Testing Strategy Document

# Version Control

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| --- | --- | --- | --- |
| Version (v) | Date | Sprint | Changes |
| 0.1 | 27-02-2023 | 0 | Initial Testing Strategy |
| 0.2 | 02-03-2023 | 0 | Quality Assurance and Testing Overview |
| 0.3 | 09-03-2023 | 1 | Base for PRA, Test Strategy and Test Cases |
| 1.0 | 16-03-2023 /  20-03-2023 | 1 | First draft for Product Risk Analysis, Test Strategy, Logic Test Cases and Physical Test Cases |
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# Overview of Tests

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| Type | Purpose | Where |
| Unit Test | testing individual methods and functions of the classes, components, or modules used by your software. | * CI/CD Server * Precommit |
| Integration Test | Testing microservices and database to see if they work with one another. | * Manual |
| Functional Test | Integration test but expecting a result (technically a unit test). | * CI/CD Server * Precommit |
| End-to-end Test | Replicate user behavior and expect output. | * Manual |
| Performance Test | Measuring speed and reliability of components of the application. | * Manual |
| Smoke Test | Basic tests that check the basic functionality of an application. | * Post Build CI/CD Server |

# Product Risk Analysis

This chapter describes the product risk analysis for the project. Each functional and non-functional requirement will be graded based on the chance for the action to fail (Failure Mode) and the impact of the damage (Damage) if it were to fail.

The Risk Number is equal to “Damage \* Failure Mode’. The Risk priority class then is based off the Risk number.  
Damage: 1 = Low, 2 = Medium, 3 = High  
Failure Mode: 1 = Low, 2 = Medium, 3 = High  
Risk Number: Damage \* Failure Mode  
Risk Priority C: Risk Number ≤ 2  
Risk Priority B: 2 < Risk Number ≤ 6  
Risk Priority A: Risk Number > 6

The higher the Risk Priority, the heavier the testing strategy will need to be.

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| **Test Goal** | **Damage** | **Failure Mode** | **Risk Number** | **Risk Priority** |
| FR-01 | **3** | **2** | **6** | **B** |
| FR-02 | **2** | **2** | **4** | **B** |
| FR-03 | **1** | **1** | **1** | **C** |
| FR-04 | **2** | **2** | **4** | **B** |
| FR-05 | **2** | **1** | **2** | **C** |
| FR-06 | **1** | **1** | **1** | **C** |
| FR-07 | **3** | **2** | **6** | **B** |
| FR-08 | **1** | **2** | **2** | **C** |
| FR-09 | **1** | **1** | **1** | **C** |
| NFR-01 | **1** | **2** | **2** | **C** |
| NFR-02 | **-** | **-** | **-** | **-** |
| NFR-03 | **-** | **-** | **-** | **-** |
| NFR-04 | **-** | **-** | **-** | **-** |
| NFR-05 | **-** | **-** | **-** | **-** |
| NFR-06 | **1** | **1** | **1** | **C** |

Non-Functional Requirement 02 – 05 are not tested in the same way that the other requirements are. Instead, their requirements will be integrated into the pipeline, where it will check whether these requirements are fulfilled.

# Test Strategy

This chapter will define the test strategies for each Test goals. The severity of the testing will be based on the Product Risk Analysis. Requirements with an ‘A’ need at least one set of heavy testing, ‘B’ requires one set of Medium testing and ‘C’ at least one set of low level testing.

PRA-RP Risk Priority from the Product Risk Analysis (PRA)  
UT Unit Test  
IT Integration Test  
FT Functional Test  
E2E End-to-End Test  
PT Performance Test  
ST Smoke Test  
□ Limited/low level testing needed  
□□ Medium testing needed  
□□□ Heavy testing needed

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| **Test Goal** | **PRA-RP** | **UT** | **IT** | **FT** | **E2E** | **PT** | **ST** |
| FR-01 | B | - | - | - | - | - | - |
| - Total | - | □□ | □□ |  |  |  |  |
| Functionality | - | □□ | □□ |  |  |  |  |
| User Friendliness | - |  |  |  |  |  |  |
| Security | - |  |  |  |  |  |  |

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| **Test Goal** | **PRA-RP** | **UT** | **IT** | **FT** | **E2E** | **PT** | **ST** |
| FR-02 | B | - | - | - | - | - | - |
| - Total | - |  |  |  | □□ | □□ |  |
| Functionality | - |  |  |  |  | □□ |  |
| User Friendliness | - |  |  |  | □□ |  |  |
| Security | - |  |  |  |  |  |  |

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| **Test Goal** | **PRA-RP** | **UT** | **IT** | **FT** | **E2E** | **PT** | **ST** |
| FR-03 | C | - | - | - | - | - | - |
| - Total | - | □ |  |  | □□ |  |  |
| Functionality | - | □ |  |  | □ |  |  |
| User Friendliness | - |  |  |  | □ |  |  |
| Security | - |  |  |  |  |  |  |

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| **Test Goal** | **PRA-RP** | **UT** | **IT** | **FT** | **E2E** | **PT** | **ST** |
| FR-04 | B | - | - | - | - | - | - |
| - Total | - | □□ |  |  | □□□ | □□ |  |
| Functionality | - | □□ |  |  | □□ |  |  |
| User Friendliness | - |  |  |  | □ |  |  |
| Security | - |  |  |  |  | □□ |  |

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| **Test Goal** | **PRA-RP** | **UT** | **IT** | **FT** | **E2E** | **PT** | **ST** |
| FR-05 | C | - | - | - | - | - | - |
| - Total | - | □ |  |  | □ |  |  |
| Functionality | - | □ |  |  | □ |  |  |
| User Friendliness | - |  |  |  | □ |  |  |
| Security | - |  |  |  |  |  |  |

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| **Test Goal** | **PRA-RP** | **UT** | **IT** | **FT** | **E2E** | **PT** | **ST** |
| FR-06 | C | - | - | - | - | - | - |
| - Total | - | □ |  |  | □ | □ |  |
| Functionality | - | □ |  |  | □ |  |  |
| User Friendliness | - |  |  |  |  | □ |  |
| Security | - |  |  |  |  |  |  |

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| **Test Goal** | **PRA-RP** | **UT** | **IT** | **FT** | **E2E** | **PT** | **ST** |
| FR-07 | B | - | - | - | - | - | - |
| - Total | - |  |  |  | □□ | □□ |  |
| Functionality | - |  |  |  |  | □□ |  |
| User Friendliness | - |  |  |  | □□ |  |  |
| Security | - |  |  |  |  |  |  |

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| **Test Goal** | **PRA-RP** | **UT** | **IT** | **FT** | **E2E** | **PT** | **ST** |
| FR-08 | C | - | - | - | - | - | - |
| - Total | - | □□ |  |  |  |  |  |
| Functionality | - | □ |  |  |  |  |  |
| User Friendliness | - | □ |  |  |  |  |  |
| Security | - |  |  |  |  |  |  |

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| **Test Goal** | **PRA-RP** | **UT** | **IT** | **FT** | **E2E** | **PT** | **ST** |
| FR-09 | C | - | - | - | - | - | - |
| - Total | - | □ |  |  | □□ |  |  |
| Functionality | - | □ |  |  | □ |  |  |
| User Friendliness | - |  |  |  | □ |  |  |
| Security | - |  |  |  |  |  |  |

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| **Test Goal** | **PRA-RP** | **UT** | **IT** | **FT** | **E2E** | **PT** | **ST** |
| NFR-01 | C | - | - | - | - | - | - |
| - Total | - |  | □ |  | □ | □□ |  |
| Functionality | - |  | □ |  | □ | □□ |  |
| User Friendliness | - |  |  |  |  |  |  |
| Security | - |  |  |  |  |  |  |

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| **Test Goal** | **PRA-RP** | **UT** | **IT** | **FT** | **E2E** | **PT** | **ST** |
| NFR-06 | C | - | - | - | - | - | - |
| - Total | - | □ |  |  | □ |  |  |
| Functionality | - | □ |  |  |  |  |  |
| User Friendliness | - |  |  |  | □ |  |  |
| Security | - |  |  |  |  |  |  |

# Logic Testcases

This chapter describes the test cases, which are derived from the requirements within the analysis document. These describe in short what sort of tests will be used.

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| --- | --- | --- |
| **ID** | **Test Goal** | **Description** |
| TC-01 | **FR-01** | Send data to MATLAB |
| TC-02 | **FR-01** | Receive data from MATLAB |
| TC-03 | **FR-07 & NFR-01** | User sends new values to server to have displayed (button) |
| TC-04 | **FR-07 & NFR-01** | User sends new values to server to have displayed (automatic) |
| TC-05 | **FR-02** | ? |
| TC-06 | **FR-06** | Load template scenario |
| TC-07 | **FR-03** | Load random scenario |
| TC-08 | **FR-05** | Export generated values & results into files |
| TC-09 | **FR-04** | Import previously generated file into app |
| TC-10 | **FR-08** | Show history lines |
| TC-11 | **NFR-06** | Change language |
| TC-12 | **FR-09** | Open the manual (In case of it being a different page) |
| TC-13 | **FR-09** | Download the manual (In case of it being a downloadable file) |

# Physical Test Cases

This chapter contains the physical test cases. These are derived from their logic test cases and describe all possible outcomes that need to be tested per logic test case. If part of the description requires a specific way of providing information that is not literal, this information will be displayed in **bold lettering**.

|  |  |
| --- | --- |
| **ID** | **Description** |
| **TC-01 (BE)** | **Requirements:** MATLAB (container) is available  **Actions:** Back-end sends data to MATLAB  **Expected result:** *Success* |
| TC-01.01 | **Requirements:** MATLAB (container) is not available  **Actions:** Back-end tries to send data to MATLAB  **Expected result:** Error: MATLAB is not available |
| TC-01.02 | **Actions:** Back-end sends invalid datatypes to MATLAB  **Expected result:** Error: Datatype X invalid |
| TC-01.03 | **Actions:** Back-end sends value out of scope to MATLAB  **Expected result:** Error: Data X out of scope |
| **TC-02 (BE)** | **Requirements:** MATLAB (container) is available  TC-01 has been executed  **Actions:** Back-end receives proper data from MATLAB  **Expected result:** *Success* |
| **TC-03 (FE)** | **Requirements:** User is on the main page  **Actions:** - User changes X value  - Select ‘**submit**’  **Expected result:** *Success:*  (Only changed values are sent?)  Data is submitted and results are shown within [**Y**] seconds |
| TC-03.01 | **Actions:** - User changes nothing  - Select ‘**submit**’  **Expected result:** Nothing is sent. Perhaps message “no values were changed”? |
| TC-03.02 | **Actions:** - User (somehow) changes value to out-of-scope value  - Select ‘**submit**’  **Expected result:** Nothing is sent. Value shows it is invalid. |
| **TC-04 (FE)** | **Requirements:** User is on the main page  **Actions:** - User changes X value  - User does not change anything for [**X**] seconds  **Expected result:** *Success:*  (Only changed values are sent?)  Data is submitted and results are shown within [**Y**] seconds |
| TC-04.01 | **Actions:** - User (somehow) changes value to out-of-scope value  **Expected result:** Nothing is sent. Value shows it is invalid. |
| **TC-05 (FE)** | **Requirements:** …  **Actions:** …  **Expected result:** … |
| **TC-06 (FE)** | **Requirements:** - User is on the main page  - User has not selected the wanted template scenario  **Actions:** - User selects a template scenario  **Expected result:** *Success:*  The template scenario data is shown without needing to connect to MATLAB. Said template option will be highlighted to indicate it is currently showing.  Any history lines will be removed. |
| TC-06.01 | **Requirements:** - User is on the main page  - User has already selected the wanted template scenario  **Actions:** - User selects the already selected scenario  **Expected result:** Nothing happens, no need to pull anything from anywhere |
| **TC-07 (FE)** | **Requirements:** - User is on the main page  - User has not selected any scenario’s  **Actions:** - User selects ‘random scenario’  **Expected result:** *Success:*  One of the pre-set randomly scenario’s is pulled and displayed without needing to connect to MATLAB.  If this is one of the template scenario’s, it will be highlighted as well.  Any history lines will be removed. |
| TC-07.01 | **Requirements:** - User is on the main page  - User has a pre-set random scenario selected  **Actions:** - User selects ‘random scenario’  **Expected result:** *Success:*  One of the pre-set randomly scenario’s is pulled and displayed without needing to connect to MATLAB. This Scenario will never be the one that was already showing. |
| TC-07.02 | **Requirements:** **TC-07.01** has been successfully executed once.  **Actions:** - User selects ‘random scenario’  **Expected result:** *Success:*  One of the pre-set randomly scenario’s is pulled and displayed without needing to connect to MATLAB. This Scenario will never be the one that was already showing *nor* will it be the scenario that showed before it. |
| TC-07.03 | **Requirements:** - User is on the main page  - User has a template scenario selected  **Actions:** - User selects ‘random scenario’  **Expected result:** *Success:*  One of the pre-set randomly scenario’s is pulled and displayed without needing to connect to MATLAB. This will never be the template that was already selected.  If it is one of other the template scenario’s, it will be highlighted as well. |
| **TC-08 (FE)** | **Requirements:** User has valid input and graphs shown on the page (**TC-03** / **TC-04**)  **Actions:** - User selects ‘Export’  - System displays window asking for save location and file name  - User inputs file name and location  - User confirms action  **Expected result:** *Success:*  The Input values and the graph data are saved to a file on the selected location |
| TC-08.01 | **Actions:** - User selects ‘Export’  - System displays window asking for save location and file name  - User cancels the action  **Expected result:** The window closes and nothing is saved or exported |
| TC-08.02 | **Actions:** - User selects ‘Export’  - System displays window asking for save location and file name  - User provides an invalid file name, file extension or location  - User confirms action  **Expected result:** Nothing happens, as the provided data is not valid. Error message could be provided |
| **TC-09 (FE)** | **Requirements:** User has a valid importable file to select from their device  **Actions:** - User selects ‘Import’  - System displays a window asking to select a file from their device  - User selects the valid file  - User confirms action  **Expected result:** *Success:*  The input data and graphs will be shown on the page based on the imported file. It does not need to connect with MATLAB for this.  Any history lines will be removed. |
| TC-09.01 | **Actions:** - User selects ‘Import’  - System displays a window asking to select a file from their device  - User cancels the action  **Expected result:** The window closes and nothing is changed or imported |
| TC-09.02 | **Requirements:** User has an **invalid** file to select from their device: *wrong file extension*  **Actions:** - User selects ‘Import’  - System displays a window asking to select a file from their device  - User selects the invalid file  - User confirms action  **Expected result:** Nothing happens, as the provided file is not valid. Error message could be provided. |
| CT-09.03 | **Requirements:** User has an **valid** file with **incorrect/invalid** data in it to select from their device  **Actions:** - User selects ‘Import’  - System displays a window asking to select a file from their device  - User selects the invalid file  - User confirms action  **Expected result:** System tries to load in the data but fails to do so. Input values and graphs are not changed. Error message shows that the file cannot be read. |
| **TC-10** | **Requirements:** User has already made sure there is graph data showing (**TC-03** / **TC-04** / **TC-06** / **TC-07** / **TC-09**)  **Actions:** User changes input values of the existing graph (**TC-03** / **TC-04**)  **Expected result:** *Success:*  The main graphs are changed, but the graph of the past result is shown via a ghost/history line |
| TC-10.01 | **Requirements:** User has executed **TC-10**  **Actions:** Execute **TC-10** once again  **Expected result:** *Success:*  The main graphs are changed, but the graph of the past result is shown via a ghost/history line. The previously visible history line is removed. |
| **TC-11** | **Actions:** - User selects the language options  - User selects a different language than is currently used  **Expected result:** *Success:*  Language of the application is changed to the new language |
| **TC-12** | **Requirements:** User is on the main page  **Actions:** User selects the manual  **Expected result:** *Success:*  System directs the user to the manual page |
| TC-12r | **Requirements:** User has worked with graphs and inputs on the main page, then executed **TC-12**  **Actions:** User selects the main page  **Expected result:** *Success:*  System directs the user to the main page. All changes that were made previously are still shown, instead of the page being on its default. |
| **TC-13** | **Actions:** User selects download manual  **Expected result:** System downloads the manual to the devices downloads location |
|  | **Requirements:** …  **Actions:** …  **Expected result:** … |

# Quality Assurance

## Static Code Analysis

Static code analysis will be supported through our pipelines in all repositories containing source code. We will check for the following criteria:

* Bugs must be `0`
* Vulnerabilities must be `0`
* Code Smells must be `A` rating.
* Security Hotspot must be `A` rating.
* Code Coverage must be at least `60%`.
* Code duplications must be at least `A` rating.

## Definition of Done

A technical task must adhere to the following before being merged into master/release branches:

1. Passing Pipelines:
   1. Build Succeeded (no errors)
   2. Local Code Tests Passed (no errors, warnings allowed)
   3. Code Analysis Criteria Passed:
      1. 60% code coverage
2. The developer has assessed code responsible for the merge request.
3. Merge request has been reviewed and approved by at least one other developer not involved in the original development of the ticket.
4. Branch has been merged with parent branch.

Note that anything implemented or edited that previously had no documentation should be added to the wiki documentation.