Reviewer’s report

Title: A Fast Healthcare Interoperability Resources (FHIR) Layer Implemented Over i2b2

Version: 0 Date: 22 May 2017

Reviewer: Philipp Bruland

Reviewer's report:

The manuscript entitled: "A Fast Healthcare Interoperability Resources (FHIR) Layer Implemented over i2b2" deals with the connection of their hospital-network wide clinical data warehouse (CDW) with a FHIR server. The described proof-of-concept is a promising approach for extracting data from a CDW via FHIR resources, which helps to access data on a standardized way from the popular i2b2 CDW.

Nevertheless, the manuscript suffers from several inconsistencies and questions which should be answered before re-submission:

- Please try to reduce the use of abbreviations (mainly FHIR) in the abstract.
- At the end of the "Introduction" you firstly mention the topic of CDW (& i2b2). This should be introduced more early and motivate why it would be so interesting to use FHIR over i2b2 to underline the need for your new concept. You have introduced FHIR in a very detailed way later, but i2b2 is only dignified with very less words.
- I would also add a statement, about why you connect it to your CDW and not to DXcare/ORBIS? This would strengthen also table 1. Reference 24 is enough in the text; can be removed from the table legend.
- In 2.2 I would suggest to formalize the "functional requirements" of your software; this is currently very narrative.
- The manuscript contains several passages that don't provide added value to the reader and can be looked up elsewhere. This concerns almost the whole "Implementation" section. What FHIR resources, profiles, terminologies and the API are, can all be cited. At this stage the reader would expect how you have implemented it. Section 4.2 also contains description about ICD and ATC codes which could be assumed as known. In addition, please take a careful look into the "Submission Guidelines" for "software paper". Some text passages do not belong to its current section. The architecture (Figure 1) should be placed in the "Implementation" section. E.g. the HL7 HAPI should be mentioned here and not introduced in the "Results".
- Section 4.3: The Oracle URL could be cited and put in the "References".

- At the end of 4.4 I'm not sure what you mean with this suffix.

- What is exactly shown by figure 4? Is it the query or the results of a query?

- Last sentence of 4.5 is about validation. Here I would expect to see any validation results as we are in the "Results" section. I also could not find any information about how you did the validation. Ad-hoc SQL queries are only mentioned here and in the introduction. You should explain it in detail.

- In the first part of the " Discussion " section, you are introducing three new concepts (virtual federated view, VMR, VHR). Why are they only here relevant and not mentioned earlier? Same with "data client system" and "data source system".

- On the second page of the " Discussion " you are stating "...Several articles reported works..." which are these articles? Please give references.

- You also state that "...most used CIM is openEHR...." From where did you know? References?

- On page x line 30, below the reference of Table 3, the sentence "Fortunately..." is quite narrative.

- Why did you place Table 3 and Figure 5 in the " Discussion "? Is it not worth for " Results "? If it does not add anything to your message I would suggest removing them.

- A major point is that you state in the beginning of the " Conclusion " (much too late) that this (your) work is an alternative to "SMART-on-FHIR implemented over i2b2". Since this work seems to be very similar to what you have done in your work, you must provide a statement on how your work is different to "SMART-on-FHIR ...over i2b2" and this should happen in the " Introduction " or at least in the " Discussion ".

- Further questions concerning the overall idea of your manuscript are:

  -- Did you use the standard FHIR resources or did you create some new or did some extensions? If so, are they provided as such?

  -- You mentioned a clinical decision system. In this regards it would be good to know whether in France is any kind of legislation concerning the medical device directive for which CDSS need to be certified for daily clinical usage.

  -- For users and developers it could be helpful to know how they could enhance this server towards additional FHIR resources.
Overall, please read your manuscript carefully concerning typos and wording, and provide page numbers which make it easier to reference positions.

- E.g. second page line 46: "Tow type" should be "Two types…"
- Same page, line 52: "We are able…"
- Section 2.1, second chapter: "…inpatient and outpatient reports, etc." No dots. And start a new sentence.
- Section 2.2: "The present […] project whose aim it is to design…"
- Please use consistent spelling of words, such as Java.
- Discussion: "Data integration is neither a …(29) nor exclusively…"
- Please check if you already have introduced abbreviations. Such as "CIM", "CPOE" and capitalize them in its list at the end.
- "in order to" could be shortened to "to".
- Finally, please take a look into your source code which shows a lot of hard coded URLs and SQL parameters. I'm not sure whether it is helpful for the re-use of your application to claim going through all the source code to identify variables to be adapted.

**Are the methods appropriate and well described?**
If not, please specify what is required in your comments to the authors.

No

**Does the work include the necessary controls?**
If not, please specify which controls are required in your comments to the authors.

Unable to assess

**Are the conclusions drawn adequately supported by the data shown?**
If not, please explain in your comments to the authors.

Yes

**Are you able to assess any statistics in the manuscript or would you recommend an additional statistical review?**
If an additional statistical review is recommended, please specify what aspects require further assessment in your comments to the editors.

Not relevant to this manuscript
**Quality of written English**
Please indicate the quality of language in the manuscript:

Needs some language corrections before being published

**Declaration of competing interests**
Please complete a declaration of competing interests, considering the following questions:

1. Have you in the past five years received reimbursements, fees, funding, or salary from an organisation that may in any way gain or lose financially from the publication of this manuscript, either now or in the future?

2. Do you hold any stocks or shares in an organisation that may in any way gain or lose financially from the publication of this manuscript, either now or in the future?

3. Do you hold or are you currently applying for any patents relating to the content of the manuscript?

4. Have you received reimbursements, fees, funding, or salary from an organisation that holds or has applied for patents relating to the content of the manuscript?

5. Do you have any other financial competing interests?

6. Do you have any non-financial competing interests in relation to this paper?

If you can answer no to all of the above, write 'I declare that I have no competing interests' below. If your reply is yes to any, please give details below.

I declare that I have no competing interests

I agree to the open peer review policy of the journal. I understand that my name will be included on my report to the authors and, if the manuscript is accepted for publication, my named report including any attachments I upload will be posted on the website along with the authors' responses. I agree for my report to be made available under an Open Access Creative Commons CC-BY license (http://creativecommons.org/licenses/by/4.0/). I understand that any comments which I do not wish to be included in my named report can be included as confidential comments to the editors, which will not be published.

I agree to the open peer review policy of the journal