Evaluation Experiment Protocol

M.EIC Dissertation | 2023-2024 | Ana Matilde Barra

Objective

Collect data to reach conclusions on the usability and user experience of the Visual Editor developed for Infragenie compared to the updated PlantUML editor. The PlantUML editor used will be the one that is updated to ensure that the available features are as close as they can be between the two editors.

Experiment

Structure

Divide participants into two groups (Control and Experimental), each with half the participants. The control group will perform the tasks in the PlantUML editor, while the experimental group will perform them in the Visual Editor.

The tasks to be performed will be simple and clearly described to ensure that the only explanation needed is the one provided at the beginning of the experiment session.

Because the participants are divided into two groups, two experiences can be conducted independently in two in-person sessions at FEUP.

Before the sessions, a Profile Questionnaire (https://forms.gle/PwTLW2NpdHNK8YAW7) and an Availability Form (https://lettucemeet.com/l/B3rRO) will be sent to the participants to organize the groups so they are the most balanced possible.

The sessions will be held in the following schedules:

- Control Group:
- Experimental Group:

The experiment itself will have the following steps: (total time predicted: 1h - Pilot Test took 40 minutes with the demo)

- Prepare my personal account on the FEUP PCs with the project source code for easier setup in the room's PCs (Chrome with the form + Infragenie opened).
- Before the participants arrive, distribute the assigned IDs through the available workstations;
- Randomly distribute the participants in the room;
- (10 minutes) Start the experiment with a small "live demo" to introduce the editor in use;

- (15 minutes) The participants execute the tasks and record the time each of them took to complete;
- (25 minutes) The participants answer the several evaluation questions available in the form.
- (10 minutes) Demonstrate the other editor version and answer possible general questions about the thesis.
- Ask the participants to deliver the assigned ID papers and exit the room.

Participants

12 participants
Their names were replaced with hashes to ensure anonymity.

Session 1 (**strawberry** - PlantUML - 15h to 16h):

- c3e7b6 - SB2
- 9b4f8f - SB5
- d1401b - SB6
- 8c1894 - SB3
- 1e31b2 - SB1
- 0fdd0a - SB4

Session 2 (**watermelon** - Visual Editor - 16h30 to 17h30):

- e4b32b - WM4
- a4a843 - WM2
- be7d2d - WM5
- 029958 - WM6
- 4893e4 - WM3
- 4553bc - WM1

Introduction to each editor

This introduction and demonstration will be done before presenting the form to the participants. It will be done in Portuguese, as all participants are native Portuguese speakers. For replication purposes, the English version of the demonstration will be added to the thesis document annex.

Demonstration Script

“Hi everyone! First, I would like to thank you again for agreeing to participate in this experiment. Your contribution is very important and valuable in evaluating the work I have developed in the past semester.
All the data collected in the context of this experiment will be kept anonymous and only used for the experiment's scope to help evaluate the tool developed and find ways to improve it.
The experiment consists of performing several tasks in a visual editor called Infragenie.”

PlantUML: “This tool allows you to edit a diagram of the architecture of a software system using the PlantUML language. The initial diagram is automatically generated from a docker-compose file in the repository analyzed by the tool.”

Visual: “This tool allows you to edit a diagram of the architecture of a software system. The initial diagram is automatically generated from a docker-compose file in the repository analyzed by the tool.”

[Demonstrate how to open the editor properly by selecting the repository and branch]

“On the editor page, you can make all the modifications you like and preview the resulting diagram with those changes.
The most important and relevant features to complete the tasks are:

- Adding new elements;
- Adding new connections or links between elements;
- Edit properties of a specific element;
- Delete elements and links;
- Submit the changes made to the repository.”

[Demonstrate how to execute these actions in the editor]

“Do you have any questions?”
If **Yes**, answer them by not providing too much information.

“In your tables, you can find a paper that contains your assigned ID for the experiment. When you finish answering the form, please deliver that paper to me and exit the room.”

“If you have any questions interpreting the form, feel free to ask. You can now open the Chrome Browser on your PC and start the experiment.”

Forms

The two forms for this experiment were developed with Google Forms.

Infragenie Profile Questions

Thank you for agreeing to participate in this experiment.
All data provided in the form is anonymous and will only be used for the scope of this experiment to help evaluate the tool developed and find ways to improve it.
The results will be published only in aggregate form and used to derive statistical data about the tool.

This form contains questions to help characterize and better understand our study groups.

Any professional experience in Software Development?
If yes, for how long? (Less than 1 year, 1 to 2 years, 2 to 4 years, 4 to 6 years, 6 or more years)

Experience with diagram-making software and languages
To be answered with a 5-point Likert scale (1-5)

- I have experience with tools that allow the creation of diagrams from plain text or code (e.g. PlantUML, Mermaid.JS, others).
- I have experience with tools that allow the creation of diagrams through a visual editor (e.g. draw.io, Lucidchart, others)
- I am familiar with the Unified Modelling Language (UML).
- I have experience creating architecture diagrams.

Response Submitted Message

Your response has been submitted.
You will receive more information about the experiment shortly.
If you wish for any additional information, please get in touch with us.
You can now close this page.

Infragenie Evaluation Form

Thank you for agreeing to participate in this experiment.
All data provided in the form is anonymous and will only be used for the scope of this experiment to help evaluate the tool developed and find ways to improve it.
The results will be published only in aggregate form and used to derive statistical data about the tool.

Introduction to the Visual Editor

PlantUML

The visual editor you will use allows you to edit a diagram of the architecture of a software system using the PlantUML language. The diagram is automatically generated from a docker-compose file in the repository analyzed by the tool. You can also preview the resulting diagram on the plantUML diagram page.

Visual

The visual editor you will use allows you to edit a diagram of the architecture of a software system. The diagram is automatically generated from a docker-compose file in the repository analyzed by the tool.

Common Text for both forms

You can move on to the next section now.
Good Luck!

Tasks to complete

This section contains several tasks for you to complete as **correctly** and **quickly** as possible.
Please read the instructions and possible answers carefully.
We will ask you to record the specific time of the start of each task and the end time of the last task.
After completing each task, **return to this form** to continue the experiment.

Please insert your assigned ID.

Please open the editor. To do so, enter the repository name and corresponding branch (see below) on the form of the tool's homepage and click on the "Preview & Edit" button.

Below, we present the relevant data to input:

- Repository: mbarra29/infragenie-tests
- Branch: *strawberry* (PlantUML), *watermelon* (visualEditor)

Start of task 1: Please record the time you reached this stage.

1. Open the properties of the Prometheus Node. How many children does this node have? **(4 children)**

Start of task 2: Please record the time you reached this stage.

2. Open the Grafana Component. Add a new property to it. What is the total number of properties after your addition? **(5 Properties)**

Start of task 3: Please record the time you reached this stage.

3. Delete the Back-tier cloud/network. How many connections/links were deleted because of that initial deletion? **(2 links)**

Start of task 4: Please record the time you reached this stage.

4. Create a new element of a type of your choosing and add a new link connecting that new element to the Datadog Node.

Start of task 5: Please record the time you reached this stage.

5. Open **one element of your choosing** and edit **one of the editable properties** (name, children, properties, ...) to your liking.

Start of task 6: Please record the time you reached this stage.

6. Please submit the changes made, **ensuring the whole diagram is visible in the preview window**. In the dropdown, select the branch previously mentioned, check the "Add to Readme" checkbox, and click the "Submit Changes" button. After clicking the button, you will be prompted to insert your assigned ID.

End of the experimental tasks: Please record when you reached the end of the tasks here.

Evaluation Questions

In this section, you will be asked to answer several questions that will allow us to evaluate the tool thoroughly.
Please answer carefully and truthfully.

Technology Acceptance Model (TAM)
(12 Questions - To be answered with a 7-point Likert scale (1-7))

Express your agreement with the following items, considering the job of creating and maintaining architectural documentation.

Perceived Usefulness

1. Using this tool in my job would enable me to accomplish tasks more quickly.
2. Using this tool would improve my job performance.
3. Using this tool in my job would increase my productivity.
4. Using this tool would enhance the effectiveness on the job.
5. Using this tool would make it easier to do my job.
6. I would find this tool useful in my job.

- Please justify your answers regarding the **usefulness** of the tool.

Perceived Ease-of-use

7. Learning to operate this tool would be easy for me.
8. I would find it easy to get this tool to do what I want it to do.
9. My interaction with this tool would be clear and understandable.
10. I would find this tool would be clear and understandable.
11. It would be easy for me to become skillful at using this tool.
12. I would find this tool easy to use.

- Please justify your answers regarding the **ease-of-use** of the tool.

System Usability Score (SUS)
(10 Questions - To be answered with a 5-point Likert scale (1-5))

Express your agreement with the following items.

1. I think that I would like to use this system frequently.
2. I found the system unnecessarily complex.
3. I thought the system was easy to use.
4. I think that I would need the support of a technical person to be able to use this system.
5. I found the various functions in this system were well integrated.
6. I thought there was too much inconsistency in this system.
7. I would imagine that most people would learn to use this system very quickly.
8. I found the system very cumbersome to use.
9. I felt very confident using the system.
10. I needed to learn a lot of things before I could get going with this system.

- Please justify your answers regarding the **usability** of the tool.

Additional Remarks (Yes, No, + Why?)

Express your opinion with these questions. When you find it relevant, please add additional thoughts.

- Do you consider having a feature “undo/redo actions” important for this type of tool?
    - Why? (not mandatory)
- Do you consider having a feature “move elements” important for this type of tool?
    - Why? (not mandatory)
- Do you consider having a feature “use of keyboard keys” important for this type of tool?
    - Why? (not mandatory)
- Do you believe the diagram achieved is compliant with UML standards?
    - Why? (not mandatory)
- Do you have any **comments** or **suggestions**, or would like to **suggest** any **new features**?

Response Submitted Message

Your response has been submitted!
We thank you again for your time and effort in participating in this experiment.
If you wish for any additional information, please get in touch with us.
You can now close this page.