Scholarly Reputation Building: How does ResearchGate Fare?

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ABSTRACT

Employing a newly developed conceptual framework of the tasks and activities that comprise today's digital scholarly undertaking and their potentially reputation building, maintaining and enhancing components, the efforts of ResearchGate in supporting scholars' reputation building endeavours were put under the microscope. Not unexpectedly, RG performs well in regard to basic research activities. Clearly, too, with ten metrics at its disposal, RG is in a league of its own when it comes to monitoring individual research reputation. Where RG falls down is regarding scholarly activities that do not concern pure research and so especially teaching. Its claim to have created a new way of measuring reputation is only partially true because if it wants to do so genuinely then it needs to extend the range of scholarly activities covered. RG also falls short in informing members as to the nature and changes to its service and of embracing new actors, such as citizen scientists and amateur experts.

1. Introduction

The article's prime purpose is to demonstrate the value and workings of a new, fit-for-purpose conceptual framework of the tasks and activities that comprise today's digital scholarly undertaking and their potentially reputation building, maintaining and enhancing components. The framework was developed as part of a European Commission (EC) funded research project, which sought to investigate and update academic reputation in the Science 2.0 age (Nicholas, Herman, & Jamali, 2015a). The framework was guided by Boyer's (1990) well-established, four-dimensional model of scholarship, updated by Garnett and Ecclesfield (2012) to include a fifth facet and further updated by the aforementioned EC project. The scholarly practices so defined are:

- **The scholarship of research**, the individual or collaborative creation of new knowledge. This large category of scholarly activities is formed of four major sub-activities: 1) producing research

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output; 2) communicating, sharing and networking; 3) disseminating and publishing research findings; 4) evaluating research;
- **The scholarship of integration**, the arraying of extant knowledge into larger intellectual patterns, often within a wider, cross-disciplinary context;
- **The scholarship of application**, the application of disciplinary knowledge and skill to societal/practical problems;
- **The scholarship of teaching**, the conveying of the human store of knowledge to new generations;
- **The scholarship of co-creation**, the participation of teachers, students and practitioners in the increasingly converging processes of knowledge production and transmission.

In seeking to show how the framework can be used to evaluate all reputational platforms - to test drive it in other words - ResearchGate (RG) has been chosen as it is, arguably, the most wide-ranging, advanced and controversial of the scholarly social networks. To those readers who are unfamiliar with RG it is one of the fastest growing of the emerging reputational platforms. It has recruited 8 million members by the end of 2015 and is likely to achieve 10 million in 2016. With 10 metrics related to reputation, the platform has also the most comprehensive set on offer. Perhaps, RG's greatest strength for many is that it feels much more like one of the big social media platforms, such as Facebook.

While others researchers have investigated RG's various reputational features and mechanisms, most notably the RG score and its membership, and many have been cited in the analysis providing evidence to support the exert analysis, this paper is, we believe, the first attempt to examine *all* its reputational features in the light of *all* the scholarly activities which have reputational potential. One exception is Thelwall and Kousha's (2015) examination of RG's reputational metrics, which, however, has been undertaken from the institutional and geographical perspective.

2. Methodology

Full details of the procedures involved in establishing the theoretical framework can be found in Nicholas, Herman, and Jamali (2015b). Here we provide a summary. Using the aforementioned five-point classification as a benchmark the following tasks were undertaken: a) the published literature was evaluated and a comprehensive list of scholarly activities identified that comprise the work-life of scholars; b) Each activity identified was described to denote its precise nature and procedures; c) Each of the activities was analyzed to discern its scientific purposes. This enabled the classification of the various activities, by the main scientific purpose they serve, into the five scholarly categories; d) All of the activities were further analyzed to determine their reputational purposes (if any). Each activity that had been found to have reputational purposes was evaluated to discern the specific fit for purpose reputational mechanism(s) it utilized. This, on the basis of our literature-based awareness of the ways and means at the disposal of scholars for achieving visibility and obtaining peer recognition and esteem, allowed for 'matching' the processes and mechanisms that could be useful in each case with the hoped-for reputational outcome.

Employing the assembled framework, RG mechanisms and metrics were investigated to determine whether they achieved the reputational purpose of a scholarly activity, and if it did, how well did it do so? This was therefore a content analysis and expert evaluation supported by: a) an analysis of dozens of internal RG news items and posts, an investigation complicated by the fact that RG is poor at explaining its functions and features and the fact that it is a moving target, with new services and features appearing all the time; b) a review of the literature on RG, the evidence from which is used directly to support the specific analysis of RG mechanisms and metrics which follows.

3. Results

For each of the 5 scholarly activities the following information is supplied: a) the scientific purpose of the activity; b) the reputational purpose of the activity; c) the specific mechanisms/processes capable of achieving the reputational purpose of the activity; d) the reputational support that RG provides in respect to the activity.

3.1 The Scholarship of Research

The pursuit of knowledge is for its own sake and the benefit of humankind. This is the biggest and most developed category by far, having been accorded most reputational attention by the scholarly community and features producing research outputs, obtaining funding, dissemination, sharing and peer reviewing. It is also the activity on which RG majors.

3.1.1 Producing Research Output

3.1.1.1 Identifying a Researchable Topic, Planning the Research Project and Obtaining Funding

Scientific purpose of activity	Finding a scientifically significant research topic and establishing its viability
Reputational purpose of activity	Producing evidence of scholarly ability to identify the significance of the topic and conduct the research as proposed; achieving visibility for a scholar's ideas
Specific mechanisms capable of achieving the reputational purpose of activity	Constructing a proposal for interested collaborators and for persuading funders that the project can deliver quality/original research

Support provided

With scientific research increasingly a collaborative endeavour rather than a singular enterprise (Hsieh, 2013; Wuchty, Jones, & Uzzi, 2007), interesting prospective collaborators is often the vital first step to getting a research project off the ground. RG's *Q&A* feature supports this important component of the present-day research undertaking by enabling the posting of ideas for collaborations

and searching for collaborators on its open discussion forums. There is even a specific forum for the purpose (ResearchGate, 2015a). A question can be posted on multiple forums to reach a wider audience. These forums have been transformed from RG's early day *Groups* to *Topics*. This conversion, to be discussed later (see 3.1.2.4), is rather more than a change of terminology, for its implications extend beyond the finding of collaborators to the essential need of scholars to link up and network with colleagues in the cultivation of science – a highly communal enterprise (Hagstrom, 1974; Merton, 1973).

Following a *Topic* and posting questions to be answered by other followers of the *Topic* also serves the purpose of finding collaborators by enabling RG members to connect with their peers. RG further assists users in finding potential collaborators and co-authors via its *Recommended for you* feature, which informs members of recently added (though not necessarily new) publications that may be relevant to them. By the same token, RG's *Related Researchers* feature identifies for members like-minded researchers, according to various criteria: institutional affiliation, previous co-authorship, previously cited authors, similar interests and followers (ResearchGate, 2015b), as well as mutual connections.

RG's *Follow* feature supports the finding of collaborators by enabling members to keep up to date with what their peers are working on. Providing ongoing notifications to scholars, regarding the research activities of the peers they follow, makes it possible to identify, locate and directly approach potential collaborators among them. RG also tells a member which users are looking at their papers, provided that the user permits it, which serves as another means for unearthing prospective collaborators. It then facilitates first contact by enabling the sending of invitations to collaborate to members with similar interests. This via the messaging feature of RG, which allows for contacting other RG members directly.

RG also aids potential funders approached, as even unregistered visitors to the site can see the profiles of portal members. Thus, they can use RG to gain at least basic information about the proposers and their scholarly achievements.

In the past RG supported the construction of collaborative proposals, too, via providing a collaborative writing environment in which data and information were kept within a group's walls. This was undertaken by facilitating the creation of private/secure workgroups, the so called *Projects*, whose members could privately discuss more confidential matters, share data, or co-edit documents. Announced in the *ResearchGATE blog* in 2012 as a tool built for facilitating and optimising collaboration (ResearchGate, 2012a), *Projects* were meant to be created by RG users, who could invite participants to their group either from amongst RG users or other, non-RG member researchers. However, apparently RG began to enrol members into *Projects* without requesting their permission, a practice that met with criticism (ResearchGate, 2014a). In any case, the *Projects* feature no longer exists: a keyword search on the *Help Center* page yields only the original announcement of the feature. Also, a *Q&A* query as to creating a private group/project (ResearchGate, 2014b), dated April, 2015, which was addressed to RG's *Support Center*, remains unanswered.

3.1.1.2 Reviewing Pertinent Previous Knowledge

Scientific purpose of activity	Anchoring research in its theoretical base
Reputational purpose of activity	Obtaining peer recognition and esteem based on appreciation of one's scholarly expertise and proficiency
Specific mechanisms capable of achieving the reputational purpose of activity	Selecting appropriate research content and presenting it as an analytic review of the literature

Support provided

According to the information provided in their 2016 factsheet (ResearchGate, 2016), RG currently has a database of more than 81 million publications, of which more than 19 million are full texts. The database is garnered from internal publication lists and database entries of members, as well as information from external databases. The search engine aids users in selecting the content relevant to their needs as it enables searching simultaneously both its internal, member created dataset and its external records of publications, this through the use of keywords, but also via the function *Similar Abstract Search*, which locates similar articles to the one provided by an author of a work.

In the past, an alternative to actively searching for information for a literature review was the option of creating a personal virtual library of relevant publications. Such a library could be created by consistently bookmarking for future use RG's recommendations for potentially relevant items according to a member's user profile. Working this way necessitated that users consistently update their *Skills and Expertise*, so that the site's algorithms could reliably offer works of interest, eliminating background noise. This type of bookmarking function no longer exists and the closest you have is a Followed items function which appears on the user's profile, which hardly constitutes a library. Nevertheless, RG's recommendations for publications of interest can contribute to the building of a personal library, though not on the site itself. By the same token, so can its *Follow* feature, which enables following a research interest, a specific publication or other members, to keep track of their publishing activities.

3.1.1.3 Requesting/Providing Help for Locating Pertinent Previous Knowledge

Scientific purpose of activity	Anchoring research in its theoretical base
Reputational purpose of activity	Achieving disciplinary and trans-disciplinary visibility
Specific mechanisms capable of achieving the reputational purpose of the activity	Sharing literature peer-to-peer or via social media based scholarly platforms

Support provided

RG, most famously, enables members to acquire previous knowledge by facilitating the sharing of uploaded full-text publications and by sending them notifications as to items that may be of interest to them (it's *Recommended For You* feature). It also allows members to request specific items

to be sent to them by their originators as a professional courtesy. Shortcuts to previously established knowledge are available via RG's *Science News* (ResearchGate, 2015c) page (formerly *ResearchGATE blog*), which, aiming at "highlighting collaboration and discovery", publishes "research stories". However, with the route to it being via the *News* or *Contact Us* options in very small print at the bottom of the various pages, its existence may be unknown to users. Also, it is not very clear how the content of *Science News* is selected for publication on the page. According to a 2009 announcement (ResearchGate, 2008), the *ResearchGATE blog* was based on blog posts from individual members or micro-articles they submitted − summaries of published and peer-reviewed articles, in which concepts and findings had been highlighted. According to a later announcement, dated 2014 (ResearchGate, 2014c), regarding the revamping of the blog, it has come to be based on the *Q&A* forums, although users were invited to let RG know if they had stories to share. However, the recently introduced *Add New* button, which enables choosing from the menu what it is that is going to be shared, does not provide for sharing either blog entries or micro-articles. Thus, it is not clear if member-generated posts of this kind are still solicited for publication on *Science News*.

In 2015 RG announced the launch of the alpha-version of the *Trending Publications* (ResearchGate, 2015d) page, intended to provide information on the most viewed and downloaded research on RG over a 24hour period in various, widely-defined disciplines. Interestingly, a spot check indicates that the articles accessed this way are not necessarily new ones. Nevertheless, this way of locating articles uses the 'wisdom of the crowd' for assembling the important or popular articles on a subject. However, as the page is not directly available and accessible from a user's homepage, the route to it and possibly even its existence may not be known to users. In fact, it could not be established whether the feature has ever passed its alpha-stage.

3.1.1.4 Producing a Research Output Individually or in Collaboration with Peers or Amateur Experts

Scientific purpose of activity	Discovering new knowledge and/or achieving enhanced understanding
Reputational purpose of activity	Obtaining peer recognition and esteem; achieving visibility among one's peers
Specific mechanisms capable of achieving the reputational purpose of activity	Presenting the results of scientific investigation suitable for peer use and evaluation

Support provided

RG allows scholars to list or upload their research output into their profiles, which is perhaps the most popular activity on the site, so that other users can find, access, evaluate and make use of their work in their own research efforts. With RG enabling, indeed encouraging (for it helps members' RG score) the uploading of *all* research-related output − articles, books, book chapters, conference papers, data sets, experiment findings, methods, patents, posters, annotations, presentations, negative results, research proposals and working papers − prospective users can gain access to knowledge, pertinent to their own research work, that otherwise might never have been made public.

3.1.2 Communicating, Sharing and Networking

3.1.2.1 Sharing Research Data with the Scholarly Community

Scientific purpose of activity	Enabling other researchers to use extant data for discovering new knowledge faster; inviting collaboration
Reputational purpose of activity	Achieving disciplinary and trans-disciplinary visibility; obtaining peer recognition and esteem; networking; enhancing digital identity
Specific mechanisms capable of achieving the reputational purpose of activity	Disseminating data sets – peer to peer or via institutional websites, data centres or repositories

Support provided

RG enables the uploading to one's profile and the sharing of datasets, inclusive of raw datasets and data from failed experiments, which can be attached as a file to a publication or a private message. This makes datasets visible and, theoretically, accessible to other users.

3.1.2.2 Sharing Methodologies, Research Tools and Protocols with the Scholarly Community

Scientific purpose of activity	Enabling other researchers to use proven methods for discovering new knowledge; promoting scholarly rigour and scrutiny
Reputational purpose of activity	Achieving disciplinary and trans-disciplinary visibility; obtaining peer recognition and esteem; networking; enhancing digital identity
Specific mechanisms capable of achieving the reputational purpose of the activity	Making one's working practices transparent and accessible over the web

Support provided

RG enables and encourages uploading to one's profile any research-related output, which may conceivably include information on methodologies or research tools and protocols, too. Indeed, the *Add New* feature, which allows for specifying via a drop-down menu what type of material is going to be shared, offers a methods category.

In the past the personal blogging function that was available on every profile allowed for sharing thoughts and news on, as well as experience with any research-related output, inclusive of methodologies or research tools and protocols. However, as Alheyasat (2015) notes in an examination of the *Q&A* feature on RG, blogs on users' pages have vanished and been replaced with question & answer forums. Still, RG does enable the seeking and sharing of its members' expertise and information resources via its *Q&A* feature, allowing as it does for crowd-sourcing. Unfortunately, though, as Alheyasat (2015) notes, many RG users are not keen to share their expertise: the percentage of users participating in the *Q&A* forums were found to be low – less than 85K out of 2 million subscribers. In addition, the forum participants tended to post questions rather than answer others' queries, so that most of the questions remained unanswered, this, presumably because posting questions is a relatively easy way of boosting one's RG score. True, the RG Score awarded for posing questions

is much lower, if awarded at all, as opposed to answers, but users may be unaware of this.

3.1.2.3 Providing Help for Solving Problems Arising in the Course of Others' Research

Scientific purpose of activity	Enabling other researchers to discover new knowledge
Reputational purpose of activity	Achieving disciplinary visibility; obtaining peer recognition and esteem; networking; enhancing digital identity
Specific mechanisms capable of achieving the reputational purpose of activity	Disseminating information, 'tips', resources, peer-to-peer or on social media-based scholarly platforms

Support provided

RG enables the crowd-sourcing of problems via the *Q&A* feature, which allows for seeking/providing help – expertise or information resources – by peers. Users can also 'follow' questions to find out when new answers are added. RG enables users to connect authors directly and send them a query, for example, on a paper that has just been read.

3.1.2.4 Sharing Research Ideas, Opinions and Interim Findings with Disciplinary Peers and the Wider Scholarly Community

Scientific purpose of activity	Obtaining peer feedback and review of work; influencing scholarly thinking
Reputational purpose of activity	Achieving disciplinary visibility; obtaining peer recognition and esteem; networking; enhancing digital identity
Specific mechanisms capable of achieving the reputational purpose of activity	Interacting with peers in conferences or on social media based scholarly platforms; live tweeting from conferences; blogging

Support provided

RG's public forums support efforts to connect, network and maintain close ties with peers. As already noted, in the past users could join various *Groups* to discuss topics of interest with like-minded peers, but as of 2011 these *Groups* have been converted to *Topics* (ResearchGate, 2011). At first glance this does not seem as much of a change, for users can still follow topics that match their research interests and participate in the discussions that arise from the questions asked in the forum. Nevertheless, the change seems to have impaired the functionality of these forums.

First of all, finding a relevant *Topic* on RG is not as easy as finding a relevant group used to be. In the past, RG enabled finding groups of interest by browsing through all public groups or by sorting groups according to activity, member count, science discipline, date of establishment or name, using a scroll down menu for the purpose (ResearchGate, 2009). Now the finding of a *Topic* of relevance is only supported by a keyword search, with all the well-known limitations of such searches, of which the most notable is the irrelevance of much of the information procured this way. Indeed, using the RG main search bar for performing a keyword search yields a wide

array of results where the sought-after word appears, which need to be filtered by *Topics* to find relevant discussions. Even when the system does come up with relevant *Topics*, it is not immediately clear which of them is the most relevant. Thus, for example, a keyword search for, say, 'Open Access' via the main search bar, filtered by *Topics*, leads to three possibly relevant discussions of the subject: Open Access; Open Access Publishing; Science 2.0 and Open Access. Only a closer look at the questions asked under each of these *Topics* reveals which of the three is the most relevant to the seeker's purposes.

It is hardly surprising then to find that a user wonders in a question posed in December, 2014 (ResearchGate, 2014c) "Where are ResearchGate groups? I saw ResearchGate talking a lot of their improved groups … where can I find their groups?" Incidentally, his question remains unanswered, but more than a year later, two other users express interest in adding a group functionality, too, seemingly unaware of the existence of *Topics*, or their RG-intended purpose. True, it may very well be that some RG users are more informed than others as to the group functionalities offered on RG; however, whilst *Topics* do support interactive discussions amongst RG users, they are more in the nature of ad hoc discussions among people interested in a specific subject than enduring, more or less formal groups of likeminded scholars. This is mainly because *Topics* are not the scholar-created and scholar-moderated forums that one would expect such a group to be, which, indeed, originally was the intention.

According to the aforementioned announcement of the conversion of *Groups* to *Topics* on RG News in August 2011, researchers could create a *Topic* and serve as its administrator, fulfilling the role of a curator, who both helps "to keep *Topics* organized" and has "more of a say when it comes to rating posts and comments". RG even announced in the following April that the curator/founder of a topic will have a badge on their profile in order to make their contributions visible. However, a *Q&A* thread started a few months later, in September 2012 (ResearchGate, 2012b), in which users complain about various aspects of the switch from *Groups* to *Topics*, an anonymous RG representative is cited as saying that "… questions can now be tagged with multiple topics. Therefore, the structure of our topics section is fundamentally changed and this meant it did not make sense to have topic founders and curators anymore". Thus, the moderators of the *Topics* seem to be RG staff, as opposed to scholars, which is problematic, for scholars' work can only be appreciated by fellow scholars. As one of the participants in the just-cited thread suggests "…the users can act as judges (including self-criticism) when it comes to the quality of a research quest… I can't understand why RG wants to try to do our 'job'…"

The change in RG policy concerning the creation of new groups has not been formally brought to the attention of RG users, beyond the announcements in the *ResearchGATE blog*. It is hardly surprising to find then, that in another *Q&A* thread, started on December, 2014 (ResearchGate, 2014c), users wonder how they can found a new group. This is characteristic of RG: whilst users are sent copious amounts of e-mails informing them of their own, as well as their peers' contributions and activities, new developments on RG are announced on the *ResearchGATE blog/Company News* only, if at all. However, as already noted, although the *ResearchGATE blog/News* is accessible from a user's homepage, the route to it, possibly even its existence, may not be known to all users. Tellingly, perhaps, the *Topic* ResearchGate, the forum to discuss RG and provide feedback to its

managers, is 'pending review', as it has been for years, and cannot be followed.

Beyond providing a platform to support researchers' vital need to interact with their peers, RG also allows for its members' obtaining peer feedback on their interim research findings or drafts of articles. Thus, users can engage in conversation with the originators of some research: discuss the findings, ask questions and provide expert opinions. This is via the *Add Comments and Highlight* (ResearchGate, 2015e) feature, which allows for sharing feedback publicly with authors and peers by highlighting the pertinent parts directly on the page and commenting on them.

3.1.3 Disseminating and Publishing Research Findings

3.1.3.1 Disseminating Research Results Formally

Scientific purpose of activity	Reporting the results of research for scholarly peers to verify and use
Reputational purpose of activity	Securing priority for a new contribution; achieving visibility; obtaining recognition and esteem; achieving scholarly impact
Specific mechanisms capable of achieving the reputational purpose of activity	Publishing research articles in peer reviewed journals; publishing books with well-regarded publishers

Support provided

'Formal dissemination' is generally taken to mean publishing in a recognized journal which serves as a peer reviewed host or storage site for articles. RG supports this at a secondary level. It does not provide formal peer review, or the imprimatur of the traditional publisher, but it does make publications with these characteristics much more widely available. Also, it does this on a major scale, considerably helped by the fact that many articles are full-text, free and easy to access. That this second level publication undercuts to some extent the publishers' rights and business model, and thus sets up a challenge to the established notion of formal dissemination, is where RG becomes interesting and rather more significant than just another niche social media platform. In addition, RG does provide the means to self-publish and self-promote and, for what it is worth, give such a publication the imprimatur of a DOI, hence an element of formal publication.

Nentwich and König (2014) argue that RG fails on two counts: access to research output available on the site is restricted to registered members and there is no formal peer review process. However, while access is 'restricted to registered members', in practice registration is achieved quite easily and the researcher condition is interpreted quite broadly and, of course, this applies even more to publisher databases where, without library membership or subscription, you face a pay-wall. The main issue lies with peer review. The attractions of (moderated, brokered) anonymity, as offered by formal peer review, is giving honest criticism by way of the editorial of a journal with an established reputation The open, 'wisdom-of-the-crowd' approach, favoured by RG, although largely by way of rhetoric, exposes work to non-moderated, possibly vexatious comment from anyone. Sure, the final reader could check the bona-fides of such commentators, but that places the burden of editorship upon each and every busy scholar.

RG supports well the two vital components of the disseminating of research results, as identified by Nentwich and König (2014), whether formally or informally: identity management and contact management. RG's identity management services centre upon members' profile pages, which provide a space for scholars to describe themselves and showcase their skills, achievements (awards, scholarships and grants) and research and teaching experience. At the heart of the profile is a researcher's publication record and output, which allows for making their research more visible and accessible and affords the ability to promote the dissemination, discoverability, usability and, in the long run, ability to cite their formal research outputs.

RG creates profiles for researchers, on the basis of the data they submit for the purpose and even on the basis of papers uploaded by co-authors or gathered from external databases. According to RG, this last is done to make claiming and adding publications to one's profile easier (ResearchGate, 2015f). However, the procedure can also serve to enlist new users, for a RG generated profile can be the basis for creating an account for visitors who do not have a profile on the site, via the *Are you this author?* button. In any case, anecdotal evidence seems to indicate that the RG algorithm may erroneously match researchers with publications they have not authored, a problem that should be easily corrected via the *Are you this author?* option, but, apparently, such errors can and do remain in the RG system (Datta, 2015).

RG's contact management services enable users to initiate and maintain social relationships with others by creating a network of 'contacts' through interlinking. Every time researchers update their publications, RG sends a notification to their network of 'followers' in their live feed and via email.

RG further supports the dissemination of scholars' research output by directing the attention of fellow members towards particular items that might be of relevance to them according to the keywords on their profile. It also contributes to the formal dissemination of research output via its *Science News*, formerly *ResearchGATE blog* (see 3.1.1.3), and the alpha-version of a *Trending Publications* page, both of which summarize already published, peer-reviewed articles, with the latter aiming at disseminating "the world's top research".

3.1.3.2 Disseminating Research Results Informally

Scientific purpose of activity	Reporting results of research for scholarly peers to verify and use
Reputational purpose of activity	Establishing priority of a new contribution; achieving visibility and obtaining peer recognition and esteem; networking
Specific mechanisms capable of achieving the reputational purpose of activity	Disseminating manuscripts, pre- or post-prints; giving a talk/paper/poster at a conference; blogging; live tweeting from a conference

Support provided

RG enables and encourages self-archiving − putting an electronic version of a document online in order to make it publicly accessible and thereby promote its visibility, readership, and impact. The version uploaded is often the manuscript or the pre-print of an article, rather than its published one, in order to comply with copyright restrictions. In fact, RG aids authors in complying with copyright

permissions by providing a link that explains the conditions for uploading files as part of the process of adding an article. If publisher conditions do not allow for making the full-text of an article publicly available, it can be sent to another researcher privately, either as a private message or by clicking *Send privately* in response to a full-text request.

In addition to articles, RG allows for sharing and showcasing research output in various other forms (see 3.1.1.4). Thus, for example, conference presentations can be uploaded and assigned a digital object identifier (DOI) in the system. RG also enables its members to broadcast their updates and questions to other networks as well as import status updates from other networks, such as Facebook, LinkedIn and Twitter (ResearchGate, 2015g, 2015i).

3.1.3.3 Disseminating Research Findings Informally to the Disciplinary and Wider Scholarly Community

Scientific purpose of activity	Reporting results of research for scholarly peers to verify and use
Reputational purpose of activity	Establishing priority of a new contribution; achieving visibility and obtaining peer recognition and esteem; networking; reaching multiple audiences; enhancing digital identity
Specific mechanisms capable of achieving the reputational purpose of activity	Making research findings openly accessible in repositories, on social media based scholarly platforms, personal websites

Support provided

RG allows for communicating across established borders, so that research outputs can be shared with academics from various fields and positions, even interested amateur experts (if they are registered members). RG thus enables the lowering of status-based communication hurdles in academia (Nentwich & König, 2014), as its forums can connect a scholar with both graduate students and the leaders of their field. RG's *Topics*, with all their shortcomings (see 3.1.2.4), do link users across disciplines. Thus, for example, one of the largest groups on RG is the interdisciplinary *Methods Group*.

3.1.3.4 Disseminating Research Findings Informally to the Public

Scientific purpose of activity	Popularizing science
Reputational purpose of activity	Achieving public visibility; reaching multiple audiences; enhancing digital identity
Specific mechanisms capable of achieving the reputational purpose of activity	Posting recorded lectures, pictures or video trailers on social media (i.e. Facebook); blogging

Support provided

With RG aiming at creating "a professional network where scientists and researchers can share and access scientific output, knowledge, and expertise", addressing lay audiences is not among its stated missions (ResearchGate, 2015j). Indeed, people wishing to become members are requested

to sign up with their institutional email address (ResearchGate, 2015k). There are, however, examples of non-researchers being members, for instance librarians, publishers and freelancers. Interested amateur experts can browse RG and discover content without being registered.

3.1.4 Evaluating Research

3.1.4.1 Peer Reviewing

Scientific purpose of activity	Maintaining and improving research quality and rigour
Reputational purpose of activity	Obtaining peer recognition and esteem
Specific mechanisms capable of achieving the reputational purpose of activity	Demonstrating scholarly proficiency and expertise as referee; appearing on list of a journal's reviewers; noting reviewing experience on CV and personal website

Support provided

RG does not provide the formal peer review process that journals customarily offer, although it allows for a researchers' reviewing experience to be noted on their profiles.

3.1.4.2 Participating in Open Peer Reviewing

Scientific purpose of activity	Maintaining and improving research quality and rigour
Reputational purpose of activity	Obtaining peer recognition and esteem; achieving visibility; enhancing digital identity
Specific mechanisms capable of achieving the reputational purpose of activity	Demonstrating scholarly proficiency and expertise via posting reviews of others' research on dedicated sites

Support provided

RG's *Open Review* feature solicits the posting of in-depth, post-publication critiques of publications on the site. The reviews are meant to focus on the reproducibility of the research, although not limited to it, this in an open and transparent manner, with no anonymous reviews allowed. If a publication has been reviewed, its authors are notified via on-site notifications and via email. They can then comment on the review, and the comments and/or ensuing discussion are displayed along with the review. The evaluations are not anonymous, which can be seen as contributing to the credibility of their content (ResearchGate, 2015l). In practice, *Open Review* is not used for in-depth critical review, more for commendations.

RG also maintains an ongoing process of checking others' ideas and work. Thus, users are invited to discuss publications directly with the authors and other experts by commenting on any content published on the site. By the same token, any answer in the *Questions & Answers* feature can be up-voted or down-voted, which is a way to promote high-quality contributions to the rest of the community and provide feedback for the author. The evaluations are not anonymous, which can

be seen as contributing to their credibility, but this also inhibits comments.

3.1.4.3 Monitoring One's Impact

Scientific purpose of activity	Accruing tangible evidence that research work is high quality and trustworthy
Reputational purpose of activity	Obtaining peer recognition and esteem
Specific mechanisms capable of achieving the reputational purpose of activity	Showcasing (e.g. personal website) the scores achieved in: citations-based metrics; usage-based metrics; ratings

Support provided

Arguably, this is an area RG is noted for, indeed, is a leader in. RG monitors a scholar's activities and provides traditional as well as alternative metrics, which, according to Thelwall and Kousha (2015), include: (1) number of publications listed by scholars in their profile, which can indicate the quantity, rather than the quality, value, or impact of their listed outputs; (2) cumulative journal impact factors of the publications of a scholar, which reflect a combination of quantity and journal-based citation impact; (3) total number of downloads recorded by RG for the full-text articles uploaded to an author's profile, which indicates the extent of readership for their article(s); (4) total number of views recorded for an article, which indicates the extent of interest in it. (5) RG Score, a hybrid metric, which, although calculated on the basis of an undisclosed algorithm, reflects researchers' contributions to their profiles, their interactions with other members, and their reputation among other members. RG also presents a graph of users' scores in percentile to show how a researcher's score measures up to that of their peers.

As of September 2015 RG combines views and downloads, presenting them as 'reads', "because they say the same thing – that someone has read your work" (ResearchGate, 2015m). The switch to Reads, according to Kraker, Jordan, and Lex (2015), came about in response to the criticisms surrounding the RG Score (see below), and it is now the main focus of RG's e-mails and displays. Nevertheless, the RG score is still prominently displayed on every profile and features in many of the site's services and recommendations.

Whether the RG score is accorded a more marginal role now, as Kraker, Jordan, and Lex (2015) claim, or not, it did attract quite some attention. Said to be 'a new way to measure scientific reputation, which ensures that reputation is defined and given directly by peers, eliminating the middle man' (ResearchGate, 2012c), it has been evaluated in a number of in depth scientific evaluations with controversial results. Thus, whilst Yu et al. (2015) present empirical evidence according to which "the RG score can be an effective indicator for measuring individual researcher performance" (at least in the discipline of supply chain management), other studies find differently (Jordan, 2015; Kraker, Jordan, & Lex, 2015; Kraker & Lex, 2015), so much so, that in their evaluation tellingly titled *The ResearchGate Score: a good example of a bad metric*, Kraker et al. (2015) conclude that while there are some innovative ideas in the way ResearchGate approaches their score, it also suffers from shortcomings so problematic, that "it should not be considered as a measure of scientific

reputation in its current form". Most notably, they claim, the RG Score ignores a number of fundamental bibliometric guidelines, inasmuch as it is neither transparent nor reproducible, and its dependency on Journal Impact Factors renders it inappropriate for the assessment of individual academics.

RG also enables the showcasing of a scholar's achievements, as reflected in the citations to their work, by displaying a list of citations on a publication's page, as well as on their profile. Researchers are invited to add and manage the list, but it is also automatically updated when RG finds any new or existing citations.

As of March 2016, RG also displays a researcher's h-index, both including and excluding self-citations. As the h-index is based on a researcher's most cited papers and the number of citations these papers received, it can serve a measure of their productivity and scientific impact. Note, however, that the calculation is only based on publications known to RG. Thus it may not match the same measure calculated by, say, Google Scholar. In fact, it will almost always produce a lower score.

RG also allows for showcasing a scholar's research skills, which can be endorsed by other users.

3.2 The scholarship of Integration

The synthesizing research tradition represented by the scholarship of integration is just as much concerned with creating knowledge as the investigative tradition represented by the scholarship of research. Thus, many of the research activities described in the preceding sections, inclusive of their reputation building capabilities, characterize the scholarship of integration, too. In fact, the unique features of the scholarship of integration are evident primarily in the activities aimed at the producing and disseminating an integrative research output. These are then the features we shall scrutinize to establish the extent to which they are supported on RG.

3.2.1 Conducting Integrative Research

RG is a genuinely multi-disciplinary site, even if Thelwall and Kousha (2016) argue that it has uneven coverage of scholarship, with the arts and humanities, health professions, and decision sciences poorly represented. Nevertheless, the discipline-spanning databases and expertise it has on offer can aid researchers in integrative scholarly undertakings, which, by definition, necessitate taking a multi-disciplinary approach.

3.2.1.1 Identifying a Complex Topic in Need of More Wide-Ranging Understanding and Planning a Research Project to Investigate It

Scientific purpose of activity	Finding a scientifically significant research question and establishing how cross-fertilization of knowledge can answer it
Reputational purpose of activity	Producing evidence of scholarly ability to identify the significance of the problem and conduct the proposed research
Specific mechanisms capable of achieving the reputational purpose of activity	Constructing a proposal for interested parties

Support provided

As conducting integrative research aims specifically at multi-faceted investigations of a topic, RG's support for finding like-minded researchers from a variety of disciplines (see 3.1.1.1) can prove to be especially important. Indeed, RG supports the locating and contacting of prospective collaborators in several ways: its *Topics* feature enables the posting of ideas for collaborations and/or the searching for collaborators on open group forums, and its *Follow* feature enables researchers to stay up to date with what their peers are working on and approach directly potential collaborators among them. RG also identifies for its members potential collaborators according to various pertinent criteria, via its *Related Researchers* feature. Another means for unearthing prospective collaborators is RG's notifications to members as to which users are looking at their papers.

RG then facilitates first contact with potential collaborators by enabling the sending of invitations to collaborate, this via the messaging feature of RG, which allows for sending private messages. RG also allows for approaching, via the site, those editors and academic publishers who are members of RG themselves, which is often the case. After all, editors are of course scholars, as are many academic publishers. Editors and publishers can thus also learn about the scholarly achievements of the proposers on RG.

3.2.1.2 Producing and Disseminating an Integrative Research Output Using Traditional Strategies

Scientific purpose of activity	Discovering and sharing wider- and novel-perspectives afforded new knowledge
Reputational purpose of activity	Obtaining peer recognition and esteem; achieving disciplinary and trans-disciplinary visibility; achieving scholarly impact
Specific mechanisms capable of achieving the reputational purpose of activity	Presenting the results of integrative interpretation of the extant knowledge on a topic in a manner suitable for peer use and evaluation

Support provided

RG enables the uploading of all research-related output – data sets, grey literature, blogs, annotations, presentations, notes, drafts, negative results – the access to which is especially important in the specific case of integrative research. This is because the integrative mode of scholarship, aiming as it does at combining perspectives, concepts, theories, information and data to achieve thorough explorations of complex problems from novel angles, may benefit from current informed opinion and unpublished knowledge.

With RG providing functionalities for identity and contact management (see 3.1.3.1), users have at their disposal the 'wisdom of the crowd' that may be especially needed for producing an integrative research output, this, because the managing of the transition between disciplines is challenging, as is mastering more than one discipline (Conole et al., 2010; Weller, M., 2011).

3.2.1.3 Producing/Disseminating an Integrative Research Output Using Open and Participatory Strategies

Scientific purpose of activity	Discovering and sharing wider- and novel-perspectives afforded new knowledge; updating and complementing extant knowledge by current informed opinion
Reputational purpose of activity	Obtaining peer recognition and esteem; achieving disciplinary and trans-disciplinary visibility; achieving scholarly impact; networking; reaching multiple audiences; enhancing digital identity
Specific mechanisms capable of achieving the reputational purpose of activity	Presenting the results of integrative interpretation of the extant knowledge on a topic in a manner suitable for peer use and evaluation; crowd-sourcing and interacting with peers on social media scholarly platforms

Support provided

Beyond the support provided by RG to the traditional methods based producing and disseminating of an integrative research output (see previous section), which applies here too, RG allows for direct interaction among researchers for obtaining ongoing feedback on work in process or drafts of articles/book chapters before publication, this via the Add Comments and *Highlight* feature (see 3.1.2.4). RG also enables users to engage in conversation with other members for crowd-sourcing purposes: its *Q&A* feature allows for asking questions and obtaining expert opinion on a variety of topics, which is especially important in a discipline-spanning integrative undertaking.

3.3 The Scholarship of Application

The scholarship of application, which has as its express aim the informing of practice, utilizes disciplinary knowledge and skill to address societal and industrial/organizational challenges. Inevitably then, its ultimate goal is also the creation of new knowledge, which is why quite a few of the activities comprising the research enterprise are typical of it, too. Here we look at those activities that more uniquely characterise this application-oriented mode of scholarship.

3.3.1 Engaging in Application-Aimed Scholarship

3.3.1.1 Identifying a Societal/Industrial Challenge in Need of a Theory-Based Practical Solution, Planning the Research Project and Obtaining Funding

Scientific purpose of activity	Finding a scientifically significant application-oriented research question and establishing its viability
Reputational purpose of activity	Producing evidence of scholarly ability to identify the significance of the topic and conduct the research as proposed
Specific mechanisms capable of achieving the reputational purpose of activity	Constructing a proposal for interesting peer and practitioner collaborators and for persuading funders that proposed project can yield best research on an important topic

Support provided

As already noted, RG supports the finding and contacting of prospective collaborators among one's peers; however, as this mode of scholarship has scholars partnering with practitioners, policy-makers and community leaders to design solutions that bring together theory and practice, RG's support for application-oriented projects may not be as extensive as required. Indeed, unless the prospective practitioner or community-representative collaborators are also independent or amateur researchers, with a verifiable publication record, they are unlikely to be RG members.

3.3.1.2 Producing and Disseminating an Application Oriented Research Output

Scientific purpose of activity	Discovering new knowledge that offers solutions to practical problems
Reputational purpose of activity	Achieving scholarly and public visibility; obtaining peer and public recognition and esteem; achieving scholarly and societal impact
Specific mechanisms capable of achieving the reputational purpose of activity	Presenting results of an application-aimed investigation both in a manner suitable for peer use and evaluation and as a societal publication (e.g. newspaper articles, television appearances and social media postings)

Support provided

RG's functionalities for identity and contact management enable its members to access, evaluate and make use of the previously established knowledge needed towards producing a new research output, inclusive of an application oriented one. However, only the academic participants in the project can use the full range of these services. RG also enables the informal dissemination of application-oriented research output, just as much as that resulting from pure and integrative research, but RG only supports the formal dissemination of research output at a secondary level (see 3.1.3.1). This is when application oriented projects need to yield formally publishable outcomes, too, or become much too costly in reputational terms for scholars, whose career depends on their publication and citation record (Braxton, Luckey, & Helland, 2002).

3.3.1.3 Serving Government or Industry as an External Consultant

Scientific purpose of activity	Devising scholarly expertise afforded solutions to societal/ industrial problems
Reputational purpose of activity	Achieving scholarly/public visibility; obtaining peer and public recognition and esteem; achieving scholarly and societal impact
Specific mechanisms capable of achieving the reputational purpose of activity	Reporting the solutions both in a manner suitable for peer use and evaluation and as a societal publication

Support provided

The informal dissemination of the solutions arrived at in the consultation process is supported on RG, which allows for posting a wide variety of research outputs. However, formal publication of research output, inclusive of the kind yielded by a consultation process, is only indirectly supported (see 3.1.3.1).

3.3.1.4 Serving the Scholarly Community (i.e., Sitting on Committees, Fulfilling Editorial Roles)

Scientific purpose of activity	Furthering the aims of one's professional community to better achieve scientific goals
Reputational purpose of activity	Achieving scholarly and public visibility; obtaining peer and public recognition and esteem; achieving scholarly and societal impact; networking
Specific mechanisms capable of achieving the reputational purpose of activity	Demonstrating scholarly proficiency/expertise in leadership roles and noting them on CV and personal website; reporting achievements in community functions and publications

Support provided

As success in academic leadership roles is widely considered a reputation enhancing achievement (Nicholas et al., 2015a), RG's allowing for showcasing on a scholar's profile any such positions held is a way to boost their professional standing.

3.4 The Scholarship of Teaching

As its name suggests RG focuses mainly on research and currently it offers only a little in the way of teaching. Where it offers some assistance is in

- *Designing a course/learning program*. RG offers vast amounts of scholarly articles, grey literature, presentations and drafts. This database can serve scholars for designing a course/learning program in ways similar to those available for preparing research proposals and/or scholarly publications. As RG lets members post drafts of any scholarly output, conceivably inclusive of course proposals, members can obtain feedback on their course/learning program proposals, too. This might be provided by RG's *Add Comments and Highlight* feature, which allows for sharing feedback publicly with peers. RG also enables users to crowd-source a scholarly output, inclusive of discussing a course proposal/draft, ask questions and provide expert opinions, thisvia its *Questions and Answers* feature. However, as students are not among the target population of RG, their feedback may not be forthcoming.
- *Producing and delivering a course using traditional strategies*. RG provides for producing a teaching program/course similar to that given to the preparing of proposals and/or writing articles. RG does not support course delivery, but does support the showcasing of a scholar's teaching experience, which can be described on their profile, in the *Info* section.
- *Producing and delivering a course using open and participatory strategies*. The support RG provides for producing a social networks based, crowd-sourcing technologies enabled, participatory online course is similar to that given to the preparing of proposals and/or writing articles.
- *Engaging in classroom research to advance learning theory*. Pursuing research into teaching and learning and reporting its results is supported on RG just as much as any other research. Thus, RG provisions for access to peer expertise and/or previously established knowledge can be used for producing research to advance learning theory.

3.5 The Scholarship of Co-creation

Support for co-creative activities is quite marginal, for the idea behind such activities is inviting amateur experts and informed citizens to join the scholarly net and opening the entire process of research to the scrutiny of public collaborators and audiences.

4. Discussion and Conclusions

Without a robust conceptual framework for the rapidly growing body of knowledge which constitutes reputation in the digital age there is a risk of fragmentation, duplication and lack of build-up. The tail (data) could wag the dog (reputation). The framework proffered hopefully will help to ensure this does not happen. Using this framework, we sought to establish the extent to which the reputational potentials of the key activities, which comprise a scholar's work, can be realized through the functions of ResearchGate. It was found that in the case of many of the activities, scholars' reputation building, maintaining, and enhancing efforts are very well supported. However, support is unequally dispersed among the five categories of activities examined, with research ones being featured much more strongly.

RG's research-focused support is hardly surprising. Scholarly reputation has long been related exclusively to narrowly defined research achievements: the volume of papers published in high-ranking journals and the number of citations they obtain (Harley et al., 2010; Housewright et al., 2013; Meadows, 1998; Mulligan et al., 2013; RIN, 2009; Van Dalen & Henkens, 2012). Obviously then, scholars are primarily interested in furthering those of their activities that can be readily translated into conventional research outputs, as these are the ones seen as potentially reputation enhancing, providing the key to career progression. Given this, it is understandable why RG concentrates its efforts on supporting activities that contribute to basic research, rather than application oriented research or teaching. Nevertheless, today's changing societal priorities, which see the future in the globalized knowledge society as hinging not only on research and innovation, but also on education for all (Altbach et al., 2009), and which call for the opening up of scholarship to participants from the entire range of the professional-amateur-citizen spectrum (Goodfellow, 2013; Weller, 2011), speak against the marginalization of scholarly activities that do not specifically aim at pure research. RG needs to be cognizant of these developments if it is to provide the services to support the possible changes looming on the academic horizon.

RG's efforts to support the formal dissemination of research output are still a work in progress, although, as Ward et al. (2015) point out, it already promotes Open Science, providing as it does fast, free, and open access to research results. It is its open peer review system that may be considered inadequate for recruitment, tenure and promotion purposes, mainly because of the reluctance on the part of researchers and institutions to drop traditional peer review. True, although universally held to be essential for maintaining the quality and reliability of research articles (Harley et al., 2010; Mulligan & Mabe, 2011; Mulligan et al., 2013; Rowlands et al., 2004; Ware, 2008; Weller, 2000), traditional peer review has many, well-known pitfalls from bias and ineffective filtering

of error or fraud to the suppression of innovation (Becher & Trowler, 2001; Egghe & Bornman, 2013; Fitzpatrick, 2010; Meadows, 1979; Zuckerman & Merton, 1979). However, open peer review is not without its shortcomings, either, as its refereeing process is in fact a general, open debate about the manuscript, conducted among self-appointed referees, whose identity is known to all (for a thorough review of the literature discussing open peer review see Ford, 2013). Most notably, the transparency it affords can be seen as potentially harming to the carefully built connections among researchers, in result of which, as Ford (2013) explains, "there is widespread scepticism about open peer review, and many potential authors and referees hesitate to participate. Where referees are concerned about publicly criticizing the work of established scientists, authors may prefer to privately discuss mistakes or flaws of their writing and scholarship".

Something else which could be detrimental to RG's endeavours is that access to the full range of services available on the site is largely restricted to the academic community. With RG aiming specifically at creating "a professional network where scientists and researchers can share and access scientific output, knowledge, and expertise" (ResearchGate, 2015j), addressing the digitally empowered lay audiences is plainly not among its stated missions. True, as Ijad Madisch, co-founder and CEO of ResearchGate points out in a recent interview, this safeguards RG from abuse, at least to an extent (Winter, 2015). However, with engagement with citizens and professional in non-professional alliances (crowd sourcing, public participation initiatives) increasingly seen as advantageous for scholars, providing as they do fresh opportunities in their scientific undertakings and increased visibility afforded prestige (Irwin, 2008; Pew Research Center, 2015), RG needs to re-examine its policy in this area.

An important finding that emerges from this review of RG's functions is that the users are often left in the dark as to site developments. Whilst users are sent copious (sometimes irritatingly so) numbers of e-mails informing them of their own, as well as their peers' contributions, activities and achievements, new developments on RG, be these the launching of new services or discontinuation of existing ones, are announced on the *News* site only, if at all, this when the *News* site may not be known to all users, as it is only accessible via the options featured in small print on the very bottom of the various pages. There is a public forum to discuss RG and provide feedback to staff, but it is 'pending review', as it has been for years, and cannot be followed. This state of affairs needs to be addressed for RG to successfully fulfil its mission of providing researchers what they need to advance their research.

Finally, it must be acknowledged that the study concentrated largely on the potential reputational building features RG has and not on whether that potential has been utilized, although where such data are already obtainable and reliable − and it is patchy - we have noted it. We do know though from our own studies that the potential has not been fully realized (Nicholas et al., 2015; Jamali, Nicholas, & Herman, 2016). Many members do not fully engage with the social/community side of the platform and tend to use it just as a resource discovery or a publications showcase. It is hoped though, that by highlighting its full range of reputational building mechanisms this will encourage researchers to become more adventurous and streetwise in their reputational ambitions.

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