

# Open Access and Institutional Repositories: The Turkish Landscape

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## Abstract

The development of the "Open Access" (OA) movement since early 1990s has been radically changing the scientific communication landscape. Within the last decade more universities and research institutions are recommending their scholars to make their works freely accessible through their web sites and/or institutional repositories (IRs). The research impact of OA articles as measured by the number of citations is much higher than that of printed ones. Several universities have developed policies to mandate OA and set up IRs to guarantee public access to the output of publicly funded research projects. Refereed journal articles, conference papers, theses and dissertations, and courseware (i.e., lecture notes, audio and video records of lectures) can be given as examples of such research output. This paper defines the concepts of OA and IR and briefly reviews the current situation of IRs in Europe. It then chronicles the development of IRs in Turkey. The paper concludes with some recommendations.

## Introduction<sup>1</sup>

There are some 24,000 scientific journals publishing 2.5 million articles each year. Scientific journals are expensive. The economic model of publishing is based on subscription and licensing. Price hikes in the publishing sector within the last 30 years are well beyond the inflation rates. This has been primarily due to lack of competition. Some publishers can easily become monopolies, as no two journals can publish the same article in view of copyright restrictions. Moreover, those who use the scientific journals (scientists) and those who pay for this service (usually libraries) are different, which results in what is called the "price inelasticity" in economics and empowers the scientific journal publishers further (Meyer, 1997). As scientific journal prices increase, some libraries cancel some of their subscriptions because they cannot afford the price hikes. Publishers then increase prices further to make up the lost income. Consequently, some more libraries discontinue their subscriptions. In response, to make up the lost income, publishers increase the prices again. . . This vicious circle is not only the main cause of the so called "serials crisis," but also it affects the scientific communication process. Interestingly, the lack of competition in scientific journal publishing enables some publishers to increase their market shares by increasing prices. When the price of an already expensive journal is further increased, libraries tend to cut off subscriptions to cheaper but prestigious journals in order to keep the more expensive ones (House of Commons, 2004).

Scientific research and its outcome (e.g., scientific journal articles) get supported primarily by public money. Articles are given by scientists to commercial publishers free of charge and refereed by scientists free of charge. Yet, the same scientists pay dearly, through their libraries, to subscribe to the very same journals despite the fact that their salaries are paid for by public monies and their libraries are supported by public funds. The triple payment of public money to support research projects, to pay for salaries of scientists, and to fund libraries is emphasized by the following comment: "What other business receives the goods that it sells to its customers from those same customers, a quality control mechanism provided by its customers, and a tremendous fee from those same customers?" (House of Commons, 2004). Universities and governments have recently begun to scrutinize the scientific communication process. Web access to research articles created new opportunities and showed that alternative or complementary economic models can be experimented with (Prosser, 2004; Willinsky, 2003).

## Definition of Open Access

One of these models is what is called Open Access (OA). OA is defined as "free . . . access to" scientific publications. "A complete version of the work . . . is deposited (and thus published) in at least one online

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<sup>1</sup> Information given in this section and the following one is taken verbatim from Tonta and Ünal (2008).

repository . . . maintained by an academic institution, scholarly society, government agency, or other well-established organization that seeks to enable open access, unrestricted distribution, inter operability, and long-term archiving” (Bethesda, 2003). OA increases the research impact by making articles available, free of charge, to all those interested. Two parallel and integrated strategies to create a more effective and equitable scientific communication process are suggested: (1) researchers “self-archiving” their articles that are published in refereed journals in their web sites or institutional repositories and making them available through the Internet; and (2) researchers publishing their articles in OA journals. More than 90% of commercial publishers support self-archiving. There are currently more than 2,500 OA journals published in all subjects. Several prominent institutions including OECD and UN support OA. Recently, some universities decided to mandate researchers to self-archive their published articles. A bill (Federal Research Public Access Act) mandating OA to publicly-funded scientific publications in the United States is likely to become enacted in the near future. The European Commission (EC) recommends OA to EC-funded research reports (European Commission, 2006, p. 87). Governments allocate billions of dollars of taxpayers’ money to research. For instance, the annual budget (28 billion dollars) of the US National Institute of Health alone is higher than the GDP of 142 nations (Suber, 2006). OA increases the impact of the publicly-funded research and triggers new research projects, thereby increasing the return on investment (Lawrence, 2001; Harnad & Brody, 2004; Harnad et al., 2004; Antelman, 2004).<sup>2</sup>

### Definition of Institutional Repositories

The SPARC position paper defines an institutional repository as a “digital collection capturing the intellectual output of a single or multi-university community” (Crow, 2002, p. 16). It can contain “any collection of digital material hosted, owned or controlled, or disseminated by a college or university, irrespective of purpose or provenance.” The position paper further emphasizes that the digital archive should be

accessible to end users both within and outside of the institution, with few if any barriers to access. In other words, the content of an institutional repository is:

- Institutionally defined;
- Scholarly;
- Cumulative and perpetual; and
- Open and interoperable (Crow, 2002, p. 16).

The SPARC position paper offers two interrelated propositions to explain the rationale behind setting up and implementing IRs by universities: The first one is to support the new scholarly publishing paradigm based on open access so that research results can be shared more easily and broadly within the academia and beyond, thereby increasing the impact of research. The second one is to increase the institutional visibility and prestige of the university by making its intellectual and scholarly output accessible throughout the world (Crow, 2002, p. 6ff).

Lynch (2003) defines a university-based IR as

a 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. It is most essentially an organizational commitment to the stewardship of these digital materials, including long-term preservation where appropriate, as well as organization and access or distribution. . . . At any given point in time, an institutional repository will be supported by a set of information technologies, but a key part of the services that comprise an institutional repository is the management of technological changes, and the migration of digital content from one set of technologies to the next as part of the organizational commitment to providing repository services. An institutional repository is not simply a fixed set of software and hardware.

Lynch (2003) cautions that attempts to develop IRs may go wrong if the university administrations (a) see IRs as a tool to exercise control over the intellectual works of the faculty members; (b) overload the IRs with irrelevant policies (i.e., “gatekeeping” function), ignoring the fact that IRs are just an infrastructure; and (c) wish to develop IRs without much institutional and long-lasting commitment just because it is “fashionable” to do so lately. As he concludes, “[s]tewardship is easy and inexpensive to claim; it is expensive and difficult to honor, and perhaps it will prove to be all too easy to later abdicate. Institutions need to think seriously before launching institutional repository programs” (Lynch, 2003).

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<sup>2</sup> See also Tonta (2006a).

## Institutional Repositories in Europe

The first examples of IRs were developed in the early 1990s (e.g., arXiv). Since then, the number of IRs is increasing not only in the United States and Europe but also elsewhere in the world. Currently, the Registry of Open Access Repositories (ROAR: <http://roar.eprints.org>) and the Directory of Open Access Repositories (OpenDOAR: <http://www.opendoar.org>) list about 1,100 IRs all over the world. The OAIster search engine (<http://www.oaister.org>) brings results from about 1,000 IRs, amounting to more than 16 million digital objects most of which are accessible full-text. This is mainly due to the fact that several public and private institutions and universities awarding research grants introduced OA recommendations and mandates to make the results of publicly-funded research open access. The Wellcome Trust (a private company), the US National Institutes of Health (NIH) awarding more than 28 billion dollars research grants, several universities in various countries (e.g., UK, Portugal, Australia) were among the pioneers of developments of OA and IRs in the world (Tonta, in press). Recently (January 25, 2008), the European University Association (EUA) unanimously recommended OA self-archiving mandates for its 791 universities in 46 countries (European, 2008). The recommendation states that

all European Universities should create institutional repositories and should mandate that all research publications must be deposited in them immediately upon publication (and made Open Access as soon as possible thereafter). . . [and that] these [funder] self-archiving mandate should be extended to all research results arising from EU research programme/project funding (European 2008).

The recommendation also specifies the responsibilities of university leaders, the National Rectors' Conferences and the EUA.

As of 2007, however, based on a survey conducted by the DRIVER (the Digital Repositories Infrastructure Vision for European Research), it was estimated that "there are approximately 230 institutes with one or more digital repositories with research output in the European Union" (Van der Graaf & Van Eijndhoven, 2007). Only about half of them participated in the DRIVER survey. Several (10) EU countries did not have any IRs listed in OpenDoar then. Map 1 below shows that there is a lot to be desired in terms of the development of IRs in Europe: the number of EU countries in the advanced stage is not that many (the UK, France, Italy, The Netherlands, Germany, Denmark, and Sweden). The EUA's recommendation may play a crucial role and generate further interest in OA and IRs in European universities, thereby increasing the total number of IRs and change the European repository landscape might change tremendously in the near future.



Map 1 – Development stage of digital repositories for research output per EU country as estimated in January 2007.

Source: Van der Graaf & Van Eijndhoven (2007, p. 73).

## Open Access and Institutional Archives in Turkey

The concepts of Open Access (OA) and Institutional Repositories (IRs) have come to the forefront of Turkish information management landscape with the formation of the Consortium of Anatolian University Libraries (ANKOS) in early 2000s. A paper on IR was delivered by Professor Bülent Karasözen, the then ANKOS Chairman, in a symposium organized by the Department of Information Management of Ankara University in 2002 (Karasözen, 2003). The Middle East Technical University Library Electronic Theses and Dissertations Archive was established in 2003 and became the first Turkish member of the Networked Digital Library of Theses and Dissertations (April 2004). The METU Library ETD Archive has the full-texts of more than 2,200 theses and dissertations accessible through the Web (<http://ww2.lib.metu.edu.tr/en/yan.php?id=208>). In addition to the ETDs, the METU Library Open Archives Harvester (<http://hitit.lib.metu.edu.tr/oai/>) has the full-texts of conference papers and other digital objects indexed from 4 archives.

OA was the topic of the invited keynote speech delivered at the opening of the Academic Informatics meeting that took place in Gaziantep from 2-4 February, 2005 (Tonta, 2005a). Following the meeting, a test web site for the OA Platform (<http://www.acikerisim.org>) was developed by Orçun Madran. OA and IRs were also at the forefront of the activities of the 41st Library Week (28 March – 2 April 2005) whose main theme was the “Digital Culture and the New Generation Libraries” (Tonta, 2005b).

The very first experimental OA archive was developed by two doctoral students (K. Levent Ertürk and Ebru Kaya) at the Department of Information Management of Hacettepe University as part of a graduate course on Digital Libraries offered during the spring semester of 2004/2005 academic year. This experiment has later become the core of the demonstration project of Hacettepe University Open Archive ([www.acikerisim.hacettepe.edu.tr](http://www.acikerisim.hacettepe.edu.tr)) that contained the full-texts of graduate theses and dissertations. The project was carried out by the Department of Information Management of Hacettepe University. A more detailed account of the project is as follows (Akbarak et al. 2006):

... Selected theses and dissertations including multimedia components (pictures, maps, audio and video features) were scanned and files in PDF (Portable Document Format) format were created. Metadata elements such as titles, tables of contents, and abstracts were captured through an optical character recognition (OCR) software. Machine readable cataloging (MARC) data for theses and dissertations were obtained from the university library. Dublin Core-based metadata was created for each thesis and dissertation.

DSpace, an open source (free) software package developed by the Massachusetts Institute of Technology (MIT) and Hewlett-Packard (HP), and used by more than 150 universities world-wide, was used to provide network access to theses and dissertations. DSpace enables large institutions with varying digital archiving policies and workflows to set up and manage their institutional archives including theses and dissertations. It supports the Metadata Harvesting Protocol of the Open Archives Initiative (OAI-PMH) and the OpenURL standard.

The DSpace software (Version 1.2.1) was installed on a web server (Apache Tomcat) running on Linux Fedora Core (Version 3) operating system with access to PostgreSQL database. A domain name was assigned to the web server so that metadata and full-texts of theses and dissertations can be input and searched via a web-based DSpace user interface. Lucene search engine is used in DSpace to index the contents of archives. It provides several access points (author, title, keywords, etc.) and advanced search and retrieval techniques (e.g., stemming, fuzzy search) to query the database.

The DSpace user interface was translated to Turkish to facilitate the data input, search and retrieval process. Dublin Core-based metadata and corresponding full-texts files of theses and dissertations were entered to the system. Using the DSpace software, a small-scale and experimental archive (“Hacettepe University Open Archive”) was developed to demonstrate that the full-texts of books, articles and other types of materials can also be made available through the Internet. In addition to theses and dissertations, the full-texts of some 300 articles, reports, lecture notes and presentations authored by the faculty of the Department of Information Management were added to the Archive.

The next step was to register the base URL address of the Open Archive and its port numbers for incoming and outgoing requests at the Open Archives Initiatives (OAI) Registry. The Open Archive was assigned a handle prefix (2062) by the CNRI Handle System. This prefix was used to create permanent, persistent and universal URLs for items included in the Open Archive. It became the first archive in Turkey using the OAI-PMH protocol (March 29, 2005). Thus, the metadata created by the Open Archive became harvestable by the crawlers of the OAIster search engine as well as that of others (e.g., Google Scholar). Using these search engines, World-Wide Web (WWW) users was able to discover and get access to the full-texts of titles that are available through the Hacettepe University Open Archive.

More information about Hacettepe University Open Archive can be found in the project report (Tonta et al., 2006) along with relevant screen shots (see, for example, Fig. 1). Unfortunately, the demonstration project was not followed up by other such projects and Hacettepe University missed the opportunity to set up the very first operational IR in Turkey.

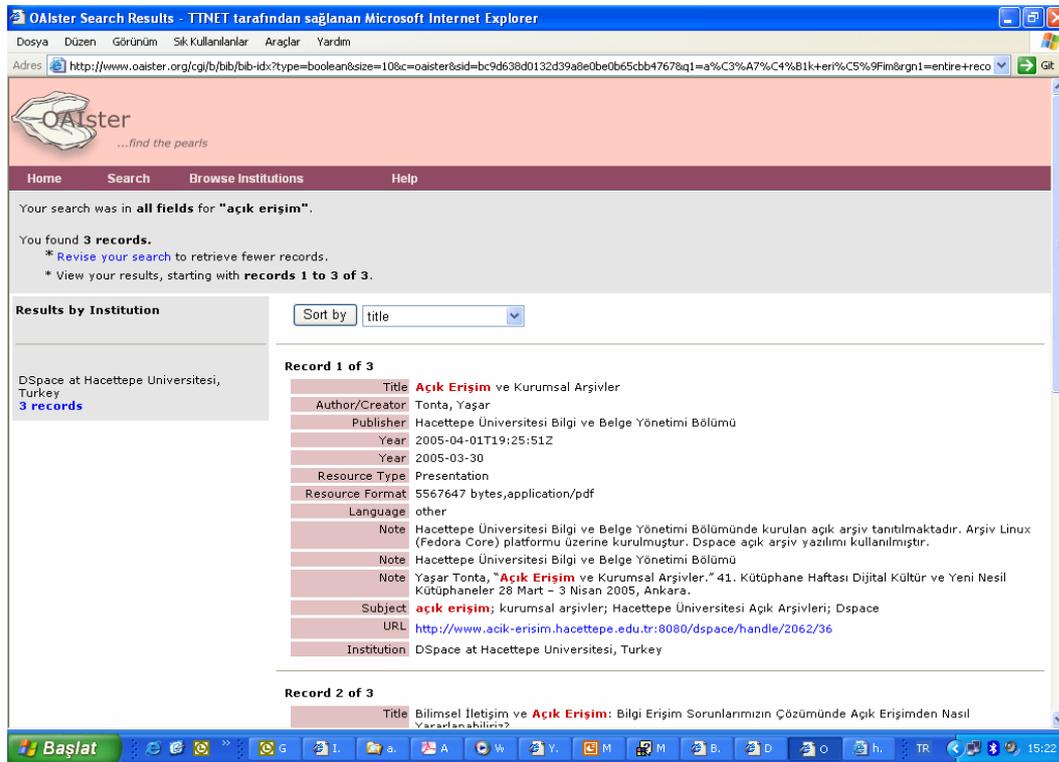


Figure 1. OAster search results from Hacettepe University Open Archive Demonstration Project (2005).

OA was discussed in a panel as part of the 10th Conference on Internet in Turkey that took place in Bahçeşehir University in İstanbul from 9-11 December 2005. The then prototype of the Ankara University Open Archive was introduced (Atılğan, Arslantekin & Bayram, 2005). It later became the first operational institutional archive set up in Turkey and registered at OpenDOAR (<http://www.opendoar.org>). In addition to theses and dissertations, the Archive (<http://acikarsiv.ankara.edu.tr>) currently contains over 2,500 items including peer-reviewed journal articles, conference papers, and lecture notes authored by the Ankara University faculty members (Atılğan & Ketten, 2008; Akbayrak et al., 2006).

One of the main themes of the Academic Informatics '06 Conference was again OA and IRs. Following an invited paper (Tonta, 2006b) and a panel discussion summarizing the experience of other institutions, a declaration was issued by the Turkish universities supporting OA and the establishment of IRs (Akgül, 2006). The declaration recommended that publications emanating from research projects that were carried out by taxpayers' monies be open to public through national or institutional archives and that Turkey should sign the Berlin Declaration on Open Access to Knowledge in the Sciences and Humanities (<http://www.zim.mpg.de/openaccess-berlin/berlindeclaration.html>). Also, following the panel discussion, a voluntary Advisory Board of OA and IRs was formed. The Board comprised members from ANKOS, the Turkish Library Association (TLA), University and Research Libraries Association (ÜNAK) and the Turkish Academic Network and Information Center (ULAKBİM). The Board, chaired by a facilitator, met a few times, set up a web site (<http://www.acik-erisim.org.tr>) and a blog to discuss relevant issues and publish the minutes of the Board meetings, but was unable to produce tangible outcomes.

During the same conference, ANKOS announced the formation of its Working Group on OA and IRs (<http://www.ankos.gen.tr/acikerisim/index.html>). The Working Group has published a brochure on OA and a guide to set up IRs (Bilimsel, 2006; Coşkun et al., 2007).<sup>3</sup>

<sup>3</sup> See Karasözen et al. (2006) for a more detailed account of the activities of the ANKOS OA and IA Working Group. See the ANKOS web site (<http://www.ankos.gen.tr/acikerisim/index.html>) for the initiatives of OA and IAs in Turkey along with a Tonta, Y. (2008). *Open Access and Institutional Repositories: The Turkish Landscape*. In Didar Bayır (Ed.). *Turkish Libraries in Transition: New Opportunities and Challenges* (pp. 27-47). İstanbul: Turkish Librarians' Association.

Currently, ROAR lists five Turkish IRs (Ankara, Atatürk, Gazi, METU and Sabancı Universities) and Open DOAR lists four (Ankara, Atatürk, Gazi, and Sabancı Universities). The Ankara University Open Archive and The METU Library ETD Archive were mentioned earlier. Sabancı University Research Database (<http://research.sabanciuniv.edu/>) provides full-text access to most of the publications of the institution. There are over 2,000 digital objects in the database as of May 2008.<sup>4</sup> Users can set up alerts using Atom or RSS to be notified whenever a new item gets added to the database. Gazi University Open Archive (<http://www.acikarsiv.gazi.edu.tr/>) has over 600 items, comprising mostly journal articles, theses and dissertation, and books and it also offers RSS feeds for dissertations. Atatürk University Open Archive (<http://acikarsiv.atauni.edu.tr/oai/oai2.php>) has about 70 items available.<sup>5</sup>

User interfaces of some (e.g., Sabancı) are in English, some are bilingual (Turkish and English), although the English one may not always be fully functional. All IRs except that of Sabancı were developed by means of a home-grown software based on MySQL and PHP. Sabancı has migrated to Eprints (<http://www.eprints.org>) in 2007 (Akyüz, 2008). Eprints is one of the most frequently used software package to develop and run IRs in the world.<sup>6</sup> Apparently, the contents of the archives of Gazi and Atatürk Universities cannot be harvested successfully by the ROAR search engine either because their OAI interfaces are not registered or not functioning properly.<sup>7</sup> Similarly, items in the Sabancı University Research Database are not apparently harvested by the OAIster (<http://www.oaister.org>) search engine crawlers, either. It is likely that Sabancı and METU have not registered in OAIster and OpenDOAR directories, respectively, even though both are listed in ROAR.

Initiatives to set up IRs in Turkey are not limited with the ones that are listed in the ROAR or OpenDOAR registries/directories. Several universities provide access to the full-texts of theses and dissertations and faculty publications. For instance, Atılım University has developed its institutional archive (<http://library.atilim.edu.tr/kurumsal/>) in 2007 using Eprints. It has some 1,500 items including multimedia objects. Anadolu, Bilkent, Boğaziçi, Çukurova, Dokuz Eylül and Süleyman Demirel Universities have ETD archives accessible over the Web for some time (e.g., Bilkent since 2001, SDU since 2003, and Anadolu and Çukurova since 2005). There may be others as well. These universities could easily provide OAI-PMH and OpenURL compatible user interfaces, and register their archives in relevant directories and search engines (e.g., ROAR, OpenDOAR, and OAIster).

As far as the ETDS are concerned, the National Theses Center of the Higher Education Council (YÖK) (<http://tez2.yok.gov.tr/>) has over 200,000 graduate theses and dissertations in its collection. The Center receives a copy of all the theses completed at universities since early 1980s. Recently, more than 175,000 theses were scanned as part of the Center's digitization project. The Center is in the process of seeking the approvals of the authors ETDs to make them available through the Web. The full-texts of more than 25,000 ETDs (13% of the total) for which authors' permissions were obtained were made accessible starting from 2008. The use statistics suddenly boomed. Whereas some 70,000 theses were used by 13,000 researchers throughout 2007, almost 12-fold (813,882) increase in the number of theses used and more than five-fold (73,699) increase in the number of users were observed during only the first quarter of 2008, despite the clunky user interface.<sup>8</sup> One could only speculate as to how much increase will be observed once the full-texts of all the theses scanned are offered through the Web!

It should be emphasized, though, that the Center follows a conservative approach when it comes to seeking authors' permission. As a non-profit institution, it is to everyone's advantage if the Center makes all the scanned theses and dissertations available through the Web as soon as possible. If an author complains because s/he did not want his/her work made accessible, the Center can easily block access to the thesis in question. For relatively new theses submitted within the last decade, authors are asked to sign a statement on their theses indicating if they want their works withheld for some time due to various reasons (e.g., patent

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bibliography of Turkish articles and presentations on the subject. Also, see Dilek Kayaoğlu (2006) and Polat (2006) for more information on OA in Turkey.

<sup>4</sup> OpenDOAR gives 1,784 items while Akyüz (2008) provides a table with 2,274 digital objects itemized by publication types. Figures for other archives provided by ROAR and OAIster are also somewhat different. For instance, according to the ROAR web site, the Ankara University Open Archive has 3,383 items, Gazi, 375, and METU Library ETD Archive, 3184 items. OAIster, on the other hand, cites 2,918 items for Ankara, 608 for Gazi, and 2,916 for METU.

<sup>5</sup> See Polat and Odabaş (2008) for more information on the Atatürk University Open Archive.

<sup>6</sup> Dspace (<http://www.dspace.org>) is the other one.

<sup>7</sup> See <http://roar.eprints.org/?action=home&q=&country=tr&version=&type=&order=name&submit=Filter>.

<sup>8</sup> Data comes from the web site of the Higher Education Council ([http://www.yok.gov.tr/arastirmacilar\\_duyuru.html](http://www.yok.gov.tr/arastirmacilar_duyuru.html)).

application, national security, and so on). Otherwise, both the author's university and the Center are free to make its electronic copy available. For older theses, it should be remembered that authors do not have the liberty to block access to their works forever. The work in question gets prepared as part of a degree and filed in the university library anyway. Filing the thesis in the university library is the equivalent of making it public. More importantly, the Center's efforts to get approvals of more than 200,000 authors will take quite some time. Even if the Center did its best, some authors or their true heirs may not be located for various reasons. The Higher Education Council could issue a binding by-law for universities to overcome the "orphan works" problem as well as to make all theses and dissertations available as soon as they are submitted to the National Theses Center. As is well known, commercial companies such as Google are also faced with the problem of orphan works when digitizing books under copyright (e.g., Google Books Project: <http://books.google.com>). This is one of the major obstacles currently stalling large scale digitization projects. Lynch (2001) foresees that "[t]he cost of clearing rights for these works is likely to be hundreds of times greater than the costs of actually digitizing the works."

Another initiative is the Turkish OpenCourseWare Consortium (<http://uadm.kulakbim.gov.tr/>). The Consortium was formed in 2007 with an agreement signed between the Turkish Academy of Sciences and the Higher Education Council. It aims to provide open access through a learning management software (eduCommons) to course materials (syllabi, lecture notes, audio and video records of lectures, slides, and so on) prepared by faculty members. The contents of some of the courseware available through Massachusetts Institute of Technology's OpenCourseWare (<http://ocw.mit.edu>) will also be translated and made available through the Consortium web site. The Consortium currently has 48 members and plans to make use of the expertise of some of the member universities such as METU, Ankara and Anadolu Universities. For instance, METU already offers several courses through its OpenCourseWare web site (<http://ocw.metu.edu.tr>).

There are other initiatives that can streamline the development of OA and IRs in Turkey. The overwhelming majority (94%) of 253 electronic journals published in Turkey are open access (Küçük & Olcay, 2006) including their retrospective issues. More than half of them are published by universities. Full-texts of articles that appear in most academic journals are freely available through ULAKBİM's web site (<http://www.ulakbim.gov.tr>). The 12 scientific journals published by the Turkish Scientific and Technological Research Council (TÜBİTAK) (<http://journals.tubitak.gov.tr>) are also accessible through the Web.

## Conclusion

Although OA and IRs have generated quite an interest lately in academic circles and that a few archives are set up and operational, this is certainly not enough. The issue has to be dealt with on a higher level and should be brought to the attention of the government, the State Planning Organization (DPT), TÜBİTAK and YÖK more forcefully. One way to do this is to place it in the agenda of the Supreme Council of the Science and Technology that meets twice a year and chaired by the Prime Minister. The Supreme Council may order the relevant bodies to prepare a draft law or by-law similar to those of other countries (e.g., the Federal Research Public Access Act of the US). The ratification of such a law by the Turkish Grand National Assembly would make the publications coming out of research projects supported by public funds open access through institutional archives.

The Higher Education Council should mandate universities to set up IRs to provide open access to such publications and courseware. Universities should sign international OA declarations such as the Berlin Declaration on Open Access to Knowledge in the Sciences and Humanities. License agreements with publishers should specify the OA clauses so that the contributions of Turkish scholars can be made available through Turkish IRs. The awareness of faculty members towards OA and IRs should be increased. Research grants offered by TÜBİTAK and DPT should enforce open access for research papers funded by taxpayers.

The contents of these repositories should be organized according to the established standards (e.g., OAI-PMH and OpenURL) so that they can be harvestable by search engine crawlers, thereby increasing the overall visibility of research carried out by the Turkish scholars. The National Theses Center should also comply with the international standards, create an OAI interface and register with ROAR, OpenDOAR and OAIster. This will facilitate the work of individual universities since not all of them may have resources and expertise to provide full-text access to their theses and dissertations. IRs set up and organized according to standards such as OAI-PMH will also facilitate the establishment of a national service in the near future (e.g., the Center of Institutional Repositories). Yet, it is not enough to simply digitize the contents and make them available through the Web: universities should develop services on top of IRs such as RSS feeds and tagging. Powell (2008) states that "[s]uccessful 'repositories' (Flickr, YouTube, Slideshare, etc.) promote the social activity that

takes place around content as well as the content management and disclosure activity –friends, groups, social tagging, comments, embedding, re-purposing, etc.” Web 2.0 technologies and social networking will play an increasingly crucial role in setting up and running IRs. Turkish IRs should keep an eye on such developments and try to implement them as much as possible.

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Note: All URLs were last accessed on June 15, 2008.

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