Author's response to reviews

Title: Bridges, brokers and boundary spanners in collaborative networks: a systematic review

Authors:

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Author's response to reviews: see over
Response from reviewers (Received Sat 19/01/2013) Response date: 5/02/2013

<table>
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<tr>
<th>Editor and Reviewer comments</th>
<th>Response to comments</th>
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<tr>
<td><strong>Editor</strong></td>
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<tr>
<td>Dear Mrs. Long:</td>
<td>Thank you, we appreciate the opportunity to address the comments and improve the manuscript.</td>
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<tr>
<td>Your manuscript has now been peer reviewed and the comments are accessible in PDF format from the links below. Do let us know if you have any problems opening the files.</td>
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<tr>
<td>Please make the following formatting changes during revision of your manuscript. Ensuring that the manuscript meets the journal’s manuscript structure will help to speed the production process if your manuscript is accepted for publication.</td>
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<tr>
<td>1. Tables</td>
<td>Tables have been re-formatted as requested. Missing reference has been added to Zaheer &amp; Soda, and corrected for Soda &amp; Usai (2004) 3rd last row of Table 4.</td>
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<tr>
<td>Please note that we are unable to display vertical lines or text within tables, no display merged cells; please re-layout your table without these elements. Tables should be formatted using the Table tool in your word processor. Please ensure the table title is above the table and the legend is below the table. For more information, see the instructions for authors on the journal website.</td>
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<td>2. Tables as additional files</td>
<td>Table 4 has been included in the manuscript in the tables section after the references (rather than as an additional file).</td>
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<td>We notice that you have included tables as additional files. If you want the tables to be visible within the final published manuscript please include them in the manuscript in a tables section following the references. Alternatively, please cite the files as Additional file 1 etc., and include an additional files section in the manuscript.</td>
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<td>3. Figure titles</td>
<td>The Figure title has been listed after the references in the manuscript file. “Figure 1” has been deleted.</td>
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<td>All figures must have a figure title listed after the references in the manuscript file. The figure file should not include the title or number (e.g. Figure 1... etc.). The figures are numbered automatically in the order in which they are uploaded. For more information, see the instructions for authors: <a href="http://www.biomedcentral.com/info/ifora/figures">http://www.biomedcentral.com/info/ifora/figures</a>.</td>
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We would be grateful if you could address the comments in a revised manuscript and provide a cover letter giving a point-by-point response to the concerns.

Please also ensure that your revised manuscript conforms to the journal style ([http://www.biomedcentral.com/info/ifora/medicine_journals](http://www.biomedcentral.com/info/ifora/medicine_journals)). It is important that your files are correctly formatted.

We look forward to receiving your revised manuscript by 17 February 2013. If you imagine that it will take longer to prepare please give us some estimate of when we can expect it.

You should upload your cover letter and revised manuscript through [http://www.biomedcentral.com/manuscript/login/man.asp?txt_nav=man&txt_man_id=5109196508329092](http://www.biomedcentral.com/manuscript/login/man.asp?txt_nav=man&txt_man_id=5109196508329092). You will find more detailed instructions at the base of this email.

Please don't hesitate to contact me if you have any problems or questions regarding your manuscript.

With best wishes,

Ms Armee Valencia
on behalf of Prof Federico Lega

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### Reviewer(s)' Comments to Author:

#### Reviewer: 1

**Comments to the Author**

This is a timely and well structured review paper on an important topic that has been extensively researched in other settings but is gaining traction in healthcare, especially in relation to implementation science. My comments are primarily in the order of minor and discretionary revisions.

As is common with review papers, they leave too much unsaid and unspecified, often using tables to express complex ideas (table1), and this is noticeable here in the lack of theoretically grounded discussion on the differences between brokers, bridges and boundary spanners. This is probably beyond the scope of the paper and so the table works fine, but I would have welcomed a little more sophisticated engagement with the different traditions from which these concepts.

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The manuscript has been revised and this document gives our response to reviewers.

This has been checked.

Thank you

Thank you, we are pleased you found the paper interesting and consider that it can make a positive contribution to the knowledge base.

We thank the reviewer for recognising our aim of keeping the scope of the paper manageable however, we have added some comments on p.6 addressing this issue and providing some direction for readers wishing to follow up this area:

“Three studies not referring to Burt’s work are focused on boundary spanning, a concept that has more diverse theoretical
antecedents such as work by Tushman on boundary roles in the innovation process [16], Friedman and Polodny’s work on role conflict among boundary spanners during labour negotiations [17] and Allen’s work on ‘technological gatekeepers’ in R&D laboratories [18].”

This was a more general gap within the overall review, which does highlight really important aspects and implications of knowledge brokers, but there are quite different theoretical and methodological considerations that frame these points, and although often mentioned, they could be given more detailed consideration, ie. the difference between SNA and observational studies.

We acknowledge this gap and have inserted additional text on p.12 to expand on this point: “There were a range of brokerage parameters (e.g. constraint, betweenness centrality, boundary spanning ties) and methodologies (e.g. archive mining, interviews, observation) used in the studies but all were seen as valid empirical means of identifying brokers. Most of the studies that used SNA took a structural approach to brokerage by evaluating actors’ relational positions within their network and the opportunities and constraints for brokerage behaviour those positions gave [48]. In contrast, qualitative studies identified brokerage behaviour, observing how actors were using their position within the network [49]. Both approaches are based on the relationships surrounding the actors of interest and the key feature of that actor lying on the pathway between two other unlinked actors.

Another notable difference between studies was how relational data was collected. Objective methods such as counting emails or patent data, or observing actual interactions contrasted with more subjective surveys and interviews reliant on respondents’ perceptions and recall of interactions. Our decision to include widely different methods of data collection arose from the recognition that brokerage operates the same within any network with one actor linking two others. However, to ensure subjective methods were appropriately managed, all the studies were assessed for quality (e.g. checking accuracy of self reports by considering reciprocity). Low response rates for whole network surveys and studies that did not discuss how
There were some interesting omissions in the literature which reflect perhaps the narrowness of the search criteria and use of data sources - I didn't realise IBSS was still functioning (ProQuest?) - and there are other relevant sources in the fields of information systems that might be of benefit for a wider review paper.

**Reviewer: 2**

The article is interesting and has a deal of potential to positively contribute to the debate about health service delivery development according to the challenges posed by emerging clusters of patients (e.g., chronic, frail, …). However, I have some remarks that could better exploit the aforementioned potential.

**Major compulsory revisions**

- On page 6 you mentioned a slight difference between the concepts of “brokerage” and “boundary spanning”; in addition, on page 7 you talk about a “marked difference in the way bridging, brokering or … positions are identified”. I suggest to briefly explain these distinctions and discuss whether or not they have implications for your results (as your reviewed studies are either focused on the former or the latter concept).

- The discussion and conclusions sections are well designed to wrap-up the results, but they very limitedly explore the implications in healthcare. I am aware of the limits of such an effort when based on the results of a literature review. However, this is the added value that the readers of this journal are likely to expect. You can meet this request even only in a deductive fashion or in the form of further research suggestions. For instance, in your opinion, what are the most important examples of potential “key agents” in healthcare? (i.e., they could be the next research target) Can you provide some relevant (for the health policy maker or the health manager) examples, in healthcare, where innovation integration, knowledge brokerage and trust play a major role and you could hypothesize desired network structures (e.g., dense, sparse) and relative costs (e.g., bottlenecks, info distortion/hoarding, distraction)?

- Yes, IBSS is available through ProQuest. We acknowledge that we kept our search criteria narrow due to difficulties in finding standardised search terms and thank the reviewer for suggestions for future work.

- We have reviewed the paper in light of these comments and have added some additional text to address the issues raised. Additional text inserted on p.4:

  “Boundary spanning as a form of brokerage includes the idea of crossing organisational boundaries such as departments or organisations [14], or cultural boundaries such as disciplines [15] in order to exchange knowledge or mediate interactions.”

  Additional text inserted on p.6 as mentioned above for Reviewer 1:

  “Three studies not referring to Burt’s work ....”

- We thank the reviewer for this suggestion, and have added further text to address this:

  “This paper argues that a knowledge of brokerage roles and their ability to improve connectivity and function across disparate groups has wide implications for healthcare. Studies in healthcare settings have shown how SNA can reveal patterns of communication between groups – both connections and gaps - and highlight key actors and areas for intervention [57]. Heng and colleagues’ [25] examination of the structure of communication between health facility management...”
departments shows the potential a well-placed broker has to increase efficiency, and Rangachari [53] showed how bridging subgroups of professionals increased the quality of coding. The identification of the pharmacist as a key knowledge broker in Creswick and Westbrook’s paper [22] could be used to inform an intervention supporting the role. It also has implications for how medication advice-seeking should be handled after the introduction of electronic medication management systems. Will medication advice be sought as readily from a computer as from a person? Hawe and Ghali’s [24] identification of brokers among high school staff was aimed at maximising the reach and effectiveness of a health promotion intervention. This strategy of identifying bridges could be used across healthcare settings to enhance uptake of new practice guidelines or other initiatives needing to be disseminated widely and has a different focus from similar work looking at the role of opinion leaders in this process [58-60]. There is also the potential for research identifying bottlenecks in communication flows or instances of information hoarding or inappropriate gatekeeping.

“Future research on the enactment of brokerage roles in specific healthcare contexts [4, 15] and evaluating interventions to support or introduce brokers will further inform this promising area.”

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<td>- There are some typos: e.g., “conducted” instead of “reviewed” on page 1 (abstract, methods); “focussed” instead of “focused” on page 6.</td>
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<td>P.1 “conducted” deleted and “reviewed “inserted</td>
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<td>P.6 “Focussed” changed to “focused.”</td>
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The limitations of social network theory/methods in analyzing and explaining the needs of connectivity in healthcare are not discussed.

Additional text inserted on p. 17:

“Useful as SNA is to describe communication patterns and identify key actors, data collection through surveys or
interviews can involve a significant time investment for already stretched clinicians and achieving a high response rate from mobile staff on rotating shifts can be difficult. This review has shown that qualitative methods such as observation and the use of documentary data are also useful and may be a preferred alternative.”

On page 9 (8th and 9th lines from the bottom) you mention “innovation involvement”: is it a synonym of “innovation integration”? If yes, please, use the same term to avoid confusion; otherwise, please, explain this further impact.

We have clarified these two concepts that are related but not synonymous and amended the text to read:

“Burt [6] showed that while a tertius gaudens strategy across structural holes led to good ideas, it did not guarantee the wider involvement of managers which would lead to the integration of those good ideas into organisational practice. Obstfeld [28] found that a tertius iungens orientation, social knowledge (who knows what in the team, where to find resources) and network density were all independent predictors of innovation involvement.”

On page 10, last two sentences before the “Knowledge brokerage” section (from “Context…” to “… by more bridging ties”): this part is not clear to me.

These 2 sentences have been clarified:

“However, if the knowledge environment is rapidly advancing, with new information appearing all the time, or one in which network members have overlapping knowledge sets, actors are better served by more bridging ties. The authors find support for their model in a study of email contacts between recruiting executives.”

On page 11, last paragraph before the “Trust” section: you start with a situation where actors have to go through their managers to get info/advice and then you derive implications for managers that need to broker knowledge transaction; it is not clear to me if the actors are also managers and if information/advice is a synonym of knowledge transaction. Please, clarify the language and justify logically any deducted (or inducted) implication.

We have reviewed this section and amended the text to clarify our use of terms:

“Secondly, there are various costs and negative sides to the brokering of knowledge [16, 24, 38-41]. When actors in a work group had to go through their leader to get information or advice from another member, that is, if the leader needed to broker the transmission of knowledge between work group
members, productivity and efficiency of the work group suffered [40], team conflict increased and team viability decreased [38]. Individuals perceived a personal cost to this brokerage role which was decreased when the role was spread across the whole team [41].”

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<th>Quality of written English:</th>
<th>Needs some language corrections before being published</th>
<th>Suggested corrections have been made.</th>
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<td>Reviewer: 3</td>
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<td>The paper is well written and the topic is very interesting. The methods are appropriate and very well described: the authors followed the PRISMA guidelines (2009). There are few minor revisions which can be addressed fairly quickly.</td>
<td>Thank you. We are glad you found the paper interesting.</td>
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<tr>
<td>1. The discussion section is focused on “the value of brokerage” and “the costs of brokerage”. In this section the authors discuss few other papers in addition to the 24 articles coming from the systematic review. However, one of these further studies should be excluded from this section because it is strictly coherent with the exclusion criteria of the systematic review (Borgatti, reference n° 14, page. 14): terrorist or criminal networks. Why did you present the results of this paper?</td>
<td>We have reviewed this section and accept your point that it introduces excluded material. Although it reinforces the point being made of the key nature of brokers to the integrity of the network it has been removed.</td>
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<td>2. Page. 10, “knowledge brokerage” section. The reference n° 36 in the text could be incorrect: i) the reference n° 36 is Rangachari (2010), but this paper is not included in the 24 articles of the systematic review, so it shouldn’t be discussed in this section; ii) Rangachari (2008) is the n° 48 in the references section and the n° 46 in the table 4. The authors are requested to control each reference.</td>
<td>Yes, the reference for Rangachari 2008 was incorrect and has been amended in Table 4. We included the second paper by Rangachari because it is based on the research described in the included paper. It gives some theory and implications which we felt was relevant in the discussion.</td>
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<td>3. It might be very interesting that the authors briefly propose a roadmap for future studies in the conclusions.</td>
<td>As reported above this additional text has been inserted on p.17 to address this point: “Future research on the enactment of brokerage roles ...”</td>
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