

Academic libraries in the digital era: An assessment of the Institutional Repository role in supporting research as a digital service

Efstratios Grammenis and Antonios Mourikis
Linnaeus University

Abstract

Digital transformation is a reality that has been happening in our daily lives and covers almost all the human activities. In this framework academic libraries worldwide have been adopting new technologies and ICT applications in order from the one hand to keep up with the developments and from the other to remain their patrons strongly connected with them. For these reasons, they have developed infrastructures and software systems with ultimate target to store and preserve the knowledge that is produced in the universities, the Institutional Repositories. So far, the IRs have managed to collect the research output in satisfied level, but many things need to be done in order the IRs to be a real safekeeper for the Universities. In this paper we attempt an assessment of the IRs' role in supporting academic research as a digital service by studying the literature and conducting open interviews with dedicated librarians. The findings from our research not only confirmed our initial essence but revealed new roles for the IRs that can guide the universities beyond their traditional mission.

Introduction

Digital revolution is a reality and it is going to be continued as covers every aspect of our lives such as business, everyday life, professional life, academic life, etc. (Raju, 2014; Sandhu, 2018). As a consequence of the digital revolution the digital transformation is happening and forces people, services, companies and institutions to use new forms and technology applications covering a broad range of their activities (Breeding, 2018; Sandhu, 2018). Following these paths, universities adopt digital technologies and solutions that enables them from one hand to create and disseminate to the academic community improved sources and services and from the other hand to be transformed digitally (Sandhu, 2018; Waugh et.al., 2015).

In this framework academic libraries not only “seek out for new digital technologies” (Breeding, 2018, p.1) but also have the experience to early adopt these new technologies in order to store, preserve and disseminate their material and the knowledge that is produced in the universities (Sadhu, 2018). In this point we can say that as academic libraries have been adopting new technologies they actually invest in digital transformation and gradually have become digital masters (Westerman et.al., 2014, p. 12) and they create digital capabilities that are a guide for the university digital transformation (Sadhu, 2018). In that sense “the conception of a digital library has become a reality” (O'Connor and Au, 2008 p. 57 as cited in Raju, 2014)

It has already been mentioned that the evolution of web-based technology and the expansion of the digital information (Anurada, 2018; Waugh et, al. 2015), have led academic libraries to create new digital services and to transform part of their collection into digital format (Raju, 2014; Waugh et, al. 2015). The ultimate goal of this effort is twofold : on the one hand the store and the preservation of the heritage information (Anurada, 2018) and on the other hand the need to demonstrate their “products” to the academic community stressing their impact on the vision and the mission of an educational institute (Bankier & Smith, 2010; Tenopir, 2013, Chang & Hopkinson, 2014; Waugh et.al., 2015,).

One of the branches of an academic library knowledge and information tree is the Institutional Repository (IR) which was exactly developed from academic libraries across the globe (Tapfuma and Hoskins, 2019) not only for storing and preserving historical material (Waugh et.al., 2015; Tapfuma and Hoskins, 2019) but also to convince university stakeholders that is suitable for their research (Waugh et.al., 2015, p. 744) and a tool to reinforce the information level of the community (Anurada, 2018) by providing free access to end users exploiting the appropriate system infrastructure (Fuhr, et.al, 2007).

The present paper attempts to explore and describe the role of the IR in supporting research in the framework of the digital revolution and subsequently in the libraries' digital transformation. As digital technologies are changing the nature not only of the academic research, but the entirely academic life (Raju, 2014; Sadhu, 2018) IRs were developed as a separate digital service at the community's service in order to make a step forward from the

traditional repository where the material was in printed format and the university output was not so easy to handle with. In that sense, an assessment (and not an evaluation, from our point of view) is needed in order to realize and understand the reasons and the causes for their creation and perhaps to identify ways for their improvement.

Of course there are several parallel parameters that have been caused by the development and the implementation of the IRs such as new technology infrastructures, the need to demonstrate and support the new service in the academic community, advanced required skills for librarians, the quality of research support that is offered, cooperations and synergies with other institutions, publishers, vendors, etc. (Armstrong, 2013; Raju, 2014). In our study, we shortly mentioned the factor of the librarians required skills because we believe that is a key factor for the success of an IR.

In what follows, the literature review is presented and after that we mention the methodology that was followed. We made the decision to conduct open discussions with dedicated librarians in IRs (three from Greece and one from the USA) in order to have their perception about the nature and the mission of an IR.

The research question is as follows: *What is the role of an IR in supporting research as a digital service?* and we strongly believe that depicts the essence of our effort. Of course, the sample is small and is subjected to the limitations of a research, but we believe that a general view is well presented. Furthermore, there is no exhaustive coverage of the literature, but we believe that an appropriate number of papers have cited. We also followed all the criteria for ethical considerations about anonymity, plagiarism and fairness.

Literature Review

As already mentioned above universities and academic libraries have developed and implemented IRs worldwide (Tapfuma and Hoskins, 2019) in order to store, preserve and disseminate the knowledge that is produced in them. Not only in developed countries such as USA (Armstrong, 2013; Waugh et.al., 2015) but also in developing ones universities adopt IRs (Yateem and Hameed, 2015; Tapfuma and Hoskins, 2019; Zervas, 2019). This evolution shows that academic libraries indeed are developing new services that from one hand go further their traditional services (Armstrong, 2013) and on the other hand are stressing their mission in the educational academic environment (Waugh et.al. 2018).

Digital transformation is a revolution taking place during the last years (Sandhu, 2018) and academic libraries are major participants in this digital revolution. First by creating and using Library Information Systems either as single institution libraries, or as members of libraries' consortia (Grammenis and Mourikis, 2018) and very recently by moving forward to their digital transformation and creating and using digital institutional repositories.

So, as Sandhu (2018) argues, libraries are acting as platforms for digital transformation as their role is getting broader within the academic community. Today libraries adopting new hardware and software in order to adapt to the digital era have become digital masters having new roles in digital pedagogy. By the creation and use of institutional repositories, libraries enforce this new role while the same time advancing the role of libraries in digital scholarship (Jain, et.al., 2009; Armstrong, 2013; Zervas et. al., 2018).

By creating and using Institutional repositories libraries acting as digital infrastructure platforms (Sindhu, 2018) that reinforce amongst others the digital experience of their users, who are in need of instant access to stored information that in other cases they would have been unable to access, such as old manuscripts or hard copies of books that are not available in digital format.

Institutional repositories as a digital transformation of modern academic libraries also enhance the role of the libraries in preserving the heritage of their academic organization while the same time enrich that heritage by adding new researches, gray literature (Master theses and Doctoral dissertations), patents etc which leads to an increase of the reputation of the institution (Spanos and Anagnostopoulos, 2012; Armstrong, 2013; Waugh et.al., 2015; Zervas, 2019).

The arising questions here are: what is the purpose of that, what an IR has to offer to the academic community, what can a researcher can find in an IR when there are plenty of resources on the web? Finally, what is the added value that an IR gives to a university? Many questions, many answers...

Before answering these questions let us see some definitions of IR:

"set of services that a university offers to the members of its community for the management and dissemination of digital materials created by the institution and its community members" (Lynch 2003)

"An IR is a digital research archive consisting of accessible collections of scholarly work that represent the intellectual capital of an institution" (Jain et.al., 2009)

“An institutional repository (IR) is an electronic system that captures, preserves, and provides access to the digital work products of a community” (Foster and Gibbons, 2005 as cited in Spanos and Anagnostopoulos, 2012)

and finally:

“An institutional repository is an archive for collecting, preserving, and disseminating digital copies of the intellectual output of an institution, particularly a research institution” (Wikipedia and New World Encyclopedia)

These definitions coincide in one main thing that differentiates an IR from a common repository: includes, preserves and provide access in the material that is produced in the universities, the so called the research output (Spanos and Anagnostopoulos, 2012 ; Armstrong, 2013; Waugh et.al., 2015; Zervas, 2019). The content of an IR can be master and doctorate thesis, reports, conference presentations, books and book chapters, monographs, peer review papers but also data, software and multimedia material (Spanos and Anagnostopoulos, 2012).

From the aforementioned, we can understand that the very first target of an IR is to collect, preserve and share by providing free access to the university research output (Zervas et. al., 2018). So, the first role of an IR is to be the safekeeper of the university’s heritage at no cost. By collecting and sharing the institution intellectual capital an IR can enhance the scholarly communication (Jain et.al, 2009) and particularly the communication not only between the faculty members but also between professors and librarians (Armstrong, 2013; Tapfuma and Hoskins, 2019). Furthermore, the scholarly production now is being created in digital format so the IRs (and the librarians of course) can play a vital role in organizing and providing this material to the public in eternity (Markey et al 2009). Librarians are also facing the challenges of preserving the copyrights both of books that are getting digitized, as well as the newly produced acquisitions (Adamou and Ntoka, 2017).

Having succeeded in its primary role the collection and preservation of the research output now the next steppingstone is the dissemination of this information. Some researchers believe that this is the core mission of an IR (Armstrong, 2013; Zervas et.al, 2019; Tapfuma and Hoskins, 2019). However, this goal would have not been achieved without gathering this material to the IR. Suffice is to say, that the success of this goal is critical and many IRs have not managed to populate their material either because they are “too selective about their content” (Tapfuma and Hoskins, 2019 p.1) or because they have not convinced their community to participate (Waugh, et.al, 2015).

In this point an arising issue is in what extend the dedicated IR librarians have the appropriate skills and what are those ones in order to successfully achieve their mission (Gerolimos & Konsta, 2008). In the restricted framework of this paper we just mention some of them so as to give to the reader a hint of the requirements that are needed. First of all, according to Orme (2008) as cited in Raju (2014) there are three main categories : a) discipline - specific knowledge (related to the LIS profession),b) generic skills (related to all disciplines) and c) personal competences (attitudes, values, etc). Very shortly we can say that regarding the first one refers to mainly specific knowledge such as metadata, knowledge on digital content and creation and data management (Choi and Rasmussen, 2009). Generic skills refer to communication and interpretation skills, critical thinking, problem solving, teamwork essence and persuasion ability (Nonthacumjane, 2011, p.283). Personal competencies refer to flexibility, adaptability and diplomacy communications skills ((Nonthacumjane, 2011, p.283).

So far many things and aspects have been mentioned regarding the role of an IR such as collection and preservation of an institution output, dissemination of the included information and the librarian factor as a key factor for the successful consolidation of the IR into the university’s environment. If we accept that all the aforementioned have been achieved the next steppingstone is twofold: the contribution of the IR in supporting research (Koltay, 2019) and the enhancement of scholarly communication in general (Jain, et.al., 2009; Armstrong, 2013). As the traditional scholarly communication has been transformed due to technological developments (Philips, 2010; Ocholla, 2011; Tapfuma and Hoskins, 2019) the very strong channel for disseminating and communicating the university research output is the open access policy that IRs offer to the academic community (Armstrong, 2013; Mullen & Otto, 2014; Tapfuma and Hoskins, 2019) subjected of course in the limitations of the open access which some researchers are asserted putting their research in restricted access zone for a certain period of time (Waugh et.al., 2015).

Theoretically speaking, the main targets of an IR are those as are arisen from the study of the literature, with the limitations of a not exhaustive coverage of the it as the field of the IRs are very progressive. Let us see if the findings from the literature are confirmed and in what extend from the empirical data collected from the interviews with dedicated librarians in IRs.

Methodology

Hermeneutics

In this small-scale research, we follow the Interpretive approach and hermeneutics. According to Myers (2004) hermeneutics is a theory that helps us to understand the meaning of a text or a text analogue. As text analogue can be considered any act of humans that can be treated the same way as a text. In our case we see as text analogue the Institutional Repositories that are being created within the Institutional Libraries.

As the main purpose of hermeneutics is the understanding of human acts, we see repositories such as an outcome of these acts and why these acts take place, what are the reasons that lead to the creation of institutional repositories and what the involved humans and technological artefacts should do in order to have a repository.

Institutional repositories are in fact Information Systems, thus hermeneutics provide us a means to well understand how they are being built, the way they are used by the users and how the information that is generated, stored and transferred within the repositories influences both social and organizational structures. This is the reason why we treat repositories as text – analogues because we need to discover the actions and their essence within the organizational structure (Myers, 2004).

Hermeneutics can be used both as a philosophy and as methodological approach for data analysis. As a philosophy, hermeneutics provides the base for interpretivism while as a methodological approach provides a way to manipulate the data that exists within the text – analogue (Myers, 2004).

We already mentioned that institutional repositories are information systems meaning that they are a phenomenon within the existence of institutional, in our case Academic, libraries and in order to interpret that phenomenon making use of hermeneutics we have to follow some of the major principles of hermeneutics (Myers, 2004).

The first principle of hermeneutics that we must follow is historicity (Myers, 2004), which implies that we have to have a good understanding of ourselves, the phenomenon and any other parts of that phenomenon through a history line, as to be able to talk with other people about it. For the needs of this paper as others we mean the academic librarians.

Another hermeneutics' principle is the hermeneutic circle (Myers, 2004), which is a way to understand the text or the text – analogue by the use of dialectic between the understanding the text – analogue as a whole and the understanding of its parts, or as Butler (1998) states, all the details and the parts that composes it. This means that participants are able to understand the academic library as a whole by interpreting the parts that creates that 'whole', in our case the institutional repository, by their established knowledge they have for the 'whole' which in our case is the academic library.

As this is a follow up paper to our Master Thesis (Grammenis and Mourikis, 2018) we do consider academic libraries as complex organizations consisted by humans and information systems. This allows us to consider the library as a whole and the repository as a part of that whole. Moving a step forward we may consider the institutional repository as a whole and the modules that articulates it as part of the whole.

In this paper we try to interpret the implications of creation and use of institutional repositories as digital service that supports the research within the academic community.

Interpretive Research

Orlikowski and Baroudi (1991) argues that the world is not meant to be a fixed formation of items and substances but rather as a nascent social process or broadening addendum of human consciousnesses and experience. The intention of interpretive research is to discern how the members of a social group through their presence in social processes achieve to portray their specific realities and enrich them with meanings and how these meanings, assumptions, positions and subjective and objective impulsions of the members help to create and establish their social action. This is why Interpretivism allege that the awareness we have about what is called reality are the aftermath of social processes and for that reason it is impossible to understand them if we try to isolate them from the social parts, including the researchers, that forms that reality.

The interpretive perspective emphasizes the prevalence of subjective meanings and behavior through which people forge their reality and researchers recognize that as interpretations are emerging and creating meanings that are used, these meanings are being put into question therefore the interpretations of reality are quite likely to change over time and under miscellaneous circumstances as well. (Orlikowski and Baroudi, 1991).

According to interpretive philosophy in order to understand the social actions and mechanisms one must get involved with the world that generates them (Orlikowski and Baroudi, 1991). Everyday habits and methods that

are formed by the language people use when trying to represent them needs to be investigated by research methods that are appointed for generating interpretive knowledge are field studies because they allow researchers to scrutinize humans in their mundane and ordinary environment.

As we argued in our Master Thesis (Grammenis and Mourikis, 2018) academic libraries are well organized complex systems of humans, information systems and technology artefacts and in this paper, we try to examine how the creation, existence and use of an institutional repository can involve and affect the research that is taking place in the academic environment.

In order to accomplish our purpose, we are making use of the interpretive approach as we are interested on recognize and interpret patterns that constructs the meaning of the institutional repositories as digital services. For that reason and due to the time this research is conducted, which is the summer time academic holidays, we choose the role of the outside observer that keeps a relative distance from the actual environment of institutional repositories, by making use of semi-structured interviews conducted either via Skype and Google Hangouts, or landline telephone calls.

Methods and Techniques for Data Analysis

In order to collect data for this paper we conducted semi – structured interviews with librarians that were in charge for the repository of their institution and notes kept. During this process of semi – structured there was an ongoing process of data analysis and interpretation, a fact that led to a slight change of the questions towards the interviewees (Creswell, 2014). This also means that the data were prepared for a deeper analysis

According to Creswell (2014) and Rossman and Rallis (1998) the procedure of the data analysis is an ongoing process where the qualitative study and analysis taking place simultaneously with the data collection, data interpretation and the researchers as well. This analysis suggests collecting data from open – ended interviews and interpreting what the interviewees told. The routine qualitative analysis usually is consisted by the data gathering procedures by the researchers, then their analysis and finally a creation of categories that more commonly are four or five. Qualitative researches are more likely to use a general procedure for their analysis using a coding from the specific to general.

In our analysis we used the same linear, hierarchical approach (figure 1 – appendix A) as in our master thesis (Grammenis and Mourikis, 2018) in order to organize, analyze and present our data in a comfortable for the reader way. Thus, we focused our analysis on the implications the creation, maintenance and use of institutional repositories may have to the library itself but also the students of the universities.

We also tried to show the limitations of that kind of digital transition, as the institutional repositories is a quite new and modern phenomenon occurring within universities' libraries. Moreover, this small-scale research is an effort to make a comparison of the Greek status toward the international on creating, maintaining and using institutional repositories.

So, in this study we used the qualitative approach making use of both semi-structured open interviews and visiting repositories via the world wide web, in order to search, describe and interpret this new phenomenon (exploratory, descriptive and exploratory) of institutional repositories that emerged from the ongoing digital transition in the libraries' life cycle.

Inductive approach and qualitative study used as a qualitative strategy is formed on the estimation of the whole phenomenon and seeks to provide some answers or to interpret the under-examination situation through the meaning that is assigned to it (figure 2 – Appendix A).

Data Analysis

As we already stated above, we conducted semi-structured open-ended interviews with librarians in order to identify the implications of the existence of institutional repositories. The libraries we chose had to have a repository implemented, the accountable librarian had to be willing to be interviewed and in most of the cases to be from Greece so to exemplify the Greek context. Of course, there were interviews with librarians from other countries as well as an effort to have a comparison (table 1 – Appendix A) and also have our results summarized in one place (table 2 – Appendix A). The interviews were conducted either from both the researchers or separately depending on the interviewees availability and lasted about 30 to 45 minutes and a sample of the questions is provided at the Appendix B. Two of the interviews were conducted via Skype, one via landline telephone and one face to face and the derived data from the were transcribed.

Before conducting the interviews, all interviewees were informed about the purpose of the interview and were asked for their consent. They were also informed that they were free to opt out at any time from the interview as well as access to the final paper.

Reason(s) of Creation – Role

All interviewees answered that one of the most important reasons for creating an institutional repository is the need for preserving the heritage and the knowledge that is produced within the university. Also, they mentioned that the existence of the repository in their library helps them to maintain their material well organized, while the same time, old and fragile material now is available to library users.

Librarians also stated that in many cases they do believe that uploading and storing material to the institutional repository will be beneficial for their research but also teaching works and as clearly pointed by a Greek librarian “...repository is really helpful especially when it comes to grey bibliography (projects, Master Theses and PhD dissertations, as they are easily accessible for researchers but also for us as librarians since we do not have to search between thousands of hard copies in order to find one...”

Another reason that was stated from three of the interviewees is the need to hold their users within the library while searching for material, as many users are now willing to find material outside the library from other sources, mainly the Google Scholar service.

Uploading

Talking about the way that the material is being uploaded to the repositories there was a diversion between librarians on how a new material is being uploaded to the repository as this comes to the internal policies of the library. So, there are cases where the uploading process has to be made by the author concerned while in other cases the uploading has to be made by the staff of the library that is assigned to library. Finally, there was one librarian who stated that in order a work to be uploaded has first to be delivered to the company that have a contract for technical support.

Accessibility

All interviewees answered that they are all supporters of free access to their repository's material, as they also said that the knowledge should be free and available to anyone who wants to access her. Yet at least two of the librarians mentioned copyright issues that they came up to as they faced the reactions of some authors, mainly ones that their work was older than the day of repository establishment. Thus, in their library repositories they set up rules concerning copyrights. For example, the author may choose between a certain period of time where his / her work will not be available to other repository users, or his / her work will be available only to certified repository users and via institutional VPN. After that period the material will be freely available to all users. These rules depending the library may be applied to any kind of work, older or new ones, or just to pre – repository establishment. Of course, there are libraries that their rule states that since a work is uploaded at the repository, then it is freely available to repository users.

Benefits

All librarians that participated to our research agreed that the creation and use of digital repositories helps their libraries and their universities to be recognized further than their physical borders as they are available through world wide web, spreading this way their heritage and the knowledge that is produced by their departments.

Librarians also mentioned that repositories have implications to their everyday routine as they helped them organize their material in a much better way, something that has as a side effect the reduced response times they have when they are serving a repository user.

Another benefit that emerges from the repository use is the fact that while the physical visitors of library have not increased the visitors that comes via internet have been increased vastly. The major volume of these visitors are mainly Master students and PhD researcher rather than undergraduate students. Another interesting implication of digital repositories is that now libraries have visitors outside their university from around the world.

Finally, all librarians told us about the use of statistics that are available from their repository management software there was one librarian who mentioned that these statistics are used by the authors in their CVs when they apply for a job position to their industry. This last one was a new finding for us, as we did not come across with it during studying our literature since it was not mentioned.

Librarians' Skills

As institutional repositories are digital artefacts emerging from the digital transformation of the university libraries, librarians also need to cultivate new skills in order to sustain their new duties So all of them stated that skills on

informatics technology are now required such as coding in XML, HTML and relational database management and generic data management skills.

Soft skills are also a need as librarians now have to communicate more with the repository users, especially when it comes to academic staff who in many cases are not willing to submit their work to the repository either due to lack of time, or because they do not understand the importance of the repository, or even because they do want to publish their work via a well-recognized publisher.

Discussion

Digital transformation is a reality as such and plays a vital role in our daily lives, forcing us to adopt new applications and challenges. Part of this procedure are the academic libraries which have been proved to be pioneered by adopting and using new developments regarding ICT and digital formats and offering to user full library services which according to Renick (2019) is a quite broad definition that includes library's material like books in any form either hard copies or digital, courses material, interlibrary loans but also technological artefacts like computers and audiovisual projecting aids, physical locations and programs that may provide help to users or offer lessons. But while libraries can offer such a variety of services, contemporary users are keener on a single page search engine like Google, while the users that are using their mobile devices are keep multiplying (Breeding, 2018) and libraries will also have to facilitate such users.

Following the above we found that librarians are able to accomplish their primary reason for creating a digital repository which is to store and disseminate the knowledge that is produced within the universities helping this way mainly the researchers to have free access to the data they are searching for within the academia (Armstrong, 2013; Tapfuma and Hoskins, 2019) rather than searching in external sources like Google Scholar, ResearchGate, Academia etc. whilst helping new researchers have their work stored in a place which is easily accessible and well-reputable (Webster, 2017).

Yet one of their main concern is the accessibility to the institutional digital repository and the copyright issues that they are coming up to. There are cases of repositories where the access is open and free to everyone concerning any kind of the stored material, while in many cases librarians reported that library had to set some predefined time restriction in accessing the material due to copyright issues raised by the writers of the material (Adamou and Ntakou, 2017). In such cases accessibility rules are established by the University and the Library administration

Today librarians are cultivating new digital and IT skills (Gerolimos & Konsta, 2008) in order to take leverage and take full advantages of the digital institutional repositories helping the repositories' patrons to have immediate access to library material that in other cases would take up to many hours or even days (for example, search for old research material that exist in one copy and this copy is in another physical place, or lent by another user), talking to academic staff trying to convince them for the importance of the repository and how critical is to upload their job there as many academic staff are not willing to store their intellectual product there either because they do not care or because they prefer to publish their work. There is also the function of providing statistics for a stored work in the repository (Raju, 2014), a feature stated as an asset by one of our interviewees as he / she told us that students of his / her institution are making use of repository's statistics of their work in their curriculum vitae when they are applying for a new job.

As digital institutional repositories are quite new and increasing part of digital transformation in academic libraries, we strongly believe that research should continue especially in the implications that repositories may bring to academic life as well to library and publication trade. Also, research must continue and to our local Greek context as well.

Conclusion

In the framework of the present study about the digital transformation in the contemporary world we made the decision to explore the role of the Institutional Repositories as a digital service under the operation of an academic library. The ongoing developments in ICT field as well as the need of academic libraries from the one hand to keep up with the development and on the other hand to play a new role in the university's life forced them not only to adopt new technologies and applications but also to be the guides in storing and preserving the university's research output. Both researchers are familiar with the IRs as Antonios is a university librarian having worked on the creation of an IR and Stratos holds a degree in Computer Science having worked many years as a schoolteacher.

The target of our study was to give to the reader a sense of what is an IR, what is its role in the university's environment and finally what is its usage to the research community worldwide. For that reason and given that fact that the research carried out in the summer period we decided to study the international literature and to

conduct open interviews with dedicated librarians in IRs. We conducted for interviews three in Greece and one with a colleague from the USA. The research question is:

What is the role of an IR in supporting research as a digital service?

The study of the literature and the interviews revealed that the role of an IR is extremely important because for the first time in universities' history there is systematic effort for storing and preserving the knowledge that is produced in them. It is also extremely for the academic community to realize that this effort actually started from the librarians who acquired new knowledge and skills about not only technical but also theoretical issues.

The next steppingstone was the enhancement of the library with the faculty and the scholars in general in order to convince the latter to upload their work on the IRs. Many steps need to be done yet but we believe that we are in the right path for that. Faculty members and researchers are gradually convinced that is worthwhile to invest in IRs and to show their work through them, bypassing expensive paths and monopolies. The next step is the successful dissemination of the included material to the research community worldwide through open access policies which renders the IRs as a unique option that offer knowledge and research at no cost.

A new role that arises is the fact that an IR can be a mean for students and researchers to be promoted to the labor market by showing their works through these platforms. It was a great surprise to us this option and frankly it was something that we had never thought of that before. This development shows the dynamic role that an IR can play.

Finally, field for further discussion could be the next generation IR the so called CRIS (Current Research Information System) which their scope is to be an extensive university repository including not only the traditional material (thesis, reports, etc) but also researcher profiles, CVs, supervisions, publications, patents, research data, funds, projects, professional activities, etc being a vivid university database showing the current research activity in a university.

To conclude the issue of an IR is a critical issue for the universities and academic libraries can play a vital role in its creation and operation by supporting the academic community in its research needs, as if they are a distillery of knowledge in the heart of the University.

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Appendix A – Figures and Tables

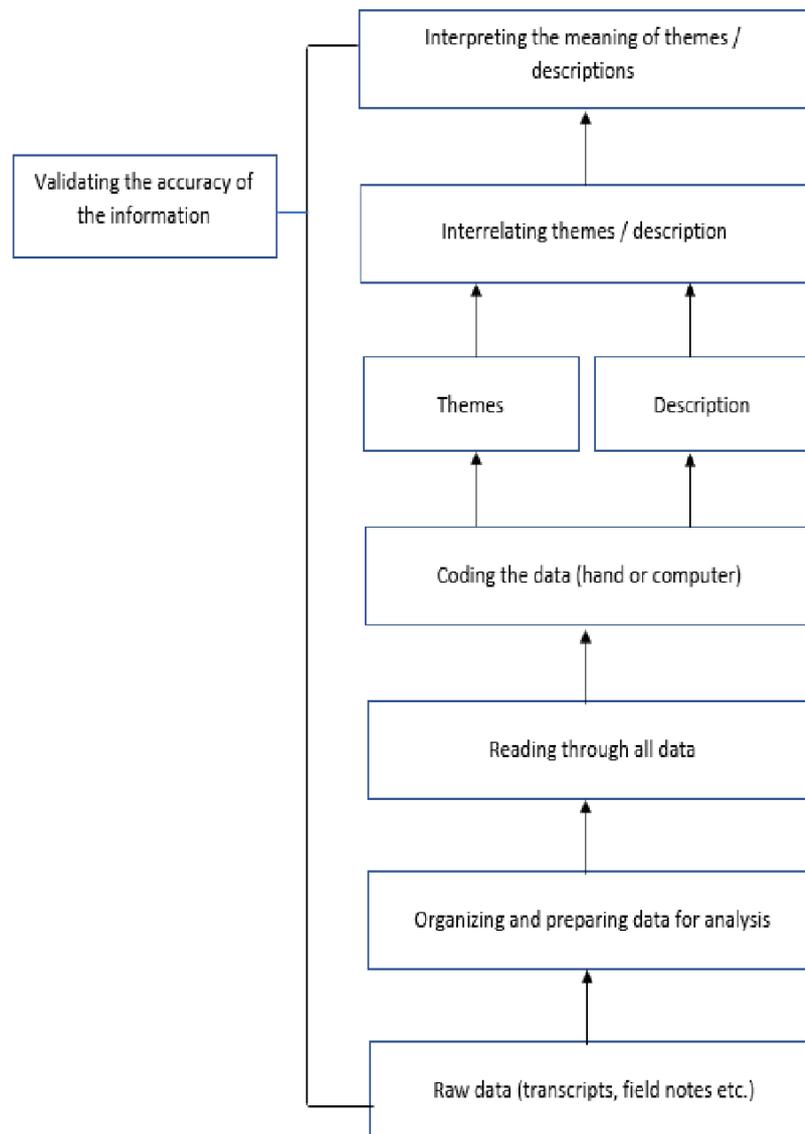


Figure 1. Data analysis in Qualitative Research adopted from Creswell (2014)

The Inductive Approach – Qualitative Research

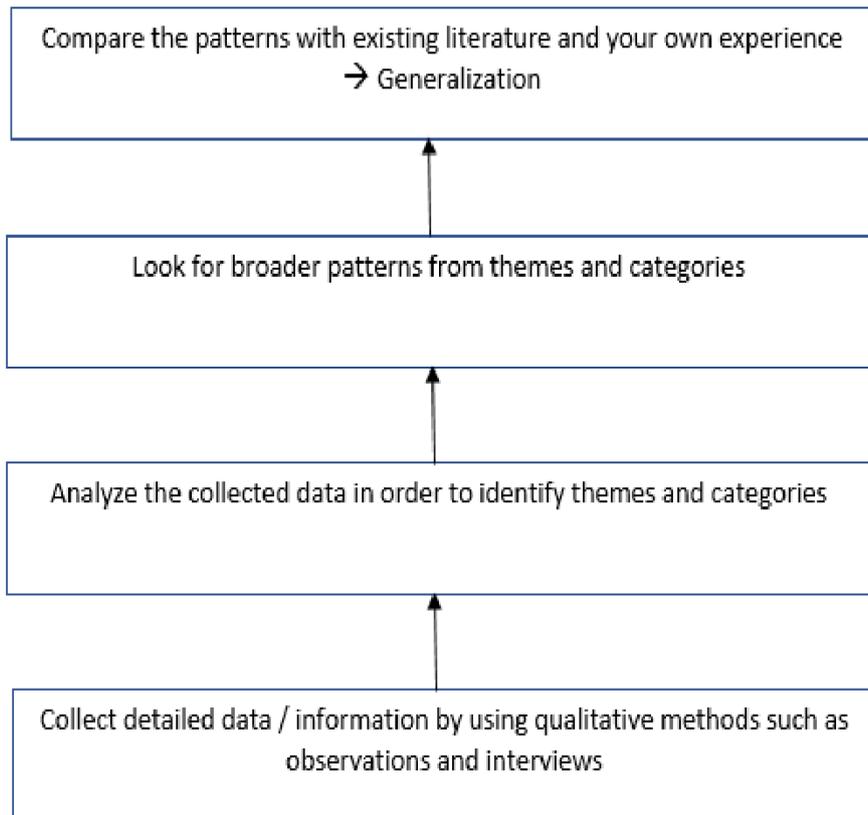


Figure 2 . The inductive approach adopted from lecture 5 (Jokela, 2017)

Name of Library	Library 1 (Greece)	Library 2 (Greece)	Library 3 (Greece)	Library 4 (U.S.A.)
Type of University	Public	Public	Public	Private
Positions of interviewees	Dedicate librarian for IR			
Software	Fedora	DSpace	DSpace	DSpace
Metadata schema	DC	DC	DC	DC
Student population	20000+	12000+	28000+	6500+
Library employees	12	9	24	21

Table 1 Presentation of libraries

Name of Library	Library 1 (Greece)	Library 2 (Greece)	Library 3 (Greece)	Library 4 (U.S.A.)
Reasons of Creation	Preserving heritage and produced knowledge, Availability of old material, Helps research, Keeping users within Academia	Preserving heritage and produced knowledge, Availability of old material, Helps research, Keeping users within Academia	Preserving heritage and produced knowledge, Availability of old material, Helps research	Preserving heritage and produced knowledge, Availability of old material, Helps research and teaching, Keeping users within Academia
Uploading	Old material from librarians, new material from authors	Old material from librarians, new material from authors	Old material from librarians, new material from technical support company	Old material from librarians, new material from Authors
Accessibility	Free Open Access to everyone	Free Open Access to everyone.	Author selects copyright period – limited access, then free access to everyone	Author selects copyright period – limited access, then free access to everyone

Benefits	Preserving Heritage, Recognition, Better Organization, Time Saving, Use of Statistics	Preserving Heritage, Recognition, Better Organization, Time Saving, Use of Statistics	Preserving Heritage, Recognition, Better Organization, Time Saving, Use of Statistics	Preserving Heritage, Recognition, Better Organization, Time Saving, Statistics, Use of Statistics in CV
Librarians' Skills	Coding, HTML, XML, Data Management, Soft Skills	Coding, HTML, XML, Data Management	Coding, HTML, XML, Data Management	Coding, HTML, XML, Data Management, Soft Skills

Table 2 Findings

Appendix B – Sample of Questions

When the digital repository established at your library?

What are the reasons for creating a digital repository?

What is software you are using for your repository?

How many records are stored at your repository?

Who is responsible for the maintenance of the repository?

How a new record is getting stored at your digital repository?

Is the access free to everyone?

Do you face copyright problems?

Is everyone willing to upload their work at your digital repository?

Is it mandatory for everyone to upload their work at your digital repository?

Have the digital repository help the students or / and the staff of your university to their job?

Have the digital repository altered your daily working routine and how?

Are you for or against to the free and open access to everyone?

Of course, there were many more questions that were popping up during the interviews as there was an ongoing process of data collection and data analysis.