Author’s response to reviews

Title: Applying representational state transfer (REST) architecture to archetype-based electronic health record systems

Authors:

Erik Sundvall (erik.sundvall@liu.se)
Mikael Nyström (mikael.nystrom@liu.se)
Daniel Karlsson (daniel.karlsson@liu.se)
Martin Eneling (martin.eneling@liu.se)
Rong Chen (rong.chen@cambio.se)
Håkan Örman (hakan.orman@liu.se)

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Applying representational state transfer (REST) architecture to archetype-based electronic health record systems

Comments by referee/reviewer 1, Koray Atalag, are in blue. 
Comments by referee/reviewer 2, Ricardo Cruz-Correia, are in green

Response and author comments are in black. We have grouped related review comments when attempting to address them jointly.

General feedback

Thanks for the kind comments regarding the manuscript's importance.

While acknowledging the breadth of the topics covered the length of the paper can probably be reduced which will also improve readability.

This is a long paper (58 pages until the end of the references), which also includes a code contribution (LiU EEE). Being so long is not easy to follow its structure [...] Personally, I think it would be better to have two papers, being the first one related with the architecture, and other with Liu EEE. Although, I feel that both these hypothetical papers would be publishable and clearer do the reader, if the authors choose to maintain as a single paper it is still a very interesting contribution.

The idea to split the paper into two separate publications was very interesting, but when approaching the editors with that idea they advised against doing that for a number of good reasons that we agree with. Instead we now tried to apply the essence of the suggestion within the boundaries of a single publication. We have distilled the main manuscript so that it focuses on the architecture and instead collected relevant LiU EEE implementation parts into a separately readable appendix A. We believe this has several benefits and hope that it makes the manuscript easier to read by reducing the number of thoughts presented in parallel. It also makes the readers' journey from introduction to conclusions more focused, shorter and easier to grasp. An additional benefit is that the architecture, that is likely to be of long term interest, is presented in the main manuscript without any tight ties to the prototype implementation (that is likely to be replaced piece by piece gradually over time).

To make the main manuscript shorter and even more focused we extracted the thorough introduction to openEHR from the Background section into a separate Appendix B. A fairly detailed openEHR introduction needs to be readily available for openEHR-non-experts reading the main manuscript, but that part does not contain any new scientific contribution and can be unnecessarily distracting to the openEHR experts and experienced implementers that are major
target audiences for this manuscript. An additional benefit is that Appendix B can be easily reused in itself in other contexts if a fairly compact introduction to the design layers, storage, querying and versioning parts of openEHR is needed.

REST it is very central to the architecture and we have observed a lack of detailed knowledge among significant enough portions of the main manuscripts target audience. In addition, there is more to HTTP than meets the eye. Thus we avoided to do any drastic reductions in those background parts.

We tried to follow the Appendix pattern from the BMC Medical Informatics and Decision Making paper at [http://www.biomedcentral.com/1472-6947/12/66](http://www.biomedcentral.com/1472-6947/12/66) by putting descriptions of the appendices (including related references) at appropriate positions in the main manuscript.

In addition to the two targeted appendix-based extractions we have also identified and removed redundant or less central material to shorten the manuscript. Further detailed advice regarding possible additional reductions is of course welcome.

It is also recommended to revisit the Results and Discussion sections so as to clearly separate interpretation of findings from further elaboration and minimise overlap.

We hope the manuscript restructuring now have helped decrease overlap and increase separation.

The use of first person should be avoided where possible, especially repeatedly.

Most occurrences of “we” and “our” in the manuscript have now been removed and reformulated. In partially subjective paragraphs, or where we specifically want to express our own intentions, the use of first person was kept it in order not to mislead the readers.

Major Compulsory/Essential Revisions

1) Overall organisation of the manuscripts should be looked at as a whole and too many subheadings should be avoided if possible. The flow should bind each and every piece in a coherent manner...

We have now removed many subheadings (including removal of all fourth-level headings and many third level headings) and have attempted to bind pieces closer together.

Some relatively short background sections that do not have an obvious connection to each other (until used later in the manuscript) are still kept separate in order to clearly signal shifts of focus to the reader. Removing those headers would likely confuse the reader.

Having hierarchically numbered sections in a paper like this one would have helped but would go against BMC template standards.
...Accordingly the authors should also look at reducing the length.

Fixed, see above (in the “General feedback” section)

2) Implementation > Contribution Builder: it is recommended to list purpose after describing it.

Now moved accordingly.

1. The abstract is missing a clear aim. In this case it should state if the aim is the design of an architecture, its’ implementation or its’ evaluation (eventually more than one).

We have now clarified the aim in the abstract.

2. The abstract should try to summarize the paper, therefore it should, at least, have an implementation section like the full paper.

We have followed the BMC instructions that say:
The Abstract of the manuscript should not exceed 350 words and must be structured into separate sections: Background, the context and purpose of the study; Results, the main findings; Conclusions, brief summary and potential implications.
[Quote from http://www.biomedcentral.com/bmcmedinformdecismak/authors/instructions/software ]

3. One of the reasons why the paper is long, is because it has some comments, that although pertinent, do not have directly to do with the main aim and distract readers (e.g. p8 “(This will of course not automatically translate the content of unstructured free-text fields.”).

We have removed the mentioned comment and similar ones.

4. The background section is too long (10 pages) because is too descriptive.

The extraction to Appendix B and additional reductions have now shortened the background considerably.

5. The “two themes” presented in the first paragraphs of the implementation should be presented on main aim, subdivided in two sub-objectives.

We hope that the new main manuscript focus on the architecture and separation of LiU EEE to an appendix properly address this point.

6. Some ideas are supported by poor references (e.g. p19 “Individual focus versus population focus”)

Added two references in the mentioned section and at some other locations.
7. When describing “User action logging almost for free”, it would be important to mention the possible implications of using shortened URIs.

Thanks for spotting this! We had not described well enough how the bookmark redirection details work, the redirection was only briefly hinted in the results “User action logging almost for free”. We have now added the following text to the manuscript part about bookmarks:

“When resolving the bookmark, a 303 ‘see other’ redirect containing the bookmark target URI is sent to the client by the bookmark server. Thus the client automatically makes a new HTTP request to the actual target resulting in execution of normal authentication and logging at the target server.”

With this addition we believe it does not need to be specifically pointed out more in the logging section.

(In addition to the target servers logging, the call to the bookmark server is of course also logged and if the bookmark database implementation is versioned, then the combination of log and database can be used to create most of the same information from the bookmark server alone. But stating this in the paper might not add enough value to justify even longer text.)

8. The discussion should start by discussing the results related with the main aim of the paper.

Fixed.

9. Again, the conclusion section is too long.

The conclusion section has now been shortened.

Minor Essential Revisions

1) Introduction> para 1: any reference to the Masters thesis mentioned?

No, it is not published yet. We now deleted the mentioning of the thesis.

2) Implementation> bullet 1: space between futureopenEHR

Fixed.

3) Implementation > Contribution Builder> para 2, ln5: ‘fist’ > ‘first’

Fixed.

4) Results>Client caching...> last line: use UK English (behaviour).

We have strived to create the entire document using US english.
5) Discussion>Need for sharding: too many first-person use.

First-person use has been reduced in entire manuscript. (See “general feedback” above.)

6) Future work> demographics and access...> missing full stop and end.) Future work> Shared contribution...? grammar error in last sentence

Fixed. (Demographics and access are now in Appendix A)

10. The introduction is more of a motivation based on personal experiences. It should be written in a more objective manner.

Fixed.

11. It is not clear what the authors mean with “the project” (see p. 4). Is it the LiU EEE?

Now reformulated.

12. In p. 7 the LiU EEE is referenced for the 1st time, but it is not explained what it is until then.

We believe the separation of architecture from the LiU EEE implementation has now fixed this. A short description is also in a part of the abstract.

13. Some issues are just mentioned and not explained. If they are not important for the paper, they should be removed. For example, the “OPTIONS” and “HEAD” methods in p.9.

Removed HEAD.

OPTIONS are used in the Implementation description: “The formal WADL-formatted descriptions of URIs, methods, and representations are available to developers by calling URIs using the HTTP OPTIONS verb”

14. Terminology is addressed for the 1st time in the discussion. Because it is not such an important issue to this paper, I propose the authors reduce the discussion around it.

The terminology section has been considerably shortened.

15. The authors describe the limitations of the prototype implementation in the beginning. It would be better if they are discussed later.

Fixed (and moved to Appendix A).

Other / Discretionary Revisions
1) Availability and requirements> bullet 5> many will argue that Internet Explorer should be in the list.

Added "standards compliant" to the descriptive sentence.

Since we want to avoid listing version numbers we want to avoid risking people assuming that the most recent version of Internet Explorer for their operating system will work. For many windows versions that is Internet Explorer 8 which can not handle e.g. the SVG standard properly.

16. The assumptions are confusing, specially the item list

Deleted the assumptions since most of that information was repeated in other forms further down.

17. Regarding punctuation, there are a few problems (e.g. p12 missing “:" and ".")

Fixed.

18. In P.18 consider changing to “identified by URIs, (e.g. … VERSIONED_OBJECT)”

Fixed.

19. The first occurrence of REST in the introduction should describe what it means. This explanation is on the background that is afterwards.

In addition to already expanding the acronym in the paper title, in the abstract and in the background we have now added another expansion occurrence in the introduction.

The deeper, more detailed technical explanation of REST and related technologies is still in the background.

20. The LiU EEE seems to be also named “The project and “EEE”. Please use always the same designation to improve readability.

References to “the project” and “EEE” are now removed and reformulated.


Now fixed by correcting the following part of a bullet list.

References

22. The references need much improvement, namely:
o the websites need to have access dates

The instructions at http://www.biomedcentral.com/bmcmedinformdecismak/authors/instructions/software#formatting-references do not include access dates and the automatic reference creations based on BMC templates in the Mendeley reference manager do not include access dates for URLs.

As a compromise we added the sentence “All web-reference URLs were accessed and checked December 3, 2012” to the start of the reference section. We ask the editor to decide if that sentence should remain or be removed to best balance BMC policy and reviewer request.

o References 10, 14 are not complete

Fixed.

Notes to ourselves: We need to remember to check and re-edit these manually before each re-submission, since automation in reference manager software fails for these. Reference #10 previously...


...is an online technical report (or specification document) BMC formatting advice is not very specific regarding this. We have now tried another classification in our reference manager that results in a more detailed reference.

Fieldings dissertation (Reference #14 previously) is also badly handled by the software...


...and should be manually reformatted to BMC PhD thesis reference standard as follows...


23. When possible, website references should be replaced by other type of references due to volatile nature of them

No better obvious offline alternatives were found for the web references still used.

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We want to thank reviewers and editors for valuable feedback that we feel have made the manuscript easier to read and understand.

Best regards,
Erik Sundvall
Linköping University, Sweden
December 7, 2012

P.s. During the review process we can also supply a manuscript version with change-markers in the main manuscript visualizing deleted text etc if that is desired.