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Researchers' Uses of and Disincentives for Sharing Their Research Identity Information in Research Information Management Systems

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Abstract

This study examined how researchers used research information systems (RIMSs) and the relationships among researchers' seniority, discipline, and types and extent of RIMS use. Most researchers used RIMSs to discover research content. Fewer used RIMSs for sharing and promoting their research. Early career researchers were more frequent users of RIMSs than were associate and full professors. Likewise, assistant professors and postdocs exhibited a higher probability of using RIMSs to promote their research than did students and full professors. Humanities researchers were the least frequent users of RIMSs. Moreover, humanities scholars used RIMSs to evaluate research less than did scholars in other disciplines. The tasks of discovering papers, monitoring the literature, identifying potential collaborators, and promoting research were predictors of higher RIMS use. Researchers who engaged in promoting their research, evaluating research, or monitoring the literature showed a greater propensity to have a public RIMS profile. Furthermore, researchers mostly agreed that not being required, having no effect on their status, not being useful, or not being a norm were reasons for not having a public RIMS profile. Humanities scholars were also more likely than social scientists to agree that having a RIMS profile was not a norm in their fields.

Keywords: Research Information Management Systems, Researcher Identity Information Management, Digital Libraries

Introduction

Institutional repositories and digital libraries need to provide a reliable and scalable determination and disambiguation of research identities. These essential services enable distributed grouping, linking, aggregation, and retrieval of scholarship; evaluation of the research productivity and impact of individuals, groups, and institutions; and identification of expertise. Research information systems (RIMSs) can be defined as the types of information systems that enable to manage and provide access to researchers' authored content and identity information. Publishers, libraries, universities, search engines, and content aggregators have created many different RIMSs, all with different data models, coverage, and quality (e.g., ExpertNet, Google Scholar, ORCID, REACH NC, ResearchGate). These systems use different approaches to and mechanisms for collecting and curating research identity information: manual curation by information professionals, users, or both, including the subjects of identity data; automated data mining and curation scripts (aka bots); and some combination of the above. Some large academic libraries use the VIVO[1] ontology to make their data, including researcher identity information, discoverable and linkable for cross-institutional retrieval, processing, and analysis by both human and computational agents. The use of ontologies and Semantic Web technologies can make data machine processable and "understandable," thereby reducing the cost of data aggregation and analysis. Ultimately, however, the completeness and accuracy of data are what make RIMSs reliable and successful. Although knowledge curation by professionals usually produces the highest quality results, it is costly and may not be scalable (Salo, 2009). RIMSs may not have sufficient resources to control the quality of large-scale uncontrolled metadata, often batch collected and ingested from faculty-authored websites and journal databases. Researchers need to share their research identity information through public profiles in RIMSs and participate in the curation of that information to ensure its quality and reliability (Heidorn, 2011; Lee & Stvilia, 2017; Salo, 2009; Tenopir, Birch, & Allard, 2012).

Research identity may include not only the publications, data sets, and research technologies a researcher produces, but also information about the researcher's capabilities, skills, and expertise (Hackett, 2005). Whereas publication information can be collected automatically from the Web and publisher databases and ingested by a RIMS, information on other facets of research identity may not be readily available. Research information management systems need researchers to contribute that information for themselves and their collaborators. Most RIMSs do not require users to have accounts to use their content. Most also enable their account holders to define their privacy settings and publicly share only the information they feel comfortable sharing. At the same time, however, to successfully determine or disambiguate researchers; to determine their research streams, skills, and expertise accurately; and to evaluate their research productivity and impact, RIMSs and their users need researchers to share their research identity information through their public profiles in the systems. To encourage researchers to deposit their scholarship, share their research identity information, and engage in curating that information, RIMSs need to provide services that are aligned with researchers' needs and expectations. Thus, to create value for their user groups, RIMSs need to have a better

understanding of researchers' expectations and priorities for RIM services. The relative value or criticality of a product feature or service can be assessed based on the extent of its use (Cook, 1997). An analysis of how RIMSs are used by researchers can help in assembling a repertoire of services that RIMSs may want to support and in determining the relative value of those services.

Furthermore, successful completion of the tasks that use research identity information may require researchers to act not just as users of RIMSs, but also as contributors to them. For instance, to successfully determine and disambiguate researchers and evaluate them on their research impact and productivity, researchers need to share their research identity information through public RIMS profiles. A cost–benefit analysis suggests that, in general, for a researcher to share her or his identity information through an online profile in a RIMS, the potential benefits received from that activity must exceed the potential costs and risks associated with the activity, moderated by the researcher's context and characteristics. The latter may comprise, but not be limited to, the opportunity costs (i.e., relative benefits the researcher may receive by spending time on other activities or tasks), resource constraints, and priorities and attitudes the researcher might have toward different research activities.

Although a significant body of literature on identity information control exists in library databases; automated entity extraction, determination, and disambiguation on the Web; and the design and management of online peer-production communities (e.g., Kalashnikov, Mehrotra, Chen, Nuray-Turan, & Ashish, 2007; Resnick, Konstan, Chen, & Kraut, 2012; Wu, Stvilia, & Lee, 2012), there is still a dearth of literature on researchers' use of online RIMSs and how scholars share their own research identity information through those systems. Specifically, it is important to have a greater understanding of the value structure researchers have for different RIMS tasks, and what affects their decision to share or not share their research identity information publicly in RIMSs. An analysis of the relationships among researchers' characteristics, the tasks they perform using RIMSs, the extent of their RIMS use, and the reasons they do not have public profiles in RIMSs can provide a greater understanding of how to recruit and retain different groups of researchers as users of and contributors to their RIMSs. This article contributes to filling the above gaps by examining the following research questions:

1. How do researchers use RIMSs? For what activities do researchers use online RIMSs?
2. What are the relationships among those activities, researchers' characteristics, and the extent of researchers' RIMS use?
3. What are researchers' reasons for not having a public RIMS profile?

Literature Review

With the increasing popularity of online RIMSs, scholars have begun to study how researchers use online RIMSs and their information exchange or communication behavior in those systems. *Nature* conducted an online survey with researchers from different countries and found that the most frequently reported activity in ResearchGate and Academia.edu was profile maintenance to promote

their professional presence online, followed by posting work-related content, discovering peers, tracking metrics, and finding recommended papers (Van Noorden, 2014). Nández and Borrego (2013) reported that academics in Catalan universities used Academia.edu to connect with other academics and share their authored content and curricula vitae. A study of another RIMS, Mendeley, found that researchers used its groups to monitor the literature, connect with other researchers, and promote themselves professionally (Jeng, He, & Jiang, 2015). In a qualitative study of RIMSs, Wu, Stvilia, and Lee (2017) identified nine activities for which researchers used RIMSs, ranging from finding relevant literature to finding a job. In addition, the results suggested that the extent of researchers' RIMS use might change as their career status changes or as their perception of the costs and benefits of using a specific RIMS changes.

The literature suggests that the extent of RIMS use may vary by the researcher's seniority and discipline. Haustein and Larivière (2014) analyzed journal articles from four disciplines in Mendeley and found that the majority of Mendeley users were junior or early career researchers. Mas-Bleda, Thelwall, Kousha, and Aguillo (2014), who studied the online presence of highly cited researchers working at European institutions, found that although most of the researchers they studied had a personal website or a research group page, few had an online presence in RIMSs (Google Scholar, Mendeley, Academia.edu). Their findings also showed that the online presence in RIMSs was higher in the social sciences, engineering, and health sciences than in the life sciences and physical sciences.

Previous studies (e.g., Dermentzi, Papagiannidis, Toro, & Yannopoulou, 2016; Desai et al., 2012; Veletsianos, 2011) also have examined how scholars use social networking sites such as Facebook, Twitter, LinkedIn, and Google+. These studies have shown that the scholarly uses of social networking sites included, but were not limited to, announcing new publications, disseminating information during conferences, following discussions on research-related topics, commenting on relevant research, listing and sharing publications, seeking help or offering suggestions, networking and connecting with other scholars, and sharing information about their classroom and students.

The use or nonuse of a specific feature or service of an information system can be studied as a system adoption problem. The technology acceptance model (Venkatesh & Davis, 2000) and the unified theory of acceptance and use of technology (Venkatesh, Morris, Davis, & Davis, 2003) postulate that the usefulness and ease of use of an information system can affect its adoption rate. Diffusion of innovation theory (Rogers, 2010) can provide additional insights into the adoption of information systems, including RIMSs. According to this theory, the rate and process of innovation diffusion can be affected by the characteristics of innovation, the communication channels used, time, and the social system. The characteristics or properties of innovation are (a) relative advantage, (b) compatibility, (c) complexity, (d) trialability, and (e) observability. Thus, an information system with a greater perceived advantage over existing systems; greater compatibility with the existing needs, values, and expectations of a targeted user group; lower complexity; higher availability of trial experimentation; and greater observability of results might have a higher adoption rate.

Another research stream that can inform this study is the literature on information and knowledge sharing. It shows that the fear of misinterpretation and the loss of reputation from negative speech or inaccurate answers can discourage researchers from having a public profile or answering other researchers' questions (Ardichvili, Page, & Wentling, 2003; Ferguson & Wheat, 2015). The literature also shows that one of the main concerns scholars might have when considering using social networking systems is protecting their privacy and the security of their identity information (e.g., the risk of having their social media identities stolen; Gruzd, Staves, & Wilk, 2012).

Study Design

The design of this study was guided by an analysis of the literature reviewed in the foregoing section. It began with semistructured interviews with 15 researchers between January and July of 2016. Participants represented 9 study fields, 10 institutions, and 5 seniority categories: 3 full professors, 3 associate professors, 3 assistant professors, 3 postdoctoral researchers (hereafter termed postdocs), and 3 doctoral students. Two authors independently coded all the interviews using an initial coding scheme based on the literature analysis. After comparing, discussing, and resolving any differences in their coding, the two authors formed a new coding scheme with emergent codes and subcategories, and then recoded all the interviews. A detailed account of their findings on the qualitative part of the study is presented elsewhere (Wu et al., 2017).

The findings of the qualitative part of the study were then used to expand and refine the interview questions and develop a survey instrument. The survey instrument was evaluated for readability and face validity with 9 participants (4 assistant professors, 2 postdocs, 1 associate professor, and 2 graduate students). The participants represented six disciplines: Library and Information Science, Chemistry, Mathematics, Business, Education, and Sports Management. The finalized survey was distributed online to 1,680 researchers via Qualtrics survey software in the fall of 2016. Participants were recruited from 115 institutions in the United States classified as Doctoral Universities—Highest Research Activity (DUHRA) in the Carnegie Classification of Institutions of Higher Education (2015). One of the authors and his research assistant manually collected e-mail addresses from departmental websites and directories, and participants were contacted individually by e-mail. When recruiting, an effort was made to obtain a sample stratified by seniority. Specifically, when identifying candidates and their contact information from a university, we ensured that that the university-specific list of candidates represented all five levels of seniority: graduate student, postdoc, assistant professor, associate professor, and full professor.

To be eligible to participate, a participant had to have at least one peer-reviewed publication. The survey instrument was composed of 46 questions. Before participating in an interview or completing an online survey, participants were given a consent form approved by the Human Subjects Committee of Florida State University. The form contained information about the project, including information about potential risks associated with participating in the data collection. Participants who finished an interview or a survey were e-mailed a $30 Amazon gift card.

Here, we report on participants' responses to the set of survey questions in which they were asked about tasks for which they used RIMSs and their reasons for not having a public RIMS profile. The criticality of researchers' activities and related needs to the design of RIMSs can be assessed by examining the relationships between researchers' activities and the extent of their RIMS use. The extent of RIMS use was measured based on how often a researcher used a RIMS and whether the researcher had a public profile in a RIMS.

Findings

Although participants completed early questions on the survey at higher rates, 412 participants finished the full survey, resulting in a response rate of 25%. These participants represented 80 DUHRA universities in the United States. Participants were approximately evenly distributed by gender and seniority. Slightly higher numbers of postdocs and assistant professors responded. The distribution by categories of fields of study was uneven. The Social Sciences category was much larger than other categories (see Table 1).

TABLE 1. Descriptive statistics of the sample.

No.	Discipline category	Freq	%	No.	Race	Freq	%	No.	Seniority level	Freq	%	No.	Gender	Freq	%
1	Engineering	75	18.2	1	African American	11	2.7	1	Graduate student	73	17.7	1	Female	180	43.7
2	Humanities	42	10.2	2	Asian	94	22.8	2	Postdoc	101	24.5	2	Male	223	54.1
3	Life Sciences	79	19.2	3	Hispanic or Latino	24	5.8	3	Assistant professor	92	22.3	3	Prefer not to answer	9	2.2
4	Physical Sciences	81	19.7	4	Caucasian	244	59.2	4	Associate professor	72	17.5				
5	Social Sciences	135	32.8	5	Other	13	3.2	5	Full professor	74	18				
				6	Prefer not to answer	26	6.3								

Note. Freq = frequency.

Researchers' Use of RIMSs

When participants were asked which RIMSs they used, 96% selected Google Scholar. ResearchGate was selected by 63% and Academia.edu by 29%. In addition, 29% of participants reported the use of other systems, such as Mendeley, ORCID, and discipline-specific or institutional repositories.

Next, the survey asked participants to select tasks for which they used RIMSs. Specifically, participants were given a closed-ended question that included a list of 26 tasks from which to choose. The tasks were identified from the analysis of responses to the same but open-ended question included in interviews preceding the survey. Four hundred twenty-nine participants completed this question. The most frequent uses of RIMSs were to find papers, identify researchers, and obtain citations to document sources (see Table 2).

TABLE 2. Research information management system (RIMS) uses.

	Participants	
For which tasks have you used a RIMS(s)?	No.	%
Find papers	390	91
Obtain papers	322	75
Find researchers	292	68
Obtain citations	287	67
Add/modify information for your own research identity profile (e.g., affiliation, research interests, paper citations, etc.)	285	66
Monitor the literature	262	61
Verify citations	236	55
Evaluate papers on impact (including your own papers)	219	51
Evaluate researchers on productivity and impact (including evaluating yourself)	184	43
Monitor other researchers	167	39
Identify experts	137	32
Raise your personal profile in the research community	137	32
Raise the profile of your work in the research community	133	31
Add/modify information for other researchers' research identity profiles (e.g., endorse them for skills)	116	27
Share authored content (e.g., papers, data sets, presentations)	112	26
Generate a CV	73	17
Contact researchers	73	17
Answer questions	65	15
Identify potential collaborators	64	15
Find potential external evaluators/reviewers	39	9
Ask questions	35	8
Find job opportunities	34	8

For which tasks have you used a RIMS(s)?	Participants	
	No.	%
Review/comment on papers	30	7
Find potential employees	17	4
Find potential graduate advisors	17	4
Find potential students	4	1

Note. CV = curriculum vitae.

To identify underlying groupings or clusters of tasks for RIMSs, we included in the study design a factor analysis, in which each task was treated as a variable. Principal components analysis was applied to extract factors. The component factor matrix was rotated using the Varimax rotation algorithm with Kaiser normalization. A scree plot suggested selecting the first nine eigenvalues. Factor loadings of 0.35 and above were identified as significant based on the total number of cases (429). Variables cross-loaded on more than one factor were removed from the model one by one, and the loadings were recalculated until no such variables were found. The final version of the model was composed of 17 variables and 7 factors. The measure of sampling adequacy (MSA) of each of the variables was higher than 0.58, and the overall MSA was equal to 0.74; the Bartlett test of sphericity was significant at the 0.0001 level. The model captured 65% of the total variance of the data.

Seven factors were labeled based on the tasks that significantly loaded on each factor. The factor-based groups were then sorted by the mean summated selection frequencies of the tasks included in each group (see Table 3). The Discover Papers group had the highest average score. The next highest ranked group was Monitor the Literature, followed by Evaluate Research.

TABLE 3. Factor-based task groups ranked by the mean summated selection frequencies of tasks loaded on each factor.

ID Task group	Mean summated frequency
2. Discover Papers Find papers Obtain papers Obtain citations	0.78
4. Monitor the Literature Monitor the literature Monitor other researchers	0.50
3. Evaluate Research Evaluate papers on impact (including your own papers) Evaluate researchers on productivity and impact (including evaluating yourself)	0.47
1. Promote Research Share authored content Raise your personal profile in the research community Raise the profile of your work in the research community Add or modify information for your own research identity profile	0.39
7. Generate a CV	0.17
5. Identify Potential Collaborators Identify potential collaborators Identify experts Find potential students	0.16
6. Ask and Answer Questions Ask questions Answer questions	0.12

Note. CV = curriculum vitae; ID numbers indicate the order of the factor analysis' factors used to define the task groups.

In addition, a factor score was computed for each factor and added to the data as a variable. Factor scores were then used to examine differences in the use of RIMSs for different task groups by different groups of researchers. The Kruskal–Wallis omnibus test of factor scores on seniority groups indicated significant differences for the Promote Research task group ($\chi^2 = 29.12$, $p = 0.001$). In particular, Dunn–Bonferroni tests of post hoc pairwise comparisons indicated that assistant professors and postdocs had significantly higher mean ranks for the Promote Research factor scores than did graduate students and full professors ($p < 0.05$; see Figure 1). Kruskal–Wallis omnibus tests of the other six factor groups on seniority were not statistically significant.

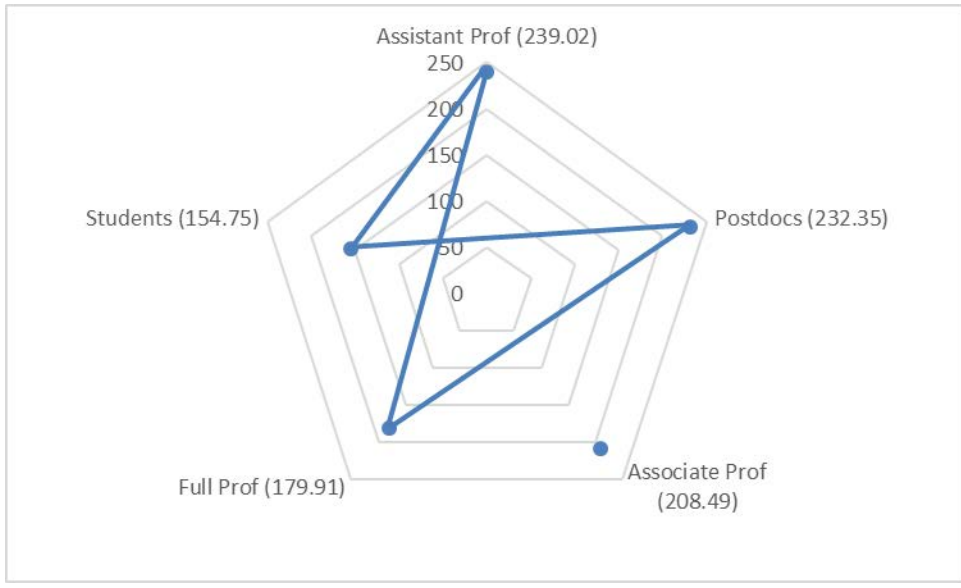

FIG 1. Pairwise comparison of seniority groups for the Promote Research factor scores. Numbers in parentheses indicate the mean ranks for seniority groups. An edge between a pair of nodes on the graph indicates a statistically significant difference between seniority groups for the research information management system (RIMS) task group ($p < 0.05$).

The similar Kruskal–Wallis omnibus test of factor scores on discipline indicated significant differences for the Evaluate Research factor scores ($\chi^2 = 15.46$, $p = 0.004$). In particular, Dunn–Bonferroni tests of post hoc pairwise comparisons indicated that humanities researchers had significantly lower mean ranks for the factor scores than did researchers from the other disciplinary categories ($p < 0.02$; see Figure 2).

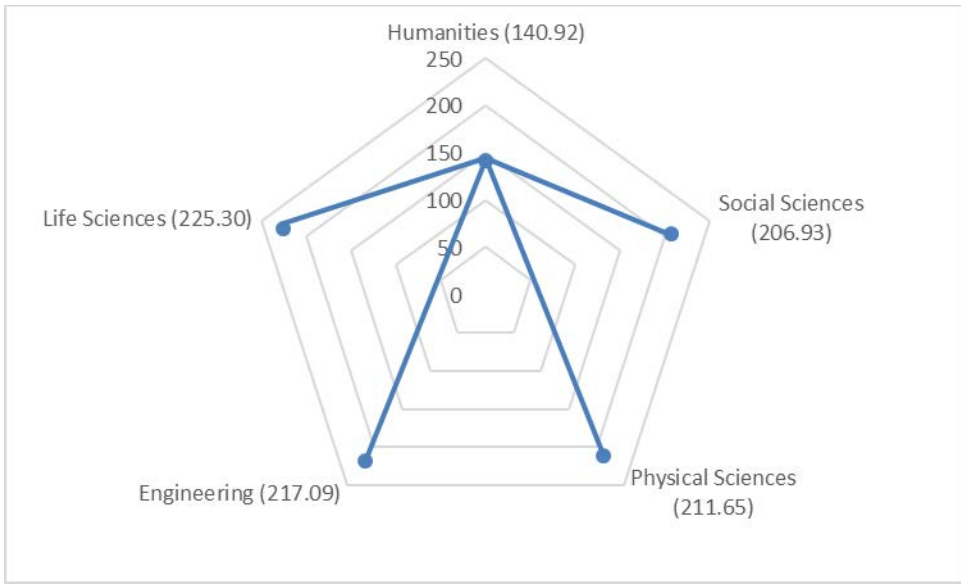

FIG 2. Pairwise comparison of discipline categories for the Evaluate Research factor scores. Numbers in parentheses indicate the mean ranks for discipline categories. An edge between a pair of nodes on the graph indicates a statistically significant difference between discipline groups for the research information management system (RIMS) task group ($p < 0.02$).

Relative Value of RIM Activities

Relationships Among Researchers' Activities, Seniority, Discipline, and Frequency of RIMS Use

To identify the relative value or criticality of RIMS tasks to researchers, we first explored the relationships among the needs for performing these tasks, researchers' characteristics, and the frequency of researchers' RIMS use. Specifically, we regressed RIMS task factor scores, seniority, discipline, and the log-transformed number of publications on the frequency of RIMS use by applying an ordered logistic regression analysis (model fit likelihood ratio: $\chi^2 = 125.21$; $p < 0.0001$; pseudo $R^2 = 0.10$; $N = 412$). The frequency of RIMS use was measured on a 5-level scale ranging from *Don't use at all* to *Use several times a day*. The analysis showed that Discover Papers, Monitor the Literature, Identify Potential Collaborators, and Promote Research were significant predictors of higher RIMS use (see Table 4). In addition, when the Full Professor category was selected as the baseline for seniority, its relationships with all the other seniority categories were positive and statistically significant, except for Associate Professors (see Table 4). When the Graduate Students category was selected as the baseline for seniority, all the other seniority categories were negatively related to the baseline (i.e., Graduate Students), whereas the odds of Associate Professors and Full Professors having lower RIMS use were statistically significant ($z = –2.20$, $p = 0.028$; $z = –2.00$, $p = 0.045$). Likewise, humanities researchers had significantly lower odds of RIMS use than did researchers from the other discipline categories.

TABLE 4. Research information management system (RIMS) task groups and frequency of RIMS use.

Category	*OR*	*SE*	*z*	*P* > *z*
Seniority (baseline = 5 [Full Professor])				
1 - Graduate Student	0.910	0.454	**2**	**0.045**
2 - Postdoc	0.809	0.358	**2.26**	**0.024**
3 - Assistant Professor	0.671	0.345	**1.95**	**0.051**
4 - Associate Professor	0.040	0.320	0.12	0.901
Discipline (baseline = 2 [Humanities])				
1 - Engineering	1.086	0.384	**2.82**	**0.005**
3 - Life Sciences	0.904	0.379	**2.39**	**0.017**
4 - Physical Sciences	1.184	0.378	**3.13**	**0.002**
5 - Social Sciences	0.979	0.346	**2.830**	**0.005**
ln(Number of Publications)	0.012	0.108	0.110	0.909
Task group				
1 - Promote Research	0.200	0.094	**2.120**	**0.034**
2 - Discover Papers	0.731	0.101	**7.250**	**0.000**
3 - Evaluate Research	0.120	0.094	1.28	0.201
4 - Monitor the Literature	0.356	0.092	**3.87**	**0.000**
5 - Identify Potential Collaborators	0.309	0.092	**3.370**	**0.001**
6 - Ask and Answers Questions	0.174	0.093	1.880	0.060
7 - Generate a CV	–0.094	0.094	–1.000	0.317

Note. Results of the ordered logistic regression, in which researcher seniority, number of publications, and RIMS task groups were regressed on frequency of RIMS use (model fit likelihood ratio: χ^2 = 125.21; $p < 0.0001$; pseudo $R^2 = 0.10$). Significant relationships are in boldface. CV = curriculum vitae.

Relationships Among Researchers' Activities, Seniority, Discipline, and Having a Public RIMS Profile

Another important indicator of the extent of RIMS use, in addition to the frequency of use, is having a public RIMS profile. Of the 412 participants who completed the survey, 331 responded that they had at least one public RIMS profile. Eighty-one participants indicated that they did not have a public RIMS profile (see Table 5). Among the seniority categories, the Assistant Professor category had the largest proportion of members with a RIMS profile, and the Graduate Student category had the smallest. Similarly, 87% of respondents in the Life Sciences category stated that they had a RIMS profile, whereas the Humanities category had the smallest proportion of respondents with a RIMS profile.

TABLE 5. Descriptive statistics of researchers with public research information management system (RIMS) profiles.

No.	Discipline category	Freq	%	No.	Seniority level	Freq	%	No.	Gender	Freq	%
1	Engineering	61	81.3	1	Graduate Student	45	61.6	1	Female	140	78
2	Humanities	29	69.0	2	Postdoc	84	83.2	2	Male	186	83
3	Life Sciences	69	87.3	3	Assistant Professor	82	89.1	3	Prefer not to answer	5	56
4	Physical Sciences	69	85.2	4	Associate Professor	62	86.1				
5	Social Sciences	103	76.3	5	Full Professor	58	78.4				

Note. For each category, the percentage represents the proportion of individuals in the category who had a public RIMS profile(s).

We used a binary logistic regression to examine the relationships among researchers' characteristics and having a public RIMS profile. In particular, we regressed the number of publications, seniority, discipline, and RIMS task factor scores on having a public RIMS profile (model fit likelihood ratio: $\chi^2 = 190.24$; $p < 0.0001$, $R^2 = 0.47$, $N = 412$). When Assistant Professor was used as the baseline for seniority, all the other seniority categories were negatively related to the baseline, although the relationships were not statistically significant. Regarding discipline, when Humanities was chosen as the baseline, all the other categories were positively related to the baseline and the relationship between Engineering and the baseline was statistically significant. Furthermore, the regression analysis revealed that an increase in the Promote Research, Evaluate Research, or Monitor the Literature factor scores increased the odds of a researcher having a public RIMS profile (see Table 6).

TABLE 6. Research information management system (RIMS) task groups and having a RIMS profile.

Category	*OR*	*SE*	*z*	*P* > *z*
Seniority (baseline = 3 [Assistant Professor])				
1 - Graduate Student	0.536	0.344	–0.97	0.332
2 - Postdoc	0.492	0.306	–1.14	0.254
4 - Associate Professor	0.944	0.616	–0.09	0.929
5 - Full Professor	0.313	0.223	–1.63	0.103
Discipline (baseline = 2 [Humanities])				
1 - Engineering	4.224	2.944	**2.07**	**0.039**
3 - Life Sciences	1.895	1.374	0.88	0.378
4 - Physical Sciences	3.437	2.380	1.78	0.075
5 - Social Sciences	2.242	1.340	1.35	0.177
ln(Number of Publications)	1.422	0.278	1.81	0.071
Task Group				
1 - Promote Research	42.102	22.713	**6.93**	**0.000**
2 - Discover Papers	0.918	0.183	–0.43	0.670
3 - Evaluate Research	1.768	0.350	**2.87**	**0.004**
4 - Monitor the Literature	1.623	0.307	**2.56**	**0.011**
5 - Identify Potential Collaborators	0.997	0.211	–0.01	0.989
6 - Ask and Answers Questions	0.968	0.202	–0.16	0.877
7 - Generate a CV	0.704	0.146	–1.69	0.092

Note. Results of the binary logistic regression in which researchers' seniority, number of publications, and RIMS task groups were regressed on having a public RIMS profile (model fit likelihood ratio: χ^2 = 190.24; $p < 0.0001$; pseudo $R^2 = 0.47$). Significant relationships are in boldface. CV = curriculum vitae.

Reasons for Not Having a Public RIMS Profile

Finally, we examined researchers' reasons for not having a public RIMS profile. Participants who indicated they did not a have a public RIMS profile were presented with a survey question listing 12 reasons for not having a public RIMS profile. Participants were asked to rate their agreement with each reason on a 7-level Likert scale ranging from *Strongly disagree* to *Strongly agree*. The reasons were identified from the analysis of the literature presented in this article as well as from the qualitative part of the study. To identify the structure underlying researchers' reasons for not having a profile, we used a factor analysis in which each reason was treated as a variable. The initial model included 12 variables. Principal components analysis was applied to extract the factors. The component factor matrix was rotated using the Varimax rotation algorithm with Kaiser normalization. A scree plot suggested selecting the first six eigenvalues. Factor loadings of 0.65 and above were identified as significant based on the total number of cases (81). The analysis showed that only one variable was significantly cross-loaded on more than one factor. This variable was removed and loadings were recalculated. The resultant version of the model consisted of 11 variables and 6 factors. The MSA of

each of the variables was higher than 0.70, and the overall MSA was equal to 0.80; the Bartlett test of sphericity was significant at the 0.0001 level. The model captured 69% of the total variance of the data.

We used the extracted factor model to develop six summated scales. These scales were calculated as the means of variables with significant loadings on a specific factor. The internal consistency of the factor scale was evaluated with Cronbach's alpha. The alpha values of the scales were above 0.70. The Not Required scale had the highest mean value, followed by the No Effect on Status and Not Useful scales (see Table 7).

To rank the relative importance of these nonmotivational scales, we regressed the scales on their values by using an ordered logistic regression. The regression analysis confirmed that participants who did not have a RIMS profile considered some factors more important than others. The values for the Not Required scale were significantly higher than those for all other scales, followed by the No Effect on Status and Not Useful scales. That is, changing from Not Required (i.e., the baseline) to any of the other scales significantly increased the odds of obtaining lower average summated agreements. Similarly, participants rated the No Effect on Status scale higher than the Not a Norm and Fad scales (see Table 7).

TABLE 7. Reasons for not having a public research information management system (RIMS) profile and their pairwise comparisons.

Scale	*M*	α	Coef(*SE*)	Coef(*SE*)	Coef(*SE*)	Coef(*SE*)	Coef(*SE*)
Scale 2: Not Required • My institution does not require me to have a profile in a RIMS • I am not expected by my supervisor to have a profile in a RIMS	5.81	0.86	**Baseline**	**1.07(0.29)****	**1.44(0.29)****	**1.54(0.29)****	**1.73(0.29)****
Scale 1: No Effect on Status • Not having a profile does not really hurt my reputation as a researcher • I feel that not having a profile in a RIMS does not affect my status as a researcher	5.06	0.96	**–1.07(0.29)****	**Baseline**	0.37(0.28)	0.47(0.28)	**0.66(0.28)***
Scale 5: Not Useful • I have no real need to have a profile in a RIMS • It does not really make a difference to my work whether I have a profile in a RIMS or not	4.77	0.82	**–1.44(0.29)****	–0.37(0.28)	**Baseline**	0.10(0.28)	0.28(0.28)
Scale 4: Cost • I avoid the cost of maintaining my profile • I do not have time to spend on maintaining my profile	4.65	0.79	**–1.54(0.29)****	–0.47(0.28)	–0.10(0.28)	**Baseline**	0.19(0.28)
Scale 3: Not a Norm • It is not common to have a profile in a RIMS in my	4.60	0.84	**–1.73(0.29)****	**–0.66(0.28)***	–0.28(0.28)	–0.19(0.28)	**Baseline**

department or laboratory • Not many researchers I know have a profile in a RIMS							
Scale 6: Fad • I'm not certain whether RIMSs are a fad or here to stay	3.78	NA	**–2.40(0.30)****	**–1.33(0.28)****	**–0.96(0.28)***	**–0.86(0.28)***	**–0.67(0.28)***

Note. Results of the ordered logistic regression in which scale name was regressed on scale value (i.e., summated average rating; model fit likelihood ratio: $\chi^2 = 74.16$, $p < 0.0001$, number of observations = 486, pseudo $R^2 = 0.04$). Significant relationships are in boldface. Coef = coefficient.
*$p < 0.02$. **$p < 0.001$.

The Kruskal–Wallis omnibus test of the scales on discipline found significant differences for the Not a Norm scale ($\chi^2 = 14.23$, $p < 0.007$) and the Fad scale ($\chi^2 = 10.10$, $p < 0.04$). In particular, Dunn–Bonferroni tests of post hoc pairwise comparisons indicated that humanities researchers had significantly higher mean ranks for these scales than did social sciences researchers ($p < 0.005$, $p < 0.04$; see Figures 3, 4). Kruskal–Wallis omnibus tests of the scales on seniority groups did not show statistically significant differences.

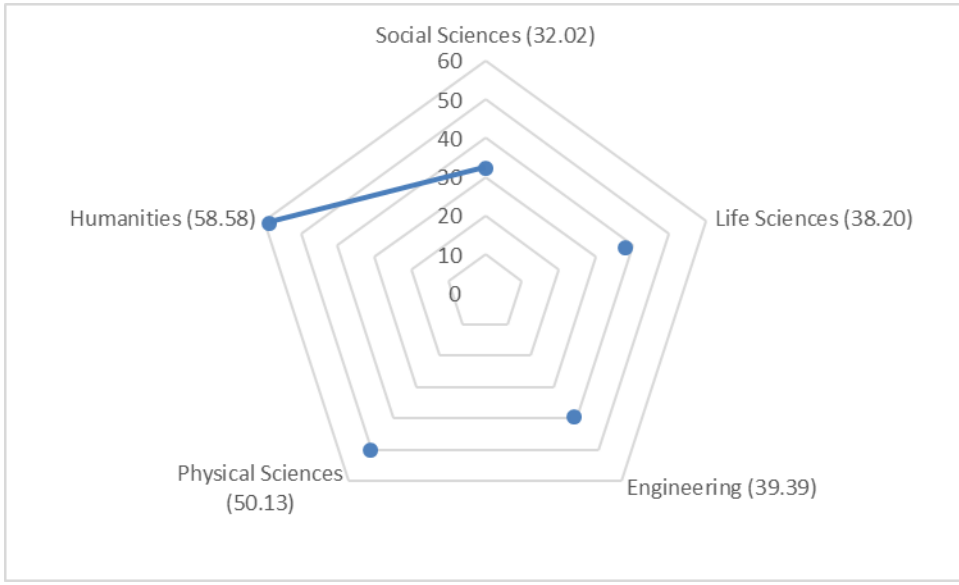

FIG 3. Pairwise comparison of discipline categories for the Not a Norm scale. Numbers in parentheses indicate the mean ranks for disciplinary categories. An edge between a pair of nodes on the graph indicates a statistically significant difference between disciplinary categories for the amotivation scale ($p < 0.005$).

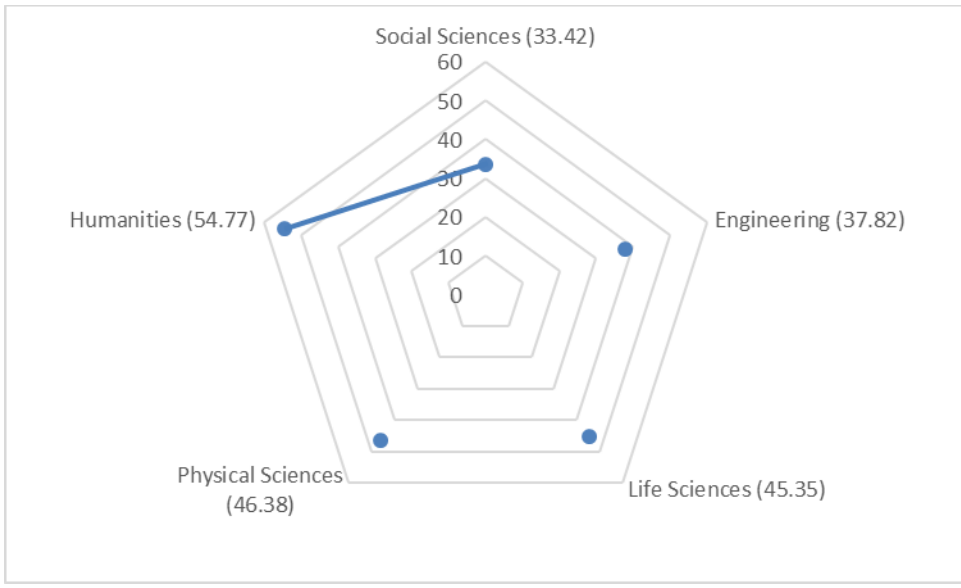

FIG 4. Pairwise comparison of discipline categories for the Fad scale. Numbers in parentheses indicate the mean ranks for discipline categories. An edge between a pair of nodes on the graph indicates a statistically significant difference between discipline categories for the amotivation scale ($p < 0.04$).

Discussion

Researchers' Use of RIMSs

The first research question examined how researchers used RIMSs. Study participants most frequently selected the task of Finding Papers, and they selected Finding Potential Students the least. Only four participants indicated that they used a RIMS for that task (see Table 2). The factor analysis of RIM tasks identified seven groups (see Table 3, Figure 5). The Discover Papers group, which included finding papers and obtaining papers and citations, had the highest mean summated selection frequency. The next highest ranked group was Monitor the Literature, followed by Evaluate Research. Thus, most of the participants used RIMSs to discover and access authored content and monitor the literature. Not all researchers have access to all fee- or subscription-based databases, particularly in developing countries. RIMSs, which enable researchers to share preprints of their publications, can be valuable alternative sources.

The next highest ranked group was Evaluate Research. This group included not only the evaluation of papers, but also the evaluation of researchers, including researchers benchmarking themselves against others who are at the same career stage. The task group of Ask and Answer Questions had the lowest average summated score. It is noteworthy that the task group comprising the tasks of sharing and promoting research content was ranked only fourth (see Table 3). Thus, most of the researchers use RIMSs for discovering research content and evaluating it. Fewer use RIMSs for actively sharing and promoting their research, and an even smaller number use these systems to ask and answer questions. The latter finding could be a consequence of the relatively high cost of these two groups of activities.

However, this same cost makes the activities valuable. Researchers engaged in promoting research make the activities in the other groups feasible or more effective. Likewise, knowledge and information shared through the question-answering activity can attract new members and foster community building around RIMSs. Hence, RIMSs need to devise reward mechanisms for motivating researchers to engage in the activity, as well as to reduce the cost of and other disincentives for the activity.

Furthermore, the results showed that compared with full professors and students, assistant professors and postdocs had higher probabilities of using RIMSs to share and promote their scholarship, including contributing to the maintenance of RIMS profiles. A possible explanation might be that postdocs and assistant professors have not yet secured long-term employment. They are evaluated more often and may therefore experience more pressure to promote themselves and keep their RIMS profiles current than are full professors. Students, on the other hand, may not have produced enough research output to share and promote their work using a RIMS. One student participant revealed:

> I feel like I am not accomplished enough to make my profile public. I believe I will make it public once I accrue more publications. (S 23)

Thus, considering the significant positive relationship between the Promote Research group and a researcher having a public RIMS profile, assistant professors and postdocs may be more willing contributors to the curation of their identity profiles on RIMSs than are other seniority groups (see Figure 5).

The analysis showed that humanities researchers tended to use RIMSs for evaluating research less than did researchers from the other disciplines. This finding suggests that the humanities might use different means or models for evaluating research compared with other disciplines. The humanities favor publishing books and monographs. Their evaluation models are often book based, whereas the other disciplines use scholarly communication and evaluation models based more on conference and journal papers (e.g., engineering; Moed, 2005; Wilsdon et al., 2015). Traditionally, books and monographs have had scant coverage by the index databases used in bibliographic analysis of research impact. Hence, researchers in the humanities may rely less on citation-based metrics than do those in other fields when evaluating research output and researchers' impact (Wilsdon et al., 2015). Moreover, providing open access to books and monographs has been more challenging (Crossick, 2016). Thus, one would expect scholars in the humanities to rely on the research evaluation models and services provided by RIMSs less than those in other disciplines. Indeed, we found that in general, humanities researchers used RIMSs significantly less often than did researchers from other disciplines. Our findings also showed that researchers from engineering had significantly higher odds of having a RIMS profile than did humanities scholars.

Relative Value of RIM Activities

Our results indicated that junior researchers (i.e., graduate students, postdocs, and assistant professors) were more frequent users of RIMSs than were full and associate professors (see Table 4,

Figure 5). This finding is in agreement with a prior study showing that the majority of Mendeley users in four disciplines were doctoral students, postgraduate students, and postdocs (Haustein & Larivière, 2014). The findings of the present study add assistant professors to the groups of frequent RIMS users.

In addition, results showed that researchers who indicated they used RIMSs for tasks from the Promote Research, Discover Papers, Monitor the Literature, or Identify Potential Collaborators groups were more frequent users of RIMSs than were other researchers (see Table 4). This finding suggests these groups of tasks could be predictors of higher use and therefore be more critical for RIMSs to support.

Findings of the regression analysis showed that an increase in Promote Research, Evaluate Research, or Monitor the Literature scores increased the odds of a researcher having a public RIMS profile (see Table 6). These relationships shed light on how (i.e., for which tasks) RIMS profiles are used. Future research could enumerate RIMS profile-based services and provide mapping schemes among the services and the activities they support. The mapping schemes could inform new RIMSs intending to provide support for the same activities. Enumerating the relationships among the activities and having a public RIMS profile could also be used to tailor communication with users to promote higher RIMS use and adoption.

Reasons for Not Having a Public RIMS Profile

Six summated scales were developed for the reasons researchers did not have a public profile in RIMSs. As expected, results showed that not being required by the home institution was the most significant reason for not having a public RIMS profile. The No Effect on Status scale was rated the second highest, even though no statistically significant pairwise differences were found among No Effect on Status, Not Useful, and Cost (see Table 7). An increase in research status or reputation is one of the main rewards in academia (Bourdieu, 1991; Zuckerman, 1988). Hence, it is not surprising that researchers who do not believe having a public RIMS profile helps increase their status may not actually have one.

It is noteworthy that the average values of all scales except the Fad scale were higher than the neutral value on the Likert scale used to measure the degree of agreement with the survey question (i.e., 4). The Fad scale had a mean value below 4. This result indicates that participants mostly disagreed with the claim that RIMSs might have an uncertain future. The study findings echo the technology adoption literature in suggesting that for researchers to have a public RIMS profile, they need to perceive it as useful (i.e., that it helps enhance their status or reputation), less expensive to use, and more effective in meeting their needs than the alternatives (Venkatesh & Davis, 2000; Venkatesh et al., 2003). Some may feel satisfied with sharing their research identity information through alternative venues, such as personal home pages or public profiles on their departmental websites.

Furthermore, the analysis showed the participants who did not have a public RIMS profile mostly agreed that in their organizations or the communities they belonged to, it was not a norm to have one.

Recruiting community or departmental gatekeepers to create and publicly share their research identity profiles could motivate their colleagues to follow their example.

Finally, humanities scholars rated RIMSs as a fad and responded that having a RIMS profile was not a norm in their fields significantly more than did social scientists. The literature shows that cultural and community norms and conventions are the essential mediating factors of human behavior in human activities (Engeström, 1990), including the activities of research collaboration, data sharing, and authorship determination (Stvilia et al., 2017). This finding suggests that the culture of a discipline plays an important role in researchers' adoption of a RIMS. It is essential that RIMSs provide services that support the culturally approved sharing, uses, and management of research information.

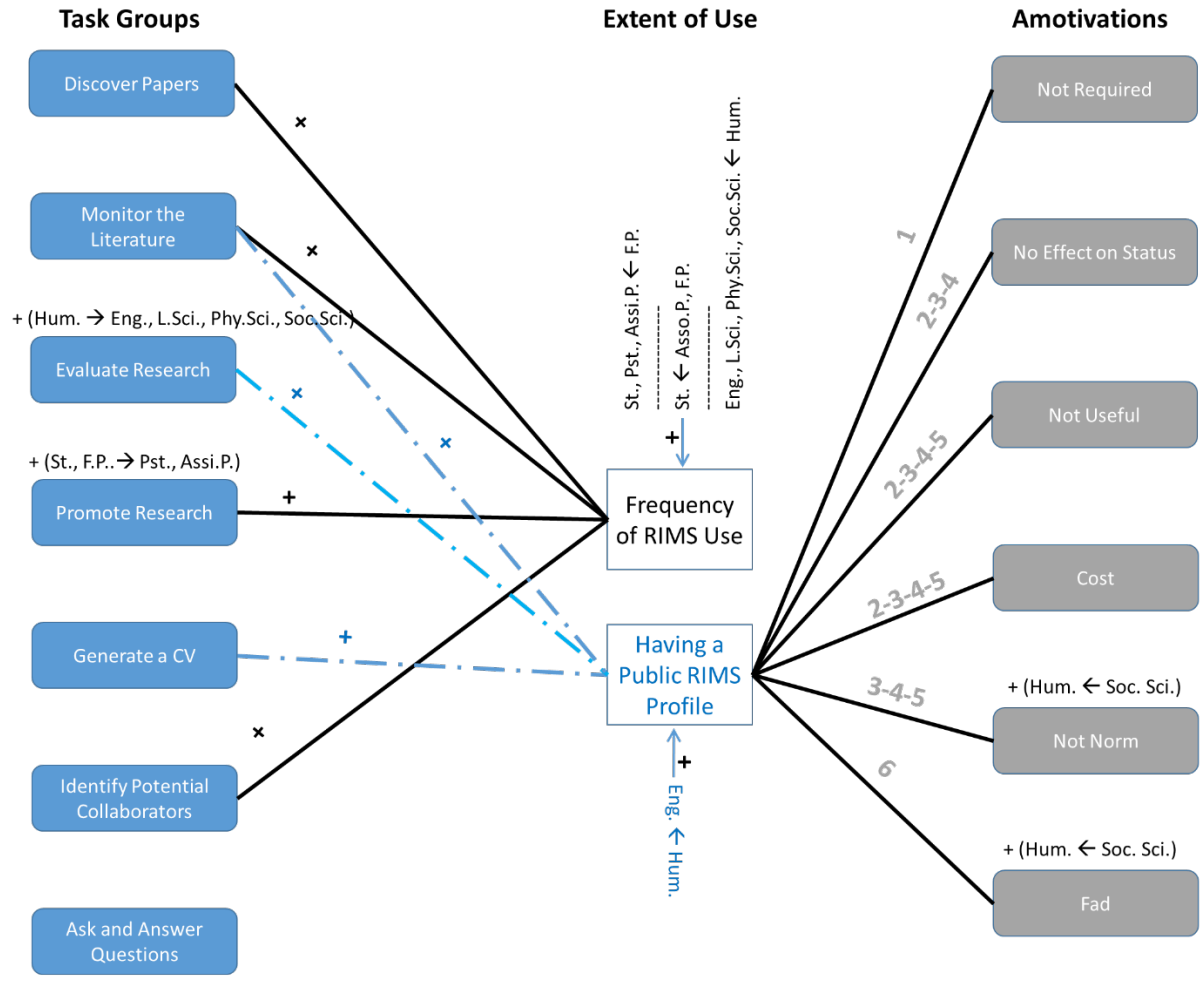

FIG. 5. Relationships among task categories, seniority, discipline, frequency of use, having a RIMS profile, and amotivations. Numbers represent the ranking of a given scale relative to the other scales. More than one number assigned to a specific motivational scale (e.g., 2-3-4-5) means that the scale shares the rankings indicated by these numbers with other scales for that activity. St. denotes student, Pst. denotes postdoc, Assi.P. denotes assistant professor, Asso.P denotes associate professor, and F.P.

denotes full professor. Hum. denotes humanities, Soc. Sci. denotes social sciences, Eng. denotes engineering, L.Sci. denotes life sciences, and Phy.Sci. denotes physical sciences.

Conclusion

This paper examined how researchers used RIMSs and the relationships among researchers' seniority, discipline, and the types and extent of their RIMS use. Most researchers used RIMSs to discover research content. Fewer used RIMSs to actively share and promote their research, and a small proportion of researchers used RIMSs to identify potential collaborators and to ask or answer questions. Results showed that humanities researchers used RIMSs less often than did researchers from other disciplines. In addition, study findings showed that early career researchers were more frequent users of RIMSs than were associate and full professors. Likewise, assistant professors and postdocs exhibited a higher probability of using RIMSs to promote their research than did students and full professors. Furthermore, the tasks of discovering papers, monitoring the literature, identifying potential collaborators, and promoting research were predictors of higher RIMS use. Researchers who engaged in promoting their research, evaluating research, or monitoring the literature showed a greater propensity to have a public RIMS profile. Six scales of reasons for not having a public RIMS profile were developed. Researchers mostly agreed that not being required to have one, having no effect on their status, not being useful, or not being a norm in their fields were reasons for not having a public RIMS profile. They also rated the Not Required scale significantly higher than the other scales. Finally, the study revealed disciplinary differences in how researchers used RIMSs and why they did not have public RIMS profiles. Humanities researchers used RIMSs to evaluate research less than did researchers in other disciplines. Humanities scholars were also more likely than social scientists to agree that it was not a norm to have a RIMS profile in their field and that RIMSs were a fad.

The findings of the study can inform the design of RIMSs by identifying the repertoire of tasks a RIMS needs to support, researchers' priorities for those tasks, and their disincentives for sharing their research identity data. The findings can be used to assemble RIMS service templates and communication strategies tailored to researchers' seniority and discipline. Future research emanating from this study will examine researchers' disincentives and lack of motivation for performing specific activities in RIMSs, such as profile maintenance and answering questions.

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Footnote

[1] http://www.vivoweb.org/.