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# Issued Patents in a University's Institutional Repository

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## Abstract

Beginning in 2016, patents issued by the U.S. Patent and Trademark Office (USPTO) granted to Oklahoma State University were included in SHAREOK (<https://shareok.org/>). The joint institutional repository for the Oklahoma State University Libraries (OSU) and the University of Oklahoma Libraries (OU), SHAREOK serves as the home for the intellectual output of both communities and will ultimately include digital dissertations, faculty publications, digital special collections, open access publications, and open educational resources. Including patents has increased the depth of the collection and allows them to be searched or indexed by date, author, title, and subject/classification. Using DSpace software, the contents of SHAREOK are crawled by Google, also the Library's online catalog. Identifying patents by assignee or owner can only be done comprehensively using the Advanced Search feature in the USPTO's Patent Full-Text and Image Database (PatFT) for issued patents or the Patent Application Full-Text and Image Database (AppFT) for pending patents or patent applications. In-house tools at the USPTO including PubWEST may also be used for comprehensive research. The following article gives an overview of patents as intellectual property and outlines the value of patents in the institutional repository, the process to identify the patents issued to Oklahoma State University over time, and the creation of the metadata structures to house the data in DSpace. Similar projects were accomplished at Clemson and Rice Universities. With various practices and software at each institution, there are no best practices at this time. Each project offers insights as to the possible ways of accomplishing similar results.

## Introduction

Patents are intellectual property rights granted by the U.S. government to any person who "invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof." (35 U.S. Code § 101. Inventions patentable). Patents document new technologies and designs and have more detailed information about a technology than any other type of scientific or technical publication. Seventy percent of the information disclosed in patents is never published anywhere else. (Hong, p. 3).

Patents must meet specific criteria, defined by law. In the United States, the U.S. Patent and Trademark Office (USPTO) is the agency responsible for issuing patents. The U.S. Constitution mandates

protection for patents and copyrights "to promote the progress of science and useful arts, by securing for limited times to authors and inventors exclusive rights to their respective writings and discoveries." (U.S. Const. article 1, section 8, clause 8).

Patents are similar to scholarly journal articles in format, and can be used for new areas of research, for ideas to improve existing research, or to see if a product has already been developed. "Patents complement peer-reviewed articles, often including more experimental data and additional references to both the patents and the research literature..." (MacMillan, et. al., 2010, p. 418).

Patents are also primary-source materials which are integral to curriculums and faculty research in the STEM disciplines. However, they are included

only in part in traditional literature searches using scientific and technical databases. They can be found comprehensively in patent databases primarily at the USPTO and are located only randomly by search engines and literature indexes. Libraries subscribe to science, technology, and general research databases, some of which can retrieve patents by subject or assignee/university. But as databases use different algorithms, each gives a different search result. Most do not include an interface that can allow for the retrieval of issued patents versus patent applications, and this is relevant information as applications can be pending for several years. These databases also include worldwide (WO) patents which include patents received in the U.S.

Patents are a significant contribution by researchers, representing discipline strengths and a record of innovation at a university. Including a university's patents in an institutional repository is valuable in that they are housed together locally and can be indexed in a library's systems, making them more accessible and visible. In turn, faculty research can be highlighted, while students and researchers can be made more aware of this form of intellectual property and its relevance to the research community. The Scholarly Publishing and Academic Resources Coalition (SPARC) defines an institutional repository as "digital collections that capture and preserve the intellectual output of university communities." (SPARC, <https://sparcopen.org/our-work/digital-repositories/>) Institutional repositories provide a way for university authors to provide broader access to their publications.

## Curriculums and Research

Patents are important for research. Patent documents supplement the traditional literature searches in many disciplines, especially STEM (science, technology, engineering, and medicine). Knowing how to search patents using classifications and not only keywords is essential as patents are inconsistently located in traditional literature searches and are so critical to these disciplines. Patents must be searched

using patent-specific databases at the USPTO using specific classification fields. These documents may be searched using Google Patents, but listings by subject or keywords in Google Patents are not comprehensive. If a university has a Patent and Trademark Resource Center (PTRC)<sup>1</sup>, library staff can provide outreach and training as to the importance of patents and how to search. Universities without a PTRC can contact these facilities that are geographically close to them for assistance. Encouraging faculty and students to consider patents for research in addition to journal articles is a valuable concept, so including patents in the institutional repository has increased awareness for students as well, through their coursework, etc.

Focal areas of research at Oklahoma State University that have been identified by the university are described at the Office of the Vice President for Research, <https://research.okstate.edu/>. Identifying and highlighting patents issued to faculty at the university can help to outline areas of research, growth, and focus at a university.

## Copyright

SHAREOK (<https://shareok.org/>) is the joint institutional repository for the Oklahoma State University Libraries (OSU) and the University of Oklahoma Libraries (OU). SHAREOK includes copyright statements for each collection in the metadata as a rights statement. The patents collection does not include this statement as regarding patents and copyright, the USPTO outlines that:

Patents are published as part of the terms of granting the patent to the inventor. Subject to limited exceptions reflected in 37 CFR 1.71(d) & (e) and 1.84(s), the text and drawings of a patent are typically not subject to copyright restrictions. The inventors' rights to exclude others from making, using, offering for sale, or selling the invention throughout the United States or importing the invention into the United States for a limited time is not compromised by the publication of the

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<sup>1</sup> PTRCs are a nationwide network of 85 public, state, and academic libraries administered by the USPTO to disseminate patent and trademark information and to help

support the intellectual property needs of the public (35 U.S.C. 12).

description of the invention. In other words, the fact that a patent's description may have been published without copyright restrictions does not give you permission to manufacture or use the invention without permission from the inventor during the active life of the patent. See MPEP § 600 - 608.01(v) regarding the right to include a copyright or mask work notice in patents." (Terms of Use for USPTO websites, <https://www.uspto.gov/terms-use-uspto-websites>)

If a patent filer wants to reserve copyright in the materials they must include a license statement in the patent application which grants permission "by anyone" to make "facsimile reproduction[s]" of the patent document or disclosure.

Without copyright notice information, then, based on the USPTO's statement in their FAQ, the USPTO seems to view that the materials have been effectively dedicated to the public domain. The FAQ (<https://www.uspto.gov/terms-use-uspto-websites>, under "Editorial Guidance > Patent Information") states that "the text and drawings of a patent are typically not subject to copyright restrictions."

Note that the USPTO's statement in their FAQ is not "the law" – there is no regulation, statute, or case law. It is just an expression of the USPTO's perspective on the legal status of the submissions (at least concerning the text and drawings). This does not mean a court would find that those submissions without the license language are public domain (Martin High, 2019).

## Project

In 2015, the Oklahoma State University Library began a project to identify and make searchable in SHAREOK – the institutional repository – 160 U.S. patents issued to the University through its history as a land-grant institution. This was a collaborative effort between the PTRC and the Digital Resource and Discovery Services (DRDS) division.

The Oklahoma State University Library has been a PTRC since 1956 and is the only Center in the state of Oklahoma. Staff assist with preliminary U.S. patent research and federal trademark searches, offer instruction in the area of intellectual property to the

campus and the community, especially design courses in engineering, and work with related departments on campus. Patent research is necessary to determine if a similar invention or research already exists.

The DRDS at OSU's Edmon Low Library facilitates access to electronic information, print materials, and library services to ensure that the information needs of OSU students, faculty, and staff are met, regardless of their location. This mission is accomplished through the use of state-of-the-art technologies, digital projects from scanning to access and preservation, and providing access to print and digital resources.

Staff involved with this project included the Metadata Librarian, who along with an assistant, created metadata dictionaries for each collection and oversaw the metadata creation and implementation. The coordinator handles technical uploads for digital collections, helps to create and maintain the Library Website, and is converting faculty publications into open source eBook textbooks.

Content in SHAREOK is organized by university and several subject areas. Sub-communities within the OSU community in SHAREOK include: Agricultural Experiment Station and Cooperative Extension Service materials, Electronic Theses and Dissertations, Faculty Papers, Honors College student papers, International Ground Source Heat Pump Association (IGSHPA) papers, International Conference on Web Handling papers, Kappler's Indian Affairs Laws and Treaties, Open Educational Resources, OSU Patents Collection, Quail/Prairie Grouse Conference Proceedings, Southern Forest Tree Improvement Conference, and Undergraduate Research. Recent submissions are highlighted.

## Related Projects at Clemson and Rice Universities

Clemson University and Rice University undertook similar projects and served as examples for the patent collection in the institutional repository at Oklahoma State University. Each university however developed its own project goals, also the workflows and handling of metadata. Clemson University focused on patents as research output and Rice University focused on the commercial value of patents; OSU has focused on the patents' value as highlighting research

areas at the university and as a research tool for faculty, students, and for curriculums. Each institution used various databases to mine the institutional patents and the discoverability varies given each library’s online systems. Metadata fields were similar but were determined by each institution; Rice and Oklahoma State each used Dublin Core (DC) metadata. Each project offers insights as to the possible ways of accomplishing similar results.

<http://patft.uspto.gov/netahtml/PTO/search-bool.html>

- U.S. Patent and Trademark Office West (PubWEST), available at most PTRCs
- European Patent Office, Espacenet, <https://worldwide.espacenet.com/>
- Pat2PDF, <https://www.pat2pdf.org/>
- Freshpatents.com – keyword monitor, <https://www.freshpatents.com/>

## OSU Patents

In order to locate patents assigned to the University throughout its history, institutional titles for Oklahoma State University were determined and then searched in both the Assignee Name and Applicant Name fields. These include in chronological order:

- Oklahoma State University of Agriculture and Applied Science
- Board of Regents for Oklahoma Agricultural and Mechanical Colleges
- Board of Regents for Oklahoma State University
- Oklahoma State University

Each title was searched in multiple databases so that all patents assigned could be counted for this project. Databases searched included:

- World Intellectual Property Organization (WIPO) Patentscope, <https://patentscope.wipo.int/search/en/search.jsf>
- USPTO Patent Full-Text and Image Database (PatFT)

## Classifications

In the U.S. and other countries, classifications or subject categories are assigned to patents as they are issued. Such classifications identify subject matter and facilitate searching by technology areas. The U.S. used its own system, the U.S. Classification, until 2016 when it migrated to the Cooperative Patent Classification (CPC) system to better align with the rest of the world<sup>2</sup>. The CPC is a joint classification system between the U.S. and the European Patent Office, who also harmonized its system toward a “common classification scheme.” (Recommendations of the University Research Spires of Excellence Task Force, 2013).

The International classification schema continues to be used by other countries. It is administered by the World Intellectual Property Organization. Classifications allow patents to be searched by codes instead of words and outline the history of a technology area.

For the project three schema were created to include to incorporate these classifications and to allow the patents to be searchable by subject:

dc.subject.primaryusclass .....The principal mandatory Primary Classification  
 dc.subject.otherusclasses .....Other U.S. Patent Classifications assigned  
 dc.subject.cpcclasses .....Subject matter of the patent as identified by the Cooperative Patent Classification System

SHAREOK can sort patents by Subject (classification) and Date Issued. Reviewing Subjects of classifications, Patents assigned to the University outlined a strong presence in the following:

<sup>2</sup> Patent Classification, USPTO,

<https://www.uspto.gov/patents-application-process/patent-search/classification-standards-and-development>

- CPC Class C07D 471/08 - Heterocyclic compounds containing nitrogen atoms as the only ring hetero atoms in the condensed system (9 patents)
- CPC Class C 07D 495/08 - Heterocyclic compounds containing in the condensed system at least one hetero ring having oxygen and sulfur atoms as the only ring hetero atoms (8 patents)
- U.S. Class 546 Organic Compounds (7 patents)
- (OK)DRUG, BIO-AFFECTING AND BODY TREATING COMPOSITIONS (6 patents)
- Class 426 - FOOD OR EDIBLE MATERIAL: PROCESSES, COMPOSITIONS, AND PRODUCTS (6 patents)
- Class 435 - CHEMISTRY: MOLECULAR BIOLOGY AND MICROBIOLOGY (6 patents)
- Class 530 - CHEMISTRY: NATURAL RESINS OR DERIVATIVES; PEPTIDES OR PROTEINS; LIGNINS OR REACTION PRODUCTS THEREOF (6 patents)

## Metadata

In preparation for adding the OSU patents to SHAREOK, a Web search was conducted to review the metadata for patents from other institutional repositories to help determine the descriptions that would be used.

Without prior knowledge of how to describe a patent, it was necessary to determine the uniqueness of a patent compared to other materials, also what fields researchers use to search, so the metadata could reflect this in the description to aid in identification and accessibility.

Iowa State University, Clemson, and Rice University were three repositories found with patents and based on their metadata and consultation with the Government Document's Librarian a set of elements

from the DSpace schema were identified with some elements being locally modified, including the inventor, assignee, patent id, and subjects (classifications).

The importance of the metadata for helping to increase exposure and traffic of scholarly works in the institutional repository with search engines like Google Scholar that index these sites cannot be understated as Wesolek, Comfort, and Bodenheimer, note, "...the all-important ranking of that content can be impacted by quality of metadata, linking of the repository and content to known trusted websites, and overall traffic to the repository in general." (Wesolek, et. al, 2015, p. ) <this endnote listing does not match this Wesolek et al quote, endnote 8 is a link to the USPTO Patent Classification page> Metadata elements for the patent set included:

dc.contributor.inventor .....	The creator(s) of the patent
dc.contributor.assignee .....	The organization that owns the patent
dc.date.issued .....	The date when the patent was granted
dc.date.filed .....	The date when the patent was filed
dc.description.abstract .....	The abstract of the patent
dc.format .....	The file format of the patent from IMT
dc.format.extent .....	The number of pages of the patent
dc.identifier.patentID .....	The identifying patent number assigned
dc.language .....	The language of the patent from ISO 639-1
dc.publisher .....	The publisher of the patent
dc.relation .....	The library department responsible for the making the patent digitally available
dc.subject.primaryusclass .....	The principal mandatory Primary Classification
dc.subject.otherusclasses .....	Other U.S. Patent Classifications assigned
dc.subject.cpcclasses .....	Subject matter of the patent as identified by the Cooperative Patent Classification System

dc.title .....	The title of the patent
dc.type .....	The physical format of the patent from DCMI (Dublin Core Metadata Initiative)
dc.type.genre .....	A specific type of material from a locally controlled list

A data dictionary was created to document the metadata and serve as reference tool and note any revisions. The elements were noted in an Microsoft Excel spreadsheet as a template and used by the Government Documents Librarian to create the metadata describing the patent.

## Data

The Institutional Repository SHAREOK is an open access repository in DSpace, a digital repository content management system. The data in SHAREOK is indexed by the OSU catalog (Ex Libris PRIMO) and Google/Google Scholar. Online digital repositories, such as SHAREOK, use a metadata schema to organize, describe, and manage the material in the repository in order to identify and make the data shareable from one system to another. Following a schema helps provide structure and consistency in the mapping and populating of the fields when describing the materials from the uploaded files. The metadata in DSpace is based on the Dublin Core (DC) schema with modification of certain elements. For example, the element for the author in the DSpace schema is dc.contributor.author, and not the standard DC element of dc.creator.

Examples of metadata fields would be the title of a piece or the author or even when the piece was created.

Comma-separated value (CSV) files are used for upload of multiple files into the DSpace instance. When opened in a program such as Microsoft Excel, the commas break the information into cells across a single row for each item.

Metadata is checked to ensure it is in the correct fields per SHAREOK's metadata schema. For the Patents collection, both Dublin Core and the original fields created by the DRDS department are used. Dublin Core is a collection of best practices across many organizations. The Library's policy is to utilize Dublin Core metadata. If metadata is encountered that does not fit in any Dublin Core field, a local field is created.

Once the CSV file is set up correctly, a Simple Archives Format (SAF) package is created, which pairs the files and metadata together in a compressed .zip. This .zip file is then uploaded into SHAREOK via the DSpace graphical user interface for batch loading in the repository. Upon successful ingest, files are checked that they mapped correctly. Records are opened on the website and the metadata reviewed. (Updated process description, Juliana Nykolaiszyn, DRDS, December 2019).

## Results and Conclusion

At the end of 2019, 172 patents were placed in the SHAREOK database in order by issue date and new patents are added to the database as they are issued by USPTO. They can be sorted by date, author, title, and subject (classification). To update holdings, staff check USPTO monthly and manually input new patents. Patents issued to the Oklahoma State University in the SHAREOK repository have contributed greatly to the scholarly content of the repository and highlight the value of patents as part of a curriculum and the research accomplishments of the University.

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SPARC, Digital Repositories Open Access, <https://sparcopen.org/our-work/digital-repositories/>

United States Patent and Trademark Office, Patent Classification, <https://www.uspto.gov/patents-application-process/patent-search/classification-standards-and-development>

U.S. Patent and Trademark Office, Terms of Use for USPTO websites, Copyright information, <https://www.uspto.gov/terms-use-uspto-websites>

35 U.S. Code § 101. Inventions patentable

U.S. Const. article 1, section 8, clause 8

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