

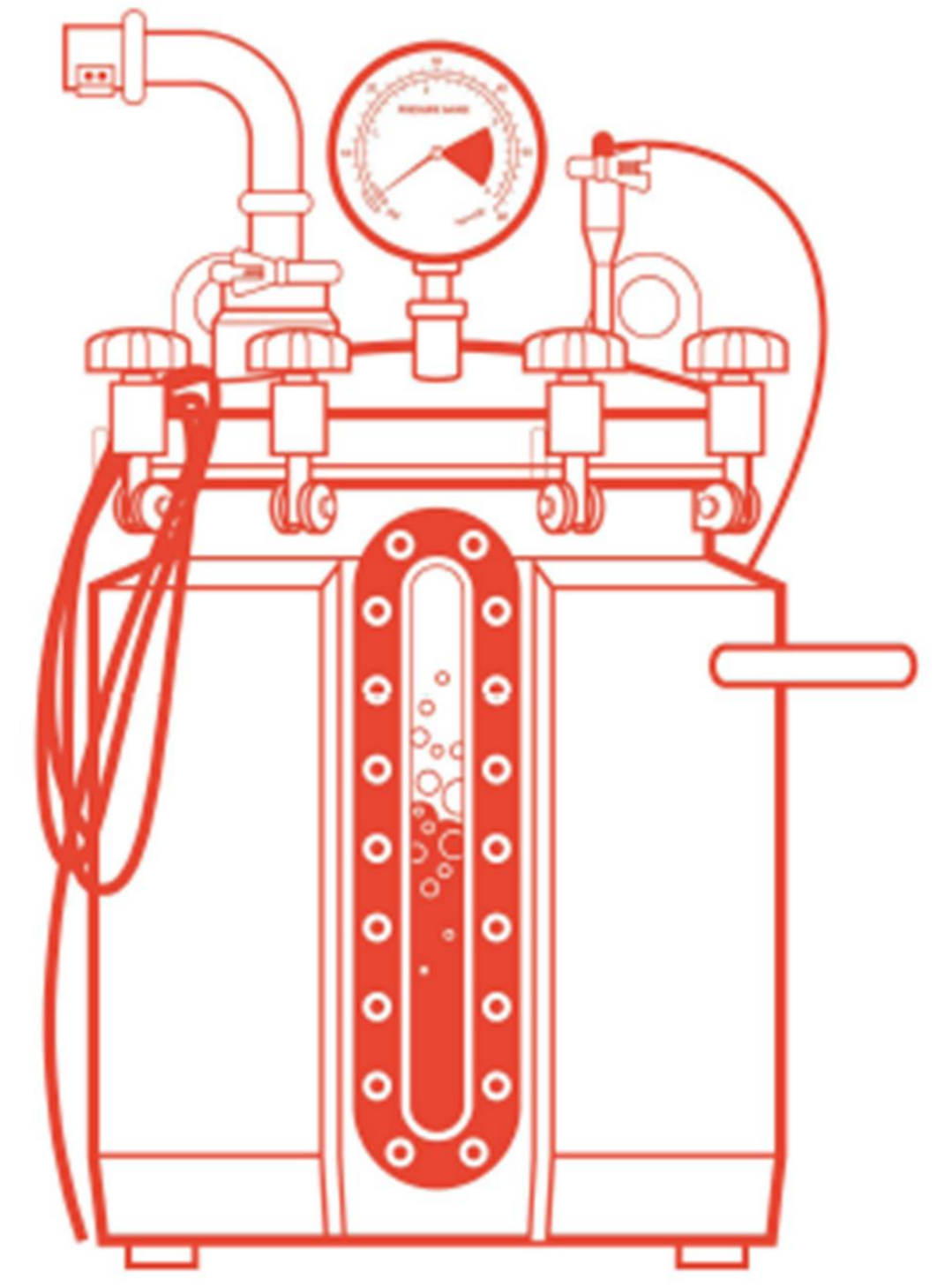
Development of a tool for the automated visualization of batch recipes

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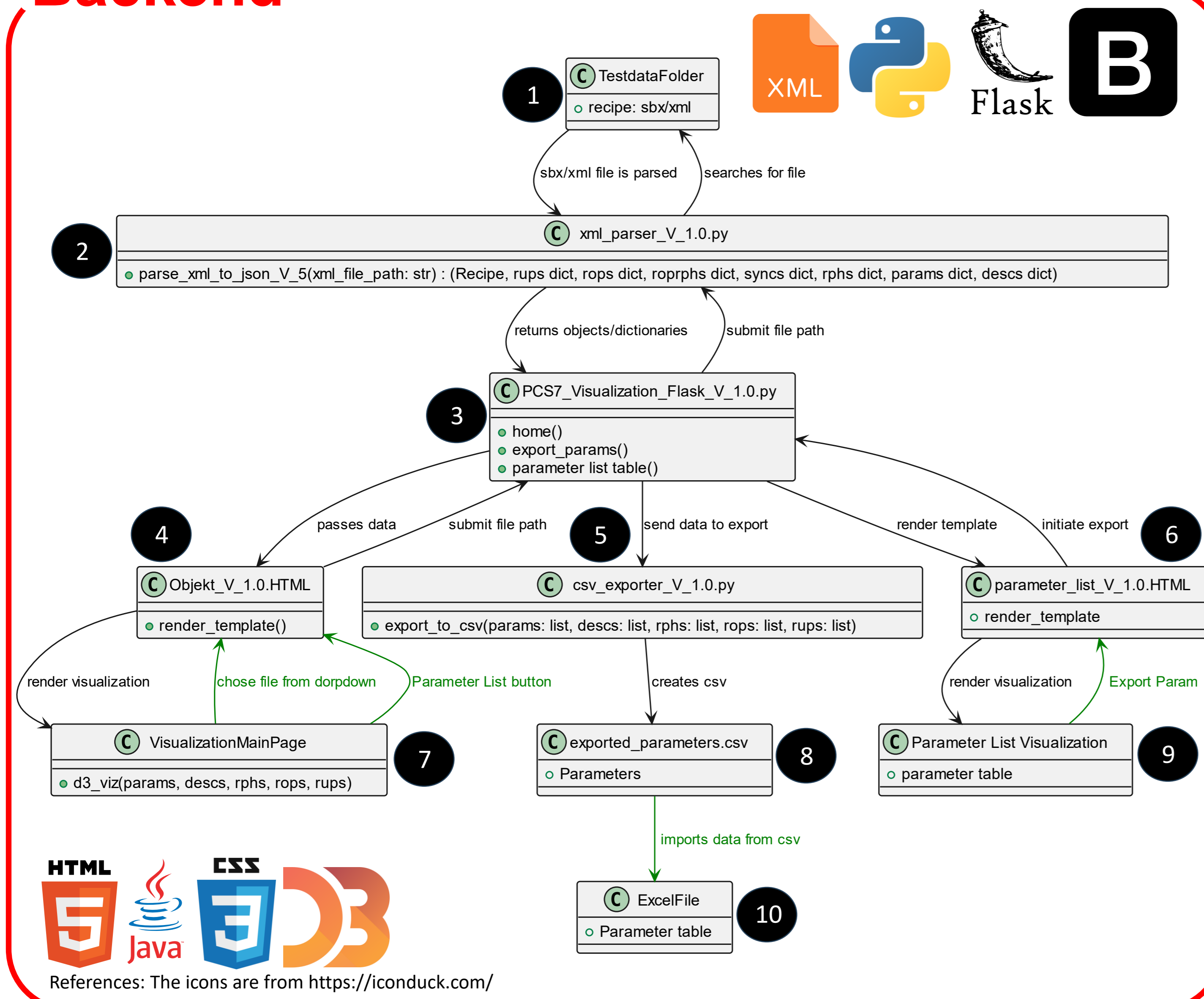
Verantwortliche/r: Prof. Dr. Andreas Zogg



Introduction

Digital Transformation is a major trend in pharmaceutical manufacturing, with chemical processes moving from traditional instruction documents to digital tools like Process Control Systems (PCS). Equipment automation is managed through recipes that include procedures, unit operations, phases, and their transitions. Due to the criticality of these processes, recipes must be easily reviewed for completeness and accuracy and visualized at different abstraction levels

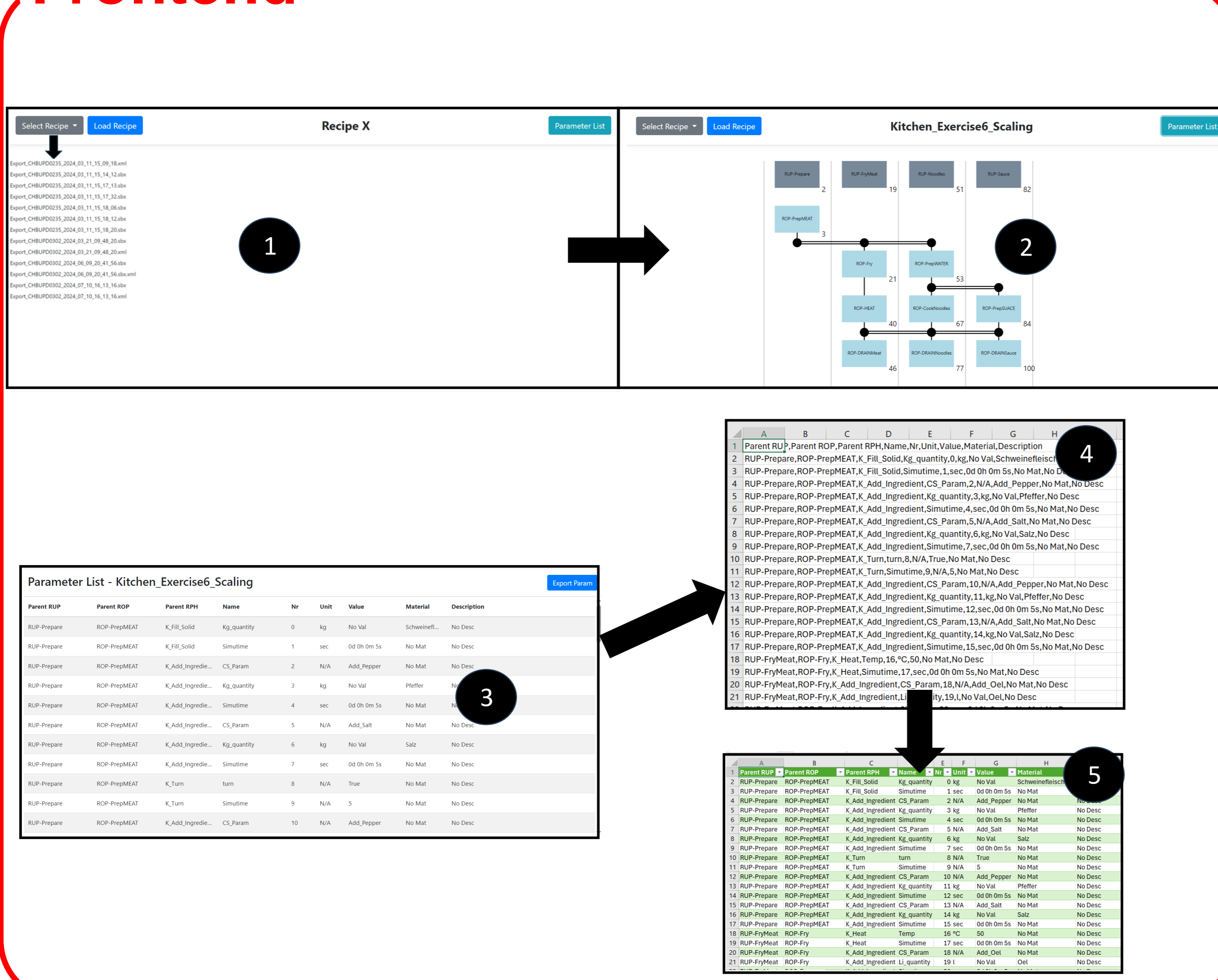
Backend



Backend explanation

1. SBX/XML files of exported recipes are stored in the "Testdata" folder.
2. Parses XML/SBX files, creates objects, calculates positions and returns objects in dictionaries.
3. Renders (4) and (6), submits file path to (2) and launches Flask server for the web-page.
4. Uses a combination of CSS/Bootstrap for styling and Java Script/d3.js to dynamically create the visualization.
5. Receives dictionaries from (3) and exports the parameters to (8).
6. Uses CSS/Bootstrap for styling and Java Script to display parameter table
7. Main page of the PCS7 Visualization tool where selected recipes are visualized.
8. CSV file where parameter table is exported to, uses commas as delimiter.
9. After the "Param List" button is pressed the parameter list is displayed in this new tab.
10. The parameters from (8) can be imported into Excel and formatted into a table for further analysis.

Frontend



Frontend explanation

1. The user has the option to choose to visualize any process recipe with its process parameters present in the 'Testdata' folder.
2. The chosen recipe is presented on the main page.
3. The parameters list is shown in a new tab and can be exported via the "Export Params" button as CSV file. The CSV file can then easily be loaded into Excel for further analysis if desired.
4. When the "Export Parameters" button is used, the parameters are exported to a CSV file that uses commas as delimiter.
5. If the parameters are imported into Excel, they get automatically formatted as a table.

Conclusion & Outlook

Currently the change management process for PCS7 process recipes is rather tedious, since the PCS7 Batch Control Center is hard to navigate and there is no option to view all relevant information in one window. This tool will change that. Additionally, it can be used for easy communication of technical information. It is also possibly the basis for many more advanced functionality since the built framework of communication and data analysis can easily be expanded.