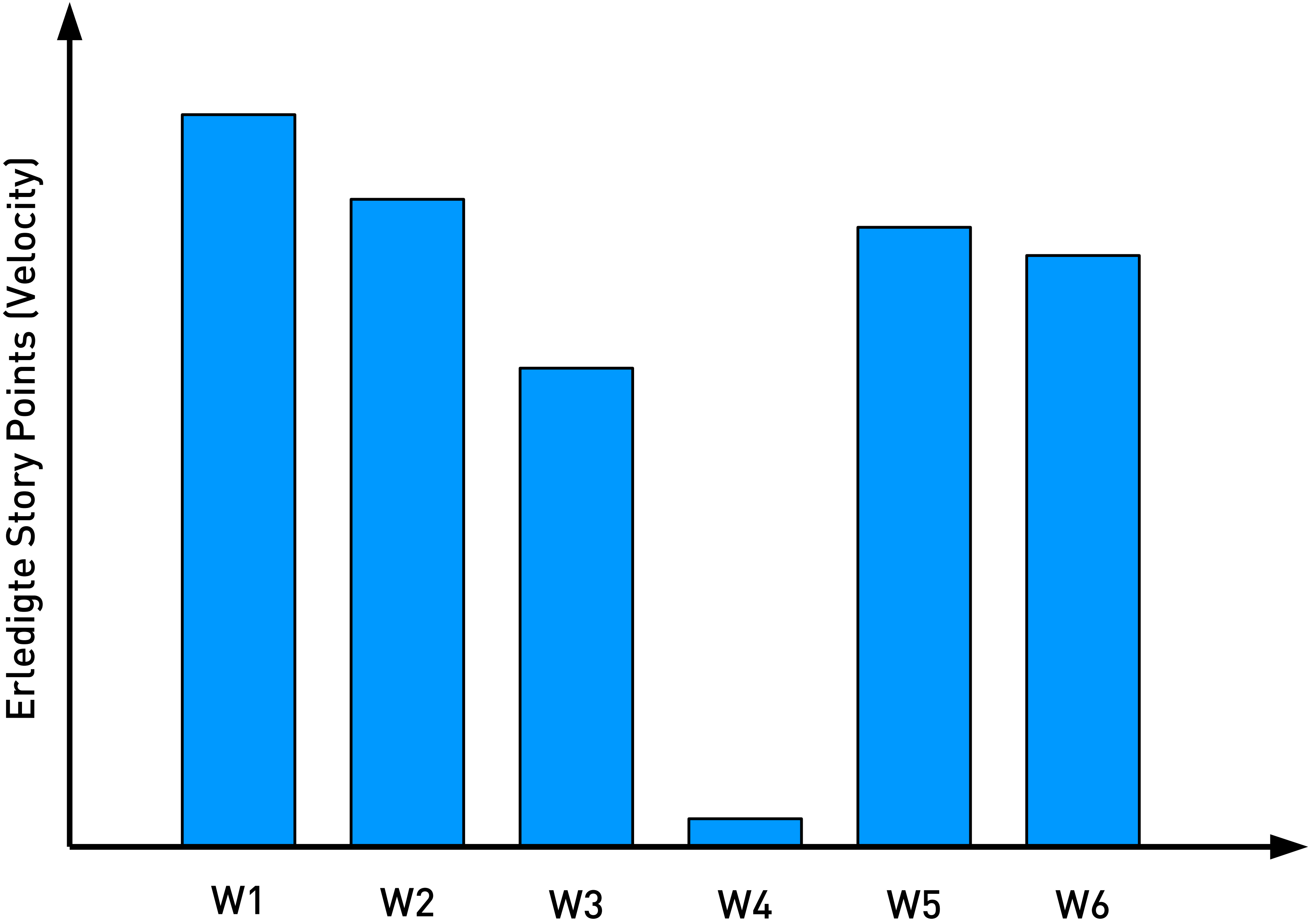
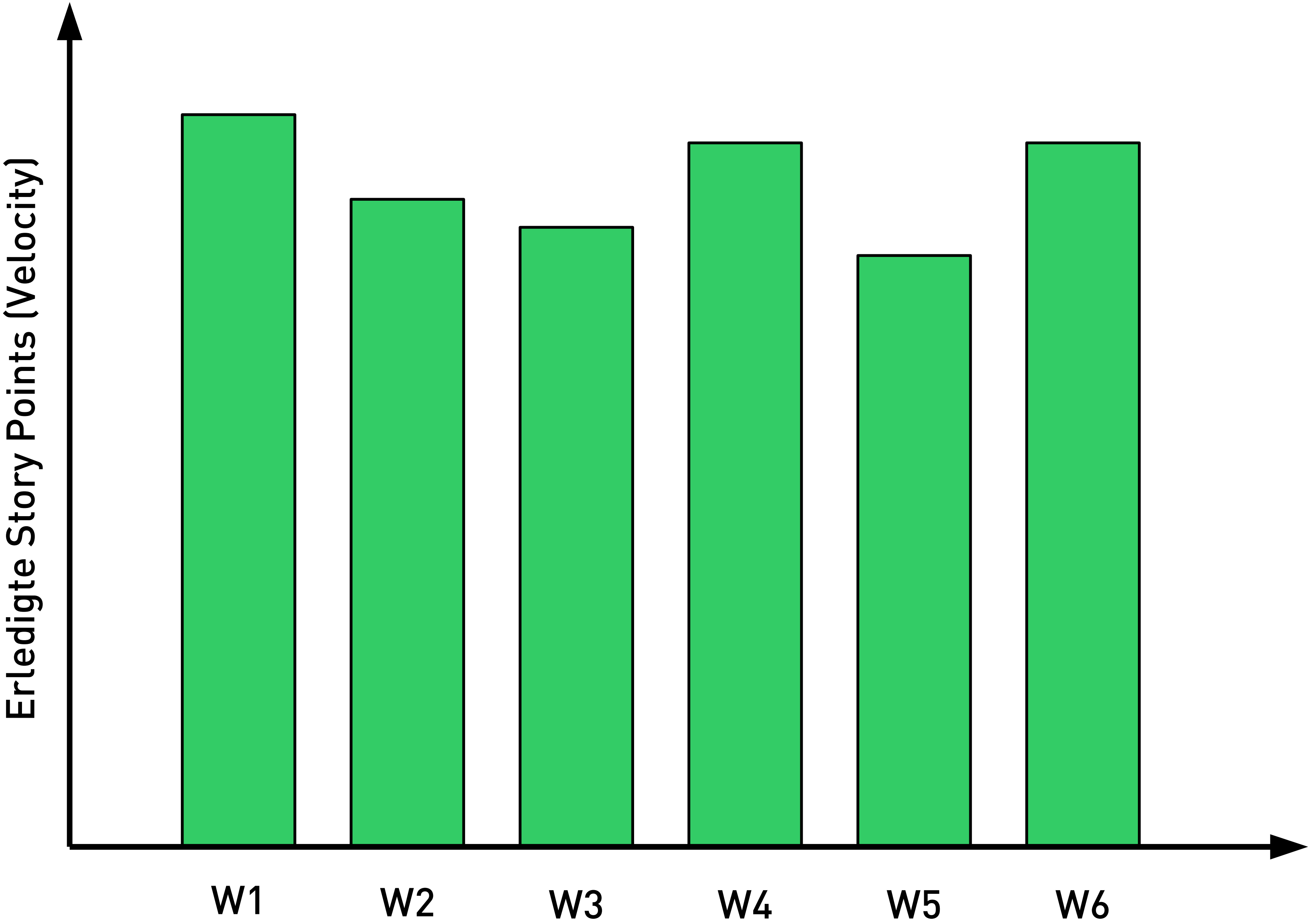
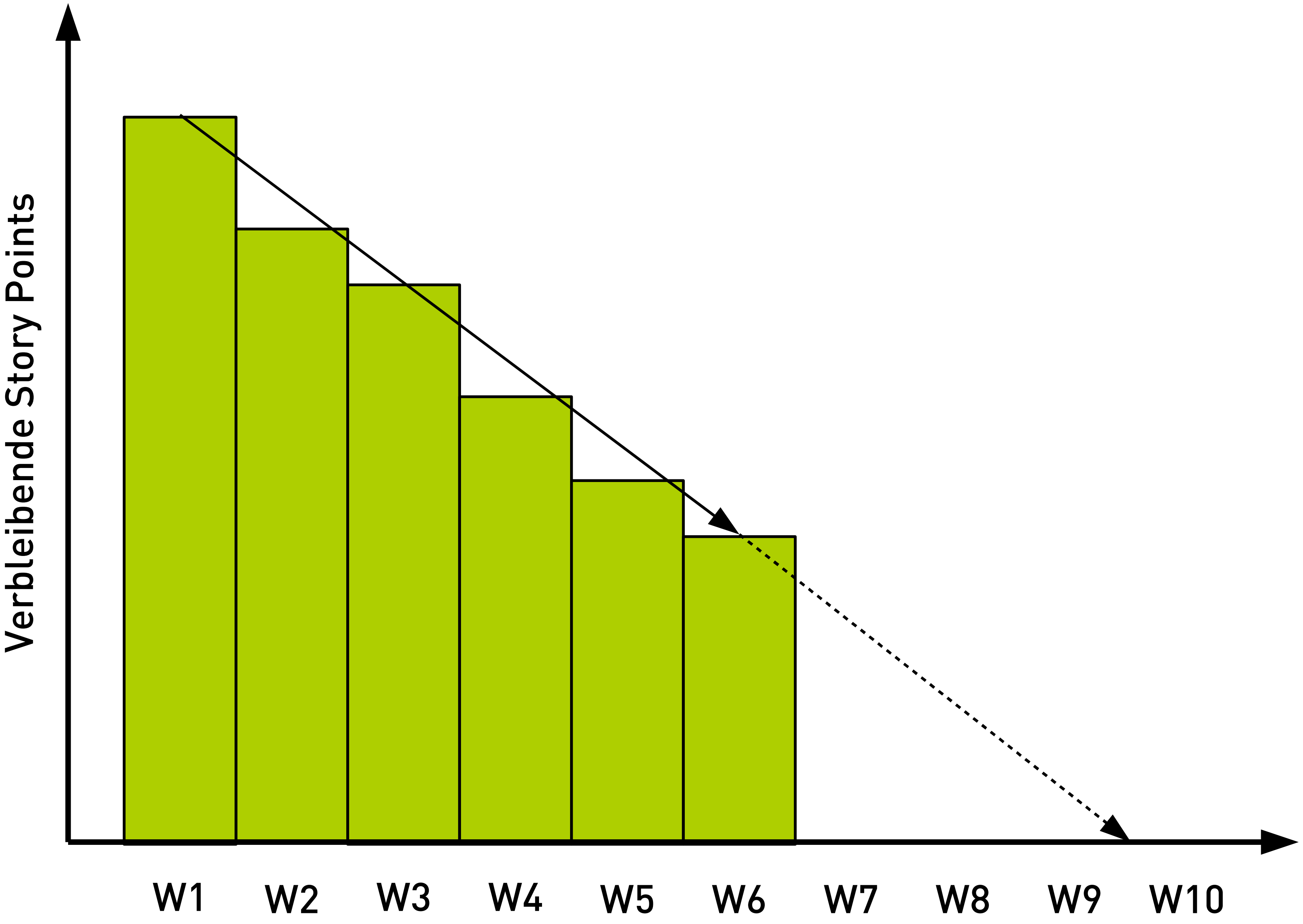
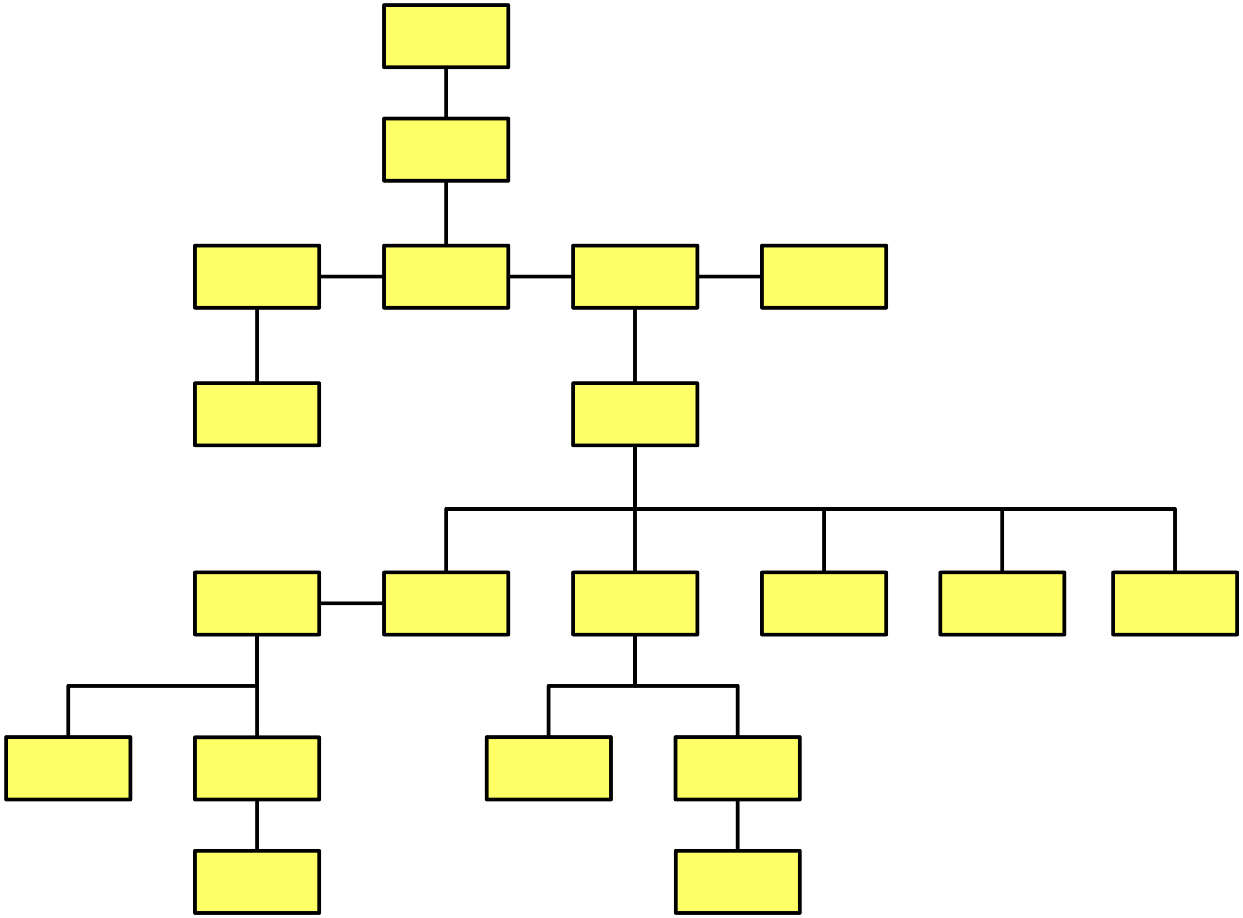
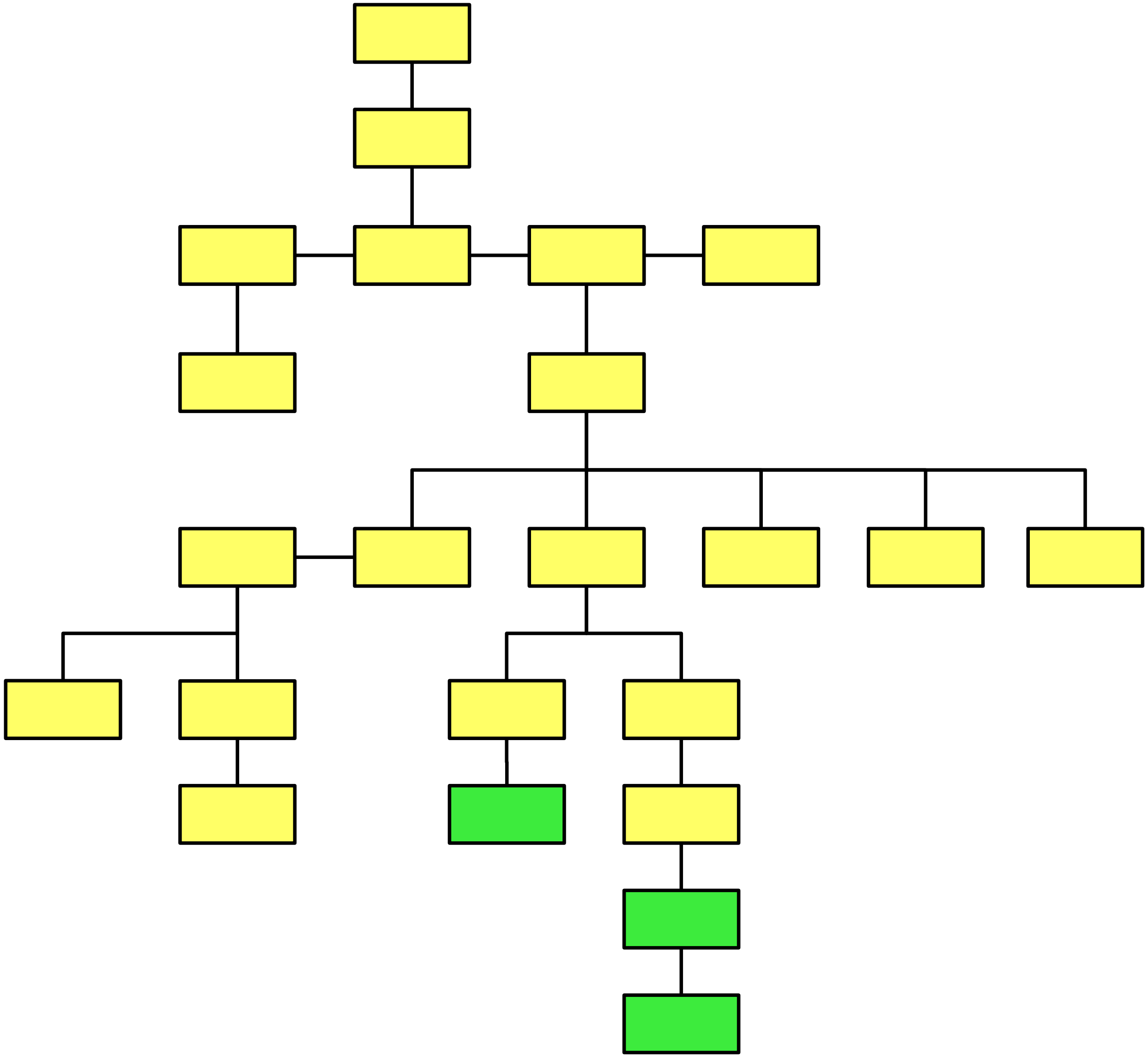

Erledigte Story Points (Velocity)
W1
W2
W3
W4
W5
W6

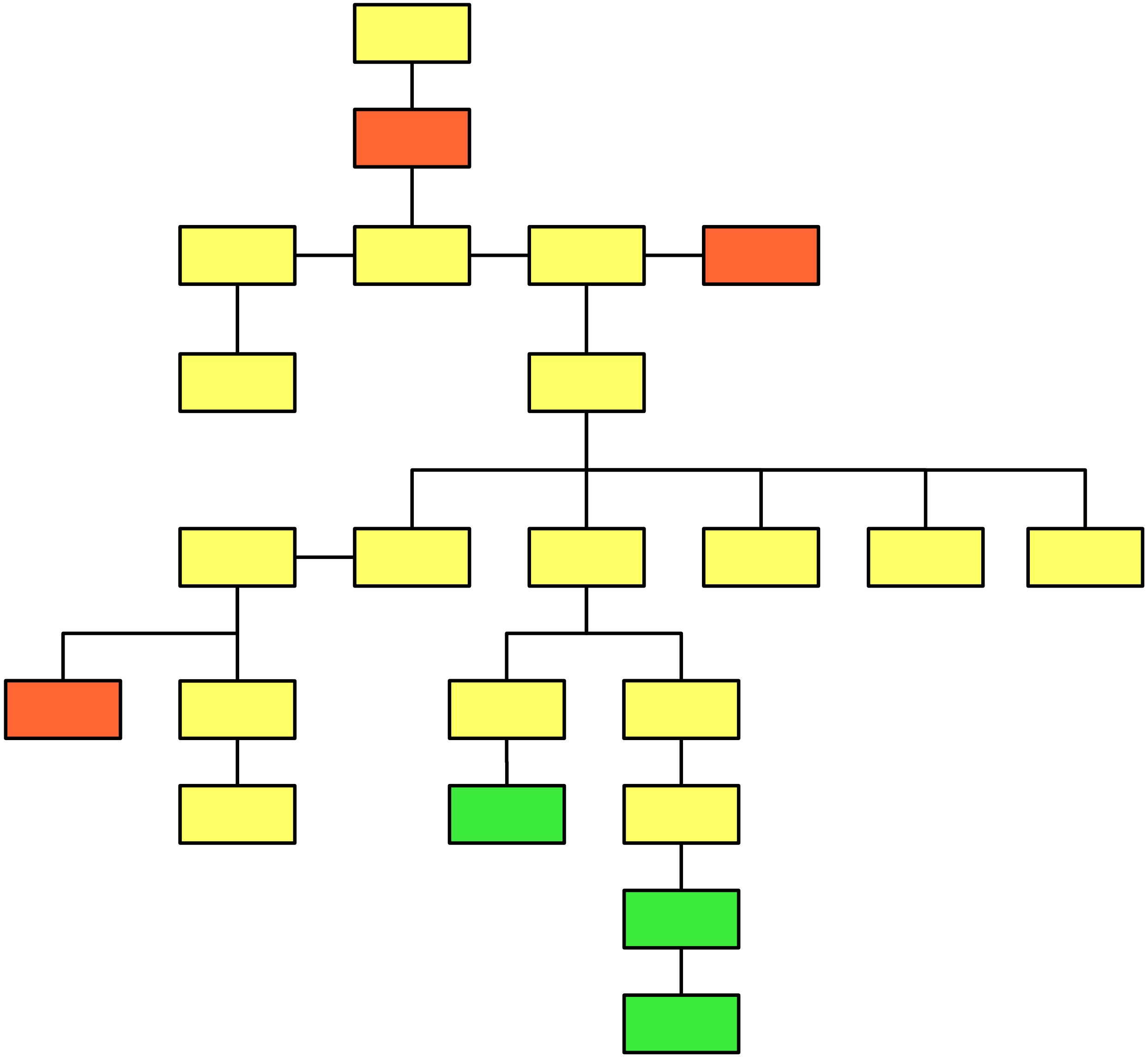

Erledigte Story Points (Velocity)
W1
W2
W3
W4
W5
W6


Erledigte Story Points (Velocity)
W1
W2
W3
W4
W5
W6


Verbleibende Story Points
W1
W2
W3
W4
W5
W6
W7
W8
W9
W10







Flexible Einteilung der Entwickler

- Tests kodieren Wissen über die korrekte Funktionsweise der Anwendung
- Entwickler müssen nicht das komplette System verstehen, um an einer Ecke zu arbeiten
- Mehr Flexibilität beim Einteilen von Mitarbeiter auf verschiedene Projekte

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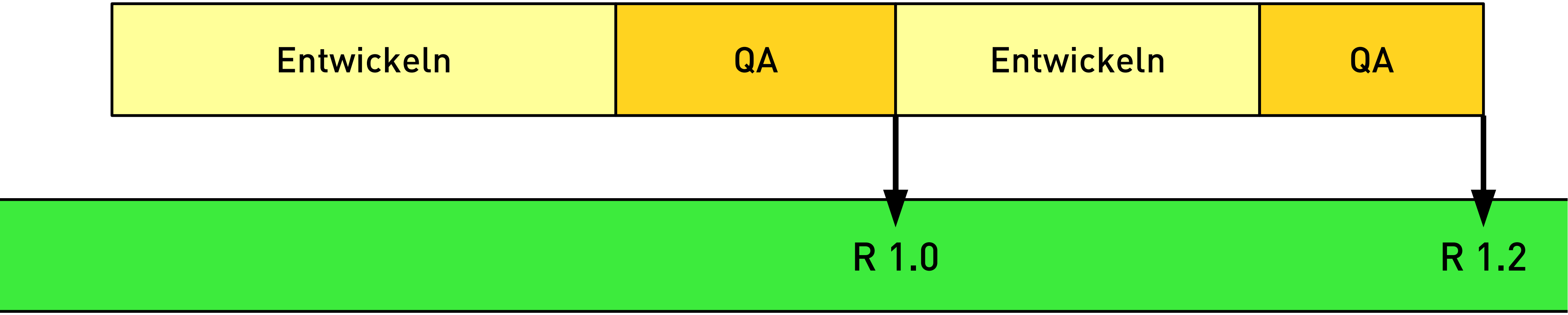
Time to Market


Entwickeln
QA
Entwickeln
QA
R 1.0
R 1.2

Händische Qualitätskontrolle ist teuer

- Ohne automatisierte Tests sind Qualitätskontrolle vor Releases sehr aufwändig („Durchklicken“)
- Händisches Testen wird aufwändiger, je größer das Produkt wird
- Die Folge sind seltene Big-Bang-Releases

„If your team is not able to test everything as soon as it is ready, they soon will ask you to introduce one or two week long test cycles. They tell you that in that time they can do all the testing and that you'll have a stable release afterwards.

Unfortunately, nothing could be further from the truth. The later you test, the more effort you've got to spend fixing bugs introduced weeks ago. And as the code is changing during the testing weeks, every test cycle you do has to be repeated. In the end, your software is no more stable then it was before the test cycle."

Matthias Marschall

Unveröffentlichte Features sind wertlos

- Implementierte, aber nicht veröffentlichte Features haben keinen wirtschaftlichen Vorteil für den Kunden
- Disconnect zwischen Kunde und Entwicklung
  - Feedback gibt es nur für veröffentlichten Code
  - Der Code altert während sich die Anforderungen des Kunden weiterentwickeln

Schnelle Durchlaufzeiten mit teilautomatisierter Qualitätskontrolle

- Händische Qualitätskontrolle nur noch für neue Features
- Kein „Durchklicken“ mehr
- Durchlaufzeit eines Features von Konzeption bis Release minimiert

Das Feature wird zur Iteration

- Features können isoliert voneinander bearbeitet und veröffentlicht werden
- Schneller Nutzen für den Kunden
- Schnelles Feedback
- Entwicklung nahe an der Realität des Kunden
- Kürzer gebundene Entwicklungsresourcen machen reaktionsfähig

Test Driven Development
Der Kosten-Airbag für Software-Projekte

Henning Koch, Robert Sonnberger

kit e.V. BESTENS VERNETZT

IT-OFFENSIVE Bayerisch-Schwaben

makandra

~~Durchklicken~~	Zeit für Design, Usability, Features
~~Big-Bang-Releases~~	Tägliche Releases
~~Angst vor Regressionen~~	Freies Refactoring
~~Explodierende Änderungskosten~~	Wartbarer Code
~~Schlaflose Nächte~~	Lächelnd in den Feierabend

Illustrationen

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