

Comprehensive Access to Printed Materials (CAPM)

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ABSTRACT

The CAPM Project features the development and evaluation of an automated, robotic on-demand scanning system for materials at remote locations. To date, we have developed a book retrieval robot and a valuation analysis framework for evaluating CAPM. We intend to augment CAPM by exploring approaches for automated page turning and improved valuation. These extensions will result in a more fully automated CAPM system and a valuation framework that will not only be useful for assessing CAPM specifically, but also for library services and functions generally.

Categories and Subject Descriptors

H.3.7 [Information Systems]: Information Storage and Retrieval – *Digital Libraries*.

General Terms

Measurement, Design, Economics, Experimentation

Keywords

Information economics, evaluation methods, browsing, digital conversion, digital preservation, robotics, paper manipulation.

1. INTRODUCTION

Libraries face both opportunities and challenges with the development of digital libraries. While some digital library initiatives focus on materials that are “born digitally,” most libraries continue to acquire materials in print format and must consider methods to manage their existing, substantial print collections. This approach of developing digital library capabilities while also managing large print collections has led to space pressures. Given the relatively high costs of building new facilities at central campus locations, many libraries have either built, or considered plans to build, off-site shelving facilities to accommodate their growing print collections.

While moving materials to off-site locations mitigates space pressures, patrons lose the ability to browse these materials in “real-time.” Given the relative ease of accessing electronic resources, it is possible that patrons are less likely to access

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printed materials in remote locations. With the ongoing migration of materials to off-site facilities, there is a risk that a growing body of knowledge will be considered less frequently, and perhaps even ignored.

The CAPM Project began with the goal of restoring browsability through an automated, robotic system that would allow patrons to browse, in real-time, materials shelved at off-site facilities through a Web interface. We envision a patron, upon noting that an item is shelved off-site, will choose the CAPM option through their Web browser. Subsequently, a robot will retrieve the requested item and deliver it to a scanner. Another robotic system will turn pages at the patron’s request. The patron will either view or print pages, and eventually “return” the item or request the item for physical delivery. Once the text is scanned, the patron may also perform automated text analysis options, such as keyword searches on the full text. In each case, the system will respond accordingly via remote control.

To date, we have built a book retriever robot that is being tested in a small-scale version of the shelving arrangement used at Moravia Park off-site shelving facility of the Johns Hopkins University. Additionally, we have conducted a valuation analysis to evaluate the potential costs and benefits of CAPM.

2. PROJECT BENEFITS

The most obvious benefit of CAPM is the ability to restore browsability for materials shelved in off-site locations. The possible risk of reduced usage for off-site materials might be mitigated with this remote browsing capability. Essentially, CAPM will “elevate” the status of materials in off-site locations towards that of electronic resources.

While achieving browsability is a noteworthy benefit of the CAPM project, it is one only facet of the project’s full potential. By combining OCR software and a search engine being developed at Johns Hopkins, it will be possible to search requested texts and generate keywords through natural language processing of full text. Additionally, the CAPM system will generate tables of contents. The combination of full text, tables of contents and keywords will be cross-referenced within a database to identify items with similar content. This capability, combined with traditional metadata, will emulate the serendipitous discovery of open-stack browsing.

While these benefits are related to access, CAPM could also provide preservation-based benefits. Preservation copies will be created by a batch-scanning mode when patrons do not require the system. Because of the enhanced access offered by CAPM, libraries and patrons might be more amenable to the transfer of

items to off-site facilities which generally offer superior conditions for materials (e.g. temperature, humidity, static shelving).

3. BENEFITS VALUATION

The benefits outlined above need to be properly delineated and evaluated before libraries will adopt CAPM. Consequently, in addition to the engineering development of CAPM, there has been a concurrent, valuation analysis. The analysis has two emphases: an engineering cost analysis and a valuation of potential benefits for patrons. The cost analysis has focused on the following cost categories: labor, increased electricity usage, maintenance of equipment, book containers, loss of storage capacity associated with book containers, equipment and setup or implementation costs. The costs were calculated as a levelized average cost per use over a ten-year period. Preliminary results indicate an average cost per use of between \$3.50 to \$24.52, depending on level of use. These costs compare favorably to costs associated with interlibrary lending services [3].

These potential costs will be compared to the potential benefits, as estimated through a contingent valuation methodology (CVM). CVM represents a "stated-choice" technique where individuals express a willingness-to-pay for benefits or a willingness-to-accept compensation for costs, using dollar values. CVM has been used widely for evaluation of non-market goods, especially in the environmental field. A previous application of CVM in the library environment provides evidence of its utility in decisions regarding resource allocations for libraries [2]. For the CAPM project, patrons were queried regarding hypothetical choices (related to potential features of CAPM) through an online survey. The survey design was developed with the help of a workshop that convened economists and librarians and was pre-tested with a small sample group. The usefulness of this survey results and overall valuation analysis will be assessed during a workshop in May 2001.

4. FUTURE WORK

Both the engineering and valuation activities of CAPM will be extended. We will test the retriever robot at Moravia Park and explore the development of page-turning devices. There are page-turning devices but they are used in controlled settings, such as for patients undergoing rehabilitation [1, 4]. We will investigate and build prototype page-turning devices that will accommodate a range of paper types.

The valuation analysis will be augmented in two ways. We will conduct a post-survey investigation to assess the effectiveness of online surveys. Additionally, there is some evidence that library patrons have difficulty with dollar values for library services [5]. Consequently, we will explore the use of multi-criteria decision-making techniques (MCDM) to evaluate CAPM. The MCDM techniques will involve assessing patrons' and library

administrators' reactions to questions involving tradeoffs of service attributes (such as time) and comparing these reactions to questions involving dollar values. This exploration will provide a more comprehensive evaluation of CAPM and a generalized framework for evaluating library services, both from the perspective of patrons and library administrators.

5. CONCLUSIONS

The CAPM Project represents an innovative response to fundamental issues related to digital library development. The system will provide an automated system for on-demand and batch scanning of materials in off-site locations. Additionally, the valuation analysis will result in a rigorous assessment of CAPM and a general framework for evaluation of library services.

Other libraries could adopt CAPM either by implementing a CAPM system in their facilities or by shelving their materials in a facility with CAPM or by accessing CAPM-scanned materials through the Web. Even at this intermediate stage of development, libraries within the United States, Europe and Asia have expressed interest in CAPM for both research interest and potential implementation.

6. ACKNOWLEDGMENTS

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