University of Groningen

Software Engineering

Evidencio Requirements Document

Authors:
Aleksandar Sasa Janjanin
(s3169618)
Jaap van der Vis
(s2344076)
Tomasz Kuczak
(s3619109)
Javier Png *(s3611655)*
Siheon Lee *(s2898373)*
Gizem Aydin *(s3611523)*
Dammes de Zoeten
(s2892138)

Lecturer:
Mircea Lungu
Teaching Assistant:
Frank te Nijenhuis

May 31, 2018

1 Introduction

Evidencio is an open library that holds quality-controlled medical prediction models and is continuously growing. These prediction models can be used to translate results from clinical studies towards patient-specific probabilities, therewith supporting medical decision-making for individual patients. These models are used by medical professionals to aid the prognosis of a medical condition and treatment for individual patients.

As of now its user-base consists only of medical professionals, one of the goals of the project is to design a front-end platform for patients called Evidencio Patient Portal. However, prediction models created on the Evidencio website are too complicated for patients to understand. That is why Evidencio Patient Portal offers an environment for the medical professionals, where they can import their Evidencio models and modify them in a patient-friendly way, creating workflows. Patients can then use prediction models via filling in these workflows. After finishing, they are able to see the result of the Evidencio prediction models, calculated on their medical conditions, in an understandable graphical representation. Moreover, they can save those results so that they can consult them with their doctor.

2 Terms

1. **Workflow**: Decision-tree like flow-model made by medical specialist for patients to fill in.

2. **Level**: Each workflow can have several steps (levels), after which the final result is reached. Each level contains one or more steps.

3. **Step**: Point in workflow that could possibly be reached by the patient at some point, part of a level. A step can be either of two types:

   (a) **Input Step**: A step that is an inner node of the workflow. It contains several variables (like age, gender, etc.) that the patient should fill in.

   (b) **Result Step**: A step that is a leaf node of the workflow. It displays a result of the workflow in a graphical way (charts, smiley faces etc.) with a proper description.

4. **Designer**: Part of the Evidencio Patient Portal where verified users can create and update workflows. The term is also used to refer to the creators of workflows themselves.

5. **Evidencio Model**: Predicition model available at the original Evidencio website, which can be used by the designers to create workflows.
6. **Rule**: Conditions on which a step should be followed by a specific next step.
7. **Model Calculation**: Call to Evidencio API, which returns a result of calculating a specific Evidencio model. It is done after completion of a step.

3 Functional Requirements

3.1 Critical

- Fill in workflows
  - Patients should be able to search for and complete selected workflows.
- Display workflow results in a graphical representation
  - After patient completes a workflow, the system should display its results in a graphical representation that is easy to understand by the patient.
- Authorisation of medical professionals for creating workflows
  - Medical professionals that want to create or edit workflows need to first register in the system. They also need to be verified by an administrator before they can start using the designer.
- Communication with the Evidencio API
  - Workflows should use the API to obtain results of a model calculation.
- Design/Create a workflow
  - Medical professionals should be able to import their Evidencio models, and use their variables to create workflows.
  - Add levels
  - Manage steps
    - Steps can be added, edited, deleted
- Show the overview of a workflow

  - For both the workflow creation and verification, users should be able to see the overview of a workflow.
- Show details of a step
  - Show the overview of a single step. This shows the variables, logic and connecting options for this step.

3.2 Important

- Verify finished workflows
  - Priviledged users (that don't need to be administrators) need to approve a workflow before it is available for patients. Verification is important to ensure the quality of the workflows.
- Download results of a workflow in a PDF file
  - Users that have completed a workflow are capable of downloading its result as a PDF file.
- Edit workflows
  - Designers are able to update their workflows.
- Edit user's account data
  - Registered users can edit their personal data and change their password.
- Choose input method of a variable
  - The designer can pick a method of inputing data (e.g. slider, text box, radio box, etc.) for selected variable in a workflow.

3.3 Useful

- Expansion to the Evidencio mobile app with the patient front-end
  - Make an expansion with the patient interface for the currently existing Evidencio mobile application.
- Delete users's account
  - Have a possibility to delete existing account of a registered user.
- Delete workflow

  - A designer can delete a workflow he created.
- Add a brief workflow description
  - Designers can provide a description of a workflow which can help all users of the system to understand its purpose.
  - Designers can modify the workflow description.
- Save workflow as a draft
  - Designers can save the workflow they are currently working on as a draft. This enables the possibility to work on a workflow in multiple sessions.
- Grant and revoke permission to review workflows and new users
  - Administrator can grant and revoke permissions to users which allow them to review workflows and newly registered users in order to expand the team of reviewers.
- Feedback for workflows
  - Patients can provide feedback based on their experience with the model.
- Design the PDF result
  - Designers are able to change the look of the result PDF which patients can export after completing the workflow.
- Authentication of patients
  - Patients can create accounts to keep basic data about them that repeat in many workflows (age, weight, height etc.). Those will be automatically inputted to a workflow.
- Storing steps
  - Steps can be stored and reused in other parts of the workflow.
- Automatic verification of users
  - The system should automatically verify users, for example by checking if the domain of their e-mail address belongs to a medical institution.

4 Non-Functional Requirements

- Security
  - The system should be secure. That means, no third-party can in any way access patient's data and workflow results.
- Privacy
  - Patient's information of the resulting model will not be saved.
- User friendly
  - Simplicity - website should be easy to understand and work with.
  - The website should follow the responsive design.
- Speed
  - The HTTP requests sent to the system should be processed in a reasonably short amount of time.
- Availability
  - Website should work properly on Internet Explorer 11 and newer browsers.
- Open Source
  - The system must be open-source for future development

5 Won't Do

- Integration into other medical systems

6 Use cases

6.1 Patient

These are the general use cases for patient users. They cover the uses that a general patient would like to achieve using the product.

- Search for workflow
- Provide Feedback

- Save (Export to PDF)
- Complete Workflow Model

6.2 Designer

Below you can see the use-cases related to the design of workflows. They deal with the creation, changing and deleting of workflows.

- Create new workflow
- Edit existing workflow
- Verify workflow to allow for it to be available for patients
- Add a brief description of workflow
- Edit a brief description of workflow
- Save workflow as a draft
- Show an overview of workflow
- Show a brief description of workflow
- Add level to workflow
- Delete level from workflow
- Add step to given level in given workflow
- Connect levels using logic and store them in a rule engine
- Ask for method of data input for given step in given level in given workflow
- Show details of given step in given level in workflow
- Edit given step in given level in given workflow
- Delete given step in given level in given workflow

6.3 Rest

Use cases relating to designer registration and authentication as well as managing designer's account permissions.

- Register a new designer's account
- Verify a designer's registration
- Designer log-in
- Designer log-out
- Delete (Deactivate) designer's account
- Delete (Deactivate) designer's account by an administrator
- Update designer's data
- Grant designer permission to verify models

7 Meeting Log

7.1 First meeting (28-02-2018)

Main Goals

Currently, Evidencio is focused for the use by medical professionals/health-care personnel. However, it can also be a valuable tool for communication with patients, but it will have to be understandable and personalized for the patients. The goal is to design and create an open-source stand-alone patient interface, through which the patient can fill in their own data/used medication/etc. Personalised and simplified models for the patients can then be used, specifically based on the data entered. The Evidencio API can be used for these models. The tool is meant to be a self-help tool.

Plan

Start with the structure of the application (rough idea, Course Design Document, will be sent later), the actual models will come later. We are going to work in PHP, specifically the Laravel Framework.

Monday (05-03-2018) some/most of us will travel to Haaksbergen to meet with the developers.

7.2 Second meeting (05-03-2018)

In this meeting we focused on understanding the goals of the project precisely and agreeing on the technical requirements.

Goals of The Project

Since Evidencio is currently aimed at the medical professionals, the given models are not suitable for patients. The percentages are not easily understandable and something more efficient is needed.

The main team of developers is solely focused on the core platform, so we are asked to expand on their idea.

Goal of the project was defined as making a platform which on one side provides the ability for medical professionals to design the patient-friendly representations of the models, and on the other side provides the place for patients to fill the models made in the designer side and receive understandable feedback.

The project is to be available on GitHub upon completion so that other developers can expand it and integrate it into different systems.

Technical Requirements

Mainly we have discussed the way to design the system and which approach to use. As mentioned above, the system will consist of two main parts. The patient, and the designer side. In the core of the system, a rule engine will be implemented. This is for future development. Along with this, a database needs to be implemented and the system needs to contact the Evidencio API.

For the languages we have agreed on PHP, and for the database on MySQL. We have agreed that we can use any technologies and libraries as long as they are open source and can be accessed by developers who will be working on this project in the future. Also, the we will need to make the system such that it can support multiple natural languages in the future.

Furthermore, it was left to us to think of a good way to represent the data, and we were told to focus on the technical, and not on the medical part. Also, a disclaimer similar to that on the Evidencio website needs to be added.

Plan

After the end of the sprint (13-03-2018) we will provide the developers with the Requirements and the Design documents and will discuss upon it further. Furthermore, some of the developers will visit Groningen, and we will agree on the time and place for the next meeting beforehand.

In the meantime, they gave us permission to contact them if we have any question or need help.

7.3 Third meeting (28-03-2018)

In this meeting, the progress so far was showed to the customers to keep everything consistent with their requests. Generally, the customers were pleased with how the product was coming out. There were some important points that were decided:

- Creating new models should be done in Evidencio side. The Evidencio Patient Portal should enable medical professionals to import Evidencio models and modify them in a patient-friendly way. Importing will be done using the Evidencio API.
- It is important for the designer to see where each step is leading, thus designer should be able to color each step.
- Workflows should make intermediate API calls after each step.
- Categorizing and reusing steps might be a good idea.
- It might be better to show the patient the steps that are used to calculate the results rather than showing every step.
- Agreed on bi-weekly meetings on every wednesday at UMCG.

7.4 Fourth meeting 17-04-2018

The customers were shown the progress of the project, which included some of the things that were suggested on the previous meeting. The current version of the database diagram was also presented. The customers were happy with the progress of the project. Following things have been decided:

- After a step there can be multiple API calls. An identifier for a call result should be set to be able to differentiate them.

- Patients should also have an option to register an account to be able to save basic data about themselves to be automatically inputted into the models. However, it is not a priority.
- There should be a "smiling/frowning faces" representation of the result included (f.ex. if a model outcome shows a 60% chance of survival of a disease, it should show 60 smiling faces and 40 frowning faces).
- As an additional feature, designers should be able to customize the exported PDFs with the outcomes of a workflow to make them more visually appealing.
- The project should be designed in a way that it is easily possible to later extend it with the features that will not be implemented before the software engineering course ends.
- Designers should be able add their own labels and titles for the graphs in the result page, as well as add a description of the result with the result value embedded in the text.

7.5 Fifth meeting 18-05-2018

The customer was presented with the current version of the website and was generally happy with the progress.

We discussed result representation, especially the "smiley faces" type. The customer wants it to be one of the types to choose by the designer, rather than being always displayed. Moreover, the representation should consist of 100 faces instead of 10.

The customer asked about progress on personal patient folders and stored steps but we decided that for now we'll focus on making the designer and workflow sites and that we can implement additional functionality when we have time.

We discussed that there are still issues with the Evidencio API but the developers are working on them.

Finally, we talked about verification of patients. The customer proposed adding a BIG code as an additional field asked during registration and making an automatic verification when user's email has a domain of a medical institution. Our team proposed a mixed solution where an automatic verification is attempted first and if that would fail, the system would request a manual verification. However, that is not a priority. We also decided on making a meeting with the developers of Evidencio the following week.

7.6 Sixth meeting 24-05-2018 (with Evidencio developers)

We showed our progress to the developers. They asked if we will be able to finish the main functionality on time. We replied that most probably we'll manage to make the critical functionalities that can be extended by the developers later.

We discussed how the rule engine would work. The developers asked about possibility to create loops in workflows. It is currently not possible and most probably won't be implemented.

Our team asked the developers to add an expected type property of a model in the API. At the time a workaround had been used to deal with the problem. We asked how to handle the issue when we receive a result and we are not sure if it is a percentage or a number. The developer team told us that the user can specify the expected outcome on their site. They would make a list of those.

8 Changelog

Contributors	Date	Section	What Was Done
All	27-02-2018	All	The initial document layout was added; Assumed requirements were added; Meeting log updated
All	13-03-2018	All	The layout was updated; Agreed requirements were added and the wrong ones were discarded; Meeting log updated
All	14-03-2018	Use-case	Use-cases made (split for the three groups)
Tomasz	27-03-2018	All	Corrected errors and left only titles of the use cases.
Gizem	16-04-2018	All	General Update.
Tomasz	17-04-2018	Meeting log	Added 4th meeting log
Tomasz	29-05-2018	Meeting log	Added 5th and 6th meeting
Tomasz	30-05-2018	All	General corrections