

**Hewlett Packard**  
Enterprise

# Test Automation

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2016.11.15

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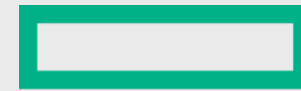
# HP Inc. and Hewlett Packard Enterprise



**Hewlett Packard  
Enterprise**

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# 2017: HPE Enterprise Services group spin off and merge



**Hewlett Packard  
Enterprise**

# Main Customers



- Development
- QA
- HPE is the integrator for Vodafone Hungary

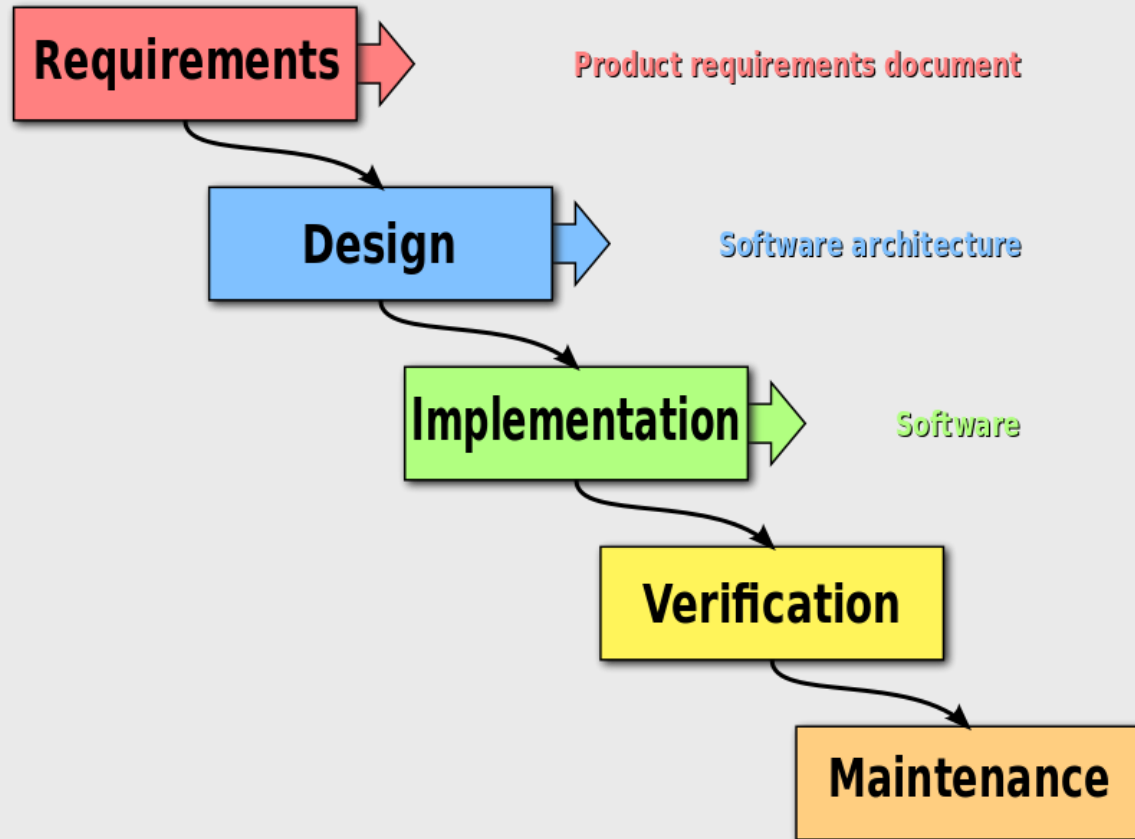


- Development
- QA
- Vendor consolidation

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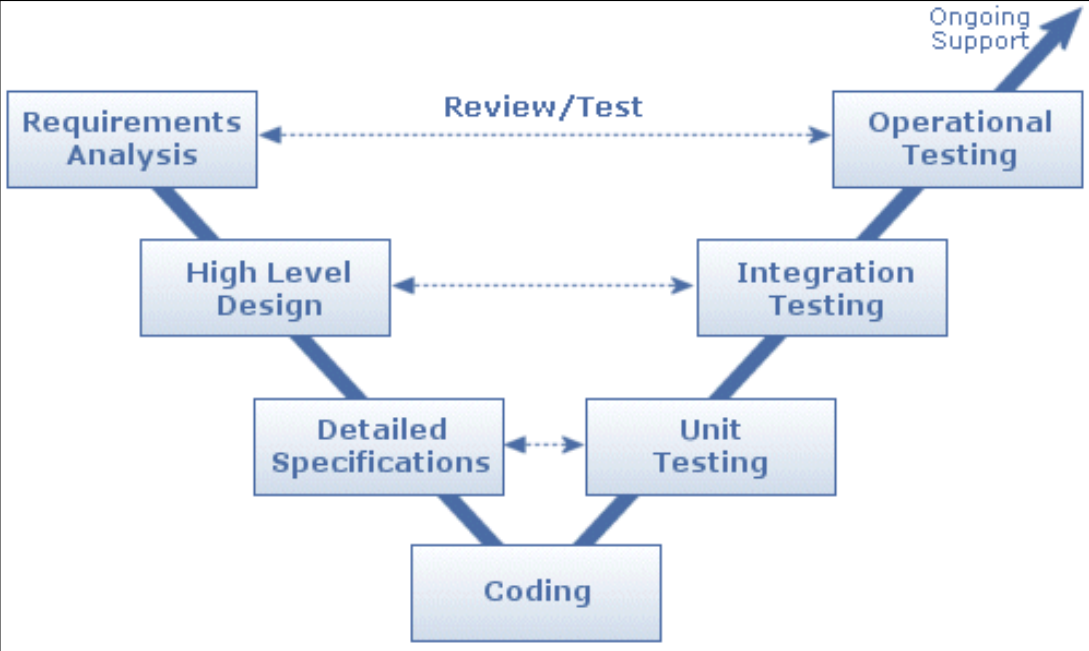
# Testing and automation

# Lifecycles: Waterfall model



- This is a very old approach. Nowadays it should not be used
- Testing is very separated
- Usually test automation doesn't appear in Waterfall models

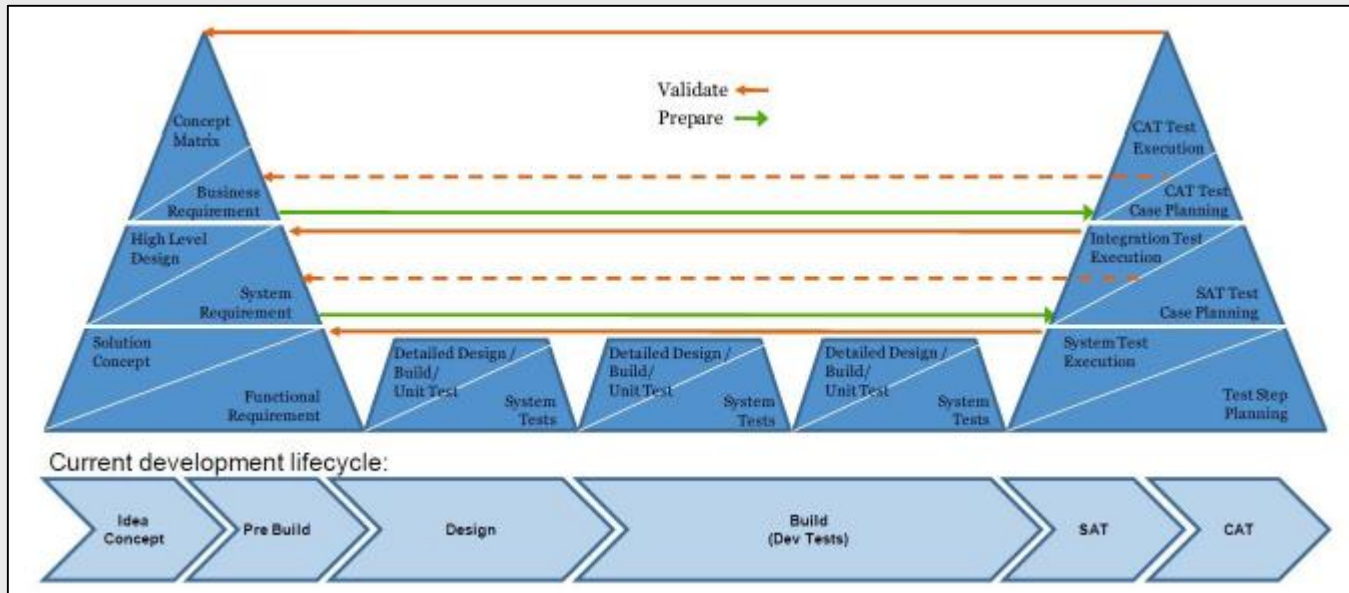
Source: [https://en.wikipedia.org/wiki/Waterfall\\_model](https://en.wikipedia.org/wiki/Waterfall_model)



- V-models help to separate testing levels  
E.g.:
  - Unit/Modul Testing
  - Integration testing
  - Operational/System testing
- It is common that you may find V-model based structures at enterprises that are not fully Agile
- The need of Test Automation usually appears

Source: <https://harmonicss.co.uk/project/the-death-of-the-v-model/>

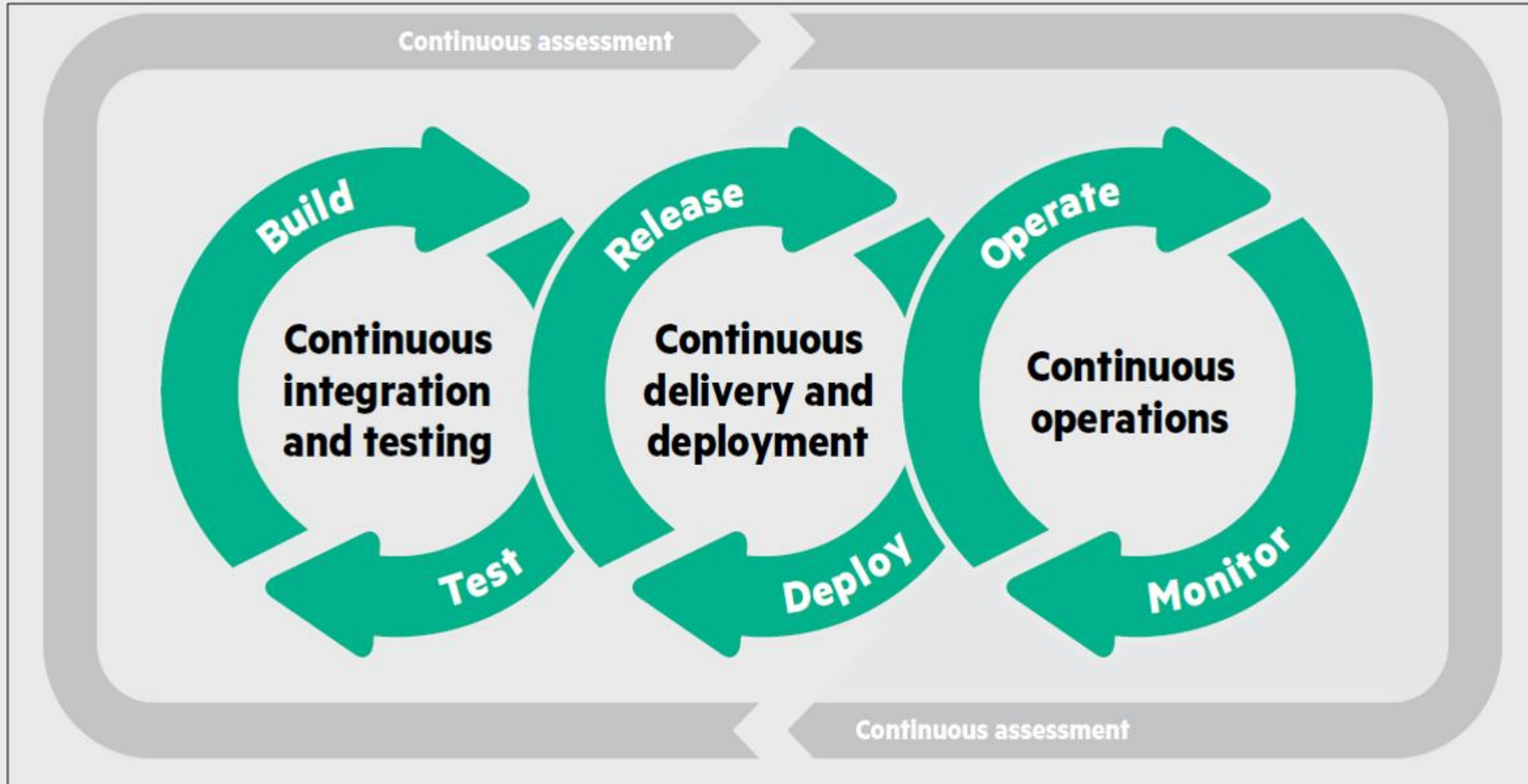
# Lifecycles: V-model with Agile component



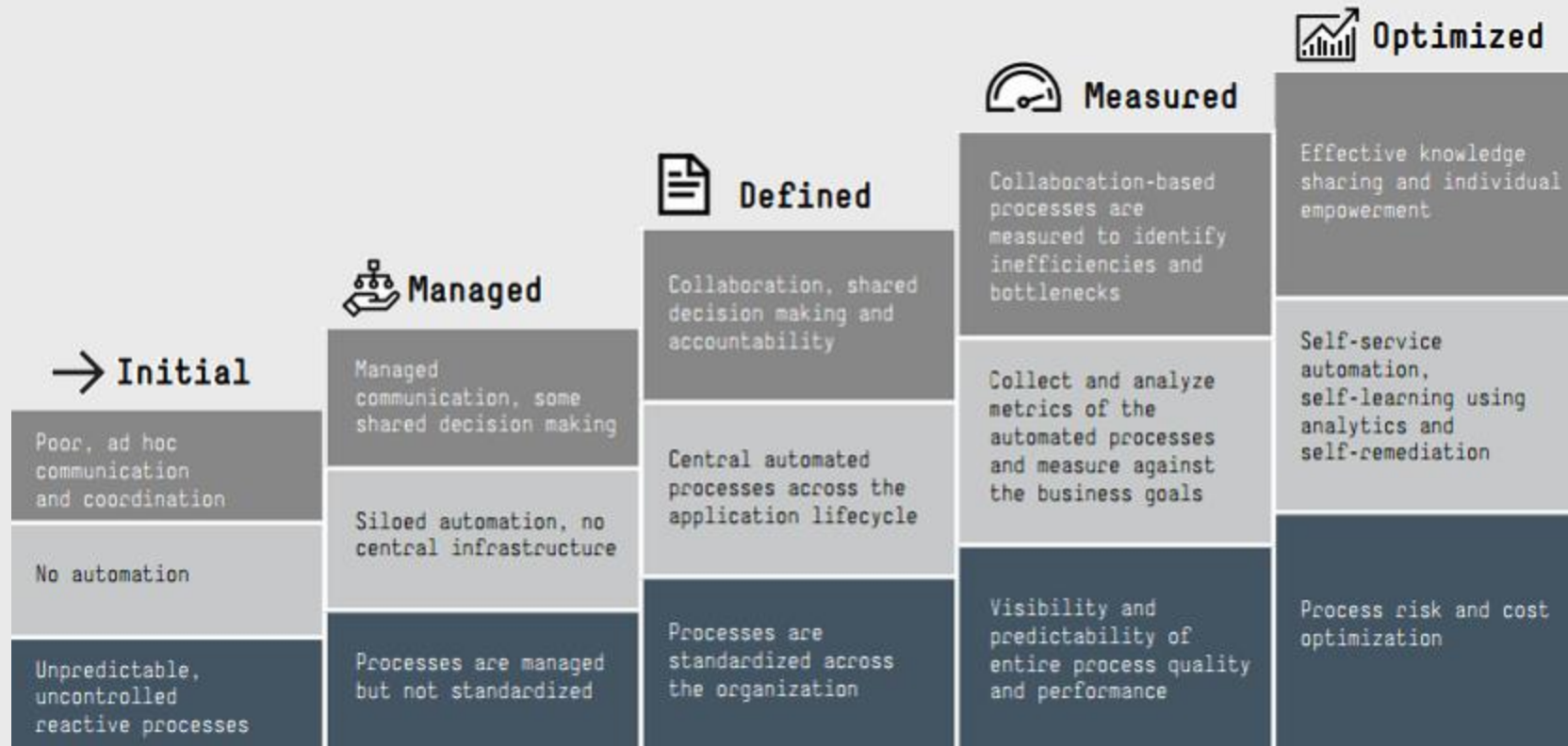
- A V-model Agile mixture usually emerges when the Development is Agile (Sprint based), however the whole enterprise is „old fashioned”.
- The complexity and the sprinting velocity usually needs automation



# Lifecycles: DevOps: Pipeline based automatic testing



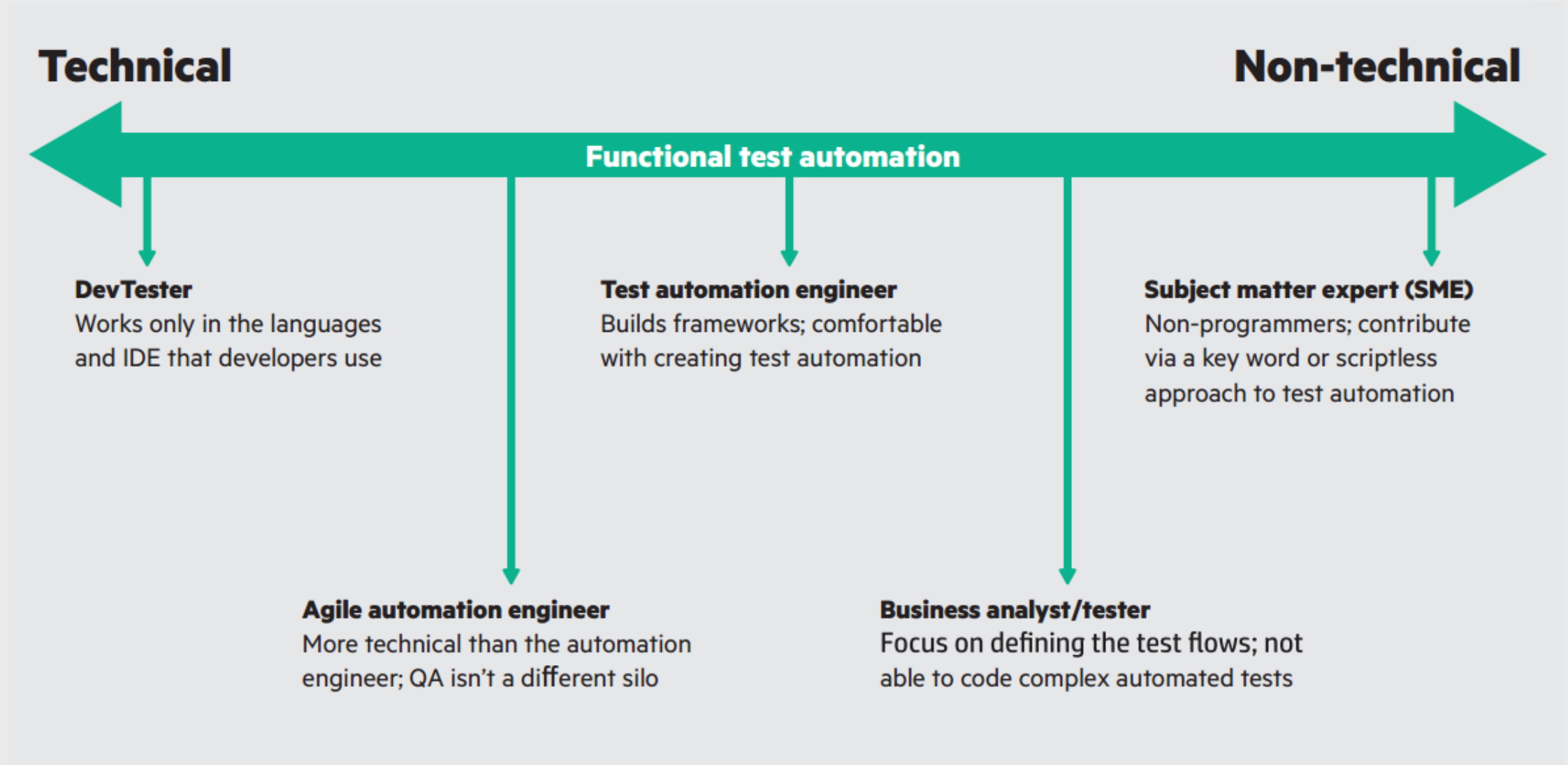
# Capability Maturity Model Integration



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# Test Automation

# Functional Test Automation



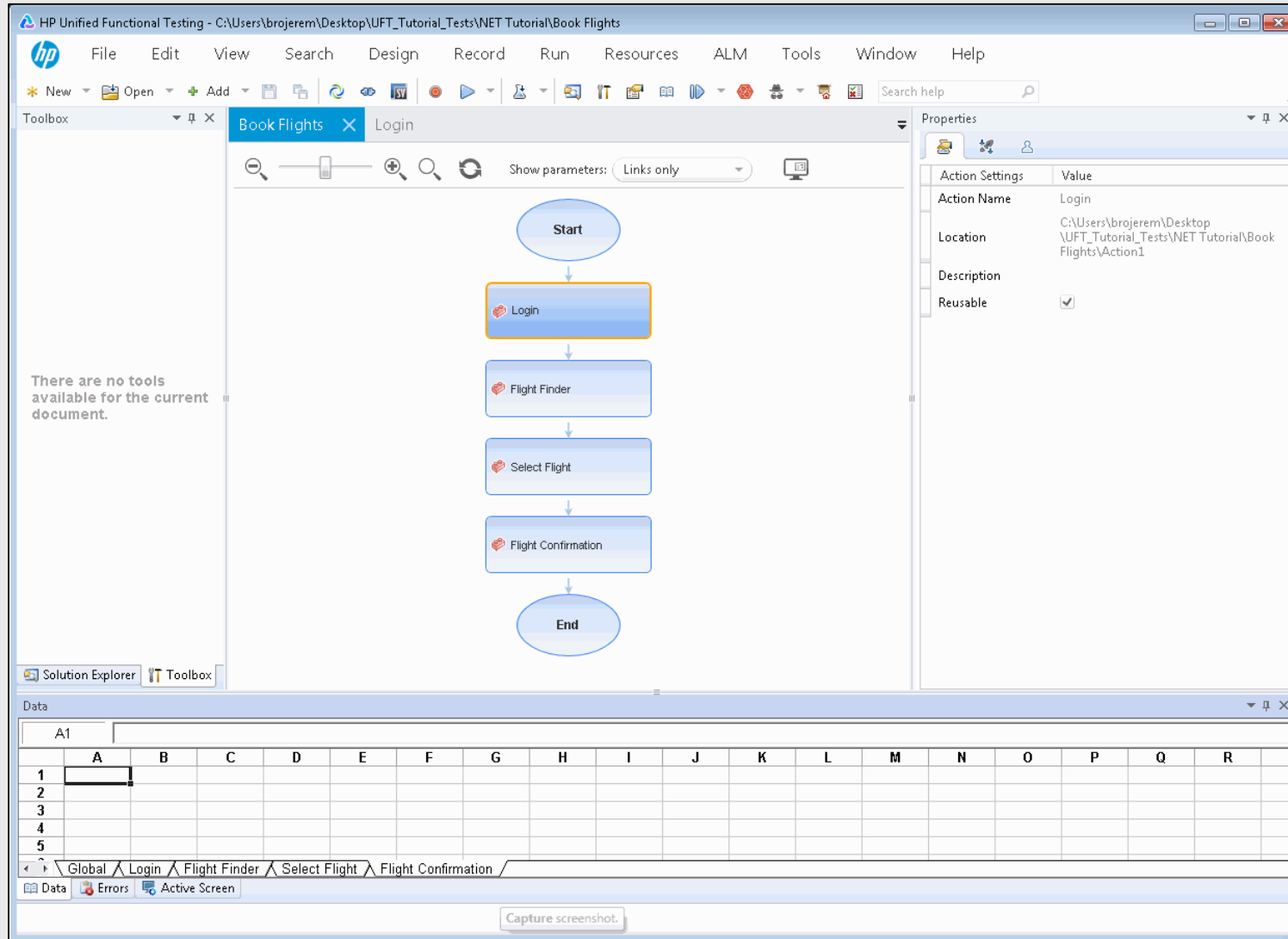
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# HPE Unified Functional Testing

UFT 12.5x

- Functional testing tool
- Specialized in GUI testing and out of the box API testing automation
- Integrates well with other HPE product

# UFT GUI Test



Some features:

- Test Flow
- Action Structure with Action Parameters
- Data-driven approach (Test iterations) with Data Tables
- Record and Replay
- Object Repositories and Object Spy
- Reusable components
- HPE product integration E.g.: ALM

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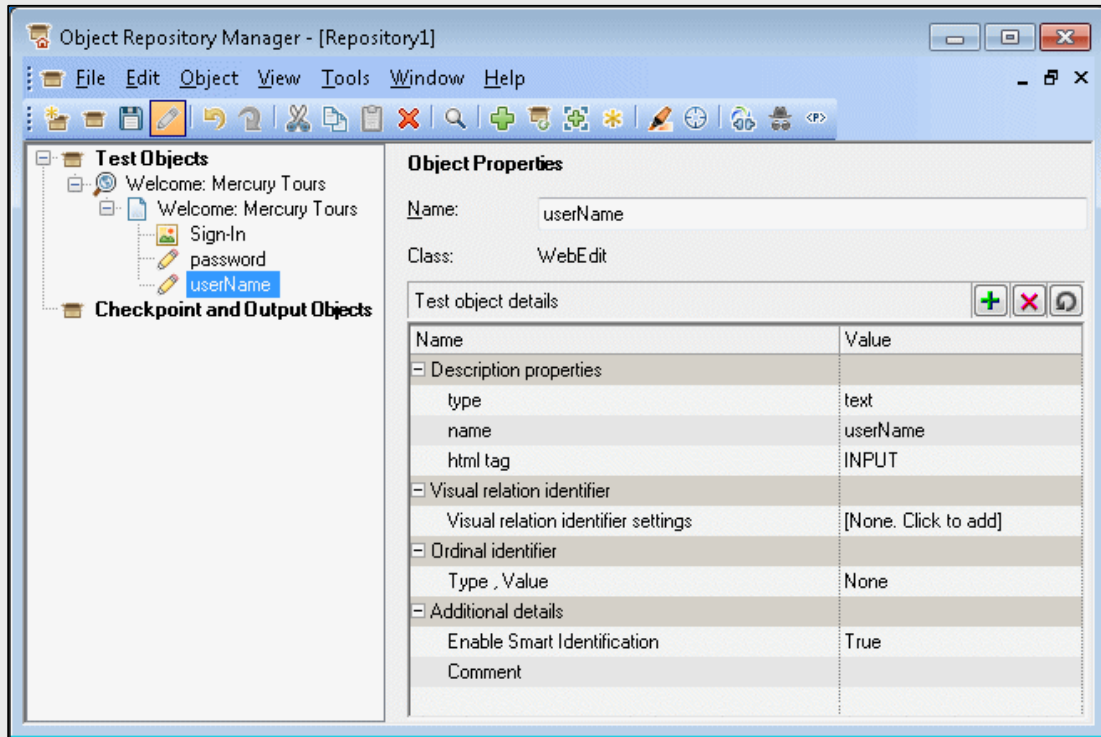
# UFT learns GUI objects

(GUI Test only)

- The default GUI Test development workflow steps are:
  - Record, Replay and Enhance
- UFT creates an Object Model when it learns GUI elements
- Object identification is done by properties:
  - Mandatory properties E.g.: Object Class Type, unique name, unique ID
  - Assistive properties
  - Optional ordinal identifiers

# UFT GUI Test: Test Object Properties

(GUI Test only)



- UFT creates an Object Model
- Test Objects are stored in Object Repositories (OR)
- Object Identification properties can be:
  - Mandatory properties
  - Assistive properties
  - Optional ordinal identifiers



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# UFT GUI Test: Descriptive Test Object identification

(GUI Test only)

- **Static.** You list the set of properties and values that describe the object directly in a VBScript statement.

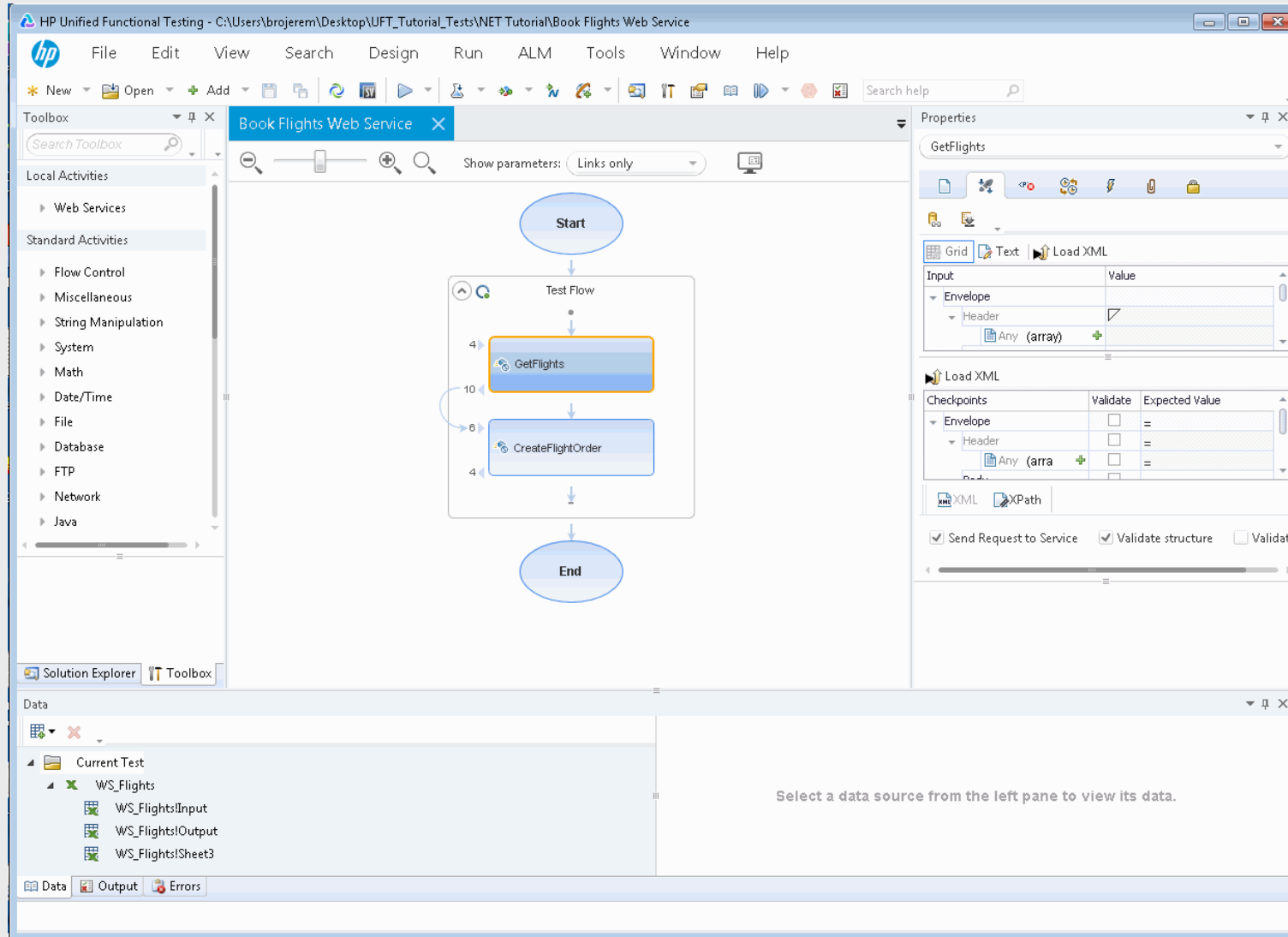
Format: **property:=value** pair E.g.:

Browser("Mercury Tours").Page("Mercury Tours").WebEdit ("*Name:=Author*", "*Index:=3*").Set "Mark Twain"

- **Dynamic.** Basically you create a Properties collection object. This object is used for identification during test run.



# UFT API Test



- Test Flow is designed on the canvas
- Standard Activities
- Custom Activities, Custom Code (C#)
- Activity Parameters
- Activity Checkpoints
- Data-driven approach
- Built in Result
- HPE Software integration

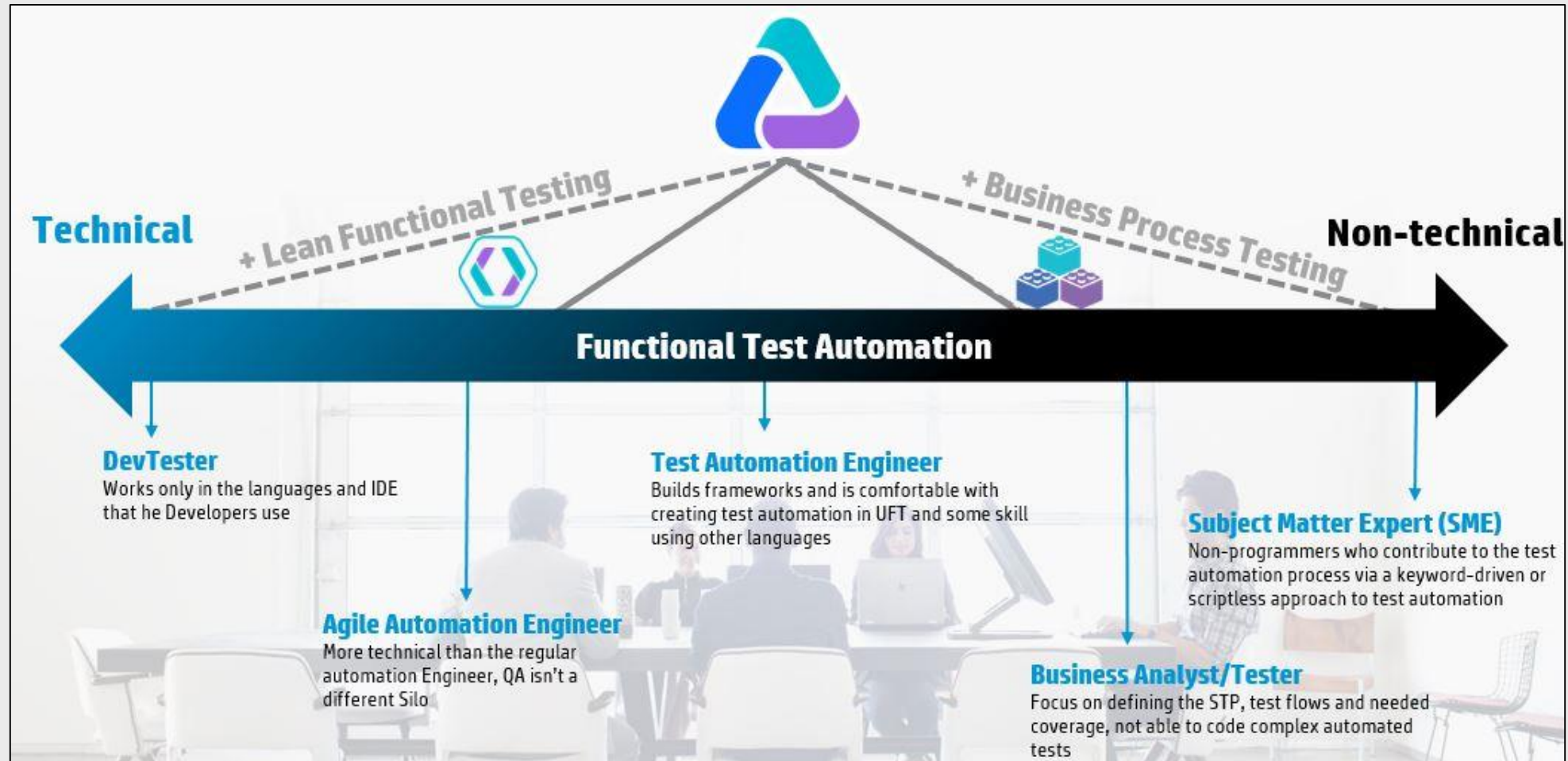
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# UFT GUI Test mini demo

Scope:

- Object Spy
- Record and Replay

# Testing with UFT engine



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# IDE level QA testing

## Acceptance Test Driven Development (ATDD)

- A more technical approach
- The tests are visible in the IDE
- Development is verified by automated test that are implemented in the IDE
- E.g.:
  - ATDD with Cucumber framework based Gherkin tests
    - Information: <https://cucumber.io/docs/reference>
    - Visual Studio integrated solution: <http://www.specflow.org/>

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## Mini SpecFlow demo

- Show where Gherkin test specifications appear in Visual Studio
- Show where the automation code of the tests appears
- Show what is the test target

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# HPE Lean Functional Testing (LeanFT)

IDE level testing with the UFT engine



- HPE Lean Functional Testing (LeanFT) is a powerful and lightweight functional testing solution built specifically for continuous testing and continuous integration.
- LeanFT integrates the UFT Runtime Engine with supported IDEs. It allows the developers to create and run GUI tests in their IDE, e.g.: Visual Studio.

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# Testing frameworks

Lets step back for a moment

















What do we need for testing?

- Store test
- Configure tests
- Run tests
- Store and analyze run results
- Store requirements
- Build test coverage
- etc.



# HPE Application Lifecycle Management

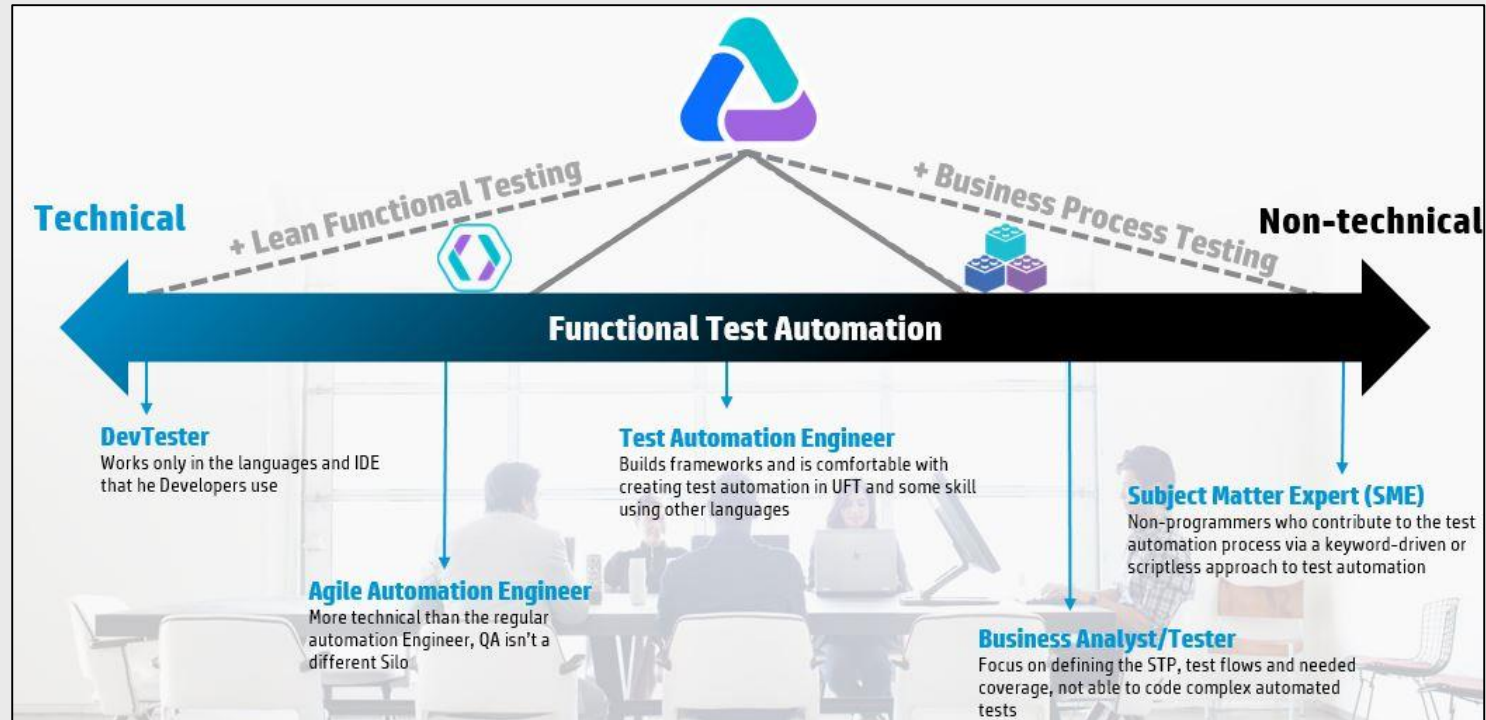
## HP ALM framework

 Dashboard	⌵
 Management	⌵
 Requirements	⌵
 Cloud Settings	⌵
 Testing	⌵
 Test Resources	
 Business Components	
 Test Plan	
 Test Lab	
 Build Verification	
 Timeslots	
 Test Runs	
 Lab Resources	⌵
 Defects	
 Performance Center	⌵
 Development	⌵

- ALM is a complex lifecycle management framework where you can handle defects, releases, build, manual and automated tests, analyze progresses, make logical links, etc.
- The ALM framework has several abilities, including testing framework capabilities
- You can store, configure and run automated tests and its test data in ALM
- Business Process Models can be imported into ALM
- Automated tests can be linked to requirements and BPM paths
- UFT can build an ALM connection. These tools can work in an integrated way.

# Business Process Testing (BPT)

A more non-technical level approach



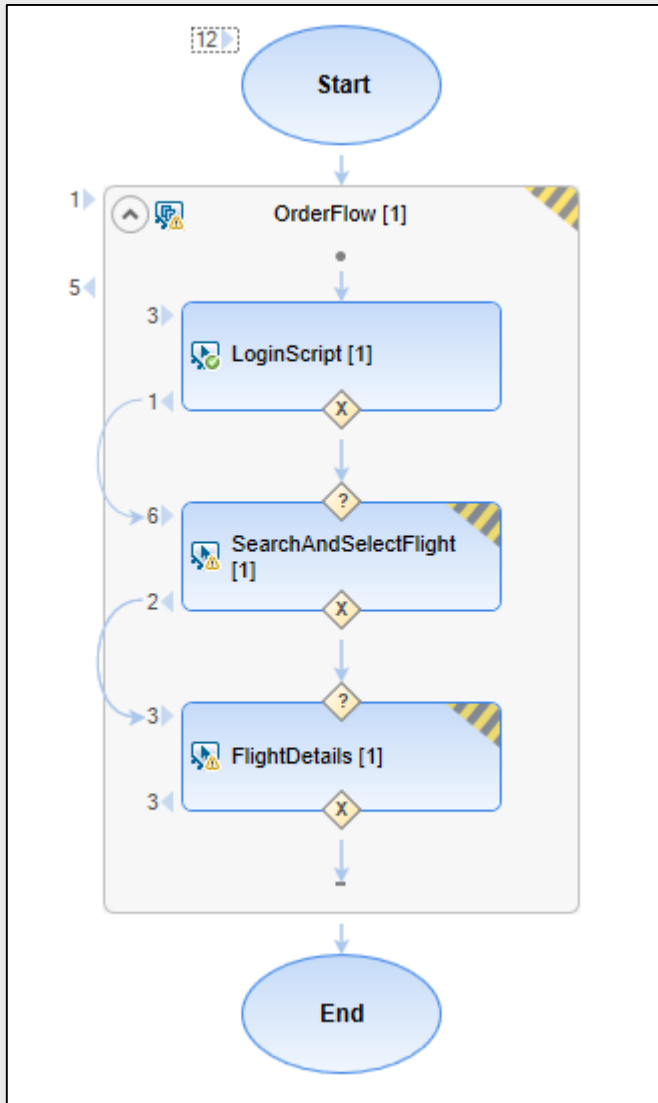
- The design is usually based on Business Process Models
- It is a Business Component and Flow based implementation

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# Business Processes

- The ability to so successfully execute a business process is mandatory in complex, integrated systems
- Processes can be modelled with BPM tools
- BPM models can be stored in ALM
- BPM Components and BPM Paths can be test automated with the Business Process Testing framework

# Business Process Testing with UFT and ALM



- With BPT we can build:
  - Business Components
  - Flows (contains components)
  - Business Process Tests (contains flows and components)
- BPT components can be parameterized and chained
- It is a modular, components based framework that supports business process testing (both GUI and API components are available)

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# HPE LoadRunner

Performance testing with LoadRunner 12.5x

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# LoadRunner main components

## VuGen

- Captures end-user business processes and creates an automated performance testing script, also known as a Vuser script.

## Controller

- Organizes, drives, manages, and monitors the load test.

## Analysis

- Helps you view, dissect, and compare the results of the load tests.

# General LoadRunner workflow

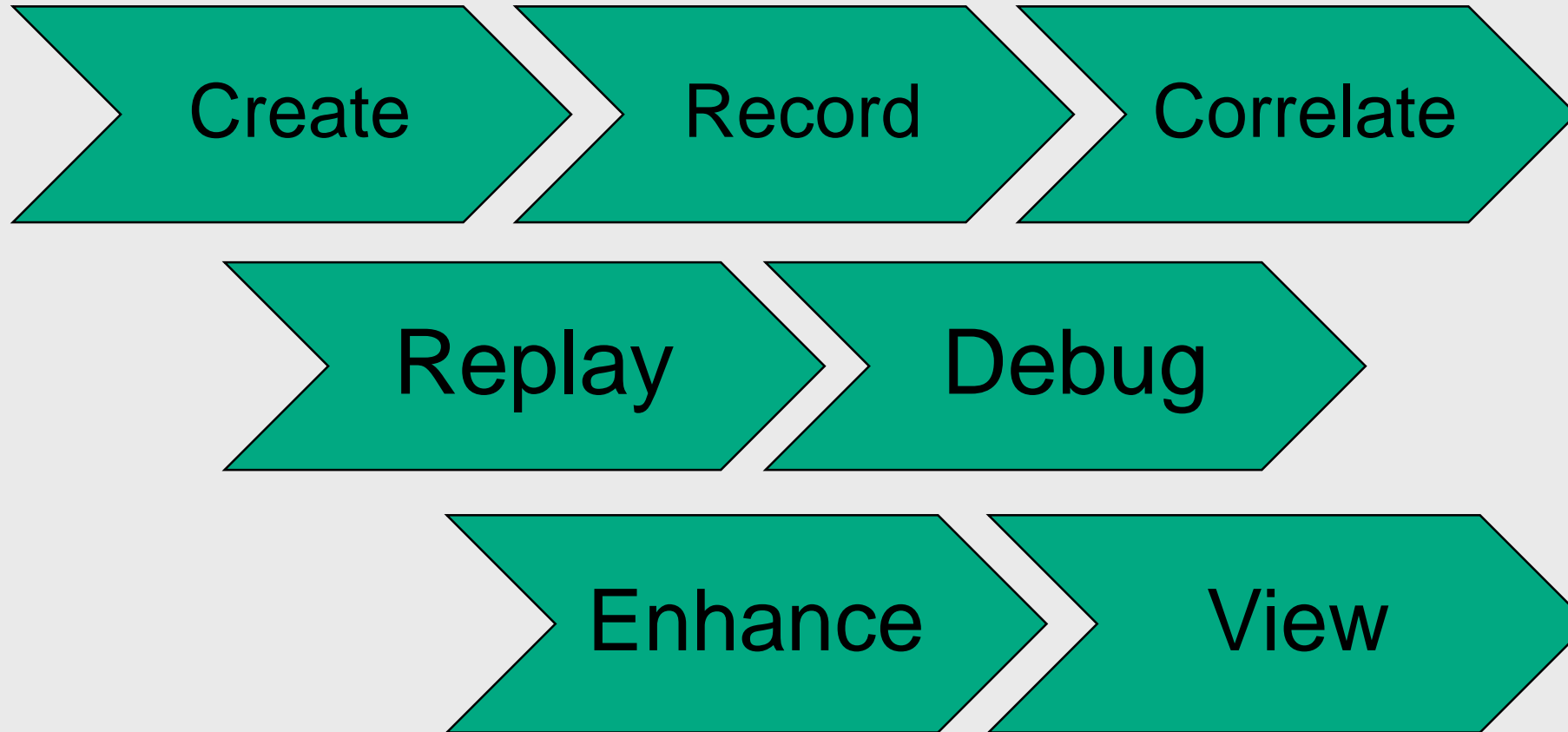


- Coding, modeling
- Unit Testing

- Performing multithreaded tests (design and run)
- Saving run results

- Evaluating and comparing results

# VuGen Workflow





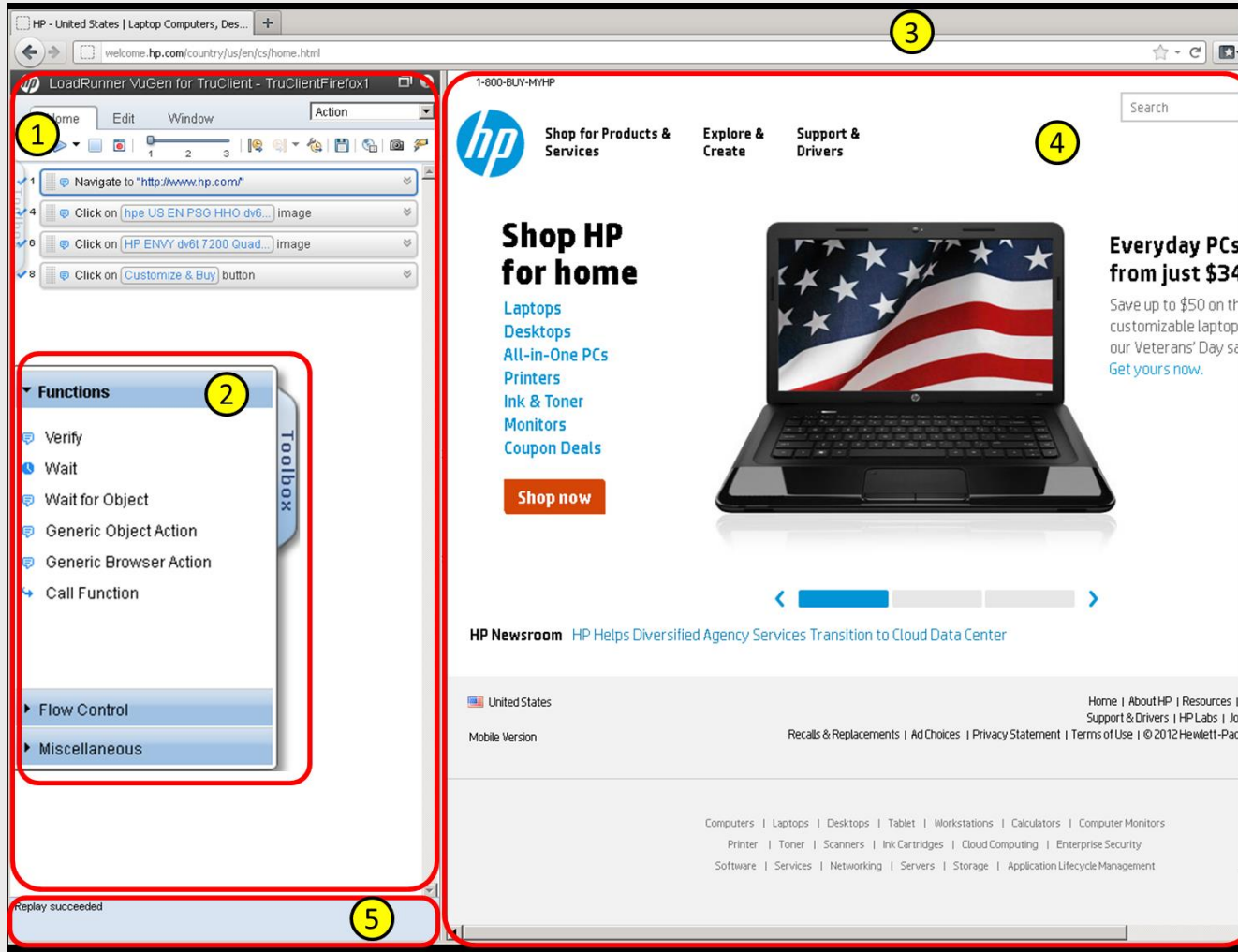
# VuGen web protocol example

```
//Extract dynamic URL from triggered Response to handle redirection and further parameter parts
web_reg_save_param("RedirectedURL",
    "LB=Location:",
    "RB=\r\n",
    "Ord=2",
    "Search=Headers",
    LAST);

web_submit_data("queriesMain.jsp",
    "Action=http://{TargetURLPart}/queries/queriesMain.jsp",
    "Method=POST",
    "RecContentType=text/html",
    "Referer=http://{TargetURLPart}/UamsForms/LoginForm.jsp?APP_ID=RM&target=http://{TargetURLPart}/queries/queriesMain.jsp",
    "Snapshot=t9.inf",
    "Mode=HTTP",
    ITEMDATA,
    "Name=USERNAME", "Value=vfh{EnvNo}", ENDITEM,
    "Name=PASSWORD", "Value=amdocs{EnvNo}", ENDITEM,
    "Name=APP_ID", "Value=RM", ENDITEM,
    "Name=target", "Value=http://{TargetURLPart}/queries/queriesMain.jsp", ENDITEM,
    "Name=x", "Value=31", ENDITEM,
    "Name=y", "Value=9", ENDITEM,
    LAST);
```

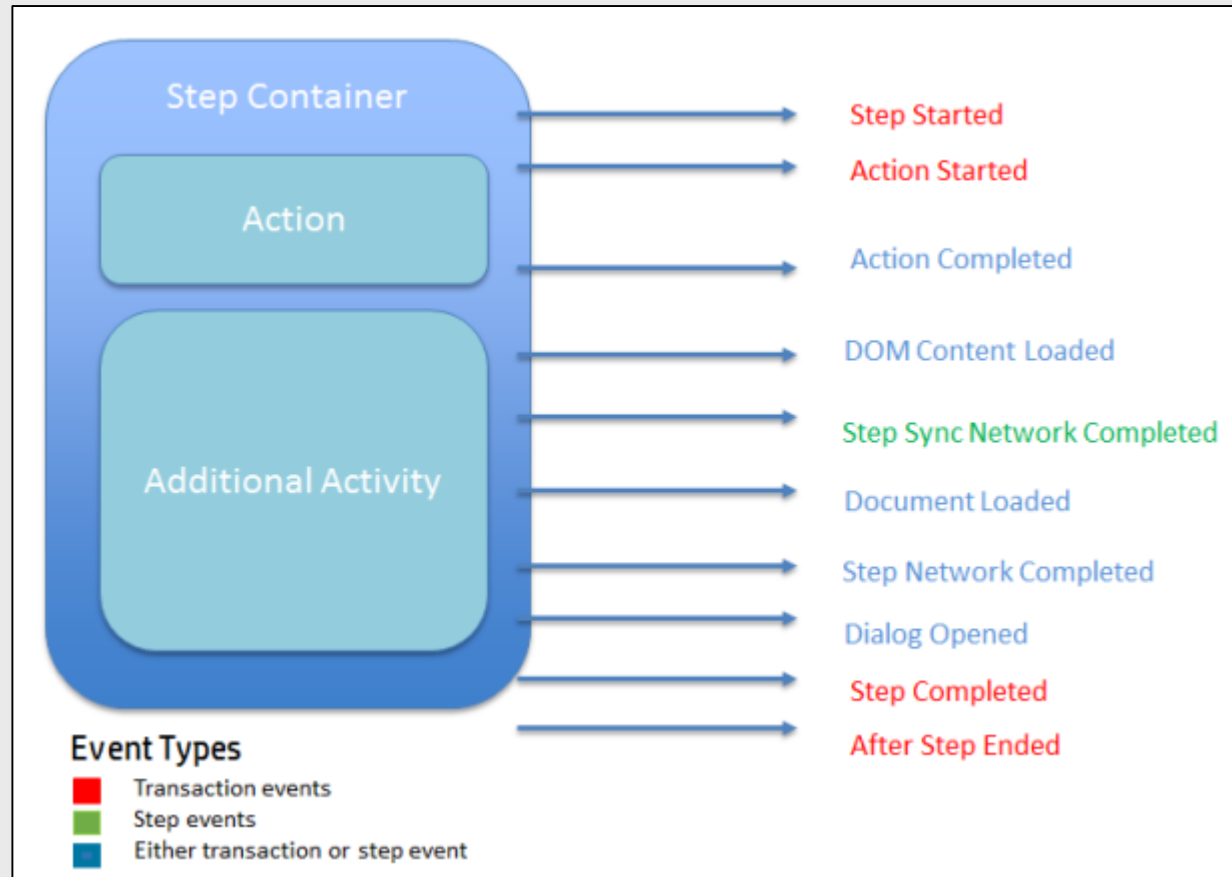


# VuGen TruClient example



- Main features:
  - Record and Replay
  - Modelling interaction with Toolbox Activities
  - JavaScript coding options
  - Supports wide range of parametrization
  - Conceals complex coding challenges
- Main components:
  1. TruClient Development Window
  2. Toolbox
  3. Browser Navigation Bar
  4. Application Browser Window inside VuGen
  5. Development Windows Status Pane

# VuGen TruClient example



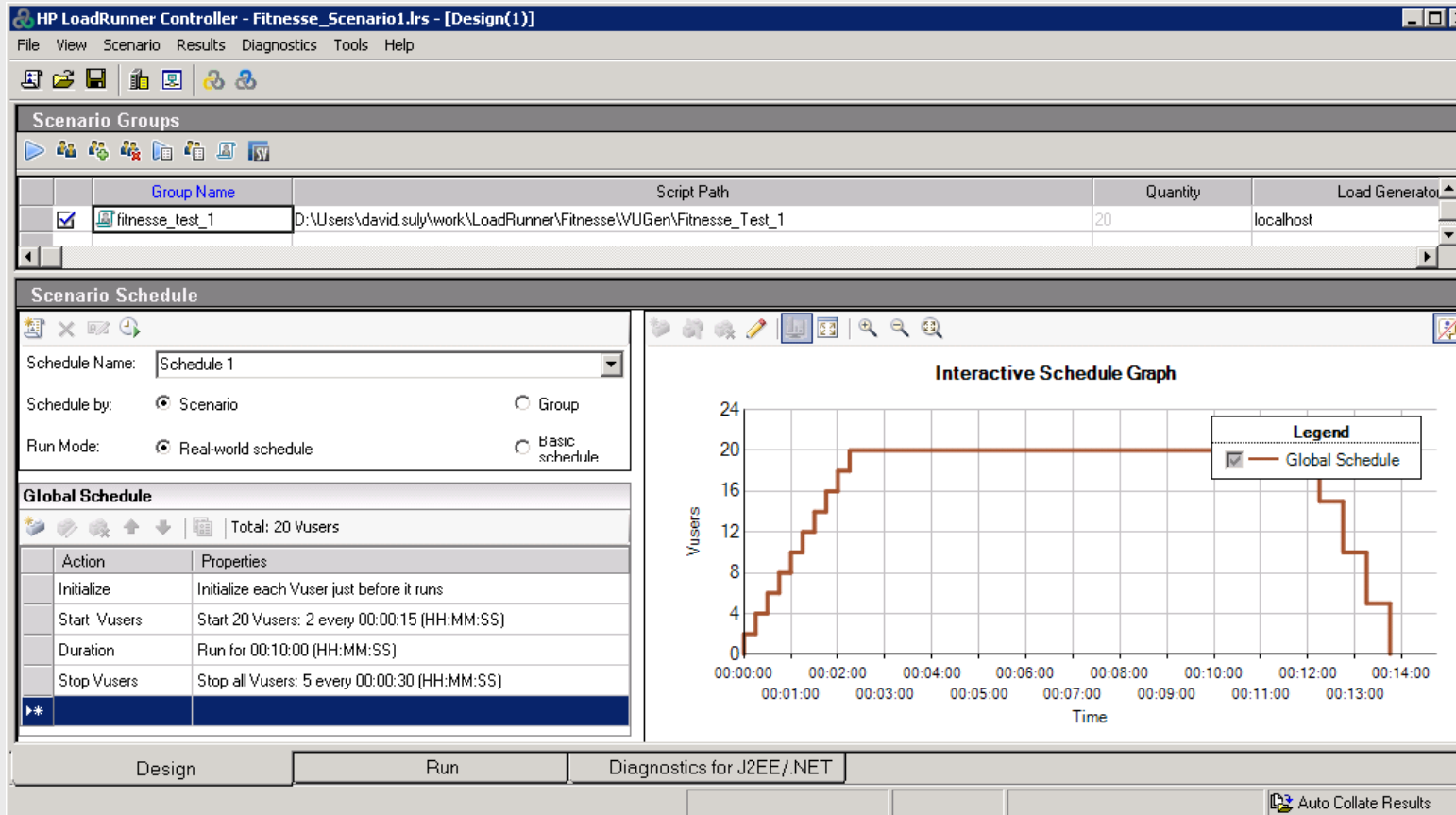
–TruClient Steps are basically collections of well configured events and expectations

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# LoadRunner Transactions

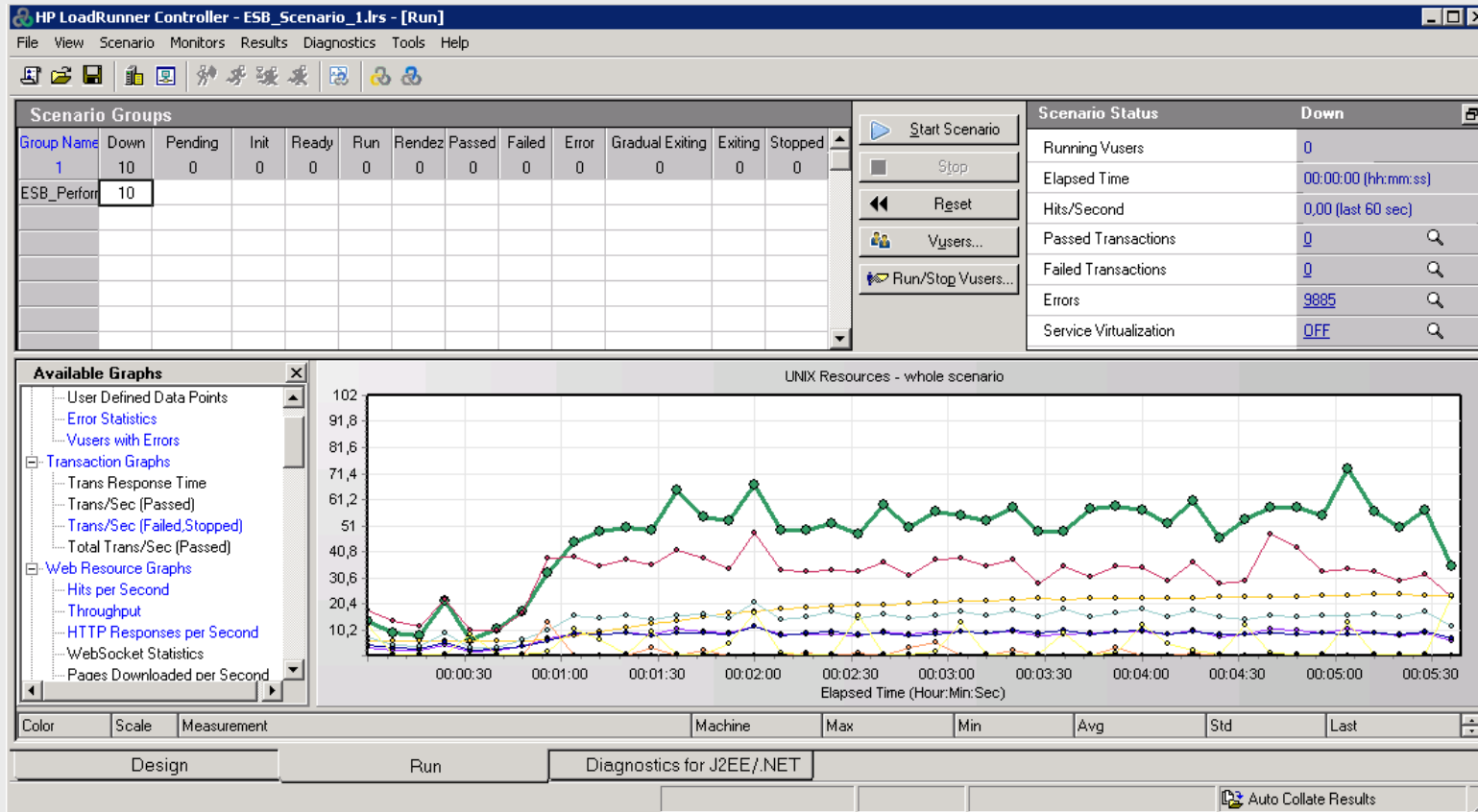
- LoadRunner Transactions are logical blocks defined by the developer
- Transactions have duration and status (PASS, FAIL)
- Response times are measured with transaction time calculations
- Load KPIs are defined by the number of occurring transactions and other metrics.  
E.g.:
  - Hit/sec
  - Passed transaction/sec
  - Failed transaction/sec
  - Calculated correlation between the number of transactions and the server resource usage

# Controller: Design



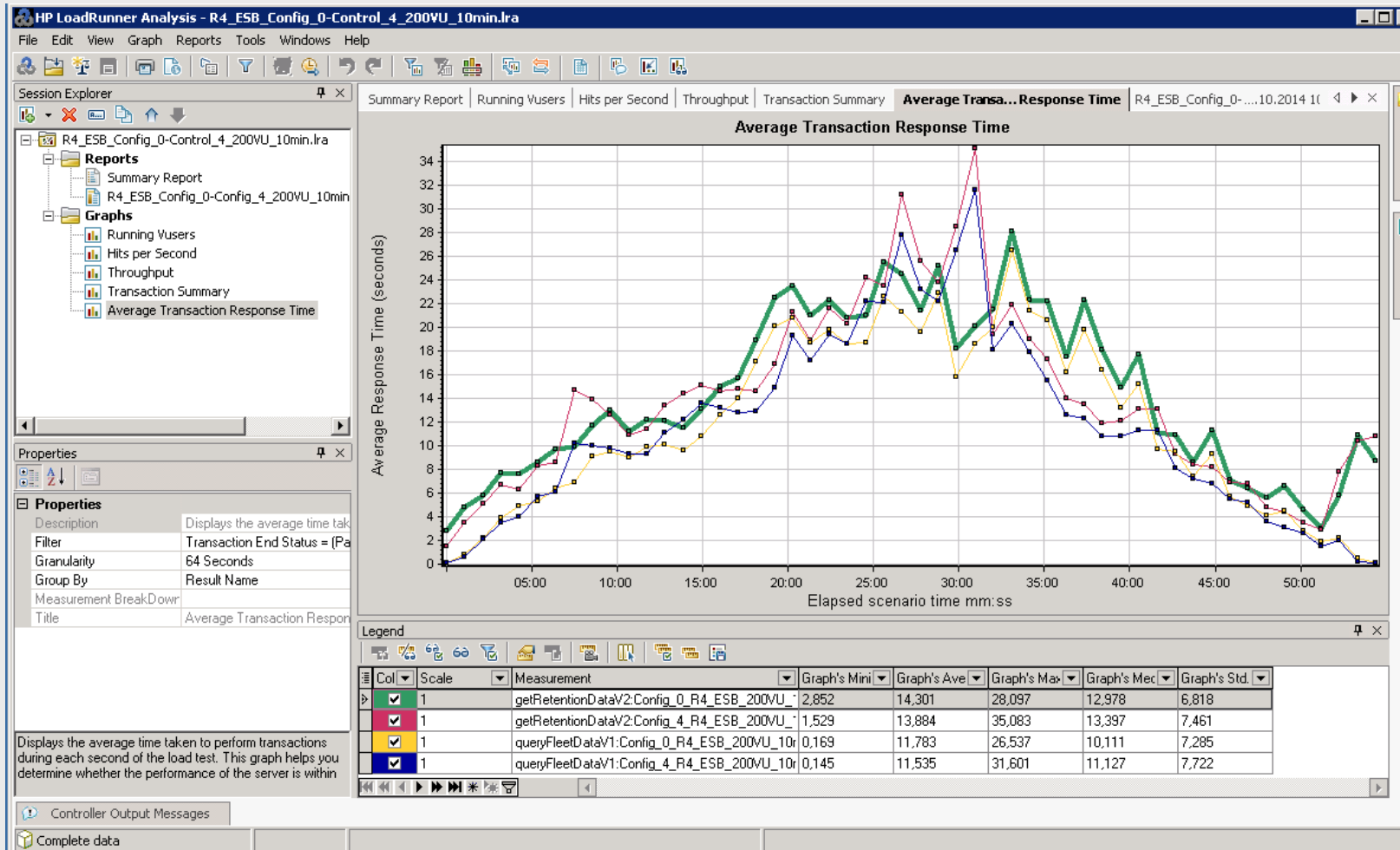
- Creating performance profile
- Setting concurrent VUsers
- Setting ramp up logic
- Selecting VuGen scripts
- Selecting LoadGenerators

# Controller: Run



- Start, stop Scenario
- Runtime monitoring
  - KPI: response times, transaction numbers
  - Error messages
- Interacting with test
  - Changing VUsers during test

# Analisis



- Evaluating results
- Cross result evaluation
- Looking for correlations
- Automatic compare
- Selecting graphs
- Generating template based reports

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# Summary

- Automation in general is mandatory in the 21'st century. Relying only on manual testing or forsaking QA testing can lead to inappropriate quality.
- HP and HPE have complex tools and solutions supporting test automation. Professional tools and frameworks are essential for success through the enterprise. It is important to chose them well.
- It is also important to chose the right tool for your business. Enterprise level tools and solution might not be good choices for small businesses.



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# Sources

Product documentation (public):

- <http://uft-help.saas.hpe.com/>
- <http://leanft-help.saas.hpe.com/>
- <http://lrhelp.saas.hpe.com/>
- <http://alm-help.saas.hpe.com/>

Downloads:

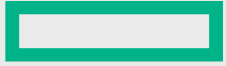
- HPE UFT Demo version: <http://www8.hp.com/in/en/software-solutions/unified-functional-automated-testing/>
- HPE LoadRunner: <http://www8.hp.com/uk/en/software-solutions/loadrunner-load-testing/try-now.html>
- HPE ALM Trials: <http://www8.hp.com/uk/en/software-solutions/alm-software-development-testing/try-now.html>
- ALM Business Process Testing time limited demo license is available from HPE license partners



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# HPE Open positions

–Search for Budapest, Hungary: <http://careers.hpe.com/>



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**Thank you**

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