History of Technologies and the Library

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Abstract – Libraries have a long history, leading up to the establishment of public libraries. In the earliest times, there was no distinction between a record room and a library. In this sense, libraries can be said to have existed for almost as long as records have been kept.1 As early as the third millennium BC, a temple in Babylonia was found to have a number of rooms filled with clay tablets, suggesting a well-stocked archive, or library.

Key Words; Establishment, Millennium, Archive.

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INTRODUCTION

The evolution of those libraries had a close relationship with the invention of new technologies. Historically, libraries have depended on available media to build collections. They were searching for a medium that maximized two main requirements: durability for permanence and relative ease of use.2 The perpetual trials still continue, and this historical aspect of media is important for the longterm plans of today's public libraries.

REVIEW OF LITERATURE

An ancient medium of baked clay tablets, which was used in the aforementioned earliest library in Babylonia, is solid, but clumsy. They took up a lot of storage space, deteriorated rapidly, and were easily damaged. Stone provided permanence, but only a **highly** skilled worker could inscribe records on it over a long period of time. It also took up a lot of storage space, and it could neither be modified nor easily transported. Because of those constraints, stone as a medium was largely replaced **by** the other media before the Roman era. However, it is still valued for its permanence **by** modern society for inscribed stone monuments. Through the ancient Greeks and Romans, scrolls of papyrus, vellum and parchment became available, and the choice of which to use was determined partly **by** purpose and partly **by** economic considerations. These media had flat, flexible surfaces which more readily accepted handwriting with ink, and could be stored more easily than clay or stone **by** rolling or folding. Papyrus was fragile if bent, but the raw material was easily available and its size was adaptable. Vellum and parchment from animal skins were stronger than papyrus, less susceptible to dampness, and could be folded as well as rolled. The idea of a library in early times is illustrated **by** the greatest library in antiquity, Aristotle's library, which was apparently intended to collect the whole body of Greek literature. The library had a complex of lecture halls, study rooms, cloisters and an astronomical observatory. In the second century, paper was invented in China, and its use spread slowly westward over the next thousand years.

Codex,1 which is the earliest type of manuscript in modern book form, was developed along with the rise of Christianity, with its demands for portable books for missionary activities. Compared to scrolls, a codex could conveniently contain longer texts because of its compactness, ease of opening, and use of both sides of the leaf. It is a good example of the acceptance of information storage medium which is both effective and appropriate. Due to the general adoption of the codex, the materials to build library collections changed. Papyrus was never used for codex, as it is fragile when folded. The use of vellum and parchment gradually shifted to the use of paper. However, on the whole, paper was used for less formal purposes, and vellum or parchment was still common for formal or important documents through the fifteenth century.

MATERIAL AND METHOD

In the 1440's, a method of printing using movable type was invented **by** Gutenberg. The most suitable surface for imprinting proved to be paper, and that caused parchment and vellum to disappear from use as the standard material for books and documents. Printed books could be

produced in large quantities, and therefore were cheaper and more widely available than the previous handwritten books. Formats became smaller and books became lighter and more portable. Gutenberg printing on codex was used without important changes until the twentieth century.

The invention of photography in the nineteenth century brought microphotography and then microfilm into general use for libraries around the 1920's.1 It saved a considerable amount of space, and made it feasible for even a small library to store, for example, an entire set of newspapers or periodicals. Microfilm also erased for the first time the constraint of paper technology for making copies. It was also the first medium which could not be directly read, and required the mediation of a machine. Later, in the 1990's, microfilm was largely replaced **by** digital media.

Microphotography Reading Machines in the **1950's.2** during the early 1960's, computers were used for the first time to digitize text in order to reduce the cost and time required to publish two academic abstract journals. **By** the late 1960's, this digitized information constituted a new type of William F. Birdsall, "The Myth of the Electronic Library: Librarianship and Social Change in America," 1994, **p. 10.**

Paul Dickson, "The Library in America **-A** Celebration in Words and Pictures," **1986, p. 17 2.** information source. However, this was started mainly **by** the database service industry, which is outside traditional information repositories such as libraries.

Recently, the Library of Congress announced its intention to have five million documents digitized **by** 2000.1 According to Bob Zich, the director of electronic programs of Library of Congress, the single most important value of digitization is that it allows major portions of its collection to be available to the entire United States via CD-ROMs and online access.2

The digitalization of information not only saved time, but also brought greater convenience such as quick access to remote resources, and word searching from whole documents. However, like microfilm, the information cannot be read directly and requires the mediation of computers to retrieve, whose systems change from time to time due to innovation, and are not always compatible. The appropriateness of media type for library collections was not an absolute, but a relative choice in terms of its suitability for a purpose as media continued to evolve over time. (Fig. **10)** In that sense, the current dominating combination of paper, printing, and codex can be regarded not as an ultimate style, but as a transitional solution. In the middle Ages, monasteries performed the functions of libraries. As well as libraries, monasteries had rooms called scriptoria where monks copied books **by** hand to add to their collection. They were in charge of reproduction and preservation of the books. Hand copying was so slow that a monastic library, which had **600** volumes, was considered fairly large,' and even the largest libraries had only about two thousand volumes.2

Book Reproduction **by** Hand Copying **by** Monks.3 The invention of movable type printing **by** Gutenberg in the 1440's had a profound impact on society. Before the invention of printing, the number of manuscript books in Europe could be counted in the thousands. However, **by 1500,** within fifty years of the invention, the number of the books came to more than nine million.' Scholars, who had not seen more than a few scores of books in their lives before, were able to consult libraries with thousands of printed books throughout Europe. That easier access to the growing store of knowledge **by** those scholars accelerated the creation of even more books. Gutenberg's invention of printing provoked the first information explosion. It seems a sense of information overload had already developed in the sixteenth century the idea of a "reading wheel" designed **by** Agostino Ramelli, an Italian engineer in **1588.** His idea appears to attempt to cope with the information overload. Ramelli described it as follows: "With this machine a man can see and turn through a large number of books without moving from one spot. **"2**

Reading Wheel to Cope with Information Overload in **15883** Since then, the growth in printed materials escalated at ever-increasing rates. For example, between **1960** and **1987** alone, the number of volumes published in the United States increased **373** percent, from **15,012** to **56,027,** and the world's book title output increased **213** percent over the same period. The once prevailing attempt to collect all available information (books) in one library was becoming infeasible. Yet, libraries kept increasing in size, and they tended to be judged **by** their book capacity, which was a great source of pride. It is expressed, for example, as in "The **$26** million project gave Boston a ten-story building with **550,000** square feet of floor area and a book storage capacity of four million volumes, the largest area and storage capacity to that **time."3** The image of the libraries became one of massiveness. The upper right image of seven layers of stacks in the New York Public Library, which opened in **1911.** The upper left image shows a magazine advertisement indicating the Library of Congress as "the world largest **'IN'** box". The lower right image shows the overload at the Birmingham Central Library in Great Britain in **1962.** In **1965,** the Detroit Public Library was giving its workers roller skates so they could move more quickly down the 250-foot long stacks. The center image of Fig. **13** was a film scene inspired **by** this fact, which suited the public perception of libraries. Next to

Gutenberg's invention, the current significant information explosion was made possible **by** the innovation of digital and networking technology. The recent impact of the information explosion brought about **by** technology seems even larger than the one from Gutenberg's historic invention.

There is not an accurate estimate of the current amount of information available. However, David Lew said in **1997** of the recent information explosion that "More information has been produced in the last **30** years than in the previous **5,000."1** According to Michael Lesk, in **1997,** if only English-language materials from the last **18** months were counted, World Wide Web sites already have more text available than the Library of Congress. Unlike in the time of Aristotle's library, the growth of information has made the once prevailing idea of collecting all available documents in one library infeasible. Instead, following on the heels of digitalization technology which drastically reduced the physical size of information storage, current network technology is allowing information stored outside of the library building to be accessible.

CONCLUSION

In its history, the size of the libraries kept increasing along with the growth of the amount of information, and the emphasis was on massive capacity, though, at a certain point, the attempt to include every book around became far from feasible. However, it now seems that information technology has brought a chance for public libraries to give up emphasizing the massive image they created in the past, as networked information resources can supercede even the most massive collections found in library buildings. Throughout the evolution of libraries caused **by** technological innovation, one of the most significant transitions is that information is becoming free from locational constraints. (Fig. 14) This transition is made possible **by** the aforementioned mass production and the physical transformation of media.

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