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BIBLIOLOGICAL ROOTS OF SOCIAL NETWORKS AND DISTANCE LEARNING[2]

Abstract: The research focuses on library and information science pioneer Paul Otlet's contribution to the philosophy of contemporary social networks and distance education. Research methods: systemic-medialogical approach to previous research in book science, library, information and documentation science, retrospective discursive and desktop analysis of documents, studies, and monographs. The study provides a chronological examination of the argumentation path followed by Otlet with regard to the document of "book" as a basic technology of the World Wide Web and the remote access to knowledge. The logic of the development of his projects has been established: by means of expanding the definition of "book", he projects its future transformations in a descending gradation – from the "Universal Book of Knowledge" (in French: Le Livre universel de la Science) through a "machine to think with" (in French: machine à penser) to a breakdown into "Biblions" – the smallest building blocks of recorded knowledge. It has been confirmed that Otlet has laid the foundations of the concept of the online hypertextual environment and the multi-sensory interface by predicting the emergence of "sense-perception-documents" which can be read remotely. Paul Otlet's contribution to the design of the Internet and online learning has been identified in the creation of what he envisaged in 1908 and 1934 as a hybrid reading room with a telephone and a TV set, and for remote servicing of learners by human librarians and bibliographers working with classified and catalogued "ontology".

Keywords: Library and Information Science, Bibliology, distance education, online learning, knowledge, books, social networks, Internet, semantic Web, Universal Decimal Classification (UDC), Paul Otlet, Mundaneum.

INTRODUCTION

It is a fact that published research on the history of technology makes no mention of a key name: Paul Otlet, founder of the science of documentation and pioneer in library and information science. 2014 saw the publication of one of the latest books in the field: "The Innovators: How a Group of Hackers, Geniuses, and Geeks Created the Digital Revolution" by Walter Isaacson (Isaacson, 2014), which also ignores innovator Paul Otlet. However, in the same year his name appeared on the cover of American Alex Wright's long-awaited book "Cataloging the World: Paul Otlet and the Birth of the Information Age" (Wright, 2014). The author is a follower of Professor Warden Boyd Rayward, re-discoverer of Paul Otlet. Since 2008 he has been in Mons,

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Аутор је ванредни професор на Универзитету у Софији. Бави се библиологијом, темама читања, књиге и медија са библиолошког, психолошког и социолошког аспекта. – Напомена ур.

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Belgium, where he has been researching the raw archives of the "precursor of the Internet" – the "Mundaneum" organization founded by Paul Otlet and Henri La Fontaine. It is precisely to Wight that we owe the newest findings on Otlet's contribution to the evolution of media and technology for 21st-century education.

SUBJECT OF THE STUDY

The prominent Belgian bibliologist and founder of the documentation science Paul Otlet (23 August 1868 – 10 December 1944) does not cease to amaze us even almost eighty years after his death. Mocked and slandered in life, abandoned by his supporters, neglectfully isolated from the history of science, unknown to contemporary communication and media researchers, today he is resurrected from oblivion. Although interest in his contributions to civilization has been on the rise over the last 25 years, many of the documents from his "Mundaneum" which have survived the Second World War still remain to be studied. The scientific intrigue is maintained by the yet unknown history of the "Mundaneum" project as well as by Otlet's as of now unread diaries and letters from the last quarter of the 19th century and the first half of the 20th century. A significant number of facts from his personal life remain unverified. Shrouded in uncertainty are the overall panorama of his relations with representatives of the political, scientific, and social elite of different countries, the impact that positivism, universalism and centralism have had on him, as well as his impact on the development of European modernism at the turn of the 19th–20th century. "Mundaneum", which reopened in 1998 but as a museum, announces on its website (http://www.mundaneum.org) that a mere 10 percent of the materials from its archives have been processed. Bibliographers from the new "Mundaneum" in the town of Mons, Belgium, estimate that the digitization of every single sheet of paper of the documentary treasury collected by its two owners Otlet and La Fontaine but hidden from the sight of humanity after their deaths is going to take another 100 years.

Over the last 20 years Paul Otlet's nicknames have multiplied with the addition of "the missing link in the history of communications", "the Samurai of the Web", "the Prophet of the Internet", "the Father of Web 1.0", "the Inventor of the Paper Google", etc. Given the new findings on his vanguard role in information, communications and media sciences, it is difficult to explain how come historians of the Internet are not familiar with a whole page in the history of information technology.

The subject of the current presentation will be the origins of contemporary social networks and distance learning in Paul Otlet's concept for universal documentation from the beginning of the 20th century as well as the contribution of his projects to the future of data organization and transmission on a global scale. Otlet's definition of "document" is well-known albeit reticently acknowledged by his contemporaries due to its abstractness and breadth: "an inanimate object containing traces of human thought and activity" (Otle, 1931). It is only today that this definition has been vindicated in communications, media and library sciences.

THE INTERFACE PROBLEM AT THE END OF THE XIX CENTURY

As early as 1892 when he delivered his first bibliographical lecture, Paul Otlet seemed to have been aware of the problem posed by the interface. In a text entitled "Something about bibliography" he tested the idea of how one might obtain more effective access to the knowledge contained in books than the physical format of the book allowed: "The external make-up of a book, its format and the personality of its author are irrelevant as long as its substance, sources of information and conclusions are preserved and may become an integral part of the organization of knowledge, an impersonal work created by the efforts of all." (Otlet, 1990, pp. 11–24). Later Otlet would call this impersonal work "Universal Book" and the substance inside it (with reference to the future content industry) – "media-neutral content". Otlet would go back to the idea about the modification of the interface of the book in many of his subsequent lectures and publications dedicated to the transformations and substitutes of the book. It would lead to his experiments with textual, visual, audio and multimedia formats (Otlet, 1911; Otlet, 1913; Otlet, 1934, pp. 216–247). Otlet was fully aware that reconceptualising the book format as the basis for a new kind of collaboratively created form of knowledge would require a rethinking of the way in which we are to interact with the processes and techniques of knowledge production and dissemination. This interaction implies what we know as the interface problem (Van den Heuvel, & Rayward, 2011).

THE BOOK – BASIC TECHNOLOGY OF THE GLOBAL WEB

Paul Otlet first spoke in depth about the function and transformations of the book at a conference in Brussels in 1908: "The book is a generic concept for all forms of printing which altogether constitute the materialized memory of humankind in which day after day, hour after hour are recorded facts, ideas, actions, feelings, dreams that have affected the human mind. [...] A book can be defined as any moving object of a substance in the interior or exterior of which a person marks, using signs, something for himself, for sharing with others and for preserving memory" (Le Musée du livre, 1908). Such a description captures simultaneously the synthetic nature of the bearer and the purpose of the text – the book as a physical body and the book as content.

In "The Book in Science" (1913) Otlet makes a bold case for the book as a medium, i.e. as the first of all forms of communication in which "thoughts" and "ideas" are registered, including magazines, photographs, diagrams and schemas, gramophone records, films, etc. For Otlet images, schemas and diagrams not only present the accumulated data more concisely and informatively; their advantage over books containing written text stems from the fact that they constitute the grammar of the universal language for the exchange of knowledge. "Each author should be considered as co-operating in a large Universal Book dedicated to the integral presentation of knowledge and intellectually formed as an ensemble of the different publications" (Otlet, 1913, pp. 379–389). The universal book of knowledge (in French: Le Livre universel de la Science) as he refers to it, will be the totality of all published works. Collective books are made up of individual books. Rather than an encyclopedia limited and determined by a particular date, the Universal Book of knowledge would be "an unlimited work, always up to date, always growing, concentrating, absorbing, synthesizing, systematizing every intellectual product from the moment it is born" (Otlet, 1913, pp. 379–389).

In his 1911 lecture on the future of the book and of bibliography, Otlet returned to the proposition he expressed in 1892 and in subsequent publications: "The arbitrary division into lines and pages of the book in its present format does not at all correspond to the presentation of ideas" (Otlet, 1911). He envisioned the emergence of a future format of the book in which each intellectual element not corresponding to a physical element will create a structure that will make possible any combination of ideas, notions and facts. He suggested that this process can operate in such a mechanical fashion that in the future the book will truly become a machine to think with (in French: "machine à penser") (Otlet, 1911). The first step toward forestalling that future would be to strip each book of whatever is new and adds to knowledge and to collect these information elements on separate cards (catalogue card index) that build the contents of the world Book. In most of his publications on the future of the book and of bibliography, Otlet repeatedly uses the word "Book" (in French: Livre) with an initial capital letter in order to emphasize the new, ideal form that he was envisioning – the book as a basic technology of the global web and of universal documentation; the book as a medium for communicating the world.

If in his earlier writing Otlet had used an expansive definition of the concept "Book" encompassing all the varied forms of recorded knowledge, in 1934 he proposed an interesting neologism: "Biblion". Similar to the way physicists treat the atom, and biologists – the individual cell, Otlet claimed to have discovered the secret to breaking down recorded knowledge into its constituents and then re-assembling those constituents into new forms – "Biblions" (Otlet, 1934). Unlocking the potential energy of these building blocks would require a new kind of science: Bibliology. As opposed to bibliography which merely describes the contents of books, Bibliology as proposed by Otlet aspires to a higher purpose: aiding the production and dissemination of all kinds of recorded knowledge (Otlet, 1934). The bibliologist would have to ensure access to every domain of human knowledge, create new works, and "trigger" inventions that contribute to human knowledge.

In fact, throughout his life Otlet had been working on expanding the definitions of information activity so as to extend the boundaries of expression, reading and comprehension.

SENSORY SPECIFICATION OF DOCUMENTS AND BOOK SUBSTITUTES

From the perspective of contemporary information and communication science, it is crucial to compare Paul Otlet's views on the organization and distribution of knowledge with currently existing technology and its extensions in the contemporary digitalized society. In order for these comparisons to be effective, it is important to gain an understanding of his ideas of book substitutes. Their evolution can be traced chronologically below (Fig. 1).

As early as 1901–1906 Paul Otlet announced at scientific events that the printed book could no longer remain the only bearer of knowledge; he spoke of "new forms of book" and defined some of them as photographic book (in French: livre photographique), microphotographic book (in French: livre microphotographique), photo-micrographic book (in French: livre photomicrographique), micro-photo book (in French: livre microphotique). By 1909 he already insisted on referring to the new media as "book substitutes" (in French: substituts du livre): visual book (in French: livre visible), sound book (in French: livre sonore), audiobook (in French: livre audible), sensory or tactile book (in French: livre tangible, livre tactile). In his 1934 "Treatise on Documentation: the Book about the Book" (in French: "Traité de Documentation: Le Livre sur le Livre") Paul Otlet went so far as to proclaim the emergence of the ebook, or the telecommunication book, using the terms "projected book" (in French: livre à projection or bibliophôte) and "televised book" (in French: livre téléphoté).

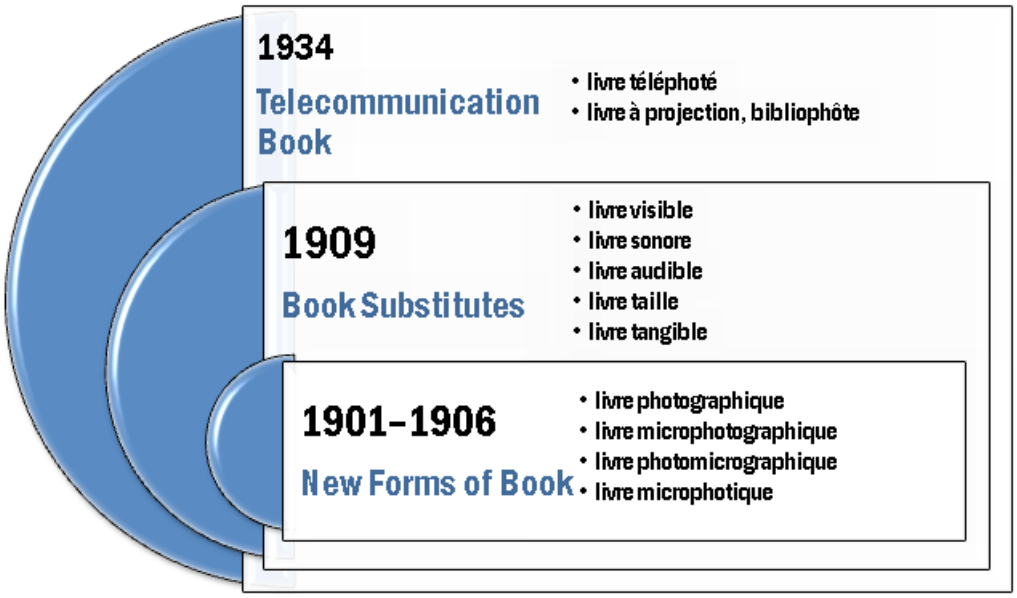

Fig. 1. *Evolution of Paul Otlet's ideas about the new forms of book.*

A revolutionary fact for those times is that parallel with the development of the new forms of book, Otlet had been researching the possibility for something to replace the printed paper book which he considered to be mere "ideas in a container"; he believed that these ideas could reach their target recipient in better and more effective ways. Otlet was convinced that pictures would ultimately prevail over written text, which would have a profound impact on the modernization of the book. All of these are forms of documentation, and they are mutually complementary. Media such as the telegraph, telephone, radio, television, cinema, sound recordings as well as museum objects have similar aims to those of books – information, telecommunications – but they achieve them differently. Otlet firmly believed that they could be brought together under a collective name, and he proposed the term "book substitutes". The book, concluded Otlet, was only one possible means to achieving the aim. Other means existed that were becoming more widespread and that eventually would meet the needs of documentation more effectively than the book, ultimately becoming substitutes for the book (Otlet, 1934).

For the first time in 1901, Otlet hinted at the tendency displayed by the book for moving towards another form – photographic, not merely as illustrated text but as entirely visual text. He developed the idea further in collaboration with Robert B. Goldschmidt in their 1906 joint publication "On a new form of the book: Microphotographic book" ("Sur une forme nouvelle du Livre: Le Livre Microphotographique"), where they offered the following formulation: insofar as the history of book remembered its successive incarnations from carved in stone and inked on pottery through drawn on papyrus scrolls, written on parchment and engraved on wood, to reproduced by printing and lithography on paper, in those days there was a tendency for the book to be morphing into *photographic form. So far that development had been limited to illustration but such "pictorial" restraint was not justified according to the authors. The development could be extended on the text itself (*Otlet, 1906). In the same year the study was presented at a conference in Marseille and members of the assembly adopted a resolution in which Goldschmidt in conjunction with the Institut International de Bibliographie offered practical procedures for creating and reading documents (text and illustrations) using the methods of microphotography and cinematography. "Knowledge Machine" by Emanuel Goldberg and later "Memex" by Vannevar Bush would implement those ideas independently of one another.

Otlet elaborated on his ideas about the substitutes for books in his lecture "The function and transformations of the book" ("La function et les transformations du Livre") delivered on 14 November 1908 at the Book House (Maison du Livre). It was then and there that he predicted that the most important transformations of the book would not take place in its conventional form but in the form of its substitutes: "les substituts du Livre" (Otlet, 1909). Content could easily be expressed in an alternative way, other than as a book: mostly as an audiobook (in French: livre audible). Otlet recognized that the telephone was an important means of transmitting sound, and that the gramophone was an important means of storing and reproducing sound, including words, while technological development in 1908 already showed that the most radical transformation of the book would result in the invention of a wireless form: "[...] based on remote data transmission, without any spatial or directional limitation: by means of waves which are capable of transporting sounds or images infinitely" (Otlet, 1909). In his 1934 "Treatise on Documentation: the Book about the Book" (in French: "Traité de Documentation: Le Livre sur le Livre") he acknowledged that the bearers of audio information represent "*auditory documentation*" (Otlet, 1934). He was explicit that following the invention of radio, "auditory documentation" should take a place of equal standing alongside visual and graphic documentation.

However, this was just the beginning. The "Treatise on Documentation" introduced the concept of the complete sensory specification of documents. It acknowledged the bearers of tactile information as "*tactile documentation*". It acknowledged "the emergence eventually of what he called tactile, gustatory, and olfactory documents – the "sense-perception-document" – in association with the other kinds of document" (Rayward, 1994).

In this sense, Otlet's treatise also laid the foundations for the concept of *hyper-documentation and multisensory interfaces. It established that documentation developed at different stages. The last and final stage included the "sensory perception of the document" which was at the core of what he called "hyper-documentation". The sensory perception of documents is a combination of objects and ideas. Visual and auditory documents are complemented by tactile, gustatory, olfactory and other kinds of documents. What remains unknown and imperceptible at this stage, will become known and tangible. Otlet suggested that even what had qualified as irrational and had been neglected, would find its expression in ways which are yet unforeseeable* (Otlet, 1934). The action would definitely be taking place at the stage of hyper-documentation.

FROM A VISUAL DOCUMENT TO AN INFOGRAPHIC

Paul Otlet can also be described as the innovator who streamlined the visualization of scientific data through infographics – the most promising syncretic communication genre as of present, with increasingly broader application in science and world media. For the needs of journalism, infographics were proclaimed as a promising tool as early as 1911 by Hearst newspaper editor Arthur Brisbane who appreciated the information value of pictures and persuaded his colleagues to use them more frequently by saying, "Use a picture. It's worth a thousand words" (Gardner, 1911, p. 18). An infographic is a single-page format of a visual document in which important data is compressed in a combination of pictures and written text, representing a unique synergy between art and science. Built following the same principle and invented by Otlet in 1920, "Encyclopedia Universalis Mundaneum" is a paradigmatic example of visual rhetoric. The encyclopedia consists of unrelated thematic boards in standard format (65 x 65 cm), covered with drawings, diagrams, and pictures. Each board summarizes the knowledge available on the topic from all media (books, magazines, archive dossiers, photography, etc.).

In 1928 these info-boards became part of Otlet's concept of a new encyclopedia – Atlas of Universal Civilisation ("Atlas de la civilisation universelle") (Otlet, & Oderfeld, 1929). It presents the territory, people, and culture of each country on "synthetic boards" (in French: tableaux synthétiques) or summary canvases showing the key data on each particular civilisation. The boards are mobile and changeable but come in different standard format (21.5 x 27.5 cm), and carry a UDC classification index and all relevant metadata according to contemporary standards in the content industry. The Atlas was approved by the International Bureau of Education in Geneva (Bureau International d'Education) for its purpose to reinforce learning according to the principles of world peace using the modern systematic approach to synthesis and visualization typical of Otlet's infographics.

These boards are a form, undoubtedly new to 20th-century science, which presents ideas and knowledge using combined tools and creolized text reminiscent of the approaches of contemporary multimediality. Otlet's infographics are further proof of his great care and concern about the easy and unrestricted dissemination of knowledge. Importantly, he initiated a creative collaboration to develop the Universalis encyclopedia: he collaborated with international experts for writing the content of the board on each topic, and he worked with artists to create pictures of the content, which were going to make it accessible to as many users as possible. Otlet's contribution in the field of schematization, visualization and multimediatization of knowledge deserves special research. Furthermore, even though infographics were widely perceived as a means of visual communication in 1982 and nowadays have evolved into animated infographics, their development is still too far from the cognitive patterns and knowledge about the visual information exchange.

FROM AN ELECTRIC TELESCOPE TO A RADIATED LIBRARY

When in 1934 the Mundaneum project was discontinued, Otlet set out to write a book where he would argue in favour of his new invention – the structure of a radiated library (in French: livre téléphoté). Cinema, phonographs, radio, television: all these tools recognized as substitutes for the book would ultimately become a new book, the most powerful creations for the spread of human thought. These would be the broadcasting library and the televised book, concluded researcher Alex Wright (Wright, 2007; Wright, 2014).

Initially, he envisioned separate machines but if their productivity was to be enhanced, Otlet foresaw that they would have to be combined into a single device. Looking even further ahead, he predicted the possibility of including television, sound recording and even tactile documentation that would transmit gustatory and olfactory information. Overall, Otlet was fascinated with the possibilities offered by machines. He wrote: "We can imagine an electric telescope which retrieves pages from books in the big libraries and then projects them remotely in a telegraph room" (Otlet, 1934).

His vision of what was going to happen at the Mundaneum deserves an unabridged quotation due to its grandiosity of scale reminiscent of the novels of Herbert Wells and Jules Verne:

> *Here there are no more books on the desk. Instead, there is a screen connected to a telephone. All the books and materials, and all the space necessary for their cataloguing and processing, together with all the catalogues, bibliographies and indexes are in a large building over there. (…) From there I can get the page onto the screen so that I can read the answers to questions asked over the telephone. The screen can be divided into two, four or even [ten] sections if there are multiple texts to be displayed simultaneously; there would*

> *also be an audio speaker if a material is necessary to supplement the text. Wells would have loved the idea. Although it may sound utopian today because such a thing has never existed, there might come a day when our efforts would make such incredible perfection possible* (Otlet, 1934).

Otlet called the library service offered to readers "a televised book" (in French: livre téléphoté). He further explained that the screen could be conveniently split into sections (similar to contemporary "windows") so that several books could be displayed simultaneously. "Thanks to television the problem will soon be solved in essence because it is now scientifically possible to retrieve images remotely, wirelessly. One can imagine an electric telescope for reading books at home, while pages requested in advance would be displayed at "teleg" halls in large libraries. This is going to be the "telephone book", Paul Otlet wrote in 1934. (Otlet, 1934). Anyone should be able to call a radiated library and obtain information in the desired thematic field. Librarians would locate the books that match the query and send images of the pages directly to the reader's TV set. It is interesting to note that in this context Paul Otlet referred to the librarian as "Semis Servorum Scientiae" – "a Servant of Servants in science", and he firmly believed that librarians had to possess comprehensive general and professional education as gaining an understanding of the scientific foundations of the profession would educate and elevate them, forcing them out of the narrowness of personal experience and the isolation of their generation, and contributing to the "socializing" of the human mind.

VIRTUAL NETWORK BASED ON "BOOK-MACHINE"

Otlet voiced his concern as early as the 1930s: "Despite advances in scientific thinking and bibliographical materials, ways of recording knowledge have not progressed much" (Otlet, 1934). To a great extent, human knowledge remained in printed books. Yet he believed that the great transformation was going to take place. Towards the end of his treatise, he revealed his vision of the future knowledge transfer based on a machine working as a single organism and, ultimately, as a means of spiritual transcendence.

In his book "Cataloging the World", Alex Wright pays special attention to that eccentric machine (Wright, 2014). It turns out that Otlet relied on the function of the book (once again in the broadest possible sense of the term) as a "book-machine" – a node in a larger apparatus which would reinforce the evolutionary progression of human knowledge (Day, 2001). The book-machine functioned as a "mechanism" or "dynamism" charged with potential energy. This energy flowed through a vast network (in French: Reseau), subjecting the ideas that poured into or were allocated among book-machines to implicit associations. The big machine for intellectual work is coming right in front of our eyes, he wrote. To describe the mechanism of operation of this machine, he turned to other familiar points of orientation such as the railways, the post, the telegram, telephone, radio, and other participants in the information flow within the industrial infrastructure.

Although in the 1930s the world was yet quite unprepared for the advent of non-material channels for the global dissemination of knowledge, a canvas from the "Encyclopedia Universalis Mundaneum" provides Otlet's successful visualization of the idea of *teleconferencing* in combination with other media such as the gramophone, cinema, radio and television. In his "Treatise on Documentation" he suggested the use of telephone, telephotography and radio-telephotography for real-time communication among scientists dispersed at conferences all over the world (Otlet, 1934). Otlet imagined that one day the global network, structured in a similar fashion, would allow university professors to broadcast their lectures to a remote

audience and even allow the audience to interact by means of asking questions over the telephone. Similarly, international associations could hold remote meetings using audio and video (what we call "virtual conferences" today). This is de facto a *multimedia telecommunication* project but given the era, sound and image is still transmitted over cable (Van den Heuvel, 2008, pp. 141–142).

The network would require a high degree of standardization in terms of protocols and administrative processes. Just as railways, post offices and electricity companies benefit from universal standards, the global network (in French: Reseau Mondial) would require an international technological standards agreement.

Metaphors for the machine derive from the concept of the book as a unit of accumulated energy which contains condensed thoughts that would be able to expand in the brain. The book-machine would function within a larger system simultaneously as a "battery" – an externalized knowledge repository, and as a "transformer" – a means of acquiring new knowledge within the larger ecosystem (Day, 2001). As these small machines multiply by the patterns of repetition and reinforcement (immanent to the dissemination of knowledge), their entirety would be gradually filling up the larger machine. In this way, the totality of human civilization could be interpreted as a giant knowledge machine: The Mundaneum (Otlet, & Goldschmidt, 1990, pp. 204–210).

This universal knowledge machine would contain a number of submachines, each of which would ensure the open and never-ending synthesis of all available information on a particular topic. Ultimately, these collections could be compressed into memory units in minute proportions so that each is part of the whole and the whole is connected to each part – an idea heralding the *networked personal computer* in multiple ways. Otlet's list of technical tools includes a portable typewriter which can fit into a briefcase, a voice recorder, a calculator, and a "selector device" for retrieving information stored on punched cards (it is based on the work of Herman Hollerith who invented punched cards in 1889, and later his company adopted the index card technology of Melvil Dewey's Library Bureau and became IBM). Over time, Otlet had established that a single device could integrate the most important auxiliary functions of intellectual activity: reading, writing, viewing pictures, examining archives, attending "tele-lectures" remotely using a television screen, copying documents and classifying them automatically, retrieving separate items of information from documents, modifying part of the information as required, sound recognition and recording, and even automatic interlingual translation of documents. These functions are performed by contemporary personal computers in a distance learning environment.

ANTICIPATING THE INTERNET

That Internet as a concept was proposed in the 1930s by Belgian bibliographer and bibliologist Paul Otlet who envisioned it as further development in telephone communication and televisi-on, came as no surprise to historians of science. The official website of the "Mundaneum", and its section on the media coverage of the institution in particular, contains a bibliography list of over 20 titles that refer to Otlet as a harbinger and forerunner of the Internet, Google, online social media and the networked organization of knowledge as a whole. Leading promoters of that universal recognition are major world media such as Le Monde, Der Spiegel, Wall Street Journal, New York Times, Live Science, Fox News (Le Mundaneum dans la presse internationale, 2015).

Researchers on Paul Otlet and Henri La Fontaine have praised the bibliographical miracle of their "Mundaneum" (1910–1934) as "a prototype of the Internet and a tool for achieving world peace" (Füeg, 1998, pp. 105–114). A joint publication by American Warden Boyd Rayward, Dutch Charles Van den Heuvel, and Belgian P. Uyttenhove has established a relationship between "Mundaneum and the origins of the Internet in Europe" (Van den Heuvel, Rayward, & Uyttenhove, 2003, pp. 16–28). Hungarian author G. Rózsa regards it as "a phenomenon in contemporary digital culture" (Rózsa, 1996).

Paul Otlet's contribution to the origins of the Internet was also discussed in the 2012 documentary "The Man Who Wanted to Classify the World: From the Index Card to the Internet" (L'homme Qui Voulait Classer Le Monde, 2003) dedicated to him and his work. The annotation of the film in the global library catalogue WorldCat makes a mention of the fact: "Barely known in his own country, Paul Otlet is considered today by historians of communication as one of the precursors to the Internet" (Levie, 2006).

Otlet did anticipate the Internet. He wrote: "The universal information and documentation network can connect all private documentation organizations. We are about to witness the creation of an enormous intellectual machine... This technology would indeed be a mechanical, collective brain..." (Otlet, 1934).

Otlet's ideas about the internationalization (globalization) of knowledge initially took an institutionalized form: the network of the International Institute of Bibliography, the Alliance of international associations, Mundaneum or, Palais Mondial. The next step was to connect these buildings with their international collections and national representative offices into a *global network (in French:* „le réseau"). This network would link the world's citizens in a hierarchical structure from a personal office, via many different spheres of the Mundaneum to the World City (in French Cité Mondiale or Cité Internationale), which would be an architectural reality as depicted in an infographic from the Encyclopedia Universalis Mundaneum (Document No. 8504/1930s) (Van den Heuvel, 2008, pp. 141–142) as well as in a recently published photo of 1943 showing Paul Otlet himself in front of a model of the World City (Wright, 2014).

Essentially, Otlet did not propose the idea of the "web" or the network structure of the World Wide Web (this invention undoubtedly belongs to Briton Tim Berners-Lee and another Belgian, engineer Robert Cailliau); what he did, though, was describe the philosophy of the Internet – the creation of a global network of documentation. As envisaged by Otlet, its mission was to guarantee access to any information to any person from any country. World knowledge had to be collected into a "universal documentary encyclopedia". The Belgian assigned the strategic role for its maintenance to libraries which would be responsible for the global registration, collection, systematization and storage of documents. Otlet entrusted the Documentary Union of Governments with the entire political and financial responsibility for the "global network" project, working on its plan from 1905 until his death. He used this concept to emphasize the idea that the bibliographic methods enhanced in "Repertoire bibliographique universel" could improve administrative and government communication beyond recognition; that it would be much easier to organize and store the intellectual output of public administrations according to the rules of the Universal Decimal Classification (UDC) of human knowledge and that "the international administrative body" could function harmoniously only in a global network (in French: réseau mondial), similar to the Internet, as interpreted by contemporary researchers (Wright, 2014).

Paul Otlet is not central to the Anglo-American history of telecommunications but he did lay the foundations of a plan of a global network of "*electric telescopes*" *retrieving inter- and hyperlinks of text, images, audio and video files accessible from any corner of the world and available to individuals directly at their homes via a platform he called* "Réseau Mondial" in French, or "Global Network". Was Otlet's "electric telescope" really a computer, asks researcher Alex Wright. If we take the word "computer" which the "Merriam-Webster" dictionary defines as a "programmable electronic device", then certainly not. However, if we take Ludwig Wittgenstein's view that a word is defined by its use, then Otlet's "electric telescope" does indeed seem to resemble what most people would refer to as a computer: that is, a connected device for retrieving information over a network (Wright, 2007).

Although there is no direct written evidence of his predictions about what would become the Internet in future (i.e. none of the pioneers of the Internet has quoted him), his contribution to a global network of hypertext documentation has been acknowledged by those who actually implemented his plans. Apparently Otlet's ideas have been "circulating" into laboratories and offices over the past 70 years.

BIBLIOLOGICAL ROOTS OF HYPERTEXT, SOCIAL NETWORKS AND THE SEMANTIC WEB

Otlet's sketches, projects, and predictions about the Internet, about social networks, hypertext, the cloud systems, the semantic Web, and inevitably, about the book – are more relevant today than ever.

Paul Otlet also predicted the possibilities of the *social networks*. While he likely would have been embarrassed by the frivolity of an environment such as Facebook, Alex Wright believes, Otlet nonetheless foresaw some of the most productive aspects of social networks, which allow users to "participate, applaud, give ovations, sing in the chorus" – the possibility of working together to collect and organize documents, to form remote creative collaborations, to deliver distance learning, and trade in messages.

Otlet's version of *hypertext* has quite a lot of advantages over the concept of the contemporary global network. He demonstrated the possibility for existence of hyperlinks of the most intelligent kind. If present-day Internet links offer a more or less passive connection between documents, the *mechanics of links* envisioned by Otlet, based on annotation and cross-references among semantically consistent documents, delivered knowledge of maximum relevance to the user. It is precisely this tool that the hidden logic of contemporary hyperlinks is lacking. Otlet's Universal Decimal Classification (UDC) proposes a unique architecture of hyperlinks, maps out a system of the yet non-existent content search on the Internet, and constitutes a challenge to the research of every new media scientist. His early data modules remain an inspiration for the design of modern databases. That is why some researchers believe that Otlet even anticipated *the semantic Web*, which is a serious challenge to inventors at the forefront of computer sciences such as Tim Berners-Lee. Similar to a semantic network, the "Mundaneum" cluster sought not just to organize static links between documents but also to map out conceptual relations between facts and ideas. This has led Michael Buckland, professor at the School of Information at the University of California, Berkeley, to admit: "The Semantic Web is rather Otlet-ish" (Wright, 2008).

CONCLUSION

Paul Otlet's bibliological contribution for bringing humanity closer to the phenomena of "distance learning" and "social networks" is undeniable (Tsvetkova, 2016) as our contemporaries have not come up with anything new since the time he proposed a hybrid reading room with a telephone and a TV set, and remote servicing of learners by human librarians and bibliographers working with excellently organized – classified and catalogued "ontology".

The findings of the study on the contributions of founder of documentation science Paul Otlet to the present-day technological landscape of distance learning and social networks in particular, contain both theoretical and political implications, namely:

(a) To encourage private investors, producers and entrepreneurs to invest in research projects and research libraries. If at the time of Paul Otlet's prolific projects (1934–1944) the model of the centralized state had been replaced by the present-day investor approach in which global network ownership is private and digital world leaders are entrepreneurs, Paul Otlet's revolutionary projects and magical information houses would not have perished.

(b) To perceive respectfully rather than ridicule futuristic ideas and projects by representatives of the meta-sciences, due to the universal and encyclopedic knowledge generated in their minds, untypical of narrow specialists.

(c) To remind high school and university students that a textbook can never provide them with all the answers they need, and relativize the misconception that socially significant knowledge is only contained in published works.

(d) To read even the most unremarkable notes in the archives of every researcher in order to extricate ourselves from the naïve loftiness that science begins with us, and we are not "adoptive bodies" of intellectual heritage, and to prevent re-discoveries, belated decisions, or lost "keys".

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LIST OF REFERENCES

1. Day, R. E. (2001). *The Modern Invention of Information: Discourse, History, and Power*. Carbondale: Southern Illinois University Press.
2. Füeg, J.-F. (1998). Le Mundaneum d'Otlet à Internet, une machine à faire la paix. *Information et documentation: du réel au virtuel*. Commémoration du XXe anniversaire de la section INFODOC (pp. 105–114). Bruxelles: Université Libre de Bruxelles.
3. Gardner, W. E. (ed.) (28.03.1911). Speakers Give Sound Advice. *Syracuse Post Standard*, p. 18.
4. Isaacson, W. (2014). *The Innovators: How a Group of Hackers, Geniuses, and Geeks Created the Digital Revolution*. New York: Simon & Schuster.
5. *Le Mundaneum dans la presse internationale* (2015). *Le Mundaneum*. Archive Centre of the French Community of Wallonia-Brussels and Temporary Exhibition Space. Mons (Belgium). Retrieved from: http://archives.mundaneum.org/en/node/47. Accessed on: 27.02.2021.
6. *Le Musée du livre* (1908). Deuxième année, 7e et 8e fascicules, décembre. Bruxelles.
7. Levie, F. (2006). *L'homme qui voulait classer le monde: Paul Otlet et le Mundaneum*. Postface de Benoît Peeters. Bruxelles: Les Impressions nouvelles.
8. *L'homme Qui Voulait Classer Le Monde* (2003). [The Man Who Wanted to Classify the World: From the Index Card to the Internet = De Man Die De Wereld in Kaart Wou Brengen]. A film by F. Levie; Original script F. Levie, B. Peeters; Executive producers P. Levie, A. Van der Wee. Nivelles, Belgium: Sofidoc, Wild Heart Productions, RTBF (Belgian Television); Distributed by Memento Productions. DVD-video: 1 videodisc: 60 min.
9. Otle, P. (1931). *Rukovodstvo k administrirovaniyu*. Moskva-Leningrad: Tekhnika upravleniya. [In Russian].
10. Otlet, P. (1906). *Les aspects du livre:* Conférence inaugurale de l'exposition du livre belge d'art et de littérature organisée à Ostend par le Musée du livre. [1901]. Publication No 8. Bruxelles: Musée du Livre.
11. Otlet, P. (1909). *La function et les transformations du Livre*: Résumé de la conférence faite à la Maison du Livre 14 November 1908. Brussels: Musée du Livre, fasc. 11.
12. Otlet, P. (1911). L'Avenir du Livre et de la Bibliographie. *IIB Bulletin*, 16, pp. 275–296.
13. Otlet, P. (1913). *Le livre dans les sciences*: Conférence faite à la maison du Livre par M. Paul Otlet. Bruxelles: Musée du Livre, fasc. 25–26, pp. 379–389.
14. Otlet, P. (1934). *Traité de Documentation: Le Livre sur le Livre: Théorie et Pratique*. Bruxelles: Editiones Mundaneum, Palais Mondial.
15. Otlet, P. (1990). Un peu de bibliographie [Something about bibliography]. Palais, 1891–1892, pp. 254–271. Rayward, W. B. (transl. and ed.). *International Organisation and Dissemination of Knowledge: Selected Essays of Paul Otlet* (pp. 11–24). FID 684. New York: Elsevier.
16. Otlet, P. & Oderfeld, A. (1929). *Atlas de la civilisation universelle: conception, organisation, méthodes de la préparation du matériel didactique en coopération internationale par Paul Otlet et Anne Oderfeld*. Bruxelles: Palais Mondial.
17. Otlet, P. & Goldschmidt, R. (1990). The preservation and International Diffusion of Thought. Rayward, W. B. (transl. and ed.). *International Organisation and Dissemination of Knowledge: Selected Essays of Paul Otlet*. New York: Elsevier.
18. Rayward, W. B. (1994). Visions of Xanadu: Paul Otlet (1868–1944) and Hypertext. *Journal of the American Society for Information Science*, 45, pp. 235–250.
19. Rózsa, G. (1996). The Mundaneum and the digital culture. *Tudományos és müszaki tájékoztatás*, 43(7–8), pp. 259–261.

20. Tsvetkova, M. (2016). Document – book – semantic web: old science documentation`s contribution. *Scientific Enquiry in the Contemporary World: Theoretical basics and innovative approach.* 7th ed.: research articles (pp. 115–128). San Francisco, USA: B&M Publishing. DOI: 10.2139/ssrn.2854529 [In Russian].
21. Van den Heuvel, C. (2008). Building society, constructing knowledge, weaving the web: Otlet's visualizations of a global information society and his concept of a universal civilization.
22. Rayward, W. B. (ed.). *European Modernism and the Information Society: Informing the Present, Understanding the Past* (pp. 141–142). Aldershot: Ashgate.
23. Van den Heuvel, C. & Rayward, W. B. (2011). Facing Interfaces: Paul Otlet's Visualizations of Data Integration. *Journal of the American Society for Information Science and Technology*, 62 (12), pp. 2313–2326. DOI: 10.1002/asi.21607.
24. Van den Heuvel, Charles, Warden Boyd Rayward, & P. Uyttenhove (2003). L'architecture du savoir. Une recherche sur le Mundaneum et les précurseurs européens de l'Internet. *Transnational associations = Associations transnationales*, 1–2, pp. 16–28.
25. Wright, A. (17.06.2008). The Web Time Forgot. *The New York Times*. Retrieved from: http://www.nytimes.com/2008/06/17/science/17mund.html. Accessed on: 27.02.2021.
26. Wright, A. (2007). *Glut: Mastering Information Through the Ages.* Washington: Joseph Henry Press.
27. Wright, A. (2014). *Cataloging the World: Paul Otlet and the Birth of the Information Age.* Oxford: Oxford University Press.

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БИБЛИОЛОШКИ КОРИЈЕНИ ДРУШТВЕНИХ МРЕЖА И НАСТАВЕ НА ДАЉИНУ

Резиме: Чланак садржи тезу да је човјечанство од прије више од 120 година идејно, теоретски и технолошки спремно за масовно учење на даљину. Аутор тврди да успјеси обезбјеђења ресурса за наставу на даљину широм свијета током посљедње двије године пандемије вуку коријене из почетка 20. вијека, са плановима о модификовању интерфејса књиге као документа. У центру истраживања је допринос пионира библиотекарске и информационе науке Пола Отлеа филозофији савремених друштвених мрежа и образовању на даљину. Познато је да медијске апликације за масовно учење на даљину за вријеме ове пандемије ковида имају историјске коријене. Радио је повремено коришћен као образовни инструмент откако је 1922. године државни универзитет у Пенсилванији по први пут емитовао курсеве за студенте преко сопствене радио-станице. У малим размјерама, радио--програми били су замјена за физичко присуство настави 1932. године, када су редовна предавања у Чикагу обустављена због редукције буџета и радио је започео да емитује љетњи наставни програм. Ипак, до тада нико није покушавао да користи радио да би школовао велике групе дјеце, као што је случај 1937. године у САД и Канади, за вријеме епидемије полиомијелитиса. Тада је учење код куће постало једина спасоносна алтернатива за дјецу, а локалне новине успоставиле су партнерство са локалним учитељима и доказале да медији могу да буду и образовни. Нови медиј који је постао партнер школа је радио. Радио-станице емитовале су лекције према распореду а учитељи су били на располагању преко телефона. У овом истраживању доказује се да је већ 1908. године управо белгијски библиолог Пол Отле утемељио концепт мрежног онлајн наставног окружења и мултисензорског интерфејса, проричући настанак „докумената који се прихватају чулима” и читају на даљину, дефинишући појам „документ” као „неживи објекат који садржи трагове људске мисли и дјелатности”. Хронолошки је пропраћен начин на који Отле образлаже документ „књигу” као базну технологију глобалне мреже и удаљеног приступа знањима. Усљед студиозног проучавања примарних докумената, створена је шема еволуције приједлога Пола Отлеа за будуће облике информационог ресурса „књиге”, које он прокламује на различитим форумима у периоду 1901–1934. године. Утврђена је логика његових пројеката боље будућности знања, која преко проширења појма „књиге” пројектује њене будуће трансформације силазном линијом – од „универзалне књиге знања” преко „машине за размишљање” до њеног уситњавања на „biblions” – најмање структурне елементе записаног знања. Допринос Пола Отлеа пројектовању интернет и онлајн обуке пронађен је у његовим приједлозима из 1908. и 1934. године – да се споје читаоница, телефон и телевизор и да онима који уче на даљину услуге пружају живи библиотекари и библиографи који раде са класификованом и каталогизованом „онтологијом” на другом крају телефонске везе. Практична корист овог истраживања јесте да пружа сигурност медијском и инструменталном обезбјеђењу сценарија о будућности школе, независно од предстојећих околности и изазова. Очекује се да ће резултати откривања доприноса библиологије настави на даљину подржати блиске и далеке планове образовних лидера, стратега или политичара да већ данас дефинишу своју улогу у тој будућности.