Establishing User Needs – A Large-Scale Study into the Requirements of Those Involved in the Research Process

Shirley Grimshaw, PhD
Portal Researcher
Information Services
University of Nottingham
King's Meadow Campus
Lenton Lane
Nottingham
NG7 2NR
Tel: +44 (0)115 84 68193
Email: shirley.grimshaw@nottingham.ac.uk

Ian Wilson
Portal Team Leader
University of Nottingham
Tel: +44 (0)115 84 68324
Email: ian.wilson@nottingham.ac.uk

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Abstract

The aim of the project was to develop a set of online tools, systems and processes that would facilitate research at the University of Nottingham. The tools would be delivered via a portal, a one-stop place providing a Virtual Research Environment for all those involved in the research process. A predominantly bottom-up approach was used with emphasis placed on effective consultation with research practitioners, administrators, technicians and research managers. Over two years, 41 focus groups were run to ascertain from users the sorts of electronic tools, systems and processes they felt would most support them in their work. Questions to the groups were guided by the lifecycle stages of most research projects from the initial scoping of ideas, through the writing of proposals and monitoring of projects up to the dissemination of results (Wilson, 2004). Key points were collated, and duplications and requests for support that could not be delivered electronically were removed or forwarded to relevant departments, respectively. A cross-group analysis was carried out to determine overlap in requirements and used to establish a priority list for development. Online questionnaires are being administered to all those who took part in the project to obtain feedback and determine user satisfaction with developments.

Keywords: Virtual Research Environment, research support, focus groups, research management

Introduction

In 2004, the British Government announced its plan to support the development of Virtual Research Environments (VREs). The definition and understanding of what constitutes a VRE has continued to evolve since that time. Based on a definition put forward by Fraser (2005) and upon a variety of projects and discussion arising from those projects, the Joint Information Systems Committee (JISC) constructed its own definition of a VRE. JISC is an advisory committee to the UK post-16 and higher education funding councils. It facilitates and promotes the effective use of information and communications technology across non-compulsory education and research. Its definition of VRE (JISC, 2006) is shown below:

A VRE comprises a set of online tools and other network resources and technologies interoperating with each other to support or enhance the processes of a wide range of research practitioners within and across disciplinary and institutional boundaries. A key characteristic of a VRE is that it facilitates collaboration amongst researchers and research teams providing them with more effective means of collaboratively collecting, manipulating and managing data, as well as collaborative knowledge creation.

The evolution of the definition is evident in the broader focus of today's work compared with that of a few years ago. In 2004, JISC defined the main purpose of a VRE as "to help researchers in all disciplines manage the increasingly complex range of tasks involved in carrying out research." By 2006, JISC had explicitly identified three main groups of VRE users: research active staff, research support staff and system administrators. This broader view of a VRE was adopted by the project team at Nottingham.

Work had already started at Nottingham on the development of electronic resources for researchers as a result of a 2003 survey (Dransfield & Wilson, 2003) that sought to ascertain from researchers and academics their priorities for improvements to the existing systems that supported research. The survey was, however, limited in its scope both in terms of the population it accessed and the questions addressed. In this project, the team wanted to obtain wider engagement with all categories of staff involved with research, whatever their role might be. Thus, as well as academics and research staff, the project team consulted research managers and administrators, technical staff, business development executives and postgraduate students. The aim of the project was to identify the electronic resources and tools that any of these groups of users would like to have available to support the implementation and management of research. The kind of resources envisaged as potentially helpful included funding alerts, tools to help the financial monitoring of projects, tools to help collaboration by identifying skills across the University, online discussion areas for sharing expertise, and tools to aid the dissemination of information about journals, seminars and conferences. By determining what researchers and research managers actually wanted, the project team could develop those tools and deliver them via a portal – a one-stop place for all electronic resources. In this way the team hoped to provide a Virtual Research Environment (VRE) for the whole of the research community at the University of Nottingham based upon users' *actual* requirements as acquired through the consultation.

Discovering what people actually wanted, as opposed to what the team thought they wanted, meant embarking on a user-led consultation process that included representatives from a variety

of roles and across a variety of domains. Such an in-depth consultation meant that development might have been slower, but might also lead to more effective implementation in the long run as users felt more involved in the decision-making process (Moreland Council Consultation Framework, 2000). Maintaining an open, transparent relationship with users throughout the project and providing them with feedback about how their contributions were being used and how final decisions for development were made, helped to retain their engagement and ease the implementation and embedding of new technologies.

The Organisational Structure of the University

The University of Nottingham is a leading research and teaching university. In 2005, it had more than 32,000 students including over 4,000 international students from over 100 countries. Its organizational structure is described below and illustrated in Figure 1. Three main bodies apply governance: Senate, Council, and the University Court. The Senate is the academic authority of the University; the Council approves the University's strategic plans and is responsible for its finances, buildings, and staff; the University Court provides a forum for involvement of external organizations and individuals in University life. The University is supported by four Centres that provide the administrative infrastructure: Information Services, External Relations, the Registrar's Department, and Financial and Business Services. Research and Innovation Services (RIS), a department within Financial and Business Services, leads the drive towards excellence in research standards and the development of new areas of research in emerging fields. It encourages the transfer of technology and knowledge from within the University to the business world, and identifies opportunities for collaborative research. Strategic decisions are made at the faculty level while day-to-day academic activity takes place at the school level. Budgets are devolved to schools and directed by a Head of School and School Manager. Some schools employ Business Development Executives (BDEs) to investigate funding opportunities, build relationships with external companies and facilitate the development of commercial activities. They report to the RIS and thus provide an important link between school and centre. There are 34 schools within the University organised under five faculties. The size of schools varies within and across faculties in terms of staff employed and students enrolled. This was an important consideration when trying to ensure that all disciplines and all categories of staff were represented in the sample.

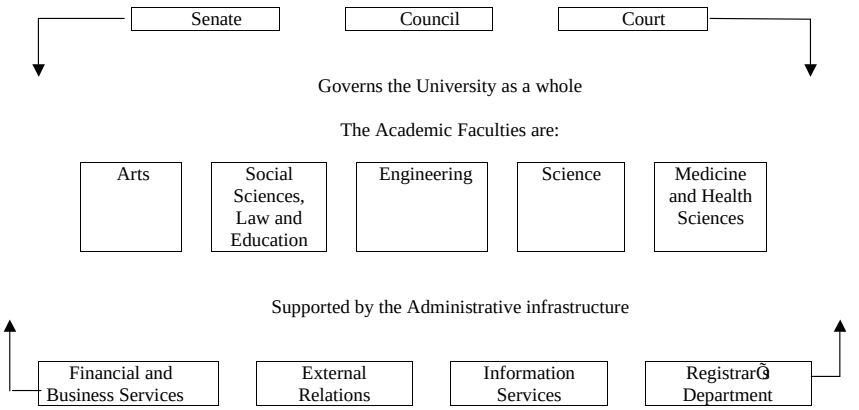

Figure 1. Organizational structure of the University of Nottingham.

Method

Choosing a methodology

As effective consultation with users was considered by the team to be essential to the success of the project, a great deal of consideration was given to choosing an appropriate methodology. It was important that users felt fully engaged in the consultation process and that the project team had a proper understanding of users' requests that was not influenced by preconceived ideas or prejudices. Several different methods were considered, each with its own advantages and disadvantages.

Questionnaires would have allowed access to all relevant users thus potentially providing a large sample of responses. Questionnaires are quick to administer, particularly if delivered online, and generally quick to analyse. They do, however, provide limited data in terms of the richness of the responses. They do not allow topics to be thoroughly explored, and responses may often be superficial, ambiguous and occasionally absent altogether.

In contrast, one-to-one interviews often elicit very rich data and, because they are conducted face-to-face, there is a much smaller risk of ambiguity or missing answers. Their disadvantage is that they are very time-consuming, and consequently only small samples of people can be consulted. Responses do not easily lend themselves to quantitative analysis so generalisation is unlikely. For a consultation that seeks to provide a VRE that is useful to *all* users, a method that uses such sampling would have been too limited.

The final method the project team considered was focus groups, which are small discussion groups of 6-10 people. Focus groups access far more participants than interviews, but far fewer than through questionnaires. In terms of the richness of the data, this method aims to promote open discussion and facilitate the expression of criticism and the exploration of different types of solution. By exchanging ideas within the group there is the potential for more creative thinking and wider opinions than afforded through individual interviews -- qualities that are invaluable when the aim is to improve services (Kitzinger, 1995). While the smaller sampling may mean that caution should be applied before attempting to generalize the results from focus groups in any empirical sense, theoretical generalization may still be possible. This is especially true when the number of groups permits insights gained from the data to possess a "sufficient degree of generality to allow their projection to other contexts or situations" (Sim, 1998, p. 350). This transferability increases the validity of focus group data.

One further consideration in the choice of method was that the team wanted users to feel fully involved in this exercise. When those consulted feel fully engaged with the process, this is likely to be reflected not only in the data obtained from the consultation but also at the embedding stage when new tools and resources are rolled out to users. Such engagement is more likely when the consultation is face-to-face as it produces a stronger sense of satisfaction in participants and a firmer belief that their opinions count (Gibbs, 1997).

Based on these factors, the method of choice was well-run focus groups.

Starting the Engagement Process

The team's first stage of the engagement process was to meet with each of the School Managers to explain the purpose of the project, enlist their advice on recruiting staff and find out the best times to arrange focus groups within their school. School Managers also provided information about which support and administrative staff were involved with research in their school, and who should therefore be included in the consultation. Schools that had insufficient support and administrative staff to form one focus group were asked to join with others, and School Managers were helpful in advising which schools could be appropriately combined in terms of their culture.

Recruitment of Consultees

The method of recruitment of staff to the consultation varied across schools and was based on the advice of each School Manager. Sometimes School Managers sent out letters of invitation to their entire school, with replies coming directly to the project team. Sometimes the managers provided the team with lists of contacts, and sometimes Heads of Schools advertised the project at school meetings. Sometimes the project team selected staff randomly from website lists. In general, the greater control the team had over the recruitment process the more successful it tended to be, as it allowed the response rate to be monitored and the method of approach adapted and changed as necessary.

A number of lessons were learned from the recruitment process in terms of optimizing engagement:

1. Email invitations needed to be brief with links to more detail if required by the recipient.

2. Email headings needed to be serious and informative so they were not dismissed as spam.

3. The language in the email needed to match that of the user. Using unfamiliar terms to describe familiar concepts tended to alienate staff and reinforced feelings of distance between different groups within the University.

4. It was better to ask staff to commit to a short period of time (one hour) and hope that they might want to stay longer than to invite them for longer (two hours) and risk refusal altogether.

5. Engagement is a voluntary process and, while it can be encouraged, the decision not to engage in the consultation should always be respected.

Twenty-eight of 34 schools participated in the project, and 41 focus groups were run over two years. Nineteen focus groups were for academics or researchers or both, five were for postgraduate students (the least eager to engage in the project), 12 were for School Administrators and five were for Central Administrators.

Designing the Questions

One way of considering the research process is to envisage it as a lifecycle with a number of

distinct stages (Wilson, 2004). For the purposes of the project, the team identified the following 10 Lifecycle Areas (LAs) that occurred in most types of research:

LA1) scoping the context when the investigator explores the literature

LA2) finding funding

LA3) finding collaborators/building relationships

LA4) creating a proposal (including contractual issues such as Intellectual Property Rights [IPR])

LA5) costing and pricing

LA6) approval and submission of the proposal

LA7) project administration (setup and ongoing monitoring)

LA8) undertaking the research

LA9) outcomes (dissemination and publication, new research, commercialization)

LA10) management of the research portfolio

As each of these areas was relevant to Academics and Researchers, questions concerning each were addressed to these users. They were asked about their current practice, any frustrations with the tasks they had to perform, how things could be improved, and what resources or tools they felt would help them carry out their role. Because focus groups were organised to last one hour, not all areas could be covered by one group. A system was therefore designed to ensure that every Lifecycle Area was covered at least once by each Faculty. This is illustrated in Table 1 below for the Faculty of Science.

Table 1

Coverage of Lifecycle Areas by Focus Groups Run in the Faculty of Science

	Schools	**LA covered**
Faculty of Science	Biology	
	Biosciences	1, 3, 4, 5, 6, 7, 8 and 9
	Chemistry	2, 3, 4, 5, 6, 7, 9 and 10
	Computer Science	2, 3, 4, 6, 7, 8 and 10
	Mathematical Science	1, 2, 3, 4, 7, 8 and 9
	Pharmacy	6 and 7
	Physics and Astronomy	1, 2, 3, 4, 5, 6, 7, 8 and 9
	Psychology	5 and 6

Questions addressed to School Managers, support and administrative staff covered those Lifecycle Areas relevant to their role. Thus, this group of users would not be asked questions concerning LA1, scoping the context, and LA8, undertaking the research, as those areas dealt with the implementation of research rather than its management. They were, however, asked some additional questions about their satisfaction with communication among themselves, academics and researchers, and central administrators. They were also asked about their need for a shared virtual working environment where they could exchange ideas, experiences and good practice with their counterparts in other schools.

Postgraduate students were not asked questions concerning LA5, costing and pricing; LA6, approval and submission of the proposal; or LA7, project administration. Additional questions addressed to this group concerned general support within the University and the Graduate School, and any ideas they might have for improvement of resources. They were asked to relate both positive and negative experiences, as well as ideas for improving communication and inclusion.

As for Central Administrators, separate focus groups were held with those sections responsible for financial reporting, negotiation of contracts, intellectual property, and engagement with external businesses. A focus group was also held with administrators from the Graduate School, which supports postgraduate students and is responsible for both their training and the training of University researchers. Questions to Central Administrators addressed the quality of the relationships they had with staff and students in schools and ideas they might have for easing any existing tensions. Ways of improving transparency and openness in communication were discussed, as well as ways of clarifying areas of responsibilities and easing frustrations with the role. The project team hoped that information obtained from the Central Administrators would provide a different perspective from that of the research practitioners, thus presenting a more complete picture of the processes involved in the research cycle.

Although the project was concerned primarily with the delivery of electronic tools and resources to support research, the team identified three reasons for soliciting *any* ideas for support that participants could suggest. First, it would help maximize engagement and minimize any preconceptions about delivery being a "technical" problem. Second, such information would provide the team with greater insight into the needs of users and the context within which they worked, which in turn would shape the way in which the team developed and delivered the requirements. Finally, it allowed the team and users to think more broadly and to consider the possibility that some suggestions for face-to-face support or training could be delivered electronically.

Running the Focus Groups

Effective consultation requires several key ingredients. The first is the assurance of confidentiality. If participants are to be open about the frustrations they feel about their role and to feel free to be critical of present systems they must be assured anonymity. Permission to record and transcribe the sessions was obtained from all participants with the assurance that only the group facilitator would have access to the tapes, and that all means of identifying individuals would be removed from the final transcripts. No groups refused to be recorded.

The composition of groups was also critical as it was important that no individual felt inhibited or intimidated by the presence of another in their group, as might occur when junior researchers were combined with senior staff members.

Every effort was made to make the focus groups as relaxed and enjoyable as possible. Initial questions were general in nature to initiate and then promote free-flowing discussion. More specific questions were introduced as the discussion progressed. The aim was to extract opinions and ideas about specific Lifecycle Areas while not allowing the discussion to be too researcher-led. Time was always allowed at the end of each session for participants to add any comments or mention any issues that were important to them but which hadn't been covered. The team sought to ensure that no participant left a focus group feeling that his or her views had not been heard.

After each session had been transcribed, the comments were returned to participants for verification. This not only ensured accuracy in reporting, but also gave participants a second opportunity to elaborate upon or amend their opinions. The opportunity to amend comments was taken by several participants. For example, one project manager felt that she had exaggerated the number of errors she had experienced by the finance team when recording the "spend" on projects and adjusted the figure in the transcript to one she considered to be more realistic. Another participant revealed that she had much more to say about the adequacy of training and career development in her school. She had felt unable to express her true feelings in the focus group because her mentor had been present. In spite of the care taken with the composition of groups, on this occasion it had not been a complete success.

The verification process, although time-consuming, was an essential part of the consultation as it helped participants to realise that accuracy in reporting their requirements was a serious consideration of the team. It also reminded them of their discussion and ensured their continued engagement with the project.

Results

Summary of Results

Over 700 key points were collected, including 577 from Academics, Researchers or Postgraduate students. This included much duplication where similar points were made by more than one focus group. Once duplication had been removed, 293 key points covering the 10 Lifecycle Areas from the five different faculties remained. Sixteen completely generic requirements emerged from cross-faculty comparisons. The majority of these were requirements that could be supplied electronically, but more training, better communication, and more resources were also noted.

One hundred-six key points were collected from School Managers and School Administrators. Once duplication had been removed, 37 key points remained. Twelve of these related directly to Lifecycle Areas, most of which could be supplied electronically. The remaining key points were concerned with general management requirements such as an increase in resources, information, and transparency. There was also a request for systems to facilitate the monitoring of work requests and the management of postgraduate students.

Twenty discrete key points were collected from Central Administrators. Six of these related to the Lifecycle Areas, and all could be supplied electronically. As with the previous group, the remaining points related to more general issues such as resourcing, communication, and management.

The final group, the Graduate School, raised seven key points, none of which related directly to any of the Lifecycle Areas. The key concerns of staff from the Graduate School were for more effective communication and greater transparency across the University.

Analysis of Results

One of the aims of this project was to obtain an all-round picture of the requirements of all those involved in the research process. Previous work done at the University of Nottingham had accessed the views of academics and researchers but had omitted the opinions of several vital groups of people -- School Managers, School Administrators, technical staff and Central Administrators -- without whom the research cycle could not be satisfactorily completed, and among whom occasional tensions arise. It is therefore interesting to compare the key points raised by the different groups with respect to the different Lifecycle Areas (see Table 2):

Table 2

Comparison of Requirements of Practitioners and Administrators of Research Across the 10 Lifecycle Areas

Lifecycle Areas	**Generic requirements of academics, researchers and postgraduate students**	**Requirements of School Managers and School Administrators**	**Requirements of Central Administrators**
LA1 **The idea / scoping the context for the research**	Access (including off-site) to as many online journals as possible. Direct links to journals through the portal and minimum clicks to actual paper		
LA2 **Finding funding**	An efficient, uncomplicated, customisable and flexible method of finding funding opportunities Efficient focused system of notification of research calls	A central information resource on open calls and new funding sources. BDEs to get the same calls as their academics.	

Lifecycle Areas	Generic requirements of academics, researchers and postgraduate students	Requirements of School Managers and School Administrators	Requirements of Central Administrators
LA3 **Finding collaborators and building relationships**	Day-by-day calendar of seminars, lectures, guest speakers and events on campus with efficient search facility, titles of papers and links to Abstracts. Efficient, effective way of finding out staff/PhD students research interests, projects, funders and publications	Face to face meetings with opposite number or a sort of School Managers' chat room to discuss specific problems. Shared resources Information about what colleagues are up to in other Schools. Any mechanism that improves communication between Schools	Something which might help disparate groups to do more together
LA4 **Creating the proposal - contractual issues, such as IPR**	Guidance/expertise online and in human form in formulating proposals. Examples of successful and unsuccessful proposals in a relevant field.		
LA5 **Costing and Pricing**	Training seminars on costing and pricing projects and administrative help with same.		
LA6 **Approval and submission of the proposal**	Easy physical access to and good, clear communication with people in RIS. Seminars about services provided by RIS backed up by a clear website with points of contact.	For new members of staff information about who to contact in RIS, who has to sign it off and rubber stamp it. Information about the research process, where the bottlenecks are and somebody to take staff through the process. Less duplication – at present staff are sorting out funding information on one system and repeating the process on another.	

Lifecycle Areas	Generic requirements of academics, researchers and postgraduate students	Requirements of School Managers and School Administrators	Requirements of Central Administrators
LA7 **Project administration**	Accessible information/ training for staff and postgraduates about how different accounts work and on costing system (PFACT). User-friendly, up-to-date, accurate and transparent financial statements	A finance system that's more layman friendly. Improved project monitoring - items should be entered immediately – even if it's only a title or a number and start date. Something that informs staff when invoices have been paid Easy way of pulling out statistics rather than holding them in lots of different data bases	Project management tools in proforma and models or samples that academics can choose from with worked examples Systems that are more user friendly - one big browser instead of separate ones that you have to go in and out of.
LA8 **Undertaking the research**	Groups or shared workspaces tailored to needs Shared resources, tools and support sites for software		
LA9 **Outcomes**	More money for conference attendance.		Evaluatory tools for academics. Central point where you can search for information about all the products and services the University has to offer and with information about who to talk to. Hard and fast rules about forming spin-out companies published on the internet. Any deviation from the published system to be accounted for by documentation.
LA10 **Management of research portfolio**	Information about bigger plans and strategic development of Schools, Divisions and University.	More meetings with RIS to discuss strategy and direction	

The requirements of Academics/Researchers and those of School Managers/Administrators reflect agreement about the tools they would like and the things they would like improved. For example, for LA2, finding funding, there was a similar need by both groups for greater notification of research calls. BDEs emphasized their desire for greater involvement in the

process so they could provide the value-added element their role required. For LA3, finding collaborators/building relationships, there was a shared desire for collaboration with colleagues and for any tool that could assist the communication between Schools. For LA6, the approval and submission of proposals, both groups expressed a need for greater clarification of who to contact in RIS; for LA7, project administration, both groups wanted a more user-friendly finance system. Finally, there was a plea for more information about the University's strategic plans (LA10, management of the research portfolio). Schools generally felt ill-informed and excluded from discussions about the direction the University wished to take in terms of the bigger research picture.

Key requirements collected from Central Administrators focused primarily on tools to help the two groups noted above. Thus, they suggested the pro forma provision of project management tools online to help with project administration, LA7. Further, they identified an increasing need for accountability and, therefore, some type of evaluation tool by which academics could measure outcome success, LA9. They also welcomed any tool that would help "disparate groups to do more together," thus echoing the suggestions of the other two groups for a tool to help with collaboration, LA3. Tools that meet the needs of the other two groups in turn meet the needs of Central Administrators by helping them perform their role in the research process. As far as their own specific needs were concerned, like the other two groups, they requested systems that were more user friendly (LA7, project administration), plus two requirements that would help them to assist academics in achieving satisfactory outcomes. The first of these was a central place online that listed all the services and products the University had to offer together with the name of the relevant academic contact. This would enable Central Administrators to bring together outside agencies and academics and allow discussions about possible work. The second requirement was for online published procedures for the formation of spin-out companies. This would both help ensure that academics conformed to the rules and would eliminate some of the past difficulties that had been encountered by Central Administration.

In terms of requirements that could not be directly defined under a particular Lifecycle Area, several points made by School and Central Administrators were related to research. Some requirements were for greater involvement in the research cycle or for better communication to enable them to carry out their role more efficiently. Technical support managers, not part of the information loop when project proposals are submitted, wanted to be kept informed of the equipment requirements of new projects so they could more effectively allocate time and space. Newly appointed research administrators wanted online guides or locations that new staff would be directed to for information. This would allow them to familiarize themselves as quickly as possible with the University's procedures and reduce the delays caused by having to make frequent phone calls to find information.

School Administrators, Central Administrators and members of the Graduate School expressed a wish for improved and more transparent communication and a general need for more information. All three groups also mentioned inadequacies in the process of appointing new staff although their actual grievances varied. School Administrators requested an easier system of assigning codes to new staff, Central Administrators wanted vacant posts filled more quickly, and the Graduate School staff requested transition periods between outgoing and incoming staff. Both School Managers/Administrators and Central Administrators felt that School Managers

were insufficiently utilized. School Managers wanted greater involvement in management meetings and Central Administrators felt that School Managers could be a vital link between Schools and the Centre with the potential to play a useful role in overseeing strategic work. All these requirements were forwarded to the relevant bodies and departments for consideration and possible implementation.

Two things should be noted. First, as previously stated, tensions could arise between the different groups. Second, all groups identified a need for better communication, transparency and clarification of roles. Some of the tensions that exist between groups occur because people are confused about who is doing what, when things will be done and why things have to be done in the first place. Meeting the need for clarity and improved communication may go a long way towards easing any tensions that exist between the groups.

That said, very little dissention about staff in other roles occurred during the focus groups. In fact, Academics were often keen to express an appreciation of the services School and Central Administrators provided for them. It was often the system itself and the lack of resources that they criticized. Likewise, Managers and Administrators expressed an understanding of the time pressures that faced Academics and Researchers and their desire to focus on the science rather than the financial administration of projects. Effective communication can only aid the understanding and empathy each group has for the other.

Developing the VRE

Describing the VRE

As for requirements that fell within the definitions of the 10 Lifecycle Areas, the next stage was to determine which could be delivered electronically and which would need to be forwarded to other departments outside of Information Services. Table 3 shows the combined requirements of the different groups for the 10 Lifecycle Areas with duplications removed, and includes only those requirements that can be delivered electronically as part of a VRE.

Table 3

Combined Requirements of the Different Groups for the 10 Lifecycle Areas that can be Delivered Electronically via a VRE

Lifecycle Areas	**Combined requirements of academics, researchers, postgraduate students, School Managers/Administrators and Central Administrators**
LA1 **The idea / scoping the context for the research**	Access (including off-site) to as many online journals as possible. Direct links to journals through the portal and minimum clicks to actual paper

Lifecycle Areas	Combined requirements of academics, researchers, postgraduate students, School Managers/Administrators and Central Administrators
LA2 **Finding funding**	An efficient, uncomplicated, customisable and flexible method of finding funding opportunities Efficient focused system of notification of research calls A central information resource on open calls and new funding sources. BDEs to get all the calls that their academics get.
LA3 **Finding collaborators and building relationships**	Day-by-day calendar of seminars, lectures, guest speakers and events on campus – with efficient search facility, titles of papers and links to Abstracts. Efficient, effective way of finding out staff/PhD students research interests, projects, funders and publications School Managers' chat room to discuss specific problems. Shared resources Information about what other managers/administrators are up to in other Schools. A tool to improve communication and collaboration between Schools
LA4 **Creating the proposal - contractual issues, such as IPR**	Guidance and expertise online in formulating proposals. Examples of successful and unsuccessful proposals in a relevant field.
LA5 **Costing and Pricing**	
LA6 **Approval and submission of the proposal**	Information about who to contact in RIS, who signs off particular projects, who has to rubber stamp it. Information about the research process and a timeline to show where the bottlenecks are Some way of transferring funding information from one form to another
LA7 **Project administration**	User-friendly, up-to-date, accurate and transparent financial statements Automatic notification when invoices have been paid A system that allows easy extraction of statistics Project management tools in pro forma and models or samples with worked examples Systems that are more user friendly and that use one browser
LA8 **Undertaking the research**	Groups or shared workspaces tailored to needs Shared resources, tools and support sites for software

Lifecycle Areas	Combined requirements of academics, researchers, postgraduate students, School Managers/Administrators and Central Administrators
LA9 **Outcomes**	Evaluation tools for academics. A central point in the University where you can search for information on all the products and services the University has to offer with a named contact. Rules about forming spin-out companies with published procedures on the internet.
LA10 **Management of research portfolio**	Information about bigger plans and strategic development of Schools, Divisions and University.

Implementation

This combined list of requirements provided the team with a priority list in terms of development. Developing tools that meet the requirements from that list provides a win for all Faculties, most Schools and all categories of staff involved in the research process. Other more individual requirements can be developed in the future.

Several requests within LA3, finding collaborators, and LA8, undertaking the research, were for a tool that allowed the sharing of resources and information, something that would facilitate communication and collaboration across and within Schools and Faculties. Developers have responded to this need by providing a wiki facility across the University. This has allowed staff to set up groups and share ideas, comments, documents, data, and even equipment. Groups can be exclusive or inclusive according to need. As the adoption of wikis becomes a more widespread practice across the University, communication and collaboration should be facilitated.

As for the request for more online journals (LA1, scoping the context), the University continues to increase the number of journals available. Realistically the University cannot subscribe to all journals, and there will always be times when staff or students are disappointed that a particular e-journal is not listed. Easy access to all the major databases with direct links to the full text of the most frequently requested journals has been provided. The move towards an increase in electronic resources – e-books for example – has also enabled staff and students not only to access books from home but to access books which previously may have been physically unavailable if they were in use by others.

There were many requests for easier access to staff in Research and Innovation Services (RIS) and, in particular, information about who should be contacted when particular problems arise. Having named contacts can help to reduce the stress involved in proposal submission. RIS has now updated its website to include a clear diagram of its organizational structure and the names of staff in each of the teams together with their job titles or roles. The request for an online document outlining each stage of the submission process with some indication of the amount of time that should be allowed for proposals to be signed off by RIS has been passed on to that department and is currently awaiting completion.

The request for clear rules about the formation of spin-out companies (LA9, outcomes) has been addressed in the new RIS website. It is, however, a detailed document and there may be support for a short summary sheet that draws attention to the key aspects of the process by means of a list of bullet points. Similarly, the University's Research Strategies and Policies (LA10, management of the research portfolio) are described in detail in a 24-page document on the RIS website. While such a document is an essential communication, some staff did request a shortened version of the University's Strategy that could be read and absorbed more quickly. Summary documents are an effective way of communicating key information and a useful first stage in getting busy staff involved. Requests for this summary have been forwarded to RIS for their consideration.

Other requirements that have been partially developed include the provision of a search facility for staff's research interests. At present staff's electronic profiles, i.e., their research interests, projects and publications, are collated into a database in readiness for Research Assessment Exercise (RAE) submission. Developing this further so that staff can search the database and identify prospective collaborators or simply communicate with others in their field of interest will fulfill many requests logged under LA3.

A day-by-day calendar of events at the University of Nottingham is available to staff and students (LA3, finding collaborators). Further development can provide a higher profile for research-related activities that will include more detail as well as links to abstracts and information about speakers' backgrounds and areas of expertise.

While some requirements on the list require little more than refinement, development of others has not yet started. Prioritizing which tools to develop is based upon the constraints of time and resources. The team strives to keep users informed about their decision-making processes and the reasons why some requirements have been selected for development while others have been placed in the queue. Honest and transparent communication is an important factor when seeking to maintain the engagement of users and in gaining their acceptance of any decisions made.

What is also important is the need to obtain user feedback on those requirements that have been developed to find out if they meet users' needs and expectations and whether they require further refinement. This need will be met by administering questionnaires to all those who took part in the study to obtain ideas for further improvements. Effective development is often an iterative process, and user feedback is as important as the initial consultation is to that process.

Conclusion

The aim of this project was to design a VRE for use by the whole of the research community at the University of Nottingham. An in-depth consultation with users from that community was used to discover the kinds of support they felt would most help them in carrying out their role at the University. Analysis of the data allowed the team to draw up a list of requirements that could be supplied electronically and form part of a VRE. A great deal of overlap was found in the requirements suggested by Academics and Researchers, and School and Central Administrators. This overlap allowed the team to formulate a list of development priorities. Many items from that list have now been developed and the team is seeking feedback from users on the usefulness of

the tools developed. The team believes that it is only through this process of iteration that it can successfully develop a VRE that *truly* meets the needs of its research community.

An important finding from the project was that users in all roles expressed a need for greater transparency and more effective communication across the University. While this can be facilitated using electronic resources, it does require a commitment at all levels to create a culture of openness and the creation of an explicit communication strategy from which a proper communication plan can be formulated.

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