

International Open Public Digital Library (IOPDL): A Proposal for the Future

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Abstract

In the digital age, information access through digital libraries is limited by factors relating to geography, authorization, cost, copyright, and quality and quantity of collections. Addressing the limitations, the International Open Public Digital Library (IOPDL) by federation approach strategy is proposed for the future. It is an *open public* digital library for the world public to be able to access digital resources all around the world for free or with at least restrictions as a nonprofit organization. IOPDL will consist of a set of cooperating Well-Designed Digital Libraries (WDDLs) respecting their autonomy, and a set of newly published collections all over the world in many subject areas. WDDLs are selected by evaluations with respect to their collection quality, usability, and performance. And it will provide a uniform interface and an integrated search engine achieving interoperability among WDDLs using a Common Terminology to share their collections. Building financial support model, one united organization to establish and manage IOPDL, and unifying language are also required for IOPDL. The discussed impacts of IOPDL in library and education fields are upgrading quality of the present digital libraries by evaluations; providing life-long learning opportunities for the public and for all ages of the world; and ultimately, realizing the human rights in accessing the common property of mankind, knowledge.

1. Introduction

According to Thomas Jefferson, “Knowledge is the common property of mankind” (Haslhofer & Klas). If so, how is mankind to access the common property? One answer, of course, is through libraries, knowledge repositories. According to the ALA’s 2013 report, 53% of Americans had visited a library or bookmobile in 12 months for activities such as browsing the shelves (73%), borrowing books (73%), and researching topics (54%) (ALA, 2013). Moreover, thanks to the Internet, mankind can also access the common property through websites. According to world internet usage and population statistics on June 30, 2012, 34.3% of the world’s population has Internet access. This rate actually has grown 566.4% between 2000 and 2012 (IWS, 2012). That is, in today’s digital era, people would like to access information, books, and other materials easily, not only in physical libraries, but also online via digital libraries.

A digital library, according to the International Federation of Library Associations and Institutions, is “an online collection of digital objects, of assured quality” (IFLA, 2013). A digital library allows materials to be more broadly, speedily and efficiently accessed through technology deployed to place them online (Levy, 2000). In the present, more than fifty national digital libraries exist in the world including Australia, Canada, and Colombia. The Netherlands, France, and Japan are digitizing their books or materials (Darnton, 2010). The Digital Public Library at America launched in 2013 as a representative library of America (DPLA, 2013).

However, information access through digital libraries is limited by factors relating to geography, authorization, cost, copyright, and quality and quantity of collections. Region and authorization limitations block users to borrow or hold resources between other place located libraries such as Champaign Public Library from/to New York Public Library. Academic publishers such as Springer and IEEE charge fees to access their publications. Google, the search and access center, is free. However, Google is a gateway to online resources, but not a digital library. The Google book search project attempted to create the largest digital library and book business, but it was prevented by copyright limitations (Darnton, 2011). Private digital libraries are also limited with respect to the quantity of their materials and the scope of their coverage.

Then, how can people access to the largest number of resources all over the world with the fewest limitations? A possible answer is an international public digital library that provides qualified and quantitative collections of many subject areas all over the world. It should provide at least limitation services, covering and connecting many national digital libraries all over the world. Nevertheless, there are a few international digital libraries today that have

still limitations. Addressing the limitations of the present international digital libraries, the International Open Public Digital Library (IOPDL) is proposed for the future. To establish it, the federation approach strategy is compared with monopoly. Five requirements that are necessary to establish it are suggested and explained. When it is established, the significant impacts of IOPDL in library and education fields are lastly discussed in the paper.

1.1. International Digital Libraries Today and Challenges

Today, there are a few international digital libraries, but they have still limitations. Europeana provides “a single, direct and multilingual access to the European cultural heritage” from more than forty national digital libraries in Europe (Europeana, 2007). But, it has a scope limitation by Europe cultural heritage. The scope of International Children’s Digital Library includes children’s books from all over the world (ICDL). But, it has an audience limitation to serve only children and parents. The World Digital Library may serve people of all ages, but their collection scope is limited to “culturally significant” content. Also the collection currently has only 8238 items with quantity limitation (WDL).

That is, to date, there is no worldwide international public digital library which presents a solution of above pointed limitations: region, audience, fee, copyright, and quantity and quality limitations. Therefore, we need an international public digital library for the future so that all ages of the world can access it anytime and anywhere at free charge with at least limitations. It should provide massive quality materials of all over the world in many subject areas. Although many people of the world agree with needs of the international public digital library, some challenges have delayed to establish it.

The first challenge to establish an international public digital library is fixed social conventions. Building an international digital library may be impossible. Cooperation with many countries with one accord may not be possible. A political agreement at the nation level may be the only way to build it. How many countries do cooperate to establish it? Eventually, overcoming fear of fail before even starting is a big challenge. Second, which national libraries can participate? How can we select quality national digital libraries all over the world for the inclusion to keep high quality collections? Third, how can we achieve interoperability among different languages and metadata standards for an integrated searching? How to design powerful search and retrieval tools maximizing interoperability? Fourth, how can it be a nonprofit organization for the public all over the world? Who will fund or sponsor it? Who will develop economic models to support creating, archiving, maintaining, migrating, backup, and preserving the digital resources of digital libraries? (LC) Fifth, which organization will be in charge the processing of establishing and managing it? Who will develop technology to digitize all over the world analog materials reducing damage? (LC) Sixth, how to and who will establish protocols and standards to assemble

distributed national digital libraries respecting privacy and copyright but providing broad access? (LC). Seventh, how to or who will address legal rights such as copyrights, publicity, and privacy associated with sharing or providing access, copying, and distribution digital materials? (LC) Solving these challenges, which way can we establish it, monopoly or federation way?

1.2. Monopoly or Federation

To realize an international public digital library, two ways, monopoly and federation, are discussed. The first way is to create a new digital library that collects huge resources of many subject areas. It uses a unified metadata format, and has its own policy and laws. For example, the Library of Congress and each national digital library in the U.S. were created by collecting high quality specialized materials with own policies. But, if we establish an international digital library by this way, the problem becomes some different issues by needs of a huge funding, time, and effort. In technical side, it looks straightforward to build it with own laws and policies. But, it seems impossible, because a bulk of huge quantity and quality resources in the world cannot be possessed by a system of one digital library. In social side, it may discourage that existing digital libraries have been developing. Also, although many countries may agree with building one digital library, they may not welcome a monopoly library of the world as Google book search case failed (Picker, 2011).

The second way is federation approach strategy based on the future national digital library that the Library of Congress presented (LC). The future national digital library should be “much more than a universal union catalog,” and “a set of distributed repositories of managed content and a set of interfaces to that content” (LC). This way may be built by the distributed well-designed (national) digital libraries (WDDLs) of the world. That is, it will have a set of links for the distributed WDDLs of the world with a unified interface. WDDLs are the digital libraries that provide uniquely high quality collections in a subject area(s) as well as providing high quality services of usability and performance. WDDLs are defined by usability, performance, and content evaluations in their subject domains. This way will reduce a lot of funding, time and effort by sharing high quality infrastructures of WDDLs. This way solves copyright and digitizing challenges, because WDDLs take care of these with their autonomy as they have been doing. In technical side, the degree of success may depend on how much cooperation is achieved among WDDLs, how much centralizing is achieved, and how much interoperability is achieved among WDDLs. In social side, this way will encourage significantly existing WDDLs to develop their unique subject areas. This way can provide much plentiful quantity and quality collections all over the world. On top of that, many countries of the world may attend and cooperate to work together for the public of the world.

2. The proposed International Open Public Digital Library (IOPDL)

Is there any way to take good things from two ways in building an international public digital library? Using mainly the second way, the International Open Public Digital Library is proposed. This is to save a big fund, time and effort, and to take notable advantages by cooperating with WDDLs. Also, it uses the first way to collect new published materials all over the world. It is named as ‘**International Open Public Digital Library (IOPDL)**.’ In this context, ‘*open*’ means no limitations relating to geography, time, cost, authorization, and quality and quantity of collections. It is *open* to everybody all over the world. It is *open* for the purpose of research, education, pleasure, etc. Also, ‘*public*’ means not only ordinary people but also all age’s people all over the world. Thus, the International Open Public Digital Library is an *open public* digital library for the public to access digital resources all around the world for free or with at least restrictions as a nonprofit organization.

2.1. The purpose and Mission

The purpose and mission of the proposed International Open Public Digital Library (IOPDL) is for the public of the world to access any digital resources for education, pleasure, or research, anywhere and anytime with as few limitations as possible. Moreover, IOPDL is for the disabled to access any resources of the world (e.g. books, CD, DVD, images, educational games, etc.) without any limitations to enlarge their educational opportunities at home, school, or elsewhere anytime.

2.2. IOPDL Structure

As Figure 1 shows, the proposed IOPDL structure will consist of a set of cooperating WDDLs and a set of newly published collections all over the world in many subject areas. And it will provide a uniform interface and an integrated search engine. The proposed IOPDL is, ultimately, like the structure of the U.S. federation. As each state runs with its own state laws and administrative policies, each WDDL runs still with its own laws, administrative policies, and metadata standards. However, as the government of the U.S. governs states using national laws and policies, IOPDL will collaborate with WDDLs with its own international laws and policies. Also, it will achieve metadata interoperability among WDDLs using a Common Terminology (CT) at schema, schema language, record, and repository metadata model levels (JinBoaz, 2014). Moreover, as the U.S. government governs fifty states, a united organization for IOPDL will administrate WDDLs with the policies of IOPDL. The organization may consist of leaders of WDDLs or cooperating governments all over the world.

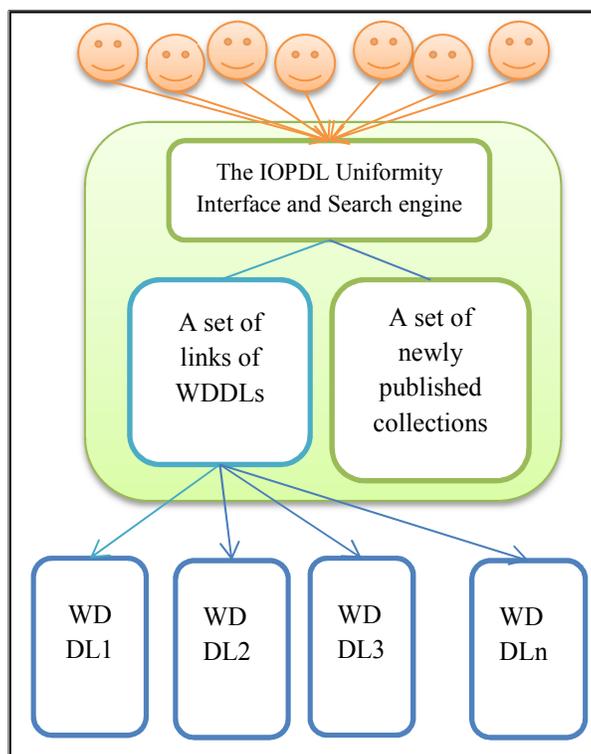


Figure1. IOPDL Structure Model

3. The Requirements

To realize the mission establishing the proposed IOPDL, five core requirements are required to solve above described challenges:

- the General Requirement: evaluating existing digital libraries to select WDDLs;
- the Technological Requirement: achieving interoperability among WDDLs using a Common Terminology to share their collections;
- the Financial Requirement: building financial support model as a non-profit organization;
- One United Organization Requirement: establishing and managing IOPDL, and
- Unifying Languages: sharing collections of multiple languages all over the world

3.1. The General Requirement - Evaluating existing digital libraries

First of all, since WDDLs are defined by evaluations, evaluations and analyses for existing digital libraries are required to select WDDLs. Through evaluations, qualified digital libraries will be considered as well-designed digital libraries, in various subject areas (e.g. science, art, technology, history, medicine, education, etc.). Evaluation tools and methods were investigated and developed. The paper, “Evaluating Existing Digital Libraries with the Suggested Criteria: Content, Usability, and Performance Evaluation Criteria” discusses the

purposes of evaluations, used criteria and methods in the evaluations, the evaluation results and analyses, and the final list of WDDLs.

For the general requirement, a prototype evaluation was conducted in 2010 at Graduate School of Library and Information Science (GSLIS) in University of Illinois at Urbana-Champaign (UIUC). Mainly three evaluations (content quality, usability, and performance) are conducted to assess sixty three digital libraries. It was done with seven sub-criteria of main three criteria: Content, Usability (accessibility, convenience, interfaces' consistency, and visual design and aesthetic appeal criteria), and Performance (response time and relevance). The Content quality evaluation was done by heuristic method and survey. Through the evaluation, sixty three digital libraries recommended as the candidates of WDDLs in fifteen subject areas (based on the Library of Congress Classification). They mostly locate in the U.S. and few other countries (e.g., UK, China, etc.). The usability evaluation is done by heuristic method with four detail criteria: accessibility, convenience, interfaces' consistency, and visual design and aesthetic appeal criteria. The candidate of WDDLs shows generally good usability so that users can easily use their websites. For the performance evaluation, their response and retrieval time, and relevance are evaluated by simulation programs. The results show the candidate shows generally weak relevance, but geography and military science subject areas show good response time and relevance. Finally, thirty four out of sixty three digital libraries turned out as WDDLs such as NASA's Visible Earth, Census Atlas of the United States, U.S. Department of Health & Human Services, International children's Digital Library, Southeast Asia Digital Library (SADL), British Library Online Gallery, etc. (JinBoaz). The selected WDDLs will achieve wide recognition as one of the best digital libraries in the world in their subject areas. They will honor to provide their qualified collections for the world. On the other hand, through the evaluations, many problems of existing digital libraries are found. The problems will encourage their developments. The prototype demonstrates a certain way to evaluate the national digital libraries of the world to select WDDLs all over the world.

3.2. The Technological Requirement – to Achieve Interoperability among WDDLs

Mainly, the suggested method for IOPDL is to respect WDDLs' autonomy in managing their collections, metadata, copyright, etc., and in digitizing analog materials reducing damage. To assure their autonomy, IOPDL will provide only their links. Through the results of the integrated searching, their links will be provided so that users can access directly to WDDLs or IOPDL databases that possess the retrieved related items. While IOPDL ensures autonomy of WDDLs, they have responsibility about copyrights, updating their metadata, and improving their collections' quality.

Although they have autonomy, second, it is essential to share specialized collections of the selected WDDLs for IOPDL. For the integrated searching and sharing their collections,

achieving interoperability is necessary. A main problem in achieving interoperability is using diverse metadata standards according to each community needs. Their standards' different degrees of generality or specificity make hard to achieve interoperability. It causes loss of information at all metadata model levels (e.g., schema, schema language, record, and repository). As a possible solution, the Common Terminology (CT) is suggested that allows WDDLs to use their own standards but providing uniformity to searching (JinBoaz, 2014). It improves interoperability and enhances searching performance retrieving resources effectively and efficiently with uniformity. It will be one of policies of IOPDL to achieve interoperability among WDDLs in sharing their collections.

The paper, "The Abstract Model and Roles of Common Terminology to Improve Metadata Interoperability with Case Studies" discusses the concept and abstract model of the CT. The Common Terminology is defined as a set of Common Terms. The Common Terminology of widely used but some different degrees metadata schemas (e.g., MARC, MODS, and DC & QDC) has developed. The performance of the CT in achieving and improving metadata interoperability is discussed through empirical evaluations with Harvard (MARC), MIT (QDC), and UIUC (MARCXML) metadata records by cooperation of three universities in the USA (JinBoaz, 2014). As a result of mapping experiments, the lexical matching rate is 93% in MIT (QDC) to the CT mapping experiment with the developed conversion and crosswalks. It is very high mapping rate reducing the gap of different degrees' standards and minimizing loss of information (JinBoaz, 2014).

To develop an integrated search engine for IOPDL, a prototype is planned to build an integrated search engine of Harvard, MIT and UIUC. It will be developed by Linked Open Data (LOD) and CT union catalog that will be conducted. These works will be based on the conceptualized CT in SKOS with URIs. The prototype will show the way to improve interoperability among three universities' libraries that use different standards (JinBoaz, 2014). It will also give a certain solution to achieve and improve metadata interoperability with the CT among WDDLs at repository level.

3.3. The Financial Requirement - Financial Support Model

Third, the requirement for financial aid is just as significant as need for cooperation among the selected WDDLs. The suggested method for financial aid is that IOPDL is supported by every state and the governments of participating countries. Amount of contribution may be different based on finance status of each state or government, and contribution degrees to WDDLs. No matter how, it is essential that all states and governments of the world participate in financial aid for the public utility. It will be one of the best ways to make use of budget for the public all over the world. Moreover, contributions of foundations and

government agencies, and organizations or individuals will play important roles to establish and maintain the world property, IOPDL.

During the first period of establishment, it is required for IOPDL to be supported. However, once IOPDL is founded, IOPDL can be operated by itself, or with very small amount of support from governments of the nations and states. How can IOPDL be operated by itself after the first period? The suggested method is related for patrons to access new published materials or rare materials. Almost resources of IOPDL are for free for any purposes. But, minimum fees will be charged as rental fees to patrons who want to access and download new published resources of IOPDL or WDDLs. It is similar with that public libraries charge rental fees for new items. Those fees will be reused to manage IOPDL, and to purchase new object materials. Moreover, rare resources and historically important resources treated carefully for preservation are limited for general users to access and download. Few fees will be charged for special users to access them. Those fees will be reused to preserve and expand rare resources. Lastly, late penalty of resources will be one of main sources to make finance support up. Constant fund, contributions and supports of the participating governments make IOPDL strong to serve people's rights in accessing their common property all over the world for education, research, or pleasure.

3.4. The Requirement of One United Organization

Lastly, above three requirements (general, technological, and financial requirements) should be governed by a united organization. The united organization may be managed by a union of WDDLs or governments of participating countries. The united organization may consist of leaders of WDDLs or participating governments. The organization must be established to be in charge of the follows:

To Fulfill General requirement

- to evaluate national digital libraries all over the world to decide which digital libraries can be WDDLs of the world in many subject areas;
- to develop evaluation tools and methods; and
- to encourage and mediate collaboration with WDDLs, states, and countries;

To Fulfill Technological requirement

- to achieve and improve interoperability among the selected WDDLs;
- to develop technology to conduct the CT union catalog, and Linked Open Data with conversions and pulled metadata of WDDLs; and
- to develop technology to design powerful search and retrieval tools maximizing interoperability;

To Fulfill Financial Requirement

- to develop economic models, and to govern financial supports of states and participating governments, and contributions of individual or organizations;
- to support creating, archiving, maintaining, migrating, backup, and preserving the digital resources of IOPDL; and
- to keep the non-profit purposes, and to provide the best service for the public all over the world.

To Fulfil Unifying Language Requirement

- to address legal rights such as copyrights, publicity, and privacy associated with sharing or providing access, copying, and distribution digital materials (LC);
- to establish protocols and standards to assemble WDDLs respecting privacy and copyright but providing broad access (LC); and
- to encourage for WDDLs to provide their metadata with a common language, English.

3.5. Unifying Languages

The most challenge in sharing collections all over the world is multiple languages used in collections of nations' digital libraries. Multiple languages have obstructed to share and understand each other countries' cultures and their societies. According to Sapir, "language is a purely human and non-instinctive method of communicating ideas, emotions and desires by means of a system of voluntarily produced symbols" (Sapir, 1921). Using different symbols in different countries block communicating ideas and sharing their collections. Thus, unifying languages in IOPDL is suggested to share globally collections.

One of practical ways to unify language, first of all, WDDLs of the world is to provide metadata described by a unified common language of the world. These metadata can be converted into the CT with the same unified common language and saved in a metadata repository as the CT union catalog. A unified common language may be English, because it is the common language of the world nowadays. Providing metadata content described by English will be the first step to unify languages so that the world can share their collections regardless using different languages. And it will enhance efficiency and effectiveness of the integrated search engine of IOPDL.

4. The Impact of IOPDL

Once IOPDL is established, ultimately, it will impact significantly in library and education fields. First, it encourages WDDLs to develop and improve their specialized domains in order to provide better quality of collections, usability and performance. That is to say, it will upgrade generally quality of the present digital libraries. Second, it can provide life-long learning opportunities for the public and for all ages with rich resources all over the world. It will play a noteworthy role as a learning center with cutting-edge technologies no matter where people live and when they access resources. Third, it will realize the human rights in accessing the common property of mankind, knowledge, as an international public digital library of the world. Lastly, it will give meaningful opportunities for many countries to work together with one accord.

5. Conclusion

For the future, the International Open Public Digital Library (IOPDL) is proposed. It is for the public all over the world to be able to access any information for free or with few limitations. To establish it, the suggested method is existing Well-Designed Digital Libraries (WDDLs) will collaborate and consist of it. WDDLs should provide high quality collections in their subject domains, usability and performance as well. IOPDL will provide links for WDDLs respecting their autonomy, and will possess its own collections for new published materials and rare materials. IOPDL will provide a uniform interface and searching interfaces achieving and improving efficiently interoperability using the suggested Common Terminology (CT).

The impact of IOPDL for the future cannot estimate. It will overcome the limitations of physical and digital libraries, and education fields. It will be opened to everybody who thirsty in knowledge without region, time, and cost restrictions. It is time to go forward overcoming the fear of uncertain invisible future, and start the good work for the world to improve quality of life anywhere and anytime through IOPDL.

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