University of Groningen

Software Engineering

Evidencio Requirements Document

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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 the Evidencio Patient Portal. However, the Evidencio models are too complicated for patients. That is why Evidencio Patient Portal offers an environment for the medical professionals called "the Designer", where the designers can import the Evidencio models and modify them in a patient-friendly way, creating workflows. Patients can use the Evidencio prediction models via filling in these workflows. After filling in the workflows, they are able to see the result of the Evidencio probability models, calculated on their medical conditions in an understandable graphical representation. Moreover, they can save those results so that they can consult to their doctor with it.

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. Each step contains several variables (like age, gender, etc.) that the patient should fill in when he is completing the workflow.
4. **Types of Steps**: Result-step (used for showing final results), Input-step (used for requesting extra input from patient)

3 Functional Requirements

3.1 Critical

- Fill in workflow model

  - Patient user should be able to search for and complete selected workflow models
- Display workflow results in a graphical representation
  - Completed workflow models should display result in a graphical representation
- Log-in for medical professionals for creating workflow model
  - Medical professionals that want to create or edit workflow models need to first register and be verified by an administrator
- Communicates with Evidencio API for possible results
  - Models should get the results calculated through API connection with Evidencio API
- Design/Create workflow model
  - Medical professionals should be able to import their Evidencio models, and create workflows using the variables in their Evidencio models.
  - Manage levels
    * Levels can be added, edited, deleted
  - Manage steps
    * Steps can be added, edited, deleted
- Show the overview of the workflow
  - For both the workflow creation and verification you have to be able to see the overview of the 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 completed models before making them available for patients
  - Verification is important to ensure the quality of the workflows
- Download results of workflow in pdf-file

  - Users that have completed workflow models are capable of downloading the results of the model as a pdf

- Edit workflow model
  - Designers can edit the workflow
- Edit medical professional's account data
  - Registered medical professionals can edit their personal data
- Data input method dialogue
  - The designer can pick a method of inputing data (e.g. slider, text box, radio box, etc.)

3.3 Useful

- Expanding the app with the patient front-end
  - Possibly make an expansion with the patient interface for the currently existing Evidencio app
- Delete medical professional's account
  - Have a possibility to delete existing account of a medical professional
- Delete workflow model
  - Have a possibility to delete existing workflow model
- Add brief workflow model description
  - Have a description of a model which can help all users of the systems
- Edit brief workflow model decription
  - Edit the existing brief workflow model description
- Save workflow as a draft
  - Save the workflow on which the user is currently working as a draft in order to have the possibility to work on it in multiple sessions
- Grant and revoke permission to review workflows and new users

  - Granting and revoking permission to users to review workflows and new users in order to expand the team of reviewers
- Feedback for Models
  - A way to let patients provide feedback based on their experience with the model
- Patient registration
  - Optional accounts for patients to keep basic data about them, that can be automatically inputted to a workflow.
- Designing the pdf result
  - Workflow creators are able to design the look of the result pdf which patients can export after completing the workflow.

4 Non-Functional Requirements

- Security
  - Communication 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 woprk with
  - Responsive design
- Usability
  - The system must be usable
- Speed
  - The system must be fast
- Availability
  - Website should function on browser IE11
- 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.

- Searching 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 that has been made
- Verify workflow to allow for it to be available for patients
- Add brief description of workflow
- Edit brief description of workflow
- Save workflow as a draft
- Show an overview of the workflow
- Show 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 the graphs in the result page, aswell as add a description of the result with the result value imbedded in the text.

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