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Soft Systems Methodology: An Inclusive Informatics Re-Design Approach for a New Economy

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Abstract
The research study focuses on the application of Soft Systems Methodology (SSM) to develop a collaborative user-centered approach within the context of organizational learning, and concludes with suggestions of further research. More specifically, it explores library users’ and academic librarians’ ideal characteristics for the library discovery and access services mediated through the Online Public Access Catalogue (OPAC) of the Academic Library of the School of Philosophy at Athens University in Greece. SSM’s applied theories and design processes guide the collaborative re-design of a more user-centered library information system. Recommendations discuss the efficacy of this approach, which expresses systems thinking and guides inclusive social learning, which reflect the characteristics of New Economy informatics.

Keywords: Academic Libraries, Greece, User-centered Design, Soft Systems Methodology (SSM).

Introduction
The financial crisis in Greece during the last four years produced serious issues in Greek academic libraries, such as reductions in human, technological and financial resources [1; 2]. Despite these issues, the multidimensional need for and role of academic libraries has not decreased. In fact, increased demand for library services by users has been observed and documented [3; 4]. So, the provision of improved library services, which employ innovative technology-based information systems, could appreciably improve Greek academic libraries’ future.

Illustrative of this potential, which projects trends in information and knowledge organizations in a New Economy, the Academic Library of the School of Philosophy at Athens University in Greece is investigating a more user-centered approach for the ‘public facing’ module of its Integrated Library System (ILS). Technology innovation has been employed to address the current economic, societal and environmental crisis as well as to generate growth. Therefore, this research focuses on library users’ and library staff’s perspectives of the current library services provided by the existing Integrated Library System (ILS) and their desired characteristics of an ideal Online Public Access Catalogue (OPAC). The aim is to explore and acquire knowledge about the existing situation and recommend improvements in a technology-mediated library system, which provides access to authoritative scholarly resources.

Study Context
Given the aforementioned circumstances created by the economic crisis, the Academic Library of the School of Philosophy at Athens University has to respond to challenges and seize opportunities by strengthening its services and their impact. This requires exploration with and for users to find ‘solutions’, which include improving the Online Public Access Catalogue (OPAC) interface features and functions. The Academic Library has used an Integrated Library System (ILS) since 1998 for the auto-
mation and execution of the main librarianship duties. These core functions include books and serials purchase, acquisitions, cataloguing, classification, subject indexing, and circulation. In addition, the Online Public Access Catalogue (OPAC) serves as a portal to academic scholarship for library users. Because of the age of the system, all of the modules lack user-centered features. However, because of the potential for offering higher-quality services through a more user-centered information system, the OPAC was selected as the project focus. The larger aim involves fortifying the library’s presence on campus through clarifying users’ expectations and requirements for library systems and associated services. Therefore, this study builds on successful results from other library initiatives that have employed Soft Systems Methodology (SSM) [5].

**Research Fundamentals**

In this study, Soft Systems Methodology (SSM) provided the ‘tools’ for guiding exploration of the problematical situation, to see what emerged and to generate fruitful recommendations. This learning process [6] supported collaborative creation of a user-centered information system. Hence, it built upon theories and techniques which, through social learning systemic processes, promote “learning the way” [7].

In addition, SSM represents a user-centered design approach. According to ISO 13407-1999, which was later replaced by ISO 9241-210 [8], human or user-centered design is “an approach to interactive system development that focuses specifically on making systems usable. It is a multi-disciplinary activity”. The user-center approach focuses on humans’ interaction with technology, rather than the technology’s support of humans’ work. The end users’ needs, desires, requirements and limitations are put at the center of attention when designing an IT artifact and the users are actively involved in the process [9], with the ultimate goal to produce an IT artifact with high usability. Herein lies the importance of user-centered co-design which, according to Langefors [10], requires identification of user requirements to create systems that anticipate needs.

**Soft Systems Methodology**

In 1970 Peter Checkland developed Soft Systems Methodology (SSM) as an approach for undertaking the improvement of problematical social situations [6]. SSM is inherently Action Research, where the researcher approaches a real world situation with the intention to improve the situation [11]. Therefore, the change process becomes the real object of research [11] and the participants become actively involved in it.

Checkland and Poulter [6] argue that SSM is an action-oriented process for improving local situations. In a cyclical fashion, practitioners go through several stages, from developing an in-depth understanding and learning about the problem to taking actions to improve it. These problems are characterized by complexity because they are constantly changing. Also, every participant sees and understands the problem from his/her point of view. So to improve the problematical situation, Soft Systems Methodology guides social learning for taking action to improve.

Soft Systems Methodology (SSM) develops in seven (7) stages [12]. At the first stage, the practitioners explore the problematical situation through intervention, social and political analysis. Rich Pictures represent the second stage [6]. According to Checkland and Poulter [6], Rich Pictures is a technique for depicting the problematical situation that needs to be changed or improved by showing the interrelations be-
tween the involved parts (stakeholders, processes, structures, and ‘climate’). The process of generating and interpreting Rich Pictures perceives the organization as a system and analyses it in order to locate problem areas [13]. The focus of this conference paper will be Rich Pictures.

Although outside the scope of this paper, the following subsequent SSM stages are described in detail in the thesis, *Advancing an Academic Libraries Services through Soft Systems Methodology* [14]. These subsequent phases, which build on the Rich Pictures, include a third stage in which Root Definitions are formulated. The Root Definitions are statements describing the activity system that needs to be created in order to improve the situation and act as the basis for building some Conceptual Models of the systems at the fourth stage. The Conceptual Models describe all the activities that need to be performed in the system in order to achieve its transformation [13]. These Models are next compared with reality for defining the differences between the ideal and current situations. At the sixth stage, the outcomes of the comparison are used to find out the needed changes for improving the problematical situation. The changes should be aligned with what is possible regarding the cultural and political situation (cultural feasibility), and the changes should also be aligned with the Human Activity Systems stated in previous stages (systemic desirability). At the final stage, the proposed changes are implemented. Therefore, Soft Systems Methodology (SSM) is considered not an optimizing system, but rather a learning and participative system [15].

**Rich Pictures**

Soft Systems Methodology was selected for this study because the complex situation of the library system is characterized by complexity, uncertainty, and contrasting interests. It involves various stakeholders with different perspectives, such as the university students, the faculty members and the University authorities, and the librarians working in the Academic Library. So Soft Systems Methodology was used to learn through the perspectives of different stakeholders groups regarding library services, present conceptual models of their desired library services and finally facilitate the Academic Library’s collaborative design of a more user-centered library information system that could advance the library services. Rich Pictures constituted an essential tool to developing insights into the diverse stakeholder perspectives of faculty, students, and librarians.

Rich Pictures were collected in March and April 2014 from the stakeholder groups of postgraduate students, Faculty members, and academic librarians. Participants were required to have at least two (2) years of experience as library users of the Academic Library. Also, the sampling was purposive, which, according to Patton [16], means that the selection of the sample is emphasized purposely on the richness of the information sources rather than generalizing the results to other populations.

Each group drew a Rich Picture of ideal characteristics of the ‘public facing’ Online Public Access Catalogue interface, which produced three (3) Rich Pictures, described below. See also Figures 1, 2, and 3. According to Mingers and Taylor [17], the technique of Rich Pictures is one of Soft Systems Methodology’s most common and favorite techniques. The Rich Picture technique aims to represent a situation without demanding a strict structure [6]. Checkland and Poulter [6] state that Rich Pictures is an excellent way of representing complex human situations as a whole, as the interre-
lations and worldviews of the stakeholders are illustrated. This holistic approach informed the research question: “How do library users and academic librarians describe the ideal characteristics of a ‘public facing’ Integrated Library System (ILS)?”.

The focus groups’ Rich Pictures below depict participants’ visual representation of ideal OPAC characteristics. The first Rich Picture was generated by the focus group of postgraduate students. Although they focused on the economic crisis, they recognized that the problematical situation involves financial, political, social and technological forces. Their Rich Pictures depicted the Greek state, the Ministry of Education, Athens University, and its libraries. Although the latter were comprised of professors, students and staff, the students focusing on the librarians, who were represented as the link between the students and their professors. The postgraduate students underscored that they paint the stakeholders in various colors in order to show their acceptance of differences (color, gender, gender orientation, etc.).

At the left side of the paper, they drew something like a premature visual prototype or representation of their ideal OPAC characteristics. They drew one search box that searches all academic resources in a single unified index. Next to the search box, they put tags with subject keywords added by library users. They emphasized their need for retrieval of easy, quick and reliable research results, including display of relevant newly acquired items, along with the most popular relevant borrowed items. They pictured the cover page of the retrieved book, its abstract, its table of contents, as well as the library users’ reviews. Although they indicated a preference for fully digitized material, students said that they were willing to add - without assistance - the cover and back pages, the abstracts, the table of contents, and other features of print resources.

![Figure 1. Postgraduate Students’ Rich Picture](image)

The students described a personalized Online Public Access Catalogue interface with ‘My Account’ features. They identified the desired ‘My Account’ features as ‘List of currently borrowed material’, ‘My History’ and ‘My Wishing list’. Students even painted an electronic floor plan map associated with call number ranges, in order to facilitate book location in the stacks. They differentiated by color the availability of the retrieved items: red for checked out/not available items, yellow for limited availability and green for checked in/available items. Students also underscored the importance of making suggestions about material acquisition from the OPAC page, sug-
gesting the addition of a ‘recommended purchase’ function. Finally, they expressed their desire for an attractive and more modern OPAC layout.

The Faculty members’ Rich Picture emphasized the interrelations of the various parts of the higher education environment and the academic information ecosystem, including that the economic crisis produced funding reductions and many dismissals of public servants, including university administrative staff and academic librarians. More knowledgeable than the students regarding the university’s organizational chart, they drew all six (6) Academic Libraries of Athens University, one (1) for each University School. They drew a line connecting the Academic Library of the School of Philosophy and the academic librarians and library users, both faculty members and students. They even emphasized the increased demand for library services by users that has been observed and documented in previously cited secondary reports.

Finally, on the upper right side of the Rich Picture, they created a summary list of their ideal characteristics of the Online Public Access Catalogue module. The professors’ recommended enhancements included suggestions for a search system that retrieves better results easier and quicker. Functional information system improvements included keyword search capabilities supplemented by faceted search capabilities for advanced searches that simultaneously search for digital and non-digital resources. In addition, they wanted the option of a personalized OPAC interface with ‘My Account’ features, as well as an enhanced OPAC interface with Web 2.0 tools. The professors’ desired characteristics of an ideal OPAC, as expressed through the Rich Pictures, showed a convergence of views with those of the postgraduate students.

The academic librarians’ Rich Picture illustrated the general context of the situation, including its financial, political, social and technological elements. They acknowledged the Greek Government, Ministry of Education, Athens University and its Academic Libraries, and represented the interconnections by drawing many rectangles, one within the other, to show the strong interdependencies. In their Rich Picture, the librarians expressed many ideal OPAC characteristics also identified by Faculty and students, including a comprehensive search from a single search box with one unified index. As previously noted, Mobile and Web 2.0 apps were identified as highly desirable enhancements. Librarians also wanted to see quicker and more reliable retrieval, as well as display of the most relevant items first. They also suggested recommended
a subject term or keyword recommendation feature. As others noted, they welcomed the addition of book cover images, as well as tables of content (TOC) and other discovery enhancements, as well as ‘My Account’ functionalities. Uniquely, they also desired educational videos, available 24/7, to advance research competencies.

Figure 3. Academic Librarians’ Rich Picture

Data Analysis and Research Findings
Thematic analysis of data set patterns supported interpretation of collected Rich Pictures data. This coding process for qualitative data entailed six (6) steps: become familiar with the data, produce primary codes descriptive of the data, recognize themes in these codes, examine the themes, define the themes and present the findings [18]. The resulting categories produced by analysis of Rich Picture (and focus group transcripts, which are outside the scope of this paper) identified user-generated enhancements to increase usage of and satisfaction with library services.

The user-centered characteristics of an ideal Online Public Access Catalogue proposed by the library users and the academic librarians envisioned a simple, but modern and attractive, OPAC layout featuring a single search box with one unified index for all curated content, regardless of whether it was in print or digital formats. In addition, other enhancements included automatic spelling correction in proximity to the search box results, Web 2.0 applications, and ‘My Account’ features.

Discussion
As the Rich Pictures illustrate, the situation is complex for Greek Academic Libraries. The financial crisis in Greece during the last years has produced reductions in human, technological and financial resources. But the economic crisis has not reduced the importance of academic libraries. In fact, increased demand for library services by users has been observed and documented. In response, this study offers a proven methodology, Soft Systems Methodology, for re-inventing systems in a New Economy.

As this study illustrates, Soft Systems Methodology considers every situation as a systemic whole and uses tools such as Rich Pictures to generate redesign recommendations. As results illustrate, SSM tools proved to be enabling and engaging for users which is important because users are the experts when it comes to designing a ‘tool’ for themselves. Additionally, by being significantly involved in the practical aspect of
design or redesign, users experience influence and even control and, that engenders ownership and adoption.

**Conclusion**

The academic aim of the study was to explore the efficacy of user guidance on the re-invention of the Online Public Access Catalogue module in order to better support university researcher workflow. Longer-term, the aspiration is to use these research results to enhance the Athens University OPAC design and thereby provide better user services. Further in the future, the hope is to continue to conduct user-centered design projects in order to satisfy researchers’ ever-changing and evolving expectations and requirements amidst disruptive changes in the scholarly communication and higher education environments. Hopefully, the results of this study will also inspire implementation of user-centered studies in other library organizations, for which this study provides a transferable example.

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**References**


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