Handover-Document

Flox Rox Visualisierungs Application



Verfasser/in

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# Vision & Goals

For all users of the FloX and RoX devices who collect data, the FRVA is a software that enables them to operate the devices and visualizes the data. Unlike in the existing processes, our product provides a graphical user interface to interact with the devices and the measurements.

# Requirements

1=must: required for initial, minimal release

2=should: implement after priority 1

3=could: implement if time allows

4=would, lower priority, may be scheduled for a later release outside of the scope of the current project

## Epic A Set up communication with Flox/Rox (Disconnected mode)

As a user of the application I would like to be able to connect my Linux-Computer with a FLOX/ROX device in order to gain information from the FLOX/ROX

Details of communication

Connection over Bluetooth (HC05 - various breakout boards)

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| --- | --- |
| ***User Story A1.001 adjust settings (bluetooth and serial) (5 SP)*** | ***Priority: 3*** |
| A user should be able to set the path of the library via the settings of the appliction. As user I want to switch between Looks for the application (High contrast vs Regular mode.) | |
| Author: P. Wigger | |
| Comment | |

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| --- | --- |
| ***User Story A1.002 Search and display available bluetooth devices (5SP)*** | ***Priority: 1*** |
| As a user of the application I want to be able to list all available bluetooth devices in my area. (Filtered for FloX RoX Devices) | |
| Author: P. Wigger | |
| Comment | |

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| --- | --- |
| ***User Story A1.003 Initiate connection over Bluetooth (8SP)*** | ***Priority: 1*** |
| As a user of the application I would like to initiate the connection-process to communicate with a FLOX/ROX. | |
| Author: P. Wigger | |
| Comment | |

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| --- | --- |
| ***User Story A1.004 Connection status (3SP)*** | ***Priority: 2*** |
| As a user of the application, I would like to be informed about the progress and status of the bluetooth-connection. | |
| Author: P. Wigger | |
| Comment | |

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| ***User Story A1.005 Communication over Bluetooth (8SP)*** | ***Priority: 1*** |
| As a user of the application, I would like to be able to send serial commands over the bluetooth-connection and receive serial data from the FLOX/ROX | |
| Author: P. Wigger | |
| Comment | |

## Epic B Statusview (connected mode)

As a User of the application I would like to get Information about the current status of the FLOX/ROX.

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| ***User Story B1.001 Status (13SP)*** | ***Priority: 2*** |
| As a user of the application I would like to see the following:  **always**  - current settings (integration time (man/automatic), time between measurements)  - GPS position (or an indicator that GPS is not available)  **before measurement-process (during automatic mode)**  - time until next measurement starts  **during  measurement-process**  - time until completion (progress bar)  - Current task (WR1, VEG, WR2, DC WR, DC VEG) | |
| Author: P. Wigger | |
| Comment | |

## Epic C Live view (connected mode)

As a user of the application I would like to see the data, the FLOX/ROX measured since I have been connected.

***Definition of term***

*preview-data: low resolution data sent to the computer during a measurement*

*measurement-outcome: the data sent to the computer after a measurement-process (measurement nr)*

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| ***User Story C1.001 Preview during measurement process (5SP)*** | ***Priority: 3*** |
| As a user of the application, I would like to be able to preview the measurement during the measuring process as “pseudo” (low resolution) live data. (Low resolution data will be discarded after view, only measurement outcome will be stored.) The measurements in the live view should be displayed as Radiance. | |
| Author: P. Wigger | |
| Comment | |

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| ***User Story C1.002 Store measurement-outcome after measurement process (5SP)*** | ***Priority: 1*** |
| As a user of the application, I would like to have stored all the past measurement outcomes (since I have been connected with the FLOX/ROX) on my computer. These data will be stored in the data format identical to the one produced by the FLOX/ROX system. Optionally with a start/stop record button. | |
| Author: P. Wigger | |
| Comment | |

## Epic D Device control (connected mode)

As a user of the application I would like to be able to control the FLOX/ROX device

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| ***User Story D1.001 Set integration time. (1SP)*** | ***Priority: 3*** |
| As a user of the application, I would like to set the integration time manually in order to make manual measurements. | |
| Author: P. Wigger | |
| Comment | |

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| ***User Story D1.002 Set integration max time (1SP)*** | ***Priority: 3*** |
| As a user of the application, I would like to set the integration max time. | |
| Author: P. Wigger | |
| Comment | |

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| ***User Story D1.003 Set interval time between measurements. (1SP)*** | ***Priority: 2*** |
| As a user of the application, I would like to set the time between measurements. | |
| Author: P. Wigger | |
| Comment | |

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| ***User Story D1.004 Set internal date and time (1SP)*** | ***Priority: 2*** |
| As a user of the application, I would like to set the date and time of the FLOX/ROX. | |
| Author: P. Wigger | |
| Comment | |

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| ***User Story D1.005 measure manually (1SP)*** | ***Priority: 1*** |
| As a user of the application, I want to start a manual measurement. | |
| Author: P. Wigger | |
| Comment | |

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| --- | --- |
| ***User Story D1.006 switch mode(1SP)*** | ***Priority: 1*** |
| As a user of the application, I want to switch from automatic mode to manual mode and vice versa. | |
| Author: P. Wigger | |
| Comment | |

## Epic E Data import (disconnected mode)

As a user of the application, I would like to transfer the content of the SD-card to my computer and manage the data import.

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| ***User Story E1.001 Import from SD-card (3SP)*** | ***Priority: 2*** |
| As a user of the application I would like to initiate the data-import from a mounted SD-card into the application. It should be possible to specify which datasets should be imported. Calibration data used by the selected datasets will also be imported, allowing to work with re-calibrated spectrometers, i.e. with calibration files changing over time. The time stamps to work out which calibration files apply to recorded data are contained in the calibration files. | |
| Author: P. Wigger | |
| Comment | |

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| ***User Story E1.002 Synchronisation of Data from SD Card and Data received via serial COM (3SP)*** | ***Priority: 4*** |
| As a user of the application I would like to synchronise the Data from SD Card and Data received via serial COM to avoid duplications. | |
| Author: A. Hueni | |
| Comment | |

### Epic F Datavisualization (disconnected mode/connected mode)

As a user of the application, I would like to visualize FLOX/ROX RAW-data.

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| ***User Story F1.001 Choose data (2SP)*** | ***Priority: 1 MVP*** |
| As a user of the application I would like to choose which data I want to visualize. I am able to select single or multiple measurements. I am able to select multiple measurements with help of the shift/ctrl button. After I press the visualize button, the active tab visualizes the dataset. I am able to update my selection and update the visualization by hitting an “update plot” button. | |
| Author: P. Wigger | |
| Comment | |

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| ***User Story F1.002 Visualization of raw data (5SP)*** | ***Priority: 1 MVP*** |
| As a user of the application, I would like to plot a selected dataset of raw data.  The x-axis of the plots can be chosen to be either band numbers or wavelengths. The wavelengths are read from the FLOX/ROX. The y-Axis changes its units according to the chosen type of data: DN (Digital Number) for Raw Data For Raw data the following graphs are shown: WR, Veg, DC\_WR, DC\_Veg, | |
| Author: P. Wigger | |
| Comment | |

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| ***User Story F1.003 Visualization of processed data (5SP)*** | ***Priority: 1 MVP*** |
| As a user of the application, I would like to visualize a selected dataset as radiance and reflectance. A selected dataset can consist of 1:N measurements sequences. A measurement sequence is defined as (WR1, VEG, WR2, DC WR, DC VEG). The maximum number of sequences in a dataset, N, can be configured or is hardcoded to avoid too long plotting times. N should be around 30-50 as a minimal requirement.  The x-axis of the plots can be chosen to be either band numbers or wavelengths. The y-Axis changes its units according to the chosen type of data: , W/( m²sr nm) for Radiance, and no units for Reflectance.  The calibration from raw data to radiance and the calculation of reflectance is done within the application. The radiometric calibration uses the radiometric calibration coefficients stored on the FLOX/ROX. The wavelengths are read from the FLOX/ROX.  For Radiance data the following graphs are shown: WR, VEG  For Reflectance data only one spectrum (reflectance) is shown. | |
| Author: P. Wigger | |
| Comment | |

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| ***User Story F1.004 Visualization of processed data (5SP)*** | ***Priority: 3*** |
| As a user of the application, I would like to calculate and display a few basic vegetation indices directly from the reflectance (NDVI, PRI, TCARI, etc.) The application should show Min and Max Values of the selected datasets. | |
| Author: Andreas Burkhart | |
| Comment | |

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| ***User Story F1.005 Adjust view (8SP)*** | ***Priority: 2*** |
| As a user of the application I would like to navigate (zoom, scroll) through a visualized dataset to be able to adjust my view. | |
| Author: P. Wigger | |
| Comment | |

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| --- | --- |
| ***User Story F1.006 Data management (8SP)*** | ***Priority: 2*** |
| As a user of the application, I would like to manage the datasets (live recordings and imported data) and be able to manage (view, export, delete with confirmation) these datasets.  Single and multiple measurement sequences can be manipulated. | |
| Author: P. Wigger | |
| Comment | |

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| ***User Story F1.007 Calibration view (8SP)*** | ***Priority: 4*** |
| As a user of the application, I would like to display the calibration vectors used to do the radiometric and wavelength calibration. The x-axis of the plots can be chosen to be either band numbers or wavelengths. | |
| Author: A. Hueni | |
| Comment | |

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| --- | --- |
| ***User Story F1.008 Hover-Menu (?SP)*** | ***Priority: 4*** |
| As a user of the application, I would like to be able to hover/click on a line in the graph to get additional information for this line (which measurement it belongs to, time of the measurement, exact value of the spectrum at the point where it was clicked) | |
| Author: A. Hueni | |
| Comment | |

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| --- | --- |
| ***User Story F1.008 Calibration view (?SP)*** | ***Priority: 4*** |
| As a User of the application, I would like to plot a wavelength/band-nr over time to see how this band/wavelength changed over time. | |
| Author: A. Hueni | |
| Comment | |

# Restrictions

It is not possible to access and/or manage data on the SD-card over the serial connection.  
  
The application runs on a Linux (Debian? ArchLinux) system as Java Application.

The GUI will be developed in Java FX.

GUI size initially to be fixed to allow display on all common screen resolutions, 16:9 ratio. (1280\*720)

GUI Look and Feel is [Modena](http://fxexperience.com/2013/01/modena-new-theme-for-javafx-8/), A high contrast mode should be implemented

Application architecture should be done in a way, so that a port to a mobile OS is as easy as possible.

# Release Plan

Is part of FRVA\_Phasenplanung.docx

# Change Management

Issues are managed over Gitlab Issue tracking. This table only contains major changes of the requirements.

Changed Requirements (will be added)

|  |  |
| --- | --- |
| 30.10.17 | New Requirement: Data should not be stored in memory, Target: 1.5 mio measurement in database. Lazy loading: Measurement should be loaded on demand. |
| Comment | |

Additional Requirements (to be discussed what of these requirements are going to be implemented)

|  |  |
| --- | --- |
| 30.11.17 | Requirement by Xavier: if White-References vary by more than 1% the measurement should be marked invalid. Button to remove all invalid measurements |
| 30.11.17 | Requirement by Xavier: A button to start a series of 5 measurements. |
| 30.11.17 | A sync mode to import only new measurements. A sync mode to add new measurements to an already imported SD-Card. |
| 30.11.17 | Extension to FloX Data. |