WILL YOUR TESTS STAND THE TEST OF TIME?

PATTERNS FOR AUTOMATED UI TESTS

ALEX SCHLADEBECK

@ALEX_SCHL

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INDIVIDUELLE SOFTWARE

INTRODUCTIONS

- I am…
  - A tester, head of testing, a product owner
  - A geek ☺
- Bredex is
  - A software development company
  - With a strong focus on quality
    - Own open source tool
    - Multi-tool strategy
    - Agile testing
    - Scalable test automation

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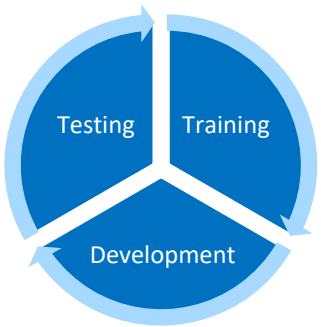
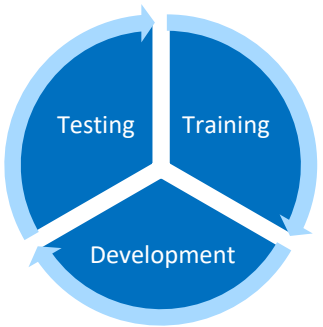
ASQF
Arbeitskreis Software-Qualität und -Fortbildung e.V.



INTRODUCTIONS

- I am…
  - A tester, head of testing, a product owner
  - A geek ☺
- Bredex is … hiring ☺



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TODAY‘S JOURNEY

- The bad reputation of UI testing
  - Reasons and explanations
- Test structure for scalable UI tests
- Examples

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<rant>

Everyone hates UI tests

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Slow feedback


More infrastructure


They‘re flaky


They‘re the top of
the pyramid!


Small changes
lead to big work

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Different level of feedback – for things that we can wait for

Yes

Sometimes yes, often because of bad design or wrong usage

They're still in the pyramid.
User focus is valid.
And….context!

1. Same for development
2. Only if you design them badly

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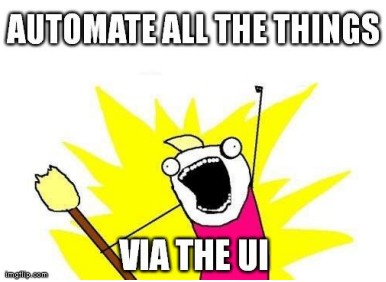
TO BOIL IT DOWN TO TWO POINTS…

- UI tests are often used to test things that shouldn't be tested via the UI



- And they are often written badly. Very badly…

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Just because they’re maybe a bit more difficult – and not the favourite domain of developers – doesn’t mean that they are not potentially valid

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</rant>

UI TESTING TOOLS ONLY THINK OF ONE THING…

Technically addressing UI components in an application

They give no structural support for test design

In fact, they help you to make a mess often…

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“Don‘t use capture-replay. ‘Tis the devil‘s work“

- Alex Schladebeck, repeatedly from ~2006 AD

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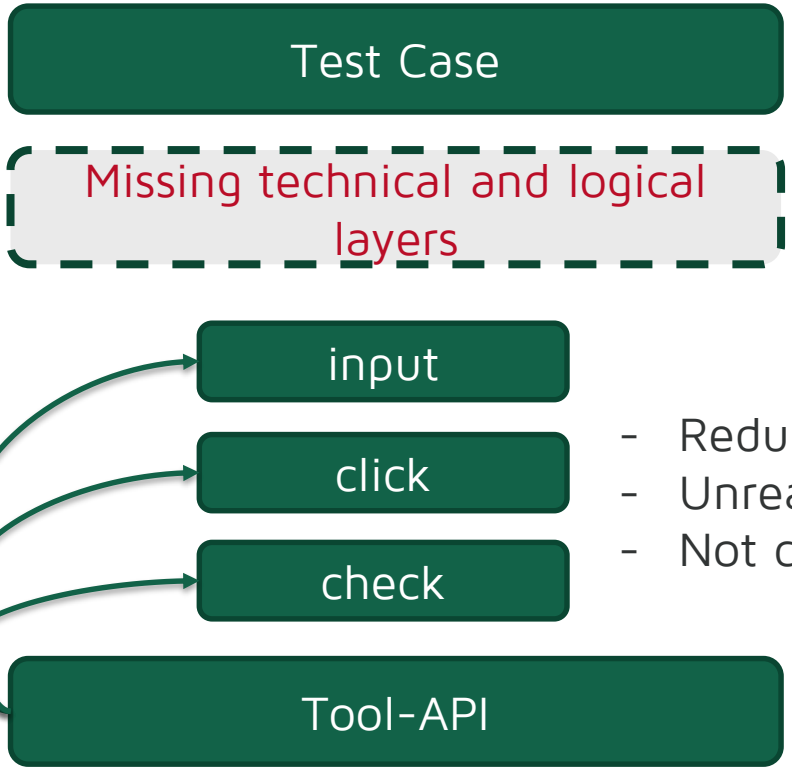
WHAT USUALLY HAPPENS



Direct tool API calls
to create workflow

- Redundancies
- Unreadable
- Not conducive to team work

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THERE ARE WAYS OF AVOIDING THIS...

In software engineering, a software design **pattern** is a general reusable solution to a commonly occurring problem within a given context in software design.

It is not a finished design that can be transformed directly into source or machine code.

HOW TESTS SHOULD BE STRUCTURED

Test Case

Functional workflows

Functional atomic actions

Technical Keywords

Tool-API

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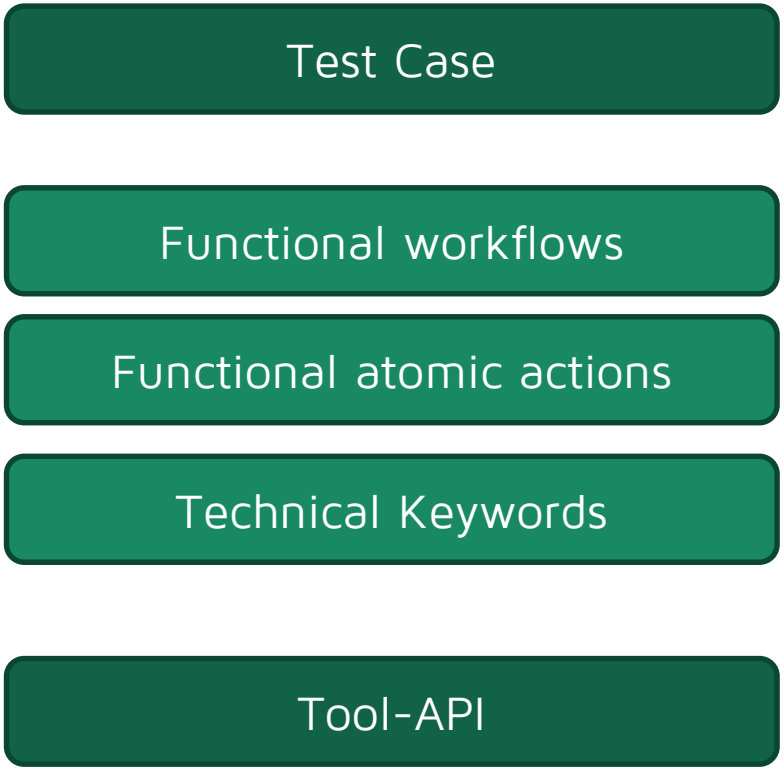
HOW TESTS SHOULD BE STRUCTURED



May be split into internals (private) and services (public)

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HOW TESTS SHOULD BE STRUCTURED

Test Case

Test manager
Customer

Functional
tester

Functional workflows

Functional atomic actions

Technical Keywords

Technical
Tester / dev

Tool-API

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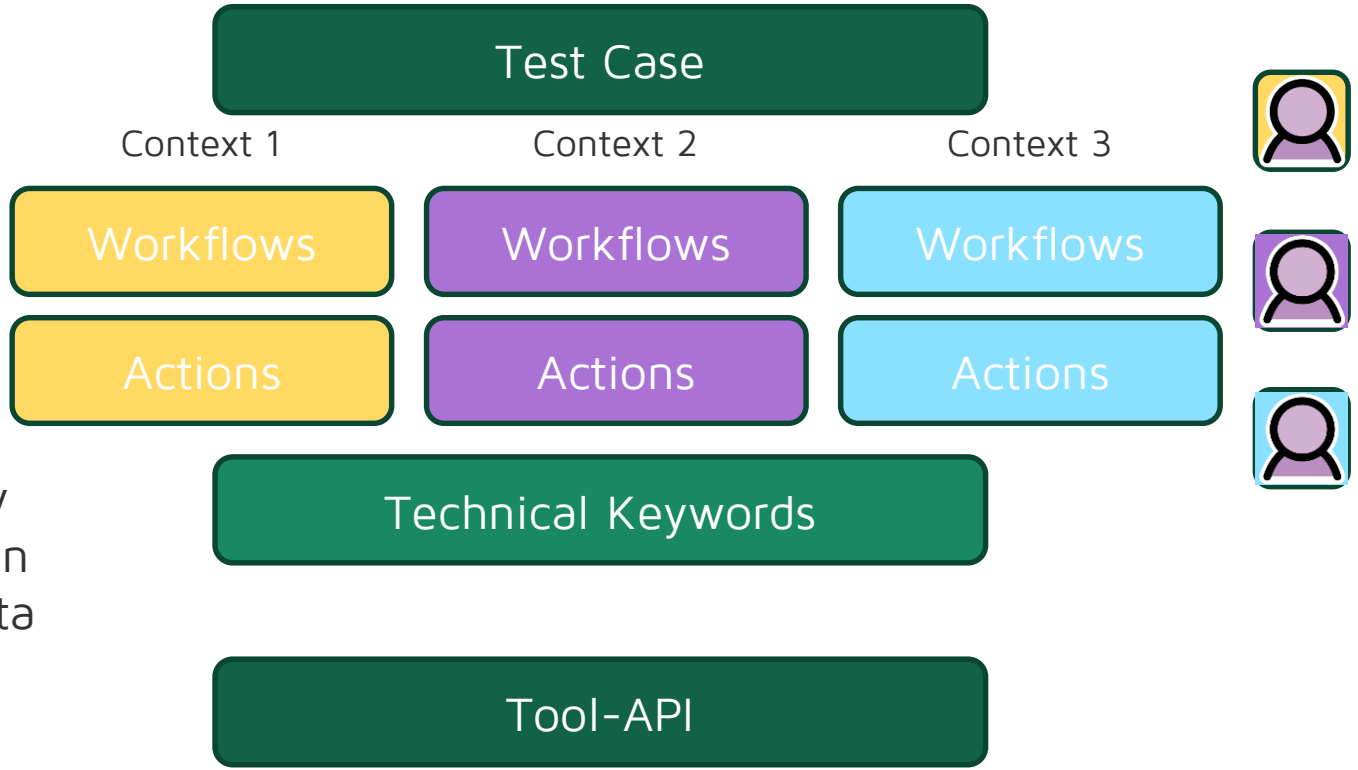
EXAMPLE: GOOD LAYERING

Test Case	TC CUS 001: Create new customer - Check customer does not exist [CUSTOMER_KEY] - Create new customer [CUSTOMER_KEY] - Check customer exists [CUSTOMER_KEY]
Functional workflow	Create new customer [CUSTOMER_KEY] - Open new customer dialog - Fill out customer form [CUSTOMER_KEY] - Click Save
Functional workflow	Fill out customer form [CUSTOMER_KEY] - Enter customer name [NAME] - Enter customer street address [ADDRESS] - Enter postcode [POSTCODE]
Functional atomic action	Enter customer name [NAME] - Replace text [TEXT]
Technical keyword	Replace text [TEXT] - Click - Select all - Send keys

EXAMPLE: SPLITTING INTO CONTEXTS



Context: functionally connected application area, e.g. Master Data

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YOU MAY KNOW SIMILAR APPROACHES

- Page Object Pattern
  - Services and Implementation separated → more layers
  - Focus on page → focus on functional context
  - Assertions → checks
  - Strong user focus
- Gojko's 3 layers → more layers

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https://github.com/SeleniumHQ/selenium/wiki/PageObjects
https://gojko.net/2010/04/13/how-to-implement-ui-testing-without-shooting-yourself-in-the-foot-2/

BAD EXAMPLE 1

```
public void deleteCustomer() {
  driver.findElement(By.id("openCustomer")).click();
  WebElement customer = driver.findElement(By.xpath("//table[@id='table']/tbody"));
  List<WebElement> customerList = customer.findElements(By.tagName("tr"));
  for (WebElement actualCustomer : customerList) {
    if (actualCustomer.equals("MyCustomer")) {
      driver.findElement(By.id("delete")).click();
    }
  }
}
```

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- No abstraction levels
- Redundant object location
- Technical operations at highest level
- Hard coded data

REAL LIFE BAD EXAMPLE 1

```
public void login() {
    WebElement usernameTextField = driver.findElement(By.name("username"));
    WebElement passwordTextField = driver.findElement(By.name("password"));

    usernameTextField.sendKeys("...");
    passwordTextField.sendKeys("...");

    WebElement loginButton = driver.findElement(By.className("login-button"));
    loginButton.click();

    WebElement uploadLink = driver.findElement(By.linkText("Datei-Upload"));
    uploadLink.click();

    WebElement fileInput = driver.findElement(By.name("UPLOAD_FILENAME"));
    fileInput.sendKeys("...");

    WebElement uploadButton = driver.findElement(By.name("UPLOAD_BUTTON"));
    uploadButton.click();
}
```

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LAYERING EXAMPLES

```
@Test
public void CUST_TC_01_01_03__CreateCustomer() throws InterruptedException {
  CustomerAdministration.checkCustomerExists("My", "Customer", "Street", "9", "38100", "Brunswick", true, false, false);
  Thread.sleep(5000);
  CustomerAdministration.createCustomer("My", "Customer", "Street", "9", "38100", "Brunswick");
  Thread.sleep(5000);
  CustomerAdministration.checkCustomerExists("My", "Customer", "Street", "9", "38100", "Brunswick", true, false, false);
}
```

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LAYERING EXAMPLES

```
@Test
public void CUST_TC_01_01_01__CreateCustomer() {
  CustomerAdministrationData CUSTOMER = CustomerAdministrationData.CUST_TC_01_01_01;

  CustomerAdministration.checkCustomerExists(CUSTOMER, false);
  CustomerAdministration.createCustomer(CUSTOMER);
  CustomerAdministration.checkCustomerExists(CUSTOMER, true);

}
```

- Clear levels
- Data objects
- VAV pattern

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A LOOK AT THE LOWER LAYERS

```
  //Internal workflow

  private static void filloutCustomerForm(CustomerData data) {
    setName(data.name);
    setSurname(data.surname);
    setStreet(data.street);
    setPostcode(data.postcode);
    setCity(data.city);
  }

  //Public workflow (service)

  public static void createCustomer(CustomerData data) {
    openMenuCustomer();
    openSubMenuCustomer();
    filloutCustomerForm(data);
    clickSave();
    MainView.toMainMenu();
  }
}
```

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A LOOK AT THE LOWER LAYERS

```
@FindBy(id = "postcode")
private static WebElement postcode_cti;

@FindBy(id = "street")
private static WebElement street_cti;

@FindBy(id = "city")
private static WebElement city_cti;
```

```
private static void setStreet(String street) {
  Reused.replaceText(street_cti, street);
}

private static void setPostcode(String postcode) {
  Reused.replaceText(postcode_cti, postcode);
}

private static void setCity(String city) {
  Reused.replaceText(city_cti, city);
}
```

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DIFFERENT TOOLS AND DIFFERENT APIS

```
// Selenium iterate through table and click on element
public static void selectValueFromTableSelenium(WebElement tableElement, String value) {
  String information = null;
  int rowIndex = 1;
  if (value != null) {
    List<WebElement> totalColumnCount = tableElement.findElements(By.tagName("tr"));
    for (WebElement colElement : totalColumnCount) {
      information = "";
      information += colElement.getText().trim();
      if (information.contains(value)) {
        Reused.clickLeftSingle(colElement.findElement(By.tagName("button")));
      }
      rowIndex++;
    }
  }
}
```

```
//Jubula API select from table with some parameters set
private static void selectValueFromTable(String row, String value) {
    table.selectValueFromRow(row, Operator.equals, value, Operator.equals, 1, BinaryChoice.no, SearchType.absolute, InteractionMode.primary);
}
```

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MORE PATTERNS: VAV

- Verify – Act – Verify
  - Because otherwise you just don't know

```
@Test
public void CUST_TC_01_01_01__CreateCustomer() {
  CustomerAdministrationData CUSTOMER = CustomerAdministrationData.CUST_TC_01_01_01;

  CustomerAdministration.checkCustomerExists(CUSTOMER, false);
  CustomerAdministration.createCustomer(CUSTOMER);
  CustomerAdministration.checkCustomerExists(CUSTOMER, true);

}
```

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MORE PATTERNS: DATA OBJECTS

- One row per required data set
- Key and column are encapsulated in actions

```
@Test
public void CUST
  CustomerAdmini
  CustomerAdmini
  CustomerAdmini
}
```

```
@Test
public void CUST_TC_01_01_01__CreateCustomer() {
  CustomerAdministrationData CUSTOMER = CustomerAdministrationData.CUST_TC_01_01_01;

  CustomerAdministration.checkCustomerExists(CUSTOMER, false);
  CustomerAdministration.createCustomer(CUSTOMER);
  CustomerAdministration.checkCustomerExists(CUSTOMER, true);

}
```

```
, false, false);
, false, false);
```

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MORE PATTERNS: FORM PATTERN

- Fill in variable amounts of fields with one workflow

```
private static void filloutCustomerForm(CustomerData data) {
  setName(data.name);
  setSurname(data.surname);
  setStreet(data.street);
  setPostcode(data.postcode);
  setCity(data.city);
}
```

```
private static void setName(String name) {
  Reused.replaceText(name_cti, name);
}
```

```
//Technical keyword
public static void replaceText(WebElement element, String input) {
  fluentWait(element);
  if (input != null && element.isEnabled()) {
    element.clear();
    element.sendKeys(input);
  }
```

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THERE ARE MORE…

- Responsibility assignment
- Fresh / shared setup
- …

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POST-EXAMPLE DISCLAIMER

This works all the time like perfect unicorn rainbow poop! *

* In the contexts we have used these things in so far, they have been very useful to us and have saved us a lot of time and hair-pulling out.

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EXTRA DISCLAIMER

"These are patterns we know from software development!"

- people

"Then train developers and testers to use them
so that they write good UI tests"

- me

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THINGS TO TAKE AWAY

- You don’t have to hate your UI tests
  - You just have to do them right
- Don’t reinvent the wheel completely, but remember to expand and extend it
  - And re-evaluate for new contexts
- Use these patterns to get developers and testers of all flavours on board with UI automation

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