Author's response to reviews

Title: RMS: A platform for managing multi-disciplinary and multi-institutional research project collaboration

Authors:

Jake Luo (luojake@gmail.com)
Carolyn Carolyn Apperson-Hansen (cva9@case.edu0)
Clara M Pelfrey (cmp11@case.edu0)
Guo-Qiang Zhang (gq@case.edu0)

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Author's response to reviews:

Dear BMC Editor and reviewers:

I am pleased to resubmit the revised manuscript entitled “RMS: A platform for managing cross-disciplinary and multi-institutional research project collaboration”. We sincerely thank the reviewers and BMC editors for the valuable comments that helped us improve the paper. We have revised the paper based on the feedback and provided response in the following sections. A version containing all the tracked changes is also included.

Reviewer 1 comment 1:

The software requires a login to get in, and I therefore could not test it out nor see how it was structured inside. The documentation is from 2009, it might need an update.

Response:

We updated the “Notes” section of the paper (after the acknowledgement section). The links to the RMS documents are updated to 2012 August release. The quick-start-guide contain some user interfaces that help investigators initialize a project. To protect the patient information, research data, and project proposals, we have to verify a user after registration. However, we provide project source code and free deployment supports. The details are listed in the “Notes” section.

Reviewer 1 comment 2:

My other main concern with this paper is the references. None of the Science of Team Science papers are mentioned, and some of the references cited are out of date.

Response:

We agree that team science papers can provide more background to our work. The background section was revised and new introduction was added. Recent Team Science papers were cited as reference, including: Wuchty et al, 2007
We also want to clarify that the paper is an informatics paper that mainly focus on the collaboration infrastructure implementation for biomedical and clinical investigators. At this point, out project is not focus on the Science of Team Science (SciTS) study that investigates the theory and outcome of team-based research. This will be our future work when we further investigate the characteristics and nature of collaborative investigators and projects in RMS. The connection of our work to SciTS is that it can be viewed as a cyber-infrastructure that initializes collaborative projects and manages the progress. Therefore the evaluation measures the growth of initialized projects and connectivity of collaboration.

Review 1 comment 3

The first sentence of the Background section states that multidisciplinary collaboration is also called interdisciplinary collaboration, and whereas many people do confuse them, the two terms are clearly defined as distinct in Stokols et al 2008 and the NSF and NIH are clear about the different meanings. Please amend this first sentence and possibly also your title, as the correct phrase in this context is cross-disciplinary collaboration.

Response:

We agree with the reviewer that “cross-disciplinary” collaboration is more precise for this paper. In the background section paragraph 1, Stokols et al’s paper was cited to improve readability and provide background for team science research. The title of the paper was also changed to cross-disciplinary collaboration.

Stokols et al, 2008 paper identified cyber-infrastructure as an important collaboration-readiness factor for team science. The RMS is a cyber-infrastructure that improves the collaboration-readiness by providing an integrated information system to manage biomedical research collaboration.

Review 1 comment 4:

The four requirements mentioned in the background section fall into two categories, namely communication and project management. There is nothing unique to bioinformatics in these requirements; they are true of every research community. Similarly on page 7. An example or two from the particular community the authors are targeting would be good.

Response:

We thank the reviewer for helping us summarize the requirement section, and we agree that the identified requirements can be categorized to two broad categories. A summary sentence was added before introducing the four requirements: “Four major requirements were identified desirable for reducing the communication and project management barriers to collaborative research projects.”

There are two major reasons for elaborating the four requirements: 1) The
requirements were directly collected from the users (investigators and administration staff), hence the implementation of RMS system described in the next section were specifically designed to address the requirements. 2) The requirement can also help readers understand the design rationale of RMS and improve the paper readability.

Reviewer 1 minor comment 5:
Page 4, paragraph of “The first requirement”, 5th sentence down, change “provide” to “provides”.
Response:
We fixed the grammar problem based on the reviewer’s comment.

Reviewer 1 minor comment 6:
Conclusion statement is weak, may not be needed, and discussion gets a bit repetitive, could be cut down. Perhaps talk about the expandability and scalability of this tool beyond the CTSC/CTSI community.
Response:
To make the paper more succinct, we removed the last conclusion section.

Reviewer 2 comment 1:
On p. 3, in the “Background” section, the authors equate multidisciplinary collaboration with interdisciplinary collaboration. This is not at all the case as there are fundamental differences that have a direct bearing on this technology. For example, interdisciplinary science requires a much higher degree of project coordination. As such, the text needs to more clearly distinguish between these forms of collaboration. Also, if warranted, the authors should discuss whether their technology better serves one or the other forms of cross-disciplinary research.
Response:
We changed the phrase “multi-disciplinary collaboration” to "cross-disciplinary collaboration" throughout the paper. Cross-disciplinary collaboration has a broader meaning and covers both multidisciplinary and interdisciplinary collaboration. RMS focuses on supporting the management process (e.g., finding collaborators and services, monitoring tasks, updating progress) and communication (e.g., initializing project, and progress discussion) of research collaboration. Users of RMS, except system administrators, were voluntarily registered to use the system. Therefore, we do not control the degree and granularity of collaboration within the system.

Reviewer 2 comment 2:
On p. 3, in the “Background” section, the authors might also consider citing more general research findings showing the increase in prevalence and impact of teamwork in science.
(e.g., http://www.ncbi.nlm.nih.gov/pubmed/17431139)

Review 2 minor comment 4:
On p. 3, in the “Background” section, the authors assert that the Cleveland CTSC has “had a deep impact on many aspects of affiliated institutions.” Such assertions are unwarranted without data to support them.

Response:

Reviewer 2 comment 5:
On p. 5, in the “System Architecture” section, the authors assert that the portal provides “an intuitive interface.” In the absence of defining what this means and, more importantly, providing user data to support this claim, this reads like a sales brochure rather than a journal article.

Response:
The sentence has been changed to reflect the Ajax technology used to provide interactive operation: “Users access all the RMS functionalities through a one-stop web portal (see Figure 1-A). The portal provides an interactive interface [16, 17] using Ajax technology for both project management and system administration.” The interface of RMS is derived from the Multi-modality and Multi-Research (MIMI) informatics framework. The interface of MIMI was evaluated in paper [16, 17]. Several screen shots of the user interface were included in the user “quick start guide” listed in the “Notes” section.

Reviewer 2 minor comment 6:
On p. 6, the authors note that “two instruction manuals are provided” for new investigators. More information is warranted here. Why “two” manuals? How long are they? How are they structured? How easy are the manuals themselves to understand?

Response:
The manuals (User Manual and Quick-Start-Guide) are provided at the “Notes” section at the end of the manuscript.

Review 2 minor comment 8:
On p. 8, in the section on “RMS Members”, another assertion is made in the
absence of data. They state “it also indicates the capability of RMS to support cross-institutional projects.” Essentially, because the system has 36 different institutions signed up for use, the claim is that the system works. But there is no data with regard to whether or not it works, or at least, how well it works or if there are any problems.

Response:
We updated the sentence: “This result shows that RMS has already attracted a considerably large group of users from different institutions.” The main goal of RMS is to facilitate investigators to establish collaborative projects and manage the collaboration process. For the CTSC, the target is to create more collaborative projects. In Result section 3, we provided evidence to show the growth of projects in RMS.

Reviewer 2 comment 9:
On p. 10, in the section on “Growth of Research Collaboration”, another assertion is made in the absence of data. They state that the increase in connectivity is indicative of the system positively fostering collaboration. But, again, there is no data with regard to the nature of the collaborations taking place within the system and/or what is the quality of these collaborations.

Response:
The RMS is designed to enable investigators to find collaborators and manage the collaboration process. If two RMS members connect on the diagram, they have already worked together at least once on a project. We also show that the total connection (collaborative work) increased 4 times from 2009 to 2012. The results show significant increase of collaborative work. As shown in table 2, the collaboration service can be categorized in 176 different types within 12 research cores, and the collaborative task within each category is summarized. We understand the reviewer’s concern over the quality of the collaboration. In this paper, our main goal is to develop a cyber-infrastructure to enable and facilitate the establishment and connection of collaboration (e.g. finding collaborative service, keep track of tasks); hence RMS focus more on the quantity of collaboration, which we believe is very important for research project. Evaluating the quality of collaboration will be our future work.

Reviewer 2 minor comment 10:
On p. 10, when describing Figure 5, a vague term is used to interpret the graphic. The authors note that the “RMS has been supporting rich collaboration across different research divisions.” But, again, there is nothing substantive to warrant such a claim, nor any description of what, precisely “rich collaboration” is.

Response:
To clarify the expression, we edited the sentence to “RMS has been supporting 176 different types of collaboration across 201 research division.”

Reviewer 2 minor comment 11:
On p. 11, the authors state that “Figure 6 intuitively shows the diverse research
activities supported…” It is not clear what intuitively means in this context.
Response:
On page 11, the word “intuitively” is removed on the sentence.
Reviewer 2 comment 12:
On p. 12, the authors conclude that their “integrated solution bridges the gap between institutional resources, therefore promotes collaborative research.” The summative/descriptive data provided in this paper is not the evidence necessary for stating that the software either “promotes” such research, or does it particularly effectively.
Response:
We change the sentence to “integrated solution bridges the gap between intuitional resources, therefore facilitates and increases research collaboration”.
We have provided these evidences:
1) Table 2 shows that within RMS, 176 different types of collaborative services have been created by domain experts, and over 4800 tasks were finished.
2) Diagram 4 shows that an average RMS user collaborated with 1.34 experts in 2009; while in 2012 an average user collaborated with 3.82 experts. The collaboration increased nearly 300%.
3) Figure 5 shows that RMS supported 201 research divisions and established over 606 unique cross institutional collaborations.

The authors would like to thank the reviewers for their time and their very valuable comments.