What's your question? The need for research information from the perspective of different user groups

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Summary

In this paper results of a field study into the need for research information of different user groups are presented: scientists, policy makers and policy researchers, industry and media. Main questions of semi-structured interviews were: what kind of research information users need, what kind of research information resources are used and which information resources are missing at the moment. User groups are missing for a diversity of reasons the overview of research, experts and institutes in the different scientific fields. Especially for the accessibility and transparency of the scientific world these overviews are reported to be needed. Neither Google nor any of the research institutes or policy research organisations are able to present surveys for different science fields at the moment. Giving users the possibility to search, browse and navigate through accessible and more specialised layers of research information might give answers to different user groups simultaneously.

1 Introduction

In former days developers of Current Research Information Systems (CRIS) have not always asked questions from the perspective of the user. The first priority was to build a database and to fill it, with due regard to coverage and currency (product orientation). Now time has come to look at systems from the user's point of view (user orientation).

What's your question? Asking this seems to be straightforward and simple, but simple questions can be the most complex ones. In the world of research information, this question is an important one. Why? It brings us back to the user and the information he or she is looking for. Do (potential) users need research information? Who are these users? What kind of research information is the user looking for? For which reason is the user searching for research information? We will try to give first answers to questions like these in section 3. How users want to search is the central question in section 4. In the last section we are looking at how we can fulfil the need for research information of the different user groups for different goals.

The research that has recently been done in the Netherlands for the Dutch Research Database (NOD) will be used as case material. The study has been carried out in order to be able to adjust the NOD to the needs of users of research information. In the months April and May 2002, 32 semi-structured interviews have been held among representatives of four user groups[1]: researchers (10), policy maker's (6) and policy researchers (5), media (7) and industry and services (8).

1 Some of the respondents can be placed in two of these groups.

2 Method

In the study for the NOD, the central subject is the need for research information of different user groups in the Netherlands. Research information is hereby being defined as: "National as well as international scientific research information resources around researchers, scientific institutes and projects. These can include expertise and contact information of researchers and institutes, descriptions of research, as well as overviews and references to products that are the result of research as publications, data sets, patents and tools."

Several user groups need research information in their daily work. The different tasks people have to fulfil at work, give an idea on the reason why someone is looking for research information and the circumstances from which the need for information arose. Borgman states that a lot of theories and research in the past presumed that the human activities involved in access to information could be isolated sufficiently to be studied independently (Borgman 2000, 7 pp). In a lot of these researches only one information system or service is being studied or the gathering of information is studied as an independent task. Here the search for research information is seen as an interwoven part of other activities at somebody's work. We also see that the need for a research information system is dependent on the total information environment with all the other information resources available. This is why we have chosen in first instance to do qualitative explorative research, using the method of semi-structured interviews.

For the preparation of the fieldwork, a literature study has been done and brainstorm sessions have been held, focused on the needs for research information of each user group. As respondents were selected: experts in the field of scientific information, key-representatives like the chairmen of certain user groups, as well as 'ordinary users'. The interviews were being held by two persons of the department of research information of NIWI-KNAW and were 1.5 hours of length. This research has given us a first impression of the needs of different user groups and will be a starting point for further studies in this area.

3 Main questions and the needs for research information of different user groups

What are the main questions different user groups are asking in the field of science? With which aim is the user searching for research information? What are the needs for research information of the different user groups at their work? What kind of research information are the different user groups missing? In this section we will try to give an answer to these questions.

3.1 Researchers

In this part of the study the group of researchers is defined as scientific researchers working at a university or research institute, who are not primarily working for third parties. Policy researchers and researchers who are working for the industry are represented in the other groups. We have spoken with researchers from different disciplines: history, social sciences, technical sciences and humanities.

There are three main reasons given by researchers to search for information:

- As part of doing a specific research
- To stay informed about the own discipline
- For networking and acquisition

Scientists need highly specialised research information resources, which are mostly internationally orientated. Most researchers say that they know their colleagues in their discipline and that they know which research is going on in their field. Contact with colleagues is mentioned as the most important way to get information. At conferences scientists are meeting

colleagues and keep in touch. Researchers are also very interested in conference papers, which are more easily distributed, because they are still without copyrights. Publications are stated to be the most important resource for information to researchers. Internet is being used a lot, most of the time by going directly to research institutes in the field or by searching with engines like Google. Researchers more and more see the need and necessity of databases. In general the trend is that databases are seen as part of the research infrastructure.[2] Other resources named as important are newsletters, data and software, pre-print archives, internal databases of organisations, discussion lists and email.

Descriptions of current research projects are scarcely used by researchers. Reasons are that in this early stage mostly results (publications) are not yet available, that the abstracts are written for the financier, that during the actual research they may already have changed and that they do not contain enough information. Scientists prefer to look at somebody's publications, to find out what somebody's specialisation is. Bibliographic databases are also seen as less interesting to scientists. Researchers are most interested in full-text online publications.

But still a lot of information is missed. The mentioned need for research information, which is not fulfilled by other resources among scientists, is:

- Research information from another discipline or subject, for multidisciplinary or interdisciplinary research.
- Research information for a researcher at the beginning of his career, for example as PhD researcher or Master student, when somebody is still orientating himself in the scientific world.
- Research information that can be used for trend studies and exploratory studies, to see patterns and trends, as well as studying the history of science over the years.
- Underlying research information system for the European Research Area (Networks of Excellence), as well as for electronic conferences and the 'virtual networking' of the future.
- Overview of 'networks' in different areas.
- Finding the more unknown researchers in a certain discipline.
- Research information might be more needed in specific areas. Mentioned is for example the field of Social Sciences, where there is also a need for publications in the own language (Dutch) which is not found in international literature.
- Contract research

Besides users of research information, researchers are also the producers of research information. Researchers say they are willing to supply information to a research information system, but only once and they need an incentive[3]. They don't have time to supply information for all different kinds of internal and external inquiries, visitations and databases. Information supply to the NOD is found especially interesting when research information is distributed from the NOD to other (inter) national databases.

3.2 Policy makers and policy researchers

Policy makers will be defined here as decision-makers and financiers of scientific research and policy research, working at a ministry, province or municipality (3.2.1). Policy researchers are doing contract research on behalf of these ministries, provinces or municipalities (3.2.2).

2 This is also visible in the expenses of the Netherlands Organisation for Scientific Research (NWO).

3 This is why in the Netherlands the research information system METIS is developed for universities, in which each researcher will have his own personal database, where he can among others publish his articles, presentations in different formats for the Internet. This system is also used for management information needed by universities.

3.2.1 Policy makers

The information need of policy makers is very broad. At a ministry the subject, about which information is needed, differs from time to time and is depending on the political agenda. Most of the time policy makers are not asking themselves which information sources to use to fulfil their information needs. Information seeking behaviour is done very subconscious and in an unstructured way. Some respondents were saying that there is not enough time to look for the right information. Above all there is already a lot of information coming automatically at their desks. A couple of respondents have the feeling of an information overload. But are policy makers able to find the research information they really need?

Two areas are seen where policy makers need research information, science policy and policy in general. There are three different sets of activities for which policy makers need research information:

- Making of decisions
- Justification of decisions
- Commissioning of research

Policy makers want to have surveys of current and recently completed research, linked to full-text online reports and publications. Summaries, recommendations and conclusions are the most important parts of publications for policy makers. Also research information is needed to justify policy decisions in a certain policy field. Being able to evaluate and monitor policy is becoming more important for transparency of government expenses and policy[4]. Personal networks and knowledge are dominant information resources. But also Internet and Intranet are used a lot. Among others several state-of-the-art, evaluation, and monitoring studies, are being commissioned to policy researchers.

For decision making in science policy, information is needed at macro-level. Questions dealt with are questions around the volume of research, the available expertise in different science fields. Policy makers want to make comparisons and to be able to see trends and patterns in and between science fields. To justify investments in science, it is important to know which resources have been put in the different science fields and to know the results of these activities. Policy makers want to see if resources that have been put in (input indicators), are leading to certain output, like a growth of publications, patents and so forth (output-indicators). To justify the scientific budget in the Netherlands, a lot of figures are missing. A systematic supply of quantitative information in the field of science is not available. Activities in the field of knowledge transfer are very difficult to measure at this moment. Information at international - particularly European - level is needed to be able to make comparisons between science policy in the Netherlands and other countries.

For commissioning of research knowledge is required to select institutes or experts for certain tasks. An overview of institutions or experts who are specialised to do research in a certain research field is necessary, as well as information about the individual institutes (profiles, contact information) and experts.

Information about individual researchers and research institutes is being found by searching at Internet with search engines like Google or by going directly to the sites of known organisations in the field. Intranet and internal databases are also mentioned as important sources of information. Also personal networks and knowledge are again playing an important role. Publications are mentioned as the most important source to get an indication about somebody's expertise. Guides are used frequently, especially the guide of universities and research institutes in the

4 Especially since from 1999 there is in the Netherlands the obligation to report in May of each year on the results of policy (VBTB), in addition to the government budget in September. Responsibility for the content of policy is being put central in these progress reports.

Netherlands[5]. Structured databases are used less frequently. An overview of the different databases is missing. It is also said to be very difficult to search in all the different databases, if one does not use them frequently.

Policy makers need information about experts and institutes in the first place on a national scale, but this has changed with the increasing internationalisation of research and becomes more manifest with the advent of the European Research Area. For finding referees information on an international scale is needed.

Policy makers have also other aims, which are not connected to their own information needs. In general these aims can be summarised in three main goals:

- Knowledge transfer among scientists
- Knowledge transfer among science and society
- Promotion of science on a national and international scale

Providing information services for the needs of other groups like scientists, business, media and the general public, is being mentioned as very important in all the interviews with policy makers. It is one of the tasks of the government to make publicly funded research available to everyone[6]. In the report of the study on the future of science in the Netherlands by Rand Europe, it is stated that: "Knowledge about knowledge could be enhanced by the existence of a publicly-available, detailed database containing information about scientific research. Such a database would facilitate the co-ordination among financiers, users and producers of research, resulting in the demand for research being more easily met and the supply being more easily accessed" (Kahan et al. 2001, 16). Hermans, the Minister of Education, Culture and Science in the Netherlands, is saying at the conference 'Access to publicly financed research' that he would break a lance for access to scientific knowledge for a broad and general public (Hermans 2001, 22). One of the interesting discussion points, which came up in one of the interviews, was if a country makes al its knowledge freely available on the Internet to its international competitors.

3.2.2 Policy researchers

Policy researchers are doing research for third parties (contract research). The information resources needed are very much depending on the research questions that are coming in from the contract parties. That is why it is very difficult for them to give a good overview of information needs. The contract parties are often policy makers at ministries, provinces or municipalities. The information needs of policy researchers are in this way connected to the information needs of the group of policy researchers (see section above).

The aims of looking for research information in this group are the same as those mentioned by scientific researchers: information needed for doing a specific study; information to stay informed about the own discipline or information for networking and acquisition. The latter aim seems to be more important for policy makers, since policy researchers are more dependent on getting contracts for new projects and studies than scientific researchers.

Differences between scientific researchers and policy researchers are that there is in general less time for literature study. There are also fewer possibilities to go to conferences. Policy researchers seem to find grey literature more important than scientific researchers. In summary it can be said that the need for research information is more specialised than the information need of policy makers, but more general than the information need of scientific researchers.

It is notable that policy researchers often speak about the necessity to work with databases for doing state-of-the-art, evaluation or monitor studies. To do systematic research controlled

5 The NOD is the data resource for this guide.

6 This is also why the NOD and several different thematic databases in for example the field of ICT or Health Care are being financed.

environments are essential. Google cannot be used as an analytical tool, but can be sufficient for doing a simple search e.g. for finding specific information about an expert.

3.3 Media

The user group of media will be defined here as professionals, who are focussed in their work to translate scientific information to the general public, like for example public relations officers of universities and science journalists. The aim of activities in the field of scientific communication is to make scientific information accessible for society.

The aims for using research information of *science journalists* are:

- Inspiration for (actual) subjects for articles
- Finding background information about subjects, among which information about experts

To get inspiration, journals like 'Scientific American', 'New Scientist', 'Science' and 'Nature' are playing an important role. Sometimes a topic is being translated to the Dutch situation. Dutch science magazines and science sections of newspapers are also being read. Press releases are an important source of information. Internet is mentioned as a very important source: searching with Google, looking at websites of universities for press releases or agendas, or news sites of for example the BBC. Also own databases with published articles are being used.

For finding background information the interviewees use the same kind of resources. Homepages of researchers are mentioned as important for finding information about experts, especially publication lists and CV-information. Also the guide of Universities and Research Institutes in the Netherlands is frequently used.

Science journalists attach much value to information about professors as well as PhD-researchers. Professors have an overview of their discipline. The graduation of PhD-researchers is a good moment to write about a research topic. Journalists seem to be looking especially for information about experts in the Netherlands. In general scientists have the reputation to be very open and willing to help journalists, but they are not seen as very pro-active. They do not often write articles or give material to the public media themselves. Mentioned is that information needs to be understandable for science journalists, but can be more specific than information for the general public. Publications are found to be too specific, but references and bibliographic information are being used. Information about current research is seen as important for knowing who is doing which kind of research at this moment.

The main task of *public relation officers* in science is to promote research and expertise of the institute. Public relation officers issue press releases and give advice to scientific journalists about research and expertise in the institute. Internal publications and expertise are the most important information resources. Also information about research and expertise of research available at other institutes is important for giving references. Personal contacts with other public relation officers are used as information resource for this reason, as well as the NOD and various guides. Research information databases are being used to make research and expertise of a university easily accessible and transparent for internal users like other scientists and external users like policy makers and science journalists. One university is using dynamic links to the NOD for this aim and another university has built an expert database making use of a content management system.

Suggestions coming up during the interviews were: to add press releases as information source, to add a field 'media willingness' in the NOD and to make a societal thesaurus.

3.4 Industry and services (Business)

The most important aim of the use of research information in industry and services is innovation. Knowledge is of becoming more and more important to all companies. The character of knowledge needed in companies is always multidisciplinary and applied.

In the user group of industry and services two groups can be distinguished:
- R&D-oriented companies (about 10% of the companies)
- R&D-followers (about 90% of the companies).

In the first category there are multinationals as well as high-tech orientated small and medium-sized enterprises. For the first category of companies, particularly current knowledge is needed. Persons working in the R&D-orientated companies predominantly have a high level of education and the need for and the use of research information is nearly the same as that of scientific researchers. One of the differences is that a lot of these companies provide specialised internal information services. 'Knowledge workers' are often doing literature searches.

The R&D-followers also have a need for research information. Here information intermediaries are needed. The Ministry of Economic Affairs is financing these intermediaries, who will work in regional innovation centres. The idea of developing a thesaurus in co-operation with the users is found to be very interesting. It is stated that information about research projects needs to be accessible, but not too specific and without the use of jargon. Press releases about research could be a resource of information.

In any case there is need for transparency and accessibility, being able to know who is doing which kind of research where. Overviews of current and completed research of a certain theme or subject, are stated as being important. Also the suggestion has been made to take a more proactive role by making analyses about overlaps, where companies and knowledge institutes could work together.

One of the main problems in the field of research information in this area is that companies and innovative research institutes will often not supply research information to public databases for secrecy and competition reasons. Van Raan is indicating that there is a trend that more and more economically relevant knowledge is being kept secret (Van Raan 2001).

3.5 Conclusion

In general three main factors can be distinguished regarding the needs for research information:
- Having knowledge and networks around a certain subject/discipline (experts) versus not yet having much knowledge and networks around a subject/discipline (newcomers).
- Working in a small-demarcated field versus working in a broad field.
- Needing specialised information resources versus needing more general and accessible research information resources.

Especially scientists who are having already a lot of knowledge and networks around a subject/discipline, say that they are able to find the information they need for doing their research by using existing available resources. Newcomers like PhD-researchers or master students have more difficulties to easily find the research information they need.

When a policy or scientific researcher is working in a more inter- or multidisciplinary field, it is more often noticed that it is difficult to have an overview and find the research information from different disciplines. User groups like policy makers, science journalists and business-people are all working in multidisciplinary fields.

Researchers are interested in specialised and more detailed information resources like publications. Information about current research projects is considered to be of minor importance. In other user groups people need less detailed information resources like accessible abstracts of current and completed research and would like to have easy mechanisms to find experts, for ex-

ample with a (societal) thesaurus. But these users also want to judge somebody's expertise by looking at publication lists and references.

4 Ways of searching for and the presenting of research information

The way the interviewees want to search is depending among others on how broad or specific the information need is, the knowledge of the subject somebody already has and the aim why somebody is searching for information. Searching is working well if the question is specific and well defined. Browsing and navigating is commonly used when the information need is not clear at all or very broad (see also Borgman 2000; Feng et al. 2001).

All user groups, particularly science journalists, are searching and want to be able to search in a simple and quick way, by typing in one or two words. Most people are searching with Google. The problem with this type of searching is the long lists with answers obtained; these include sometimes a lot of irrelevant material, and it takes much time to scan. Moreover it is not clear which words one should use in order to get the optimal result.

Besides searching, respondents want to be able to browse and navigate through a system, by using the structure of the database. They want to be guided in a visible and hierarchical way (tree structure) from discipline to sub-discipline, from institutes to faculty to researcher. This is also one of the reasons why people are using often the 'offline' printed guide for research institutes and universities. They want to navigate in a structured way though the keywords with thesauri and taxonomies. An interesting form is of course vector space analysis, in which words can be seen in their context in a visible way[7]. In the chaotic world of Internet users in all different user groups want a guide to easily and quickly find the path to reliable research information.

Finally, users would like to consult a system in a more 'unstructured way', by snowball searching. They want to switch for example easily from an overview of all experts on a certain subject to more information about an expert, the homepage of a researcher or to the publications of a researcher. Or from research information to the publications, to information about the researchers who are working or have worked on a research project. They want to click on the different keywords in the system and go through the system in this way.

A well-defined and controlled environment is essential and the most important difference and advantage over searching in Google. Users do not expect that a database is perfect in the sense of coverage and currency. Databases need not to be complete to succeed. What users expect is to have clear information about what they can find in the database. The resources of the database, the way of getting the information, the quality and currency of information in the database and the distribution of information to other databases has to be clear and transparent. Users also want to have options to exclude information (resources).

When it is possible to define a structural information need, users want to search in a demarcated area, like a thematic database. Users do not want to see all information, they only want to see relevant information.

Most interviewees are finding Intelligent Agents and Personal Information Environments not an interesting option, because information needs are often not clear or specific enough. When the information need is very specific, e.g. for researchers who are working in a mono-disciplinary field, they seem already to be able to find their information in other ways. But for researchers working in an inter- or multidisciplinary research environment, it might be interesting to develop these kinds of options. Especially the option of presenting research information about a subject from different disciplinary perspectives has been mentioned.

7 See for example http://www.inxight.com/.

5 How can questions of the different user groups be answered?

Research information has to be provided to user groups with different levels of knowledge and networks around a certain subject/discipline, who are working in demarcated as well as in a broad multidisciplinary field and who need different levels of detail and accessibility of research information. Providing different information layers with different levels of detail and accessibility might be a solution for tailoring research information to different user groups and different aims.

Besides opportunities for searching, users are finding it especially important to be able to browse through a system. It is particularly important to provide the opportunity to present overviews with taxonomies and thesauri, with which a user can start to browse and navigate further in a quality-controlled environment. These taxonomies and thesauri have to be developed in co-operation with the different user groups. In this way CRISes may become pre-eminently important to function as guides in the scientific world.

If a CRIS enables a researcher to profile his research and expertise in a broader context than his own discipline on a national and international - particularly European - level, it will become attractive to deliver research information to a CRIS. Policy makers, industry and business as well as the media are important groups. They are either funding research or are making research visible in a broader context. A researcher has to be asked to put effort in providing information about his expertise and research also in a more common vocabulary. But with distributed systems, the delivery of information to a research information system should take place only once for internal and external information systems and for different user groups. In this way a CRIS may become a central instrument for science communication and knowledge distribution in and between countries.

The development of research information environments on the level of a group or network is becoming more important in the future with the upcoming 'Networks of Excellence' of the European Research Area, as well as developments in the direction of electronic conferences and 'virtual networking'. For a lot of users personalisation in an environment working with intelligent agents is of less importance. The information need of most user groups, except for researchers, is often not well defined, depending on for example currency and scope (multidisciplinary).

Another important field is the studying of the research process and mechanisms for policy or scientific research. CRISes may be used for trend studies and exploratory studies, to see patterns and trends, as well as studying the history of science over the years. For these aims a centrally controlled database ('source database') is needed and archiving is important. For these studies users want to make counts and ratings, for example how many publications and capacity are available in different science fields. Users are also asking to include financial information.

For a diversity of reasons users are missing the overview of research, experts and institutions in different fields. Especially for the accessibility and transparency of the scientific world these overviews are needed. In general Internet is a good source for finding information about individual researchers and institutions or finding specific publications. But neither search engines like Google nor any of the research institutes or policy research organisations are able to present surveys for different science fields at the moment. The Internet cannot provide research information in a controlled environment: this is why research information systems are needed.

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