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Y.S Chen

*Louisiana State University, QMChen@unix1.sncc.lsu.edu*

B. Ives

*Louisiana State University, bives@lsu.edu*

D. Leleux

*Louisiana State University, DALMIS@aol.com*

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# Information Systems Knowledge Repository: A Structure for Electronic Scholarship

[Y. S. Chen](mailto:qmchen@unix1.sncc.lsu.edu), qmchen@unix1.sncc.lsu.edu

[B. Ives](mailto:bives@lsu.edu), bives@lsu.edu

[D. Leleux](mailto:DALMIS@aol.com), DALMIS@aol.com

Department of Information Systems and Decision Sciences

E.J. Ourso College of Business Administration

Louisiana State University, Baton Rouge, LA 70803

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## Abstract

This article describes our experience in designing and beginning to create a prototype IS knowledge repository. Our objectives include demonstrating how this new form of scholarly dissemination can tighten the links between theory and practice, thus making knowledge more concrete for students. Students will also learn, while adding value to, the repository. To illustrate how the repository operates, we describe its organizational model.

## Information Systems Knowledge Repository

Scholarship, according to Webster's dictionary, is "a fund of knowledge and learning." A repository, according to Webster's, is "any thing or person thought of as a center of accumulation or storage". Thus, the IS knowledge repository we are creating on the WWW will provide an electronic "fund" for sharing "accumulated" knowledge and assisting in the comprehension of material related to IS. It will do so by harnessing the experience and energies of our students and faculty in both creating new knowledge and adding value to old knowledge, as well as disseminating knowledge within our own community and the discipline. Below we discuss the vision and an initial experience of designing and beginning to create this repository. Our initial objectives include providing tighter links between theory and practice, making knowledge more concrete for students and helping students learn to learn while simultaneously adding value to the repository. We expect these objectives to broaden as we gain more experience and as the repository grows.

The repository would structure knowledge as a series of different entity types, derived from and sustained by a rapidly expanding education ecosystem comprised of students, faculty, industry and other collaborating universities. Among these entity types are conceptual models, methodologies, techniques, tools, learning modules, case studies, and so on. Our attention will typically focus on those entities for which knowledge is relatively long lasting - conceptual models, methodologies, technologies - rather than those that age quickly. We will initially use static hyperlinked pages to structure knowledge but, as we gain experience and better understand both our long term objectives and the alternative technological solutions, we will migrate towards creation of dynamic pages based on a repository database. To assist our own learning we have formulated an entity-relationship diagram (ERD) for one element of the database, describe below.

To limit the scope, and to facilitate sharing the creation task with others, individual repositories will be created paralleling the foci of the Centre's for Virtual Systems, three center's located at LSU, University College Dublin, and Melbourne University with a shared objective to study virtual organizations. Repositories are currently planned in areas such as enterprise systems, work group collaboration, and process design. Some sub-repositories within these areas will grow in more detail than others reflecting faculty interests, student project requirements, funded research, and so on.

## Projects Underway

We are currently working on prototypes of two sub-repositories. One, an introduction to information technology will provide an introduction to office tools such as Microsoft's Office 97 as well as to internet tools. For the second, graduate students in a systems analysis class, working in teams of two, have documented conceptual frameworks, methodologies, and tools for carrying out business process reengineering (BPR) projects. In addition to descriptions and tutorials, students have described how they might apply their chosen approach on a common project - the reengineering of a dentist's office. Faculty contributions to the repository provide examples for students which serve as boilerplates to reduce student work while ensuring consistency and a professional look and feel. While students tended to focus on tools and techniques, faculty contributions were more conceptual. Thus, there are opportunities to link between conceptual models and tools that may support them.

The documentation for the various BPR tools adheres to the following consistent format so as to readily provide future students with the requisite knowledge to apply the tool and to find additional information.

- \* Name of the tool, technique, or methodology
- \* Brief Description
- \* Description of when this tool or methodology is useful
- \* Brief tutorial describing how to apply the tool or methodology
- \* Illustration of the tool's use within a common context (the projects)
- \* Discussion of available software
- \* References to additional information (including links to appropriate web pages)
- \* Comments on the tool, technique, or methodology
- \* Student's name (and potential link to resume or home page)

The repository currently includes three interlinked conceptual frameworks. The three are work-centered analysis (WCA), frequency-based WCA, and the customer service life cycle (CSLC). WCA [Alter, 1996] consists of six elements: business process, products/services, customers, participants, information, and technology. Together these components constitute a working system for carrying out the process as well as the products of that process and its customers. The frequency-based WCA [Chen, Mount, and Liao, 1997], also captured in the repository, extends the knowledge embedded in the WCA's scoping stage. It classifies the customers into frequent, infrequent, and potential classes and the products/services into simple, moderate, and complicated classes. The combination of the two classifications generates nine different versions of processes. The important ones can then be analyzed based on the customer service life cycle, the third framework in the initial prototype. The relationships among these conceptual models, as well as the various techniques and tools, illustrates the power of the hypertext model within the repository.

Creating meaningful projects that will both serve and be served by the repository requires careful planning. Projects must attempt to facilitate learning by making maximum use of the repository. Thus, using the language of work-centered analysis, students must be viewed as customers. But, simultaneously projects must capture the maximum outputs of the learning experience in order to refresh and advance the repository. Students are, therefore, also participants in the knowledge creation process. Thus there is a recursive relationship between a repository and students.

The notion of a knowledge engine serves as a metaphor for the repository. Using this engine, students can learn a new topic and see its application within a broader, more concrete context. Students can see how an

application provides an example of how a technology, concept, or a tool is used. Or, they might see another student's comment about the value of a particular tool. The knowledge engine balances on a fulcrum in a well-designed project, with the level of knowledge acquisition balanced by the amount of knowledge creation. For example, we have a project underway in which a class of students will create modules to assist in learning Microsoft's Office 97 product. Each student, or teams of students, will develop small modules using a boilerplate. A number of learning objectives have been identified, all closely linked to the project's various stages (e.g., basic programming, debugging, maintenance, directory structures, project management, quality assurance). For each additional module a particular team or individual is called upon to create, the opportunities for learning decrease, while the contribution to the repository, presumably increases. Thus the need for balance. Let us assume that this project does not fully meet our expectations, perhaps because of our failure to properly balance knowledge acquisition and knowledge creation. According to plan, the repository would also contain a body of facts and opinions as to why the project had failed. Thus the carefully documented failure can serve as building blocks for the next attempt. As a result, the new team achieves a more advanced result, hopefully success.

The distributed nature of the web allows us to invite partners from other universities to help build the knowledge structure. To ensure accountability and to avoid conflicts, the joint projects might be decoupled from one another. For instance, at the end of a semester, development responsibilities could be turned over to another group of students, taking a similar course at another university. They would later turn a now much enhanced version over to a third group, before returning it to us nine months later. Thus, students would experience an opportunity to participate in a worldwide learning organization and to share in the joint product. Interestingly, the structure that returns to us a year later would be deeper and different - encouraged by a philosophy of maturing the structure as well as the content. [*We invite inquiries from interested partners.*]

## Conclusion

Although web-based initiatives such as ISWorld Net have helped us to better envision how complex knowledge structures can contribute to knowledge creation and learning, they have generally been disappointing in their implementation. They have failed, partially, due to lack of rewards within the traditional faculty promotion and tenure process and partially due to lack of energy focused in particular areas. They have also fallen victim, in some instances, by being mere collections of links rather than value adding deep knowledge structures. Together these limitations have made it difficult to achieve the critical mass necessary to overcome negative entropy. By embedding the creation of these knowledge structures into student learning exercises, the above problems can be significantly reduced. Faculty energies will be rewarded in teaching evaluations as well as research deliverables. Students will be repaid for their modest contributions both from the learnings associated with creating and using the knowledge models. And, each class will build on, rather than repeat, the learning experiences of those who have come before. Students efforts, if well organized, evaluated, and focused in relatively narrow domains of relatively less perishable knowledge, provide a new engine for creating these new knowledge engines. Their creations will differ from traditional textbooks in being created by other students, by being instantly and economically available throughout the world, by being interactive, and by their ability to be maintained in a piecemeal manner.

## References

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