The Impact of an Ontological Knowledge Representation on Information Retrieval: An Evaluation Study of OCLC's FRBR-Based FictionFinder

정보검색에 온톨로지 지식 표현이 미치는 영향에 대한 연구: OCLC의 FRBR기반 FictionFinder의 평가를 중심으로

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ABSTRACT

With the purpose of enriching existing catalogues with FRBR, which is the Functional Requirements for Bibliographic Records, in mind, this paper aims to evaluate the impact of bibliographic ontology on the overall system's performance in the field of literature. In doing this, OCLC's FictionFinder (http://fictionfinder.oclc.org) was selected and qualitatively evaluated. In this study 40 university seniors evaluated the following three aspects using the 'transferring thoughts onto paper method': 1) In which ways is this FRBR-aware bibliographical ontology helpful? 2) Are the things which are initially attempted to be helped being helped? 3) Would users seeking one work in particular also see all other related works? In conclusion, this study revealed that, as Cutter claimed in his 2nd rule of the library, collocations give added-value to the users and overall ontology provides better interface and usefulness. It also revealed that a system's evaluation with qualitative methodology helped to build full pictures of the system and to grip the information needs of the users when the system is developed. Qualitative evaluations, therefore, could be used as indicators for the evaluation of any information retrieval systems.

초 록

이 연구의 목적은 문학 분야의 서지적 온톨로지인 OCLC의 FictionFinder(http://fictionfinder.oclc.org)를 질적으로 평가하려는 것이다. FictionFinder는 FRBR모델을 기반으로 기존 목록의 질을 향상시켜 더 많은 가치를 부가하기 위해서 만든 모델인데, 이에 이것이 실제로 전반적인 검색 시스템 성능에 어떻게 영향을 끼치는 가를 평가한 것이다. 이를 위하여 40명의 대학교 4학년 학생이 '생각을 종이에 적기 방법'을 이용하여 다음과 같은 세가지 면을 평가하였다. 어떻게 이 온톨로지가 도움이 되었는가? 처음에 도움이 되리라고 생각되었던 것들이 실제로 도움이 되던가? 어떤 한 군데를 보던 이용자들이 실제로 관련이 되는 다른 곳으로 이동해서 보던가? 그 결과 온틀로지 기반의 정보검색은 Cutter의 두 번째 원칙대로 의미 있게 묶어서 보여주니 이용자에게 부가가치를 주었으며 인터페이스의 유용성과 사용성을 높여주는 것으로 밝혀졌다. 또한 질적인 방법에 의한 시스템 평가는 시스템 개발 시 전체적인 그림 구축과 이용자의 요구 파악하는데 유용함을 알 수 있었다. 따라서 질적 평가도 정보검색시스템의 평가지표로서 활용될 수도 있을 것으로 본다.

Keywords: information needs, user interface, FRBR model, ontology, bibliographic ontology, qualitative evaluation, FictionFinder
정보요구, 이용자 인터페이스, FRBR모델, 온톨로지, 질적평가

1. Introduction

It seems apparent that a majority of library users don't already know what they are searching for or where to find it when they start searching an index in printed or electronic form. In addition, they aren't eager to practice complex searching techniques that even librarians spend years acquiring. In this respect, scholars like Belkin et al (1980), Dervin (1983), Bates (1986), Taylor (1986) proposed newer perspectives on system design to ensure maximum value to the users. All of them, in one way or another, expressed the user's difficulties in getting what he or she wanted to find from the system involved. The users simply couldn't articulate what they needed in system terms. The general systems are too rigid. But, what if some additional values or some information tags or some relationships are added to the existing system to reveal what is being ignored and hidden in the name of cataloguing in traditional MARC based systems?

Current cataloguing systems based on mostly MARC have 'wonderful' elements to represent bibliographic records for the people. The record and the data are, however, actually presented in such a way that it can only be understood by the human mind and eye, particularly to the specialist's trained eye (Henga, 2004). The designers thought that they fully accommodated something for the users to interact with the system, but actually this didn't happen as they expected. MARC has only accelerated the retrieval speed compared to the tradi-

tional card system. The current MARC system just gives one big chunk of information according to its title, or author. That's not enough, it's too mechanistic. On top of the current system's rigidity, some better representation should be added for the users' navigation. For this purpose, the idea of 'collocation' has been picked up by the Library of Congress and OCLC.

The point is that the potential was there but no computer system tried to translate human information seeking behavior into an IR system. But after the advent of the system which emphasizes the 'meaning' and the 'relation' aspects of the system, the situation has begun to change. Today's seekers of information have more sophisticated expectations and needs and cataloging systems must be able to meet them to remain viable and competitive.

Suppose the traditional MARC is layered into 4 distinct entities, having its own attributes, and these entities and all attributes are interrelated according to a conceptual model provided, namely the FRBR model, then it would retrieve the results never even thought of. Actually, it is difficult and almost impossible for a computer to identify the entities and relationships in a traditional MARC-based record. In fact, MARC is limited in describing the dynamic nature of information resources because of its rigid and single-layered linear structure. Traditionally, bibliographic and authority records in most catalogs represent discreet manifestations of works or describe author and corporate entities. Each record, in other words, describes a single

piece of information. It is unclear, however, how the information in one cataloging record connects to or relates to information in other records. In this sense, most library catalogs are flat, with each record representing a single feature of the bibliographic landscape. FRBR, on the other hand, describes a conceptual model that shifts the bibliographical focus from the single item or object to the broader, more inclusive context of a work. As a result, the bibliographic landscape assumes new depth, breadth, and order, suggesting that the information universe is more multi-dimensional and organized than it appears to be in traditional catalogs.

After realizing the power of Entity-Relationship Model in Relational Database Systems, the idea to collocate records, Cutter's 2nd principle for libraries, has been picked up by the International Federation of Library Associations and Institutions (IFLA). FRBR (Functional Requirements for Bibliographic Records) is a 1998 recommendation of the International Federation of Library Associations and Institutions to restructure catalog databases to reflect the conceptual structure of information resources. More technically, FRBR uses an entity-relationship model of metadata for information objects, instead of the single flat record conceptualization underlying current cataloging standards. If fully implemented, FRBR would produce the biggest change cataloging has seen in the last century. In traditional cataloging, bibliographic units are described out of context. With FRBR the items must be described in context in a manner

sufficient to relate the item to the other items comprising the work. A single search would retrieve all related materials even if cataloged in different languages or different subject headings.

The information explosion of recent years, evident not only in volume but also in an ever growing variety of formats, the expectation of global access to information, and the development of international bibliographic cooperatives, such as OCLC, have motivated librarians to find simpler ways to organize and describe materials for inclusion in bibliographic databases and library catalogs.

The goal is to facilitate the discovery of information resources for the student and researcher by bringing together under one record what is essentially the same intellectual or artistic content represented in different versions, editions, or media, so that the user can easily see what is available and choose what he or she wants.

With all of these, the FRBR glasses are made. FRBR entities, of which there are ten, are divided into three groups: the first group is product entities: works, expressions of the works, manifestations of the expressions, and finally items of the manifestations. Works and expressions are abstract. Manifestations and items relate to physical publications. Next are the responsibility entities: persons and corporate bodies. The last group is subject entities: concepts, places, events and objects. The entities are described through the attributes they have. Some examples: a person has a name and birth date; a work has a title; a manifestation has a date of publication and an identification

number (e.g. ISBN); an item (copy) has a call number. There are, of course, several more attributes than those mentioned here.

As explained in "What is FRBR?" published by the Library of Congress (2004), it has four related user tasks: "So what are these FRBR user tasks? Briefly, they are find, identify, select, and obtain. 'Find' involves meeting a user's search criteria through an attribute or a relationship of an entity. This can be seen to combine both the traditional "find" and "collocate" objectives of a catalog. 'Identify' enables a user to confirm they have found what they were looking for, distinguishing among similar resources. 'Select' involves meeting a user's requirements with respect to content, physical format, etc., or rejecting an entity that doesn't meet the user's needs. 'Obtain' enables a user to acquire an entity through purchase, loan, etc., or electronic remote access."

One would start by finding a work, then identify a work by looking at a list of expressions of the work, and finally, from a list of all manifestations in the system, indicate that any of them would be fine. The system would locate a particular item on its own and arrange for it to be shipped.

Soergel (2000) enumerates the ways that we organise and represent knowledge in curricula, learning environments, and information and knowledge management systems known as ontologies. Ontologies are meant to reflect the types of knowledge being represented in the system. The most commonly used ontologies reflect ontological knowledge types (declarative, structural, and conceptual knowledge) in hierarchical lists of subject matter topics. Ontologies may also reflect epistemological knowledge types (procedural, situational, and strategic knowledge) based on how processes are performed or phenomenological knowledge types (tacit, compiled, socio-cultural and experiential knowledge) based on human experiences.

He further discusses how ontological representations describe knowing that, while epistemological representations describe knowing how. Epistemology is the division of philosophy that investigates the nature and origin of knowledge. Poli (1996) contrasted the tools of ontology and epistemology for knowledge organization, suggesting that while ontology represents the "objective" side of reality, epistemology represents the "subjective" side. Ontology ("being") provides a general objective framework within which knowledge may be organized, while epistemology ("knowing") allows for the perception of the knowledge and its subjective role. The fictionfinder to be evaluated in this study is certainly ontology in nature, focusing on the fiction area.

The library cooperative OCLC has also worked with FRBR-based analyses of their database in order to develop a FRBR work-set algorithm that automatically clusters catalog records at the work level. This is used in their Open WorldCat <www.worldcat.org> and Fictionfinder interfaces to condense all the versions of a given work, such as Harry Potter and the Deathly Hallows, into a single initial display.

FictionFinder is an interface that supports searching and faceted browsing of fiction works in worldcat; algorithm about most purchased books by library dictates display order, faceted browse by work; created special indexes (fictitious character, literary form…). It depends for its success on the delivery of improved functionality and services (Vizine-Goetz, 2007).

With the purpose of enriching existing catalogues with FRBR in mind, this paper aims to evaluate the impact of bibliographic ontology on the overall system's performance in the field of literature. In doing this, OCLC's Fictionfinder (http://fictionfinder.oclc.org) was selected and qualitatively evaluated.

2. Literature Review

Jeng (2004) evaluated metadata usefulness in the field of moving image collections, involving two online surveys. This study uncovers what metadata fields are useful in different stages of information retrieval. Subject Headings is ranked the most useful field to 'Find' an item, Title is the most useful field to 'Identify' an item, Access Restriction is the most useful field to 'Select' and to 'Obtain' an item. This study found what information is "enough" for each of the user tasks.

Lee and Jacob (2007) did a study on the construction of a conceptual structure as a mediator between MARC and FRBR. They argue that both MARC and FRBR are faced with problems in de-

scribing information resources. MARC is limited in describing the dynamic nature of information resources because of its rigid and single-layered linear structure. FRBR does not provide sufficient descriptive elements to fully represent bibliographic entities, although it can support the representation of multi-layered characteristics of information resources. This research has constructed a conceptual structure that can connect between the heterogeneous systems of MARC and FRBR to make up for these weaknesses.

Pisanski and Žumer (2007) did a comparative study between FictionFinder and LibraryLabs. FictionFinder focuses almost exclusively on the concept of a work, while the LibraryLabs prototype applies an FRBR-like structure only as part of a larger group of experiments. Neither of the prototypes fully follows FRBR, owing to issues associated with current cataloguing practice and the model itself. These barriers also cause some practical shortcomings for these prototypes, however new results displays clearly enhance the user experience.

3. Research Methodology

The purpose of this study is to investigate whether an FRBR model really represents a user-centric model. By putting on the FRBR glasses, how does an FRBR-based bibliographic ontology facilitate users' information seeking behavior, proposed by IFLA, namely Find, Identify, Select and Obtain? The catalog could be being rethought in light of

FRBR, asking "Do people want to see clusters rather than long lists?"

3.1 Research Questions

With this purpose in mind, this study has three research questions as follows:

1) In which ways is this FRBR-aware bibliographical ontology helpful?

2) Are the things which are initially attempted to be helped being helped?

3) Would users seeking one work in particular also see all other related works? In other words, would collocations happen as might be expected? Are related works really connected?

3.2 Research Design

3.2.1 Qualitative evaluation

Evaluation is the analysis and comparison of actual progress vs. prior plans, oriented toward improving plans for future implementation. It is part of a continuing management process consisting of planning, implementing, and evaluating, ideally with each following the other in a continuous cycle until successful completion of the activity. Qualitative evaluation is an assessment process that answers the question, "How well did we do?" or "How well did the system perform?"

3.2.2 Philosophical rationale

The motivation for doing qualitative research,

as opposed to quantitative research, comes from the observation that, if there is one thing which distinguishes humans from the natural world, it is our ability to talk and to write. Qualitative research methods are designed to help researchers understand people and the social and cultural contexts within which they live. Kaplan and Maxwell (1994) argue that the goal of understanding a phenomenon from the point of view of the participants and its particular social and institutional context is largely lost when textual data are quantified.

For that purpose, phenomenology as performing qualitative research is widely used. Phenomenology is the study of apparent phenomena, as opposed to objective phenomena. For this study, what was important was each individual's perception of the phenomena at hand; that is, how do the participants feel about this bibliographic ontology, fictionfinder? Phenomenologists tend to emphpasizes subjective inner thought and oppose naturalism (also called objectivism and positivism), which is the worldview growing from modern natural science and technology.

Everything what we understand appears in experience. Thus, no phenomena could happen without any sort of experience. So, the purpose of the phenomenology is the quest for the generalizable experience; possibly the experience from deep, inner, thoughts in essence. But this phenomenology might have some limitations of unconscious bias. Siemens (2004) bolsters the idea that experience has long been considered the best teacher of knowledge. Since we cannot experience every-

thing, other people's experiences, and hence other people, become the surrogate for knowledge. 'I store my knowledge in my friends' is an axiom for collecting knowledge through collecting people.

3.2.3 Transferring thoughts onto paper method

Think-Aloud Method (TAM) is heavily used and its usefulness has been verified in general. This is a method used to gather data in usability testing in product design and development. This method involves participants thinking aloud as they are performing a set of specified tasks. Participants are asked to say whatever they are looking at, thinking, doing, and feeling, as they go about their task. Ericsson & Simon (1987) states a related but slightly different data-gathering method: the talk-aloud protocol. This involves participants only describing their action but not giving explanations. This method is thought to be more objective in that participants merely report how they go about completing a task rather than interpreting or justifying their actions. But in this paper, an alternative approach was used: asking the participants to write down what they thought during the search.

One of the rational behind this approach was that, for example, in mathematics, students might be asked to explain how they arrived at an answer. The students who just gave an answer might not have a good score; the teacher is only interested in the process the students used. Likewise, written responses in this study did work well for assessing chunks of knowledge that interrelate, rather than individual pieces of knowledge assessed separately.

On the 5th of April, 2008, a total of 40 respondents, university seniors, who major in library and information studies at Dongduk Women's university, Seoul, Korea were selected and asked to navigate in the fictionfinder bibliographic ontology for 30 minutes without any prior knowledge of this kind of bibliographical ontology system. This homogeneous sampling might reduce variation, simplify analysis and further easier to focus the problem at hand, but it thought to give information-rich results. They haven't got any classes on FRBR or any ontological system before. They were asked simply to browse and retrieve information in a free, unstructured manner. As university seniors, they do have some extensive online or internet information retrieval experiences. It is virtually impossible to get the respondents without any kind of retrieval experiences.

The only problem which might have been encountered was with the participants' state of English understanding, but their English was good enough to understand what's involved in the fictionfinder ontology. It could be a source of biases but apparently there was no problem in representing their thoughts in Korean writing.

Having finished the search, they were immediately asked to write down their thinking about that ontology they just manipulated without any time limit. The participants tracked their thinking as it evolved during navigating to get the overall results they wanted.

Some limitations of the study include a relatively small sampling size, rather obtrusive procedures, and lack of generalizability to groups or settings dissimilar from the one in this study.

4. Research Results

As described, qualitative research was employed to describe what is actually happening to the phenomena of an ontological knowledge representation, rather than formulating hypotheses and verifying them later by gathering and analyzing data. In this, no control was made to the natural phenomena; things were observed as they were. All of the writings of the participants were analyzed according to the processes prepared.

General strategies used for the analytic processes in this study are analytic induction, constant comparison, topological analysis, enumeration and standard observational protocols. To get a thorough and total understanding of the subject at hand, the resources gathered were classified, categorized and patterned.

An analysis was made to evaluate how well the system at hand performed. The following six major categories, some of which have sub categories, are identified and further analyzed:

4.1 Gives better Value

Fictionfinder let the users add value by serendipitous strolls, by exploiting the concept of aboutness. It also reduced anomalous state of knowledge by providing better browsing facility and finally provided a learning process.

4.1.1 Increased value by serendipitous strolls

It may be useful to explore the virtual space in a serendipitous way. The users make their own explorations in a serendipitous way. The following demonstrates this fact:

"I found resources I've never thought to look for."

"I never thought I would have encountered this."

"I love it when I discover useful features like this in a serendipitous way."

"I got related information I never intended to by chance."

"Who would have known the joy of finding information you never knew existed."

"It also fascinates me the way we sometimes find the most interesting information in a very serendipitous way."

"This makes it possible to enrich the relevant knowledge. I searched for Pearl Buck and from that I found 'The Good Earth' and then I found 'Letter from Peking'. From that I knew the settings for the place and the period. Also I found a different story from the same period. This serendipitous finding adds to my existing knowledge."

"I found the information I had in mind without seeking it through accidental, incidental or serendipitous discoveries."

4.1.2 Increase value by exploiting the concept of aboutness

In this, the concept of aboutness broadly characterizes what information content is talking about. For this purpose various metadata could be used to express the characteristics of the source data and describe the relationship among the resources used. This enables Concept Retrieval. The ability to see connections between fields, ideas, and concepts is a core skill. The following demonstrates this fact:

"Partial information gives better pictures than can be imagined."

"I was at a loss what to do when I first got into the unfamiliar system, but in this, with just one notion I could get what I wanted without any prior knowledge about it."

"I was surprised when I typed the name of one of the characters in the novel which I was interested in, without knowing the author or the title of the item. But when I typed 'Sophie,' I had "The Da Vinci Code," the item I was actually looking for."

"When I needed the "The Lord of The Rings", but I couldn't come up with the name of the author, I just typed 'ring' and the system brought up "The Lord of The Rings" as well as some others."

"It was better to retrieve by just giving some notions or ideas."

"Without any prior knowledge, this system provided as many access points as possible."

"Subject search was possible; it was rather like browsing books in the bookstore. Similar concepts are connected through grouping together."

"It grouped subjectively meaningful information."

4.1.3 Reduces anomalous state of knowledge by providing better browsing facility

In Belkin's (1980) terms, an improvement in the circular model might be defined as a gradual narrowing of the gap between an "anomalous state of knowledge" and a "stable state of knowledge" The subject clouds on the first page are very helpful when I can't decide what to ask for. The following supports this:

"I can start with the alphabetical browse by genre on the first page when I am unsure what to look for."

"In fact, I had to tolerate some ambiguity and "fuzziness" in formulating my query, but with the advent of this system, I could do it in a much better way."

"It is much easier when I have a subject cloud when I don't know what to do. Another thing I like is its various fonts, maybe according to the frequencies."

4.1.4 Provides a learning process

The capacity to form connections between sources of information, and thereby create useful in-

formation patterns, is required to learn in our knowledge economy (Simons, 2004). A learning process is provided to empower people to guide themselves through their personal learning and development journey. Decision-making is itself a learning process. Choosing what to learn and the meaning of incoming information is seen through the lens of a shifting reality. While there is a right answer now, it may be wrong tomorrow due to alterations in the information climate affecting the decision. The learning process mentioned above is mentioned in the following participants' comments.

"If I invested an hour, I could get more meaningful groupings with higher efficiency than I could by investing my time on learning chronicles of the novel without any zeal." Another useful comment is that

"I learned something. For example, I thought that the fantasy was just a recent work, but it was actually from 1800."

4.2 Provides better Interface and Interactivity

It provides better interface and interactivity, thus, it eliminates unnecessary traffic between the client and the server. Therefore, better system performance can be achieved. In doing this, three areas are briefly surfaced.

4.2.1 User centric

According to Wikipedia, in broad terms, user-centered design (UCD) is a design philosophy and a process in which the needs, wants, and limitations of the end user of an interface or document are given extensive attention at each stage of the design process. Four brief comments from the participants bolster this notion.

"First, it is possible for me to navigate according to my subjective situation and requirements."

"Second, this system satisfies me by providing as many access points as possible, from an individual user's point of view."

"Third, from the user's perspective, easy and convenient retrieving mechanisms were provided."

"Fourth, it gives advanced information from the user's point of view rather than the system designer's point of view."

4.2.2 Avoids redundant information

Redundant information is unneeded or duplicated information. Some systems do provide really unnecessary information. 'Unnecessary' here means that some elements which are useful for the librarians but are meaningless to most users. The following are participant's actual comments.

"Unlike other bibliographic retrieval systems, this one doesn't have any unnecessary wording which sometimes confuses me."

"It was good to see that things I don't understand were not revealed."

"I hate to see things I hate on the screen."

"It consists of really necessary stuff. It is not complicated, but tidy. It feels like something really smart. Thus it enhances our desire to retrieve."

"It seems that the system is prepared with the things which might be requested, according to the user's expectations."

4.3 Perceived Usefulness and Perceived Ease of Use:

Perceived usefulness is defined as the prospective user's subjective probability that using a specific application system will increase his or her job performance within an organizational context. Perceived ease of use refers to the degree to which the prospective user expects the target system to be free of effort (Doll, 1998). Ease of use refers to the property of a product or thing that a user can operate without having to overcome a steep learning curve. Things with high ease of use will be intuitive to the average user. Perceived usefulness and ease of use are meant to be fairly general determinants of user acceptance. Library users certainly want easy-to-use catalogs that are accessible on the Web.

4.3.1 Easy navigation / Easy to browse

"In interacting with the system, it is easier to locate where I am."

"It is easier to see the different languages of a single work. It's easier to find all related formats."

4.3.2 Simplicity

The goal is to simplify everything that users see or touch, and to make their experience easier and more rewarding in every aspect of their engagement.

4.3.3 Usefulness:

"It is easier to decide its relevancy."

"This one provides summary information from which I can decide its relevancy easily."

"It has an image with which I can guess its contents easily."

"This indicates the target audience. Thus it is useful to make sure that the information on the list is appropriate for my needs."

"I have been forced to use the title and the name of the author to find some relevant information, but this system allows me to use subject listing. It is convenient. I could go easily to the point where I wanted to go."

4.4 Gives a better Global Picture / Comprehensiveness

"Records were available in a greater array of formats."

"It was good to see various formats available on an item; book, video, and audio."

"It gives information on various versions of

a work by grouping them together."

"Grouping by types, background, languages, editions, subjects or characters really helped."

"It's good to see how many works are available; all related information is collocated."

"Genre, characters (real & fictional), settings (real & imaginary) and literary awards are also available. It helped me a lot."

"It richly indexes the data allowing searches on fictitious characters, settings, language, and so on, alongside the usual attributes like author and title."

"I am not surprised by the author, subject, title and subject, but I was really surprised by the information on settings and characters."

"It helps to get close to the resources that the users wanted by having them access related resources."

"I narrowed it down by language, and then browsed a list of manifestations, and look at detailed information about one."

"It gives detailed bibliographic information to choose from."

"It provides many perspectives and facets."

4.5 Better Functionality

This system is offering functionality to support better access to meet the various users' needs. Above all, the collocation function allows items to logically belong together, although they present themselves differently. For example, authority control enables a catalog to index all manifestations of a given book, including translations, together. The following demonstrates this.

"It has Boolean operators."

"I found an item in which I am interested by using the groups of related works."

"It felt like a really seamless connection of knowledge. I was always given as many paths as possible according to the situation I was in."

"I had criterion information I needed as well as some related information on hand."

"This was a very useful system. It provided many perspectives as well as diverse angles on a work."

"This system provides some useful points. Some information was grouped from a certain perspective. If it was scattered loosely, it wouldn't mean anything at all."

"On the way towards the target sources using some links, I found some other types of materials. Thus I was given more chances to get to the possible sources."

"It has better functionalities when we use extended results."

"It seems that retrieved works are ordered by the number of holdings. It's pushing the most widely-held material to the top - looks like a sort of popularity rating."

"It has the Date of Birth for the authors. This means some authority file is there to identify the same authors."

4.6 Better Delivery System:

Fictionfinder tried to give maximum value to the users, in that it tried to help advance data discovery by providing metadata of sufficient richness and quality. Click on an individual work and it aggregates the bibliographical data from all the editions in multiple libraries. They aggregate all the details from every participating library's catalogs. So the record for an item has rich information.

The following demonstrates this fact.

"I noticed the results I have had some facilities aggregating bibliographic data together from various remote sites. This definitely shows this is a decentralized system. Therefore it would be easy to get a call number in different libraries."

"This system gave me even Korean materials held in the USA. It's amazing."

5. Conclusions and Recommendations

In conclusion, this study revealed that, as Cutter claimed in his 2nd rule of the library, collocations and others give added-value to the users. What was being ignored and hidden in the name of cataloguing in traditional MARC based systems has surfaced. Fictionfinder let the users add value by serendipitous strolls. Users found the information

they had in mind, without seeking it, through accidental, incidental or serendipitous discoveries. It also reduced anomalous state of knowledge by providing better browsing facility and finally provided a learning process. It indeed provided a visible demonstration of how the FRBR model can facilitate the searching process. The steps defined by FRBR (Find, Identify, Select and Obtain) supports the actions of a user approaching a library catalog with a known item in mind. It is assumed and confirmed that the users are looking for the information they need from many perspectives and necessities. This extensibility would be much easier with better navigation facilities. The unique nature of searches where the target is unknown or undefined calls for new interface designs that help users. It seems that this system has some features in it, but they are not sufficient enough to cover exploratory search. Thus, more functionality could be developed in relation to this kind of user needs.

It clearly offers a clustering of records under works; it aggregates data from multiple records to create a fuller 'work' level record. Indeed, collocation was there but differentiation was rather hard. Although it has authority control by providing birth and/or death dates for the authors. It also provided better interface and interactivity, eliminating unnecessary traffic between the client and the server. Perceived usefulness and ease of use, which were there, are meant to be fairly general determinants of user acceptance. Library users certainly want easy-to-use catalogs that are accessible on the Web. This system is offering functionality to support

better access to meet the various users' needs. Above all, the aggregation function allows items to logically belong together, although they present themselves differently. For example, authority control enables a catalog to index all manifestations of a given book, including translations, together. Thus this system tried to give maximum value to the users, in that it tried to help advance data discovery by providing metadata of sufficient richness and quality. Click on an individual work and it aggregates the bibliographical data from all the editions in multiple libraries. They aggregate all the details from every participating library's catalogs. So the record for an item has rich information.

It also revealed that a system's evaluation with qualitative methodology helped to build full pictures of the system and to grip the information needs of the users when the system is developed. Qualitative evaluations, therefore, could be used as indicators for the evaluation of any information retrieval systems.

It of course has some areas where further improvements could be made from the user's point of view. This isn't intended to be comprehensive by any means. Features built into a search interface determine the ease with which users may formulate queries and obtain results. Well-designed search software enables the user to:

1) provide well-organized contextual facilitator at each stage of the search process, such as chronological displays, any recommender system, etc; 2) view an online thesaurus with a rich set of relationship types or use vocabulary mapping to identify appropriate search terms as in the <http://www.koreanhistory.or.kr>; 3) save results independent of the Web browser used. It would be useful to have a temporary information storage space where information found can be stored; 4) improve the entire data space allowing some ontological connections to happen.

Next, recommendations from the methodology point of view:

1) Although most researchers do either quantitative or qualitative research work, some researchers have suggested combining one or more research methods in the one study (called triangulation);

2) This study could be replicated in Think-Aloud Method or Talk-Aloud method.

The six areas identified here should be further researched with other statistical methods such as factor analysis in quantitative methods as well as some other qualitative methods employing CWA (Cognitive Work Analysis) methods. The last thing is some evaluation criteria made in this study. This could be used to develop indicators for the evaluation of any information retrieval system.

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