by Carol Collier Kuhlthau

The development of the information search process (ISP) as a conceptual framework is the result of more than two decades of research that began with a qualitative study of secondary school students and the emergence of an initial model that was verified and refined through quantitative and longitudinal methods with diverse library users and further developed in case studies of people in the workplace. From these findings a principle of uncertainty for information seeking emerged that states that information commonly increases uncertainty in the early stages of the search process. Increased uncertainty creates a zone of intervention for intermediaries and system designers. I have charted the progression and development of the ISP citing selected research reports from 1985 to 2006 with a short description of the significance of each piece, shown in Figure 1. In addition, three of my books are noted in this article that summarize my research and incorporate applications for practice.

As I look back on my work on the ISP I reflect on some important decisions along the way that sustained my research agenda and resulted in the development of a useful model of information-seeking behavior. Of course these were not readily apparent at the start. Rather they evolved and unfolded as part of an intriguing research journey. There are six approaches that I have taken in this work beginning with the first study in 1983 and continuing today:

- Start with a real problem
- Stay with the problem to verify and test the findings in variety of contexts
- Develop concepts from the findings
- Apply the framework of LIS
- Design applications for implementation
- Look to the future

Start with a Real Problem

My research into the user’s perspective of the process of information seeking began in the early 1980s with my experience with students as a secondary school librarian. I noticed a recurring problem. No matter how well students were oriented to the library and its resources or how bright they seemed, there was a common pattern of behavior when they came to the library for the first few days of their research. Students almost invariably became confused and anxious in the early stages of a research project, often expressing annoyance at the assignment, the library and themselves. This led to research that grounded the initial model of the ISP as a process of construction.

In my doctoral studies I was introduced to George Kelly’s personal construct theory in which he analyzes the experience of constructing meaning from new information. Information is assimilated in a series of phases, beginning with confusion. Confusion increases as inconsistencies and incompatibilities are confronted between the new information and the constructs the person already holds. As confusion mounts, it frequently causes doubt. The disruption caused by the new ideas may become so threatening that the new information is discarded and construction of new meaning is abandoned. At this point, Kelly proposes an alternative to move the process of construction along. The person may form a tentative hypothesis to move toward incorporating the new construct into the existing system of personally held constructs. I wondered whether from the user’s perspective information seeking is a process of construction as described in Kelly’s personal construct theory and whether what I was observing with my students was a natural phase in this process. This speculation was the research problem that got me started on my journey and is a problem that still fascinates me today.

In that initial study I found that students’ information seeking did indeed involve construction that was experienced as a series of stages with thoughts that
shifted from vague to clearer and feelings that changed from anxious to more confident as the search progressed. I charted the thoughts, actions and feelings in each stage. One of my data collection methods was a timeline in which students describe their thoughts, actions and feelings during a search. I adopted the timeline to display three layers of experience in each stage and to capture the sense of process.

The stages were named for the main task undertaken to move on to the next stage: task initiation, topic selection, focus exploration, focus formulation, information collection and search closure. The model incorporated thoughts, actions and feelings common to each stage.

FIGURE 1. Progression and Development of Kuhlthau’s Information Search Process

<table>
<thead>
<tr>
<th>Date</th>
<th>Title of Selected Research Reports</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>1989</td>
<td>The Information Search Process of High-, Middle-, and Low-Achieving High School Seniors. School Library Media Quarterly, 17 (4), 224-228.</td>
<td>Large scale examination of the ISP high school seniors</td>
</tr>
<tr>
<td>1997</td>
<td>Learning in Digital Libraries: An Information Search Process Approach. Library Trends, 45 (4), 707-723.</td>
<td>Information technology and the ISP; the problem of seeking meaning from abundance of information</td>
</tr>
<tr>
<td>2004</td>
<td>Meeting the Challenge of Intellectual Access: Vital roles for librarians. Margaret Mann Lecture, School of Information, University of Michigan.</td>
<td>ISP in the context of education and the workplace that indicate new roles for librarians</td>
</tr>
</tbody>
</table>
Stay with the Problem to Verify and Test in a Variety of Contexts

After I joined the Rutgers faculty I had many opportunities to look at a whole range of interesting research areas. But this problem kept coming back to my attention. Had my study uncovered a unique situation of construction in information seeking or was the experience more pervasive? Would I find similar patterns in the experience of other students and other library users? At that time I made what proved to be a good decision, to stay with the problem to investigate it further. While some people have questioned my decision to work on one idea, I felt that I was on to something, and I wanted to see it through to verify developing findings and to test in other contexts. At the time I had no idea it would take me so far in my understanding of information-seeking behavior.

By staying with the problem I was able to verify and refine the model in various contexts. The model was verified in longitudinal case studies and large-scale studies of diverse samples of library users. Further studies have examined the implementation of a process approach in education contexts and investigated the ISP in the workplace.

I used a combination of methods to gather data from users regarding their perspective of the process of information seeking. Longitudinal methods enabled me to view changes in the process. Each of my studies had a longitudinal component of data being gathered at more than one point in time. I carried this a bit far perhaps – with one case study that extended over 15 years. However, this approach provided comparative evidence that was critical for understanding change in the process of information seeking over time. I also used a combination of qualitative and quantitative methods that proved to be an important component of the research. Initially, I had used qualitative methods to open the process for examination. But when quantitative methods enabled verification of the initial model in a large sample of diverse users, I realized the power of using a combination of methodologies. I clearly remember the excitement of discovery when I first looked at the statistical report that showed similar patterns to those I had found earlier in the initial qualitative study. A combination of qualitative and quantitative methods has been an important aspect of this research further amplified by incorporating longitudinal components within it.

After this extensive research I was able to refine the model and expand it as a more general model of information-seeking behavior known as the information search process (ISP). The ISP presents a holistic view of information seeking from the user’s perspective in six stages: initiation, selection, exploration, formulation, collection and presentation. The six-stage model of the ISP incorporates three realms of experience: the affective (feelings), the cognitive (thoughts) and the physical (actions) common to each stage. The model of the ISP describes users’ experience in the process of information seeking as a series of thoughts, feelings and actions. Thoughts that begin as uncertain, vague and ambiguous become clearer, more focused and specific as the search progresses. Feelings of anxiety and doubt become more confident and certain. Through their actions people seek information relevant to the general topic in the beginning stages of the ISP and pertinent to the focused topic toward closure. Affective aspects such as uncertainty and confusion can influence relevance judgments as much as cognitive aspects, such as personal knowledge and information content.

Formulation of a focus or a personal perspective of the topic is the pivotal point in the ISP. At that point, feelings shift from uncertain to confident; thoughts change from vague to clear and interest increases. The ISP describes common experiences in the process of information seeking for a complex task that has a discrete beginning and ending and that requires construction and learning to be accomplished. The model reveals a process in which a person is seeking meaning in the course of seeking information. From the user’s perspective the primary objective of information seeking is to accomplish the task that initiated the search, not merely the collection of information as an end in itself. The ISP describes a type of seeking information aimed at accomplishing a complex task within a period of time.

Model of the ISP

As I have said, the model of the ISP is articulated in a holistic view of information seeking from the user’s perspective in six stages. They are defined as follows:

- **Initiation**, when a person first becomes aware of a lack of knowledge or understanding and feelings of uncertainty and apprehension are common.
- **Selection**, when a general area, topic or problem is identified and initial uncertainty often gives way to a brief sense of optimism and a readiness to begin the search.
- **Exploration**, when inconsistent, incompatible information is encountered and uncertainty, confusion and doubt frequently increase and people find themselves “in the dip” of confidence.
**KUHLTHAU, continued**

**FIGURE 2. Model of the Information Search Process**

<table>
<thead>
<tr>
<th>Feelings (Affective)</th>
<th>Initiation</th>
<th>Selection</th>
<th>Exploration</th>
<th>Formulation</th>
<th>Collection</th>
<th>Presentation</th>
<th>Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Uncertainty</td>
<td>Optimism</td>
<td>Confusion</td>
<td>Frustration</td>
<td>Clarity</td>
<td>Sense of</td>
<td>Satisfaction or Disappointment</td>
<td>Sense of accomplishment</td>
</tr>
<tr>
<td>Thoughts (Cognitive)</td>
<td>vague</td>
<td>focused</td>
<td></td>
<td></td>
<td>Increased</td>
<td>Interest</td>
<td>Increased self-awareness</td>
</tr>
<tr>
<td>Actions (Physical)</td>
<td>Seeking</td>
<td>relevant information seeking</td>
<td>pertinent information</td>
<td>Documenting</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Exploring</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

- **Formulation**, when a focused perspective is formed and uncertainty diminishes as confidence begins to increase.
- **Collection**, when information pertinent to the focused perspective is gathered and uncertainty subsides as interest and involvement deepen.
- **Presentation**, when the search is completed with a new understanding enabling the person to explain his or her learning to others or in someway put the learning to use.

This model of the ISP is shown in **Figure 2**.

**Develop Concepts from the Findings**

The next important decision that I made on this research journey was to draw out the main ideas in the research and to develop concepts from the findings. This meant extending the research agenda further into an area of conceptual theory development but continuing with an eye on what it would mean for the practice of librarianship.

My studies were among the first to investigate the affective aspects or feelings in the process of information seeking along with the cognitive and physical aspects. Prior to the introduction of the ISP the affective dimension of information seeking had not been fully recognized in library and information services and systems. One of the important findings of this research was the discovery of a sharp increase in uncertainty and decrease in confidence after a search had been initiated. A person “in the dip” commonly experienced uncertainty, confusion and anxiety until a focus or a personal perspective had been formed. I have come to understand that this point, when librarians frequently first encounter students (and other library users as well), is the most difficult stage of the search process.

Central to the model of the ISP is the concept of uncertainty. Uncertainty was not a new concept in information science, but affective uncertainty had not been extensively studied or developed as an important attribute of the concept. The axiom that information reduces uncertainty is not the user’s experience in information seeking. In some situations new information actually increases uncertainty. Prior to the formulation stage users are likely to experience heightened anxiety and uncertainty in the face of incompatible, inconsistent information since it requires thought, construction and interpretation. It seems helpful for people to learn that uncertainty increases during the exploration stage of the ISP rather than thinking that increased uncertainty is a symptom that something has gone wrong. Uncertainty from the user’s perspective is a natural part of the search process. If unexpected, the presence of uncertainty and particularly any increase in uncertainty can heighten anxiety and frustration, perhaps to the point of quitting.

Kelly’s personal construct theory provided the example of a way to present a conceptual framework with a central principle and a number of explanatory corollaries. I thought it would be useful, and perhaps a bit amusing, to state uncertainty as a principle for library and information science. The principle of uncertainty for information seeking is as follows:

Uncertainty is a cognitive state that commonly causes affective symptoms of anxiety and lack of confidence. Uncertainty and anxiety can be expected in the early stages of the ISP. The affective symptoms of uncertainty, confusion and frustration are associated with vague, unclear thought about a topic or question. As knowledge states shift to more clearly focused thoughts, a parallel shift occurs in feelings of increased confidence. Uncertainty due to a lack of understanding, a gap in meaning or a limited construct initiates the process of information seeking.

The principle of uncertainty is further elaborated by six corollaries: process corollary, formulation corollary, >
redundancy corollary, mood corollary, prediction corollary and interest corollary. Each corollary is an important related concept drawn from the findings of the studies of the ISP.

Apply the Framework of LIS

From the beginning of my work on the ISP, I have been influenced by other researchers in the field of information science and in other related fields as well. I have found this field to be a rich dynamic environment for creative innovative work. My work on the ISP did not occur in a vacuum. It evolved and developed within the fruitful field of library and information science. During more than 20 years of study of this area I have read, listened to, discussed and thought about many more LIS scholars’ ideas than I can possible credit here.

I have also listened to many bright, experienced librarians who have kept this work grounded in the practice of librarianship, in the basic services of reference and instruction that enable people to seek meaning in complex information environments and continue to learn throughout their lives.

Design Applications for Implementation

Most research reports include a section on implications of the work. In the practice-oriented field of LIS, this is especially important. However, I decided early on that I needed to go further than merely listing implications. I had to develop ways to apply the work into the practice of librarianship, an important decision that I have continued to follow throughout the development of the ISP.

Based on the model of the ISP and the principle of uncertainty for information seeking, I developed the concept of a zone of intervention for applying a process approach in LIS practice and system design. The central idea in the zone of intervention is that increased uncertainty indicates a need for assistance and accommodation. The zone of intervention is a concept modeled on Vygotsky’s notion of a zone of proximal development that provides a way of understanding intervention in the constructive process of another person. The zone of intervention in information seeking may be thought of in a similar way.

The zone of intervention is that area in which an information user can do with advice and assistance what he or she cannot do alone or can do only with difficulty. Intervention within this zone enables individuals to progress in the accomplishment of their task. Intervention outside this zone is inefficient and unnecessary, experienced by users as intrusive on the one hand or overwhelming on the other.

Application for implementation of the ISP can be tracked in the chart of my selected publications in Figure 1 and is particularly obvious in the books I have written. The findings of the initial study and application with middle and secondary school students were developed in my book Teaching the Library Research Process first published in 1985 with the 2nd edition still in print. My book, Seeking Meaning: A Process Approach to Library and Information Services (first edition in 1993 and second in 2004), was aimed at summarizing the research underlying the ISP and proposing a theoretical basis for implementation in practice. My latest book, Guided Inquiry: Learning in the 21st Century, written with my daughters Leslie Maniotes and Ann Caspari, is a foundational text for guiding student learning through inquiry in k-12 schools based on the ISP model.

Look to the Future

These studies were among the first to investigate the affective aspects or the feelings of a person in the process of information seeking along with the cognitive and physical aspects. Rather than a steady increase in confidence from the beginning of a search to the conclusion, as might be expected, a dip in confidence is commonly experienced once an individual has initiated a search and begins to encounter conflicting and inconsistent information. A person “in the dip” is increasingly uncertain and confused until a focus is formed to provide a path for seeking meaning and criteria for judging relevance. Advances in information technology that open access to a vast assortment of sources have not helped the user’s dilemma and may have intensified the sense of confusion and uncertainty. Information systems may intensify the problem, particularly in the early stages of the ISP, by overwhelming the user with everything all at once or limiting him to a few most used sources. Increased uncertainty indicates a zone of intervention in the process of information seeking for information intermediaries.

The model remains a dynamic description of the information user’s experience and dilemma in seeking meaning. Occasionally, the ISP has been referred to as a linear model. I would argue that it is a sequential model rather than a linear model. The ISP is experienced as a sequence of one thing after another in a period of time. This is the way life is lived and experienced. Of course there may be some planning within each stage for the
stages to follow and reflection in what went on before. Still one event follows another in a sequence even though recursion and planning may be evident within each of the stages. The naïve observation of linearity overlooks the depth of the holistic experience captured in the model. The model rings true for many people who are in the process of constructing meaning from a variety of sources of information because it is able to capture the sequential holistic experience of the process.

Recent developments in brain science have confirmed the close relation between emotion and cognition. The future holds interesting prospects for research into the user’s experience in information seeking and use. The work on the ISP has opened paths to understanding learning and creativity in rich information environments, but it is only the beginning of our research journey into the challenging field of library and information science in the 21st century. I have found these approaches to be important for developing the ISP and I recommend them to others in the pursuit of a fruitful sustained research agenda.

Desa Informasi: The Role of Digital Libraries in the Preservation and Dissemination of Indigenous Knowledge*

by Liauw Toong Tjieka (Aditya Nugraha)

Indigenous knowledge (IK) has for quite some time been forgotten in the globalization of modern science and technology. However, the paradox of globalization – which increases the value of local information resources as the world becomes more global – has created renewed interest in IK. The interest has so far mostly been generated in the Western world toward the IK of developing countries. Although the above statements remain open for debate, it is commonly known that IK is often still poorly documented let alone disseminated by most developing countries.

Indonesia as a developing country suffers the same condition of poor documentation and dissemination of its IK. Some IK is already documented, although not very well. Most is undocumented. Dissemination is even worse. This condition is exacerbated by the fact that Indonesia is an archipelagic country and situated on one of the most volcanic- and tectonic-active regions in the world. Any volcanic or tectonic activity can cause tremendous damage in local communities, including putting their IK heritage at risk. The December 2004 tsunami in Aceh and Nias was a shocking example of such forces of nature. Undocumented IK would surely vanish, while documented IK would still vanish if not disseminated or replicated elsewhere. In this case preservation of IK entails documentation and dissemination efforts.

The root cause of the poor condition above is believed to be the fact that Indonesian culture – as with most Asian culture – does not really have written tradition. Another factor is the “inferiority syndrome” of the Indonesian people, including its librarians and other information workers, which holds that knowledge generated by the West is superior to their IK. These conditions have contributed to the low appreciation of local information resources, which in the end impedes the development of such resources. Most people do not think that IK is valuable and that anyone would want to know and learn from it. Intensive effort is needed to change this denigrating perception, to encourage local communities to start documenting and disseminating their IK.

The rapid development of information technology, especially in the area of digitization and digital libraries, could be the answer to improve the condition in Indonesia and other developing countries. The author has observed that digitizing documented IK and putting it on a digital...
library has helped tremendously in adding “appeal” to the resources, which have previously been viewed as mediocre in quality due to the inferiority syndrome mentioned above. The digitized resources suddenly have higher value than before – when they were still un-digitized – and interest in preserving and disseminating similar (IK) resources significantly increases. The digital library has also broadened access to the digitized resources. It responds to the needs for the dissemination of IK, which in the end helps preserve the IK itself since preservation of IK entails dissemination efforts. Thus, digitization and digital library hold great potential to contribute to the preservation and dissemination of IK.

What is Desa Informasi?

Desa Informasi (translated into Information Village) is an umbrella name for a university-wide effort/project conducted by Petra Christian University Library to identify, collect, digitize, catalog and disseminate IK. It is an initiative to increase the visibility of IK – for which in this project the term local content (local information resources) is usually used – and it advocates the use of IK as a learning resource.

The project was started as a small-scale digitization project to convert students’ theses collections to CD-ROM storage, since the library was running out of space for storing hardcopy documents. However, the project evolved into a full-scale local content documentation effort.

Simply and narrowly put, Desa Informasi is an institutional repository (IR), which is a form of digital library (DL). In his article, “Institutional Repositories: Essential Infrastructure for Scholarship in the Digital Age,” Clifford Lynch says the following:

A mature and fully realized institutional repository will contain the intellectual works of faculty and students – both research and teaching materials – and also documentation of the activities of the institution itself in the form of records of events and performance and of the ongoing intellectual life of the institution. –

ARL Bimonthly Report, 226, p. 2
(www.arl.org/resources/pubs/br/br226/br226ir.shtml).

Desa Informasi adopts Lynch’s definition of IRs, which makes the terms IR and DL interchangeable, at least in this discussion. Lynch’s description of the possible content of IRs is also adopted. Based on the adopted definition, Desa Informasi (www.petra.ac.id/desa-informasi) currently contains the following digital collections:

- Digital Theses: Petra Christian University students’ theses collection in digital format, mostly as PDF documents. An increasing number of multimedia resources generated by the students of Faculty of Art and Design is also included.
- eDIMENSI: Digital version of articles of DIMENSI, scientific journals published by various academic departments of Petra Christian University.
- Petra@rt Gallery: Works of art by campus communities (mostly students’ works) or works of art that are exhibited/displayed at Petra Christian University campus; mostly photographs and digitized images. The collection contains wonderful visual resources, capturing and immortalizing the intrinsic knowledge and values of art in the works documented. Some of the wonderful themes are the Visual Poetry, Café Décor, Chairs of Indonesia, Destination Branded, Nusantara and Bersatu (United Archipelago).
- Petra iPoster: Posters of events or issues related to Petra Christian University.
- Petra Chronicle: Historical documents related to Petra Christian University (in planning stage).

Figure 1 is representative of some of the images cataloged by the project. Additional images are shown in the Desa Informasi Gallery.

As apparent from the characteristics of the collections above, Lynch’s definition of content can be summarized as locally produced content/information resources. Desa Informasi expands the content definition to also include information resources containing features of local entities. It significantly affects the type of content that can be hosted in Desa Informasi. Due to this expansion, another >
collection has been developed, namely Surabaya Memory, which contains documentation of Surabaya city’s historical and cultural heritage, mostly old documents, photographs and maps. Several sub-collection additions of cultural heritage resources are being planned.

While not every single resource in Desa Informasi is a documentation of IK, it is fair to say that the majority of them do hold certain level of IK, and quite a number of them are indeed documentation of IK.

**Content Development in Desa Informasi**

Certain approaches are employed by Petra Christian University Library in the development of the (digital) local content of Desa Informasi:

1. Be proactive and lead the way.
2. Develop thematically.
3. “Piggyback” the university formal administrative system.
4. Make it the interests of the academic departments, faculty members, students, administrative units, etc., not merely the library’s.
5. Go beyond digital content and digital library development.

The first approach requires the library to assume a leadership role in identifying and collecting the local content from the campus and local communities. The library should take an active role in helping the campus communities (the academic departments, faculty members, students, administrative units and others) identify information resources in their possession that have the potential to be developed into digital collections in Desa Informasi. It is surprising to learn that most of them do not even realize that they have abundant information resources, which mostly contain IK and are too valuable not to be disseminated. The campus communities also need assistance in collecting the resources. They usually do not have the expertise or experience in developing and managing information resources as librarians do.

Developing thematic digital collections is central in creating added value for the collected resources. Having several smaller thematic collections of interest to the communities is far better than having one big collection consisting of just about anything people can throw into the collection without any defining character that binds them together. Choosing an exotic name for the collection, which also defines the character of it, is also imperative. Short and exotic names are easy to remember and make the collections personal to the communities. It further adds appeal to the digital collections. It is a strategy to attract interests, which in the end will translate into attracting resources. This second approach also stipulates that librarians conduct the collection process, rather than providing the tools and expect the communities to do it themselves. While the latter is a perfect approach, I believe that most of the time it does not work, at least not in the early stages of the initiative, since it takes time to build interest. It is a strategy to absorb proactively as many resources as possible from the communities. I would be tempted to name this second approach as “attract and absorb.”

In order to be able to absorb or capture as much IK of the communities as possible and to guarantee sustainable flow of resources into the IR, it is essential that the library formulate a collection process that piggybacks or, at least, connects to the formal administrative system of the university or the local communities it serves. Otherwise the collection process will be too massive to manage sporadically, and the sustainability of the flow of resources from the communities into the IR will depend largely on fluctuating individual interests. This approach goes both ways. The collection process, which includes the cataloging and management of digital resources/content, also has to be integrated into the library’s daily operational tasks. Otherwise it will be a project-based activity that might stop after the funding is terminated.

In working together with campus communities, especially the academic departments and administrative units, it is critical to emphasize and remind them that it is in their best interests – as well as the library’s – to develop the content in the IR. First, the IR will be a powerful documentation system to register (all) the works and intellectual output of the academic departments or, in this case, the documents and records produced by administrative units. This is where the boundaries between libraries and archives are starting to blur, a topic that I will not explore any further in this discussion. Second, having more content in the IR will increase visibility of the academic department and/or administrative unit to the campus communities as well as to the society. It could prove to be an elegant and powerful marketing campaign for academic departments to attract prospective students and build a good image in the society.

Although I believe that all the above approaches are adequate to ensure a successful IR implementation, I would encourage libraries to do more with IR beyond digital content and digital library development. However for the sake of the flow of discussion, I will elaborate this topic...
the section about expanding the libraries’ influence in the society. Let us continue the discussion by talking about content management in Desa Informasi.

Content Management in Desa Informasi

A locally developed system is used to provide content management functionalities. New SPEKTRA is a Windows-based application utilizing Microsoft Access as the database. The Digital Collection Processing (Cataloging) Module implements expanded Dublin Core as the metadata set to catalog digitized or born-digital documents. The module is in fact only one of several modules available. Others, which are not discussed in this article, are the (Traditional) Collection Processing Module, which is used to catalog physical resources (books and audio visual materials); the Circulation Module, which manages the check-in and check-out of library materials and other circulation functions; the OPAC Module which can search the traditional and digital collections using the same user interface; and the Operator Management Module.

The Dublin Core has been expanded to accommodate the need to manage digital content for use as a learning resource, as well as for the documentation (digital preservation). It has also been adapted to accommodate local needs. For example, because of low Internet bandwidth in Indonesia, PDF file size of each student thesis is reduced by making each thesis chapter a separate PDF file. Each record could hold one or more digital objects/resources in various file formats. Detailed discussion of the Dublin Core metadata set implementation in New SPEKTRA is beyond the scope of this paper.

Digital objects/resources in Desa Informasi are categorized into various themes and sub-themes, which have also been accommodated by the expanded Dublin Core metadata set. The categorization enables us to build thematic (digital) collections. This feature enables us to select an exotic name that defines the character of each collection. This categorization will also be very useful for the (future) browsing feature of the OPAC, which will provide users with more alternative methods in their information seeking endeavors.

Desa Informasi currently holds a total of 19,874,883,478 bytes (almost 20 gigabytes) of digital objects. Table 1 provides the breakdown of the total number.


Table 2 reflects the results of a further breakdown based on types of documents.

Users can access the digital collections using iSPEKTRA – the web-based OPAC – that is available in two flavors: the universal search interface and the specialized search interface. The universal search interface enables us to search (and in the future browse) all the digital collections available in Desa Informasi.

The OPAC has a basket (cart) function that allow users to drop resources in while they are shopping for more resources. The stored search results can then be saved, emailed or printed. Users can view the digital object(s) contained in each record by clicking on a “Detail” button, which opens up a “Resource’s Detail” window.

The specialized search interface provides a targeted search that limits the search results in a specific digital collection. Besides serving as an added service to users, a specialized search interface is also very functional when we build a website surrounding a particular digital collection as part of our effort in reaching out to the society. This topic will be explored further in the discussion of expanding the libraries’ influence in the society. >
Impacts of Desa Informasi to Campus Communities

The fact that Desa Informasi documents the works of the campus communities has had positive impacts, especially to academic departments (students and faculties alike):

- Motivation to produce better works, since the works will be immortalized digitally and accessible by global audience through the Internet.
- More awareness of academic integrity and copyright issues. Since everyone can virtually read or view the works, any violation of academic integrity or copyright infringement will be much more easily detected by the global audience.
- Stronger relationship between the library, on the one side, and academic departments and administrative units on the other, since the library provides a solution for documenting their works.
- Increased visibility of each academic department, the library and even the university as a whole.

All these positive impacts should provide enough incentive for libraries to build IRs. However, I would encourage libraries to go beyond building digital content and DLs/IRs. They could and should reach out further to the society. Besides as services to the society, the libraries should make use of this opportunity to expand their spheres of influence and strengthen their roles in the society.

Expanding the Spheres of Influence of Libraries through Institutional Repositories

An IR/DL with rich (digital) content that forms the body of IK of local communities can serve as a powerful tool to expand the libraries’ spheres of influence. Through various campaigns and advocacy programs that focus on or highlight the IR content, libraries can reach out to audiences that might otherwise fall outside their traditional users. Libraries can build a website on top of a particular (thematic) digital collection. The website can contain educational information that is relevant to the theme of the featured digital collection.

For example, a website has been developed for Surabaya Memory collection. The site features various information on the history of Surabaya city, lists of historical/cultural sites, lists of historical events of the city and other educational information. The availability of this information encourages the society’s appreciation of its own historical and cultural heritage and encourages the society to help preserve IK.

Another website has been created for the collection of digital theses. It is still in its early stage with only a specialized search interface available. Eventually, the website will be populated with information that educates the society on the importance of academic integrity, copyright issues, resources to help students with their theses writing and other relevant information.

Libraries, especially in developing countries where Internet access is still considered a luxury, can further reach out to the society by conducting offline/onsite (or even coupled with online) exhibitions and other community outreach programs and activities. For example, Petra@rt Gallery holds regular exhibitions in or outside the library throughout the year, featuring works of art with local themes (promoting IK of local communities). Surabaya Memory holds regular photo exhibitions every May (the anniversary of Surabaya city) featuring its collection of old photos of Surabaya. It also holds regular Heritage Walks throughout the year, offering the society a chance to experience the history and culture of the old sections of the city.

The possibilities are endless when we go beyond digital content and DLs/IRs. One might notice here that the community outreach programs and activities mentioned above are starting to mimic what a museum would do, but that is a topic for another discussion.

The campaigns and advocacy programs will raise the awareness of local communities to appreciate their IK and heritage. This will encourage documentation and preservation of their IK and heritage, which in the end will help libraries develop the content of their IRs/DLs. This will lead to the availability of digitized IK in IRs/DLs – accessible through the Internet – that will attract global users to exploit them for the advancement of art, science and technology. This process will form channels for the dissemination of IK.

Besides playing an important role in the preservation and dissemination of IK, DLs/IRs hold promises of exciting future since DLs/IRs provide new and exciting avenue for libraries to engage the society in a much broader roles and scope.

Conclusion

The issues raised in this discussion and the experience in developing Desa Informasi lead to the following conclusions:

- Digitization, digital libraries and thematically developed digital collections add appeal to indigenous knowledge, increasing interest in initiatives for the documentation and preservation of indigenous knowledge.
Digital content/resources development of a digital library provides digital preservation of IK, including historical and cultural heritage, of local communities, thus preserving their collective memories.

Digital libraries provide channels for the dissemination of IK of local communities to a global audience, thus preserving IK as well as transforming local communities from consumer of information/knowledge into producer of information/knowledge.

Digital content/resources development of a digital library yields positive impacts to local campus communities.

Digital libraries can serve as powerful tools for libraries to reach out to, expand their sphere of influence and strengthen their roles in the society.

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