

Knowledge and Attitudes Towards Scientific Data Practices & Preservation Among Turkish Environmental Scientists and Information Scientists

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1. INTRODUCTION

Climate change is a grand challenge of science whose environmental impact touches societies across the globe (UN, 1987) especially as society's consumption rates increase, populations grow, and nations modernize (Bongraarts, 1992). Climate change and its results have been identified by scientists (IPCC, 2007; Krauss & Van Storch, 2005; Victor, 2004) and shared with the public through the popular media (Egenter, 2009; Morrello, 2009; Revkin & Border, 2009; Russell, 2008). Climate change includes rising sea levels (Meehl et al, 2005) and erratic weather patterns (Shah, 2009) which can precipitate starvation and disease (Gopalakrishnan, 2009; Nobel Laureates, 2002; Patz et.al, 1997;).

Challenges such as climate change and related studies such as biodiversity require new approaches to science (Kelling et al., 2009). Scientific research is increasingly becoming more complex (Lynch, 2008), including data-intensive science, which gains new insights through data-driven approaches (Newman, Ellisman & Orcutt, 2003). Data-driven science includes using data gathered from global locations and often uses computational modeling techniques to create new ways to understand the problems.

Problems can best be addressed if barriers – disciplinary and geographic – can be overcome (Allard, 2001; Borgman, 1990; Geertz, 1983). Grand challenges such as global climate change are studying complex systems (Rind, 1999) that require collaborative and interdisciplinary scientific approaches (Allard & Allard, 2009). One approach

is the emergence of virtual organizations, i.e. DataONE, that allow scientists to more easily communicate and share their data (Allard, Tenopir & Wilson, 2009; Michener, 2009; Michener, et.al. 2010). This means that we must understand more than simply technical issues; we must also have an understanding of the socio-cultural, economic, ethical, and political issues that influence scientists' data practices on the global stage.

2. ABOUT THIS STUDY

This qualitative study explores the knowledge and attitudes of information science and environmental researchers in Turkey towards scientific data and information particularly in regards to sharing data and preservation of these data. The study also explores the potential for collaboration with a virtual organization for data intensive work in the environmental sciences.

3. PARTICIPANTS

We interviewed two groups of participants in Turkish universities and research institutions: (1) environmental scientists; and (2) scholars of library and information sciences who are interested in database management, dissemination of information, information architecture, and knowledge management. Two interviews were completed with library and information scientists and ten interviews were completed with environmental scientists. The interviews were conducted in English since it is quite common to have English as a second language in the academic circles in Turkey as higher education is conducted in English in most of the universities in Turkey.

4. METHODS

This study conducted in-depth interviews with participants in order to understand what LIS scholars, and environmental scientists think about scientists and their data practices in Turkey. Interviews were conducted in the summer of 2010. Personal contacts were used to initiate contact and snowball sampling was also used to recruit participants. One investigator had worked with NGOs in Turkey from 1999 to 2007 and established a personal network of environmental scientists. This investigator also is fluent in Turkish. Potential participants were contacted by phone and asked if they were interested in participating in such a study. If they were, a meeting was scheduled, and the informed consent was presented at the meeting prior to conducting the interview.

The interviews were conducted as informal conversations, which were guided by a discussion guide with several open-ended questions. There were separate discussion guides for the information science scholars and the environmental scientists. Some questions in subsequent interviews emerged and developed from the initial interviews.

The first few questions were designed to make the respondents feel more familiar with the interviewer and more comfortable in discussion. The subsequent questions asked the respondents to express their thoughts and feelings toward scientific data and information sharing and preservation. Interviews lasted between 30 to 75 minutes. Each interview was audio-recorded and verbatim transcribed by the Co-PI for analyzing the data and quotes. The interviews were conducted at the researchers' offices (except one that was in a coffee shop) to ensure high quality audio recording and confidentiality. The audio recordings were destroyed after the interview was transcribed.

Full analysis of the data has not been completed, although preliminary results are available for this poster as a work in-progress. Analytic induction is being used to find common patterns in the interviews by reviewing the transcripts line by line for themes or categories emerging from the initial cases, then modifying and refining it on the basis of subsequent cases. The two are using a peer audit technique to help clarify the analysis. A participant check is in the process of being conducted to ensure that participant

views are being properly represented and to discuss the final analytic scheme with participants in order to refine and clarify the analysis.

5. PRELIMINARY RESULTS: EMERGING THEMES ENVIRONMENTAL SCIENTISTS

The ten interviews with environmental scientists exhibited redundancy and therefore provided rich results.

1. Most data is held on personal computers. Some researchers have an active backup strategy. .

“In office computers, hard disks, and CDs. The photos and else. We copy everything into CDs and hardcopy” – Respondent 2.3

“I don't use a server but keep in flash disks. Not specifically for that data but, with panic, in case something happens. Sometimes I store them in a big external hard disk, sometimes I store it in pieces in small storage media. I try to backup data and my personal files.” – Respondent 2.4

However, there are issues regarding technological sustainability

“I even had a database about my field notebook made but now I can't use that software because the operations system has changed.” – Respondent 2.6

“Yes, we have format problems with very old data. Even, for some time – I'm not a very young person so let me explain you like this. There were some operating systems different from IBM PC. We have some simulation work done in these systems. There is nothing to make them work anymore. The floppy disks are here but we can't use them.” – Respondent 2.9

2. Data is most important for publication. Although there is some interest in data as a research product, the process for this is informal and usually conducted after publication.

“Q. What happens to your data and findings after your research?

We write papers, publish.

Q. What else? What happens to your raw data?

We store it. Now we are making a database.

Q. Who are 'we'?

Me and my students I'm talking about with." – Respondent 2.2

3. Turkish environmental scientists are not yet regularly engaging in data intensive science for a variety of reasons.

"What I'm trying to do is not interpreting something that is already known. Discovering a phenomenon, that's what I like. But, of course, the big datasets you mention might point out a phenomenon. I'm not denying that, I'm aware of that. " – Respondent 2.7

But some are encouraging students to use data in new ways.

"What happens is student comes in who is very keen on modeling and data mining, you know. A data can be used from different angles, different perspectives." – Respondent 2.2

4. Data sharing is only happening on a limited basis, primarily when multiple researchers are involved in a specific project. However, there is little sharing outside a set research group. There are several socio-cultural reasons.

"In fact I am a sharing person however the trustworthiness of the person that I'm going to share is critical. For instance, I might share with the people I work with or I trust. But in our country, besides plagiarism, there are cases that someone else's data is used and published. Thus, I am not doing it often." – Respondent 2.5

Academic institutions are not actively engaging researchers in a data sharing culture.

"At the universities, there isn't any institutional culture that encourages sharing. There, it depends on the skills of the individuals only." – Respondent 2.6

"The institution is of course not aware of such a thing. We do it ourselves, by our own methods. I mean, I don't know how the institution could provide a support." – Respondent 2.8

5. Data sharing is limited by concerns for intellectual attribution.

"I'd very much like to publish; however, if person A calls me and says 'you did a such study but you didn't publish, I'm going to do something like this, I'll benefit from them (the data)', I might not give." – Respondent 2.4

6. There is limited science data collaboration outside Turkey, but there is interest in being involved in international collaborations.

"I haven't had such an experience but I believe it should be happening. I think very positively about it. I believe the real sound studies could emerge in that way. Quite the opposite, I consider myself introvert and unproductive because of this (not having international experience)." – Respondent 2.1

"Many things in environment is transboundary. Thus, collaboration is-a-must; regional and international collaboration is-a-must." – Respondent 2.3

7. There are differences with attitudes towards data in government research and academic research settings.

"In government, it's much easier to share information. You don't have many problems because ultimately you are an environment specialist, even if you write five articles you will continue to be an environment specialist, ... Neither your salary will change, nor your title." – Respondent 2.4

INFORMATION SCIENCE SCHOLARS

Very few information science scholars felt they could discuss data practices, particularly in reference to science information, so only two interviews were conducted. The small number of participants means these results can only be regarded as providing a very preliminary look at the situation.

1. Most data is held on personal computers.

2. Data is seen as a means to reach an end—a publication; rather than as a research product that has value in and of itself. This is very similar to findings from previous studies.

“I think information scientists should have dual roles in data preservation. First of all they ... themselves to practice you know the data preservation. But in general information scientists are not that different from other scientists when it comes to data storage, data preservation, etc. because as a researcher they just want to complete this study and walk just like any other scientist.” – Respondent 1.1

3. A conversation regarding data management and sharing has been simmering within some academic circles, but only on a limited basis. There is some interest in sharing. But there are concerns about who will implement and maintain the process for sharing and scientists are not willing to do so. There are also concerns about how data will be used.

4. Data practices that are mandated by a granting agency, for example an European Union collaborative research project, are likely to be adopted for that project but this does not mean these practices will be adopted for other work.

5. Information sciences can play an important role in supporting interdisciplinary science efforts. However, this would require more people to be aware of information science and what it can do to support research.

“I’m speaking for Turkey, I don’t think our field is known by many.” –Respondent 1.2

It would also be a new direction in Turkish LIS education.

“These are new topics for us, new collaboration topics. I think this is going to change the curriculum of the information sciences.” –Respondent 1.1

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