Vliv současných IT trendů na budoucnost šedé literatury

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IMPACT OF CURRENT INFORMATION TECHNOLOGY TRENDS ON THE FUTURE OF GREY LITERATURE

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Abstract

This paper deals with emerging information technology (IT) and other trends and their impact on grey literature. It is based on analysis of the most prevalent trends in general information management and new IT solutions, which will define and impact the digital future of related information management activities, as well as that of grey literature. The analysis was done based on seven reports issued in 2016 by five world leading consulting and service companies that have a special interest in researching the impacts of IT on our business environments, work procedures and behaviours.

These emerging IT developments make big changes in related activities not only possible, but also increasingly necessary. IT has become a driving force for change, innovation and new opportunities by offering powerful tools for furthering the digitization of our work processes, and the services we offer, as well as the creation of information products such as grey and other literature. This emerging new digital environment has the potential to affect all aspects of the way we do business, and the way we relate to our customers and the world around us. In order to meet expectations and benefit from this challenging opportunity, information managers need to be cognizant of new IT trends and the possibilities they offer in order to define the best strategies and action plans for their successful implementation in the future.

This paper elaborates the emerging IT and other related trends and their potential benefits, and offers some concluding guidelines relevant to the field of grey literature management, its use, and corresponding challenges.

Keywords

Information Technology; Information Management; Trends; Grey Literature

Introduction

During the last few decades, we have witnessed a real revolution in computing and communications. There was a dramatic increase in the processing power of new information technologies (IT) accompanied by a decrease in the cost of communication. According to Moore's law, the processing power of microchips is doubling every 18 months. This resulted in a tremendous increase of the processing power of computers from 1956 to 2015 by 1 trillion times[1]. This and many other IT advances are a driving force behind changes which offer significant opportunities, but also pose some considerable challenges to the way we conduct our business and our lives.

IT developments and other changes also affect the way we currently create, disseminate and use grey literature, and it will continue to impact it in the future. This paper is based on analysis of the most prevalent trends in general information management and new IT solutions, which will define and impact the digital future of related information management activities, as well as grey literature. The analysis was done based on seven reports[2] issued in 2016 by five world leading consulting and service companies that have a special interest in researching the impacts of IT on our business environments, work procedures and behaviours.

These emerging IT developments make big changes in related activities not only possible, but also increasingly necessary. IT has become a driving force for change, innovation and new opportunities by offering powerful tools for furthering the digitization of our work processes, and the services we offer, as well as the creation of information products, such as grey and other literature. The emerging new digital environment has the potential to affect all aspects of the way we do business, and the way we relate to our customers and the world around us. In order to meet expectations and benefit from this challenging opportunity, information managers need to be cognizant of new IT trends and the possibilities they offer, in order to define the best strategies and action plans for their successful implementation in the future.

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[1] **http://pages.experts-exchange.com/processing-power-compared/**

[2] A complete list of reports is available as part of the References at the end of this paper.

This paper elaborates the emerging IT and other related trends and their potential benefits, and offers some concluding guidelines relevant to the field of grey literature management, its use, and the corresponding challenges. In particular, it looks at the impact on grey literature through the technology deployed, products and services offered, and customers and staff working directly with grey literature.

The impact of current information technology trends on the future of grey literature is presented through IT progress and the present state of information management, followed by the status and challenges of grey literature today. Based on the current IT trends, a set of information management relevant trends was elaborated, while the impact on grey literature is examined through a prism of the actual technology used, products and services offered, and through the changes impacting the work environment.

The progress of information technology

Ever since the creation of Z1, the first programmable computer, in 1936 by Konrad Zuse (Computer Hope, 2016), the introduction of the ENIAC[3] in 1946, and the first IBM personal computer in 1981, the progress of information technology has been characterized by tremendous developments, boundary-pushing innovations, and constant change; all happening at a very fast pace.

"Moore's law" characterizes some parts of this fast progress, where the number of transistors in a dense integrated circuit doubles approximately every 18 months and the processing power of computers from 1956 to 2015 increased 1 trillion-fold. Beside personal computers, mobile telephones also make up a portion of IT history and progress. In 1994, the first mobile phone to feature software applications (IBM Simon) was introduced; followed in 2007 by the introduction of iPhone (first commercial smartphone to use finger input), and the Samsung Galaxy S in 2010. The speed of cell phone introduction is especially significant. It took 13 years, from 1975 to 2008, to sell one billion PCs, while in 2013 alone, the sale of cell phones reached 1 billion! The introduction of the Internet and particularly of the World Wide Web in 1991 gave another impetus to the growth of IT. Connecting web technology and smart phones represents a quantum leap for the information management. Today, 89% of China's 668 million Internet users access the web from their mobile devices. The situation is similar with other developing nations. In January 2014, mobile phone Internet usage overtook PC Internet usage, opening yet another great window of challenge and opportunity for information suppliers, users and managers.

Parallel to all of these areas of information progress, another development is taking shape and becoming a practical reality. Artificial intelligence is now a new frontier that has made huge progress from the first Alan Turing tests in 1950, to Google's AlphaGo in January 2016, which crossed a major artificial intelligence threshold by besting human grandmaster Lee Sedol at the famously complex game of Go. Present today in the form of small intelligent snippets and larger smart agents, artificial intelligence represents a tremendous area of potential use and implementation in information management and, especially, in the area of grey literature identification, processing and dissemination.

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[3] Electronic Numerical Integrator And Computer (ENIAC)

Present state of information management

The present state of information management, and, in particular, certain sectors, such as libraries and information centres, is somewhat discouraging. The disappearance of many libraries around the world and their diminishing budgets and power is evident everywhere. Public and specialized libraries, and in particular libraries belonging to small and medium corporations, have been hit particularly hard. As an illustration, in the United Kingdom alone, almost 8,000 jobs, a quarter of all library staff, have disappeared in the last 6 years. During the same period, 343 libraries were closed, leading to fears about the future of the profession[4].

As staff cuts and professional work decreases, the number of volunteers working in libraries has increased, leading to the belief that library services can be run by volunteers. Although volunteers are welcome, they cannot deliver adequate professional and ethical services offered by information professionals. Skill gaps are evident and they have a negative impact on library patrons and information users.

One of the factors having a negative impact on information management, and libraries in particular, is the notion that everything is already on the web. All we need to do is search Google and all of our information needs are met. There is very little understanding that in order to appear as a book for sale on Amazon, or as a Google search result, a piece of information first needs to be placed and maintained on a website. The reliability, authenticity and correctness of information resources is not given adequate consideration, which leads to errors, lost time, and erroneous outcomes. This competitive positioning of Amazon and Google vs. libraries is of no benefit to the actual users who need information on daily basis to do their work.

Another element that defines the state of information management today is the remarkable increase in price for information content by almost all suppliers, making access even more difficult. A study done by Times Higher Education[5] found that the amount paid to Oxford University Press rose by 49.2 per cent between 2010 and 2014. The amount paid to Springer rose by 36.3 per cent and the amount to Wiley by 33.5 per cent. The smallest rise – 17.4 per cent – was in subscriptions to Elsevier journals. Overall subscription cost increased by 23.9 per cent. This price hike is also evident in the increasing cost of new library management systems and their related applications.

The protection of intellectual property rights present information management with challenges at all stages of work, starting from the creation of digital documents, and the selection and acquisition of external materials, to access rights and long-term preservation. Electronic publications offer an opportunity to open the access to information, and the flood of information through the Internet illustrates this. However, at the same time, it also requires information managers to increase access control and more closely monitor the use of information. All this is taking place at the same time as users increase their demands for faster delivery of

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[4] BBC News, 29 March 2016. **http://www.bbc.com/news/uk-england-35707956**

[5] Times Higher Education, 30 October 2014**, https://goo.gl/yLlmDL**

information in a variety of formats and with certain value added to the raw information and documentation.

Grey literature challenges

Grey literature is part of the wider information management arena so its activities and related challenges are in many ways shared. Still, there are some specific challenges related to grey literature and they include the actual concept of grey literature, grey literature processing, and its sustainability and usability.

Examples of grey literature include conference papers, reports, patents, dissertations, fact sheets, lectures, newsletters, course materials, memoranda, interviews, policy statements, posters, government documents, legislations, press releases, personal communication, photographs, bibliographies, speeches, physiological specimens, and others. Conceptually, grey literature should have a clear distinction from other forms of literature[6]. Grey literature should not be thought of as strictly 'literature', but rather as grey 'resources' as it can encompass many different formats depending on the discipline (Bichteler, 1991; Tyndall, 2008). It is accepted that it covers document types which are not commercially controlled by publishers (Schopfel, 2010), while the other view regards grey literature as the diverse and heterogeneous body of material that is made public, but is not subject to traditional academic peer-review processes (Adams et al., 2016). However, this distinction from other forms is not easy to achieve, especially since grey literature today covers many diverse types of documents including electronic forms, such as emails, blogs, webinars, comments, Tweets or Facebook postings.

There are many challenges related especially to the new forms of grey literature, such as blogs, various forum posts, comments, Tweets, etc. Collecting, processing, managing and preserving that type of grey literature is especially challenging. For example, blog archive incorporated as part of the blog page is important, not only from a historical and preservation point of view, but it is also important to the blog's success mainly for giving it special depth and credibility, characteristics that are becoming more and more valued by users.

Another set of challenges relates to processing and its reliability, since some key metadata elements are often missing, and to the lack of bibliographic controls and systematic collection. The core reasons for difficulties in identifying and acquiring this type of literature are due to its "poor bibliographic information and control, non-professional layout and format, and low print runs" (Augur, 1989). The implementation of bibliographic control through ISBNs, ISSNs or report number systems is not well organized and, therefore of not much help for grey literature repositories.

Sustainability is also a major challenge that grey literature faces. It is rare to find projects or plans for long-term preservation of grey literature, which, when combined with changes of its hosts, and lack of permanent location identifiers, directly affects its usability and sustainability. Substantial requirements for continuous financing in order to provide longer sustainability and usability of this valuable resource also represent a serious obstacle, since available funds are in most cases very scarce. Copyright 'overprotection' and other intellectual property related

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[6] The 'Luxembourg definition', developed and approved during the Fourth International Conference on Grey Literature in 1999, defines grey literature as "that which is produced on all levels of government, academics, business and industry, in print and electronic formats, but which is not controlled by commercial publishers".

issues hinder the success of the open access movement and their drive to have as much literature as possible available to the users. This is particularly the case in the area of science and technology documents that need to be shared among researches and developers if they are to make the desired impact on speedy implementation of technical solutions.

Current information technology trends

Many companies and consulting agencies deal with technological forecasts, particularly those relating to information technology. For this review, seven reports created by five leading consulting IT companies were selected and are presented here.

Gartner	Forbes	Forrester
1. The device mesh 2. Ambient user experience 3. 3D printing materials 4. Information of everything 5. Advanced machine learning 6. Autonomous agents and things 7. Adaptive security architecture 8. Advanced system architecture 9. Mesh App and service architecture 10. Internet of things architecture and platforms ***Gartner's top 10 strategic technology trends for 2016***	1. Connecting customers 2. Embracing millennials 3. Remote employee development and training 4. Strength based leadership 5. Add extra value to commodity products you sell 6. Corporate culture of customer service 7. Deliver results, not just solutions 8. Engage customers through fun and games 9. Integrate impartial content to support customer decisions 10. Develop "selling/solving" skills for non-salespeople ***Top 10 Business Trends That Will Drive Success In 2016***	1. Smart connected world 2. Systems of insight 3. APIs as strategy 4. Digital CX limitations 5. Security and risk rethink 6. Hyper-connected hyper-adopters 7. Business tech acceleration 8. Infrastructure snowballs 9. Software as part of the brand 10. Workforce technology ***The Top Technology Trends To Watch: 2016 To 2018*** 1. From customer-aware to customer-led 2. From data-rich to insight-driven 3. From perfect to fast 4. From silos to connected ***The Operating Model for Customer Obsession***

Deloitte	Accenture	
1. Right-speed IT 2. Augmented & virtual reality 3. Internet of Things: From sensing to doing 4. Reimagining core systems 5. Autonomic platforms 6. Blockchain: Democratized trust 7. Industrialized analytics 8. Social impact of exponential techn. ***Tech Trends 2016: Innovating in the digital era*** 1. Organizational design 2. Leadership 3. Culture 4. Engagement 5. Learning 6. Design thinking 7. Changing skills of HR organization 8. People analytics 9. Digital HR 10. Workforce management ***Global Human Capital Trends 2016***	1. Intelligent automation 2. Liquid workforce 3. Platform economy 4. Predictable disruption 5. Digital trust ***Technology Vision 2016 - People First: The primacy of people in a digital age***	

Table 1: Current information technology trends

Although somewhat different in their approach and the way they look at the future, identified current IT trends offer a very good starting point for establishing at least major IT influences or trends that will define the way we do business in the near future. After looking at the reports and their main elements summarised above, four different groups of trends dealing with different business areas were identified. They are:

Technology	Customers
▪ Secure architecture ▪ Autonomous agents ▪ Machine learning (algorithms) ▪ Internet of things (from sensing to doing) ▪ Application Program Interface (API) ▪ 3D printing	▪ Customer culture ▪ Connected world ▪ User experience ▪ Engage customers ▪ From data-rich to insight-driven
Products/services	**Employees**
▪ Added value ▪ Deliver results, not just solutions ▪ Social impact ▪ Predictable disruption ▪ Digital trust ▪ Analytics	▪ New generation ▪ Liquid workforce ▪ Remote work ▪ Learning & training ▪ New skills (leadership, sales) ▪ From silos to connected

Table 2: Categories of information technology trends

An attempt was made here to list the business areas and related trends in some order of priority and importance. However, it should be kept in mind that because identified trends come from different reports and different observations, they do not necessarily represent the best order of priorities, but rather an attempt to bring some order and importance to multiple factors. For example, it is very probable that from a technological point of view, secure IT architecture, and security in general, will represent the most important factor in the future. From customer related trends, many companies and organizations around the world are trying to build and implement "customer culture" – a culture where all the products, services and workflows are devoted to, geared towards and determined by customers.

In the area of products and services, we are presently experiencing growing demand to increase the value added to everything delivered, closely followed by both, the comprehensive delivery of results, not just outside solutions, and the impact of social media and social responsibility. The number of determining factors regarding employees is significant and their importance, viewed individually, is hard to rank by relevance. The introduction of a new generation of workers, with new demands and specific behaviours, is a constant, but 'liquid workforce'[7] and remote work are becoming more and more frequent. Learning new skills and continued training are of great significance, especially in dynamic areas such as information technology.

[7] According to Accenture, the 'liquid workforce' requires constant re-training in order to stay relevant in the midst of the digital revolution. A Liquid Workforce is one that is able to rapidly adapt and change based on the environment that they are in.

Impact of IT trends on grey literature

It is of great importance to explore what impact, if any, these four current IT trends might have on grey literature in the future. Since four major areas or groups of trends were identified, the same four areas need to be examined from the grey literature perspective. In other words, a parallel needs to be drawn between the impact of general technology on information management and its direct effect on grey literature. The following table offers this parallel.

Technology	Customers
▪ More difficult access to GL due to security constraints ▪ Higher level of IT expertise required to access and process GL ▪ More dynamic docs – less GL ▪ New tech-driven forms ▪ Increased amount of big data	▪ High expectations (e.g. comprehensiveness, relevance, aggregation, added value) ▪ Interconnectivity ▪ Top of the line finding tools ▪ Web 2.0 features (e.g. social networking, collaboration, user generated content) ▪ Tools to analyse and exploit big data ▪ Mobile expectations of the new generation ▪ Lack of understanding of GL value and importance
Products/services	**Employees**
▪ Availability of HR and financial resources ▪ Competition with 'big players' ▪ Lack of interest to make GL available ▪ Difficulty with going beyond local repositories ▪ Intellectual property protection ▪ Disappearing e-archives, older materials	▪ Lack of proper training and education ▪ Limited career development ▪ Frequent change of jobs and interests (i.e. lack of continuity and long-term planning) ▪ Changing technical requirements ▪ Business focus ▪ Culture of preservation missing ▪ Multitasking and rapid delivery expectations

Table 3: Grey literature related categories of information technology trends

The above table shows that all four areas of grey literature, namely technology, customers, products/services, and employees will be impacted in the future by the identified current information management trends. The impact is already being strongly felt across the information management sector, and it will continue to be of major concern, bringing many challenges and requiring well-planned, well-established, and well-financed actions. Some of these forthcoming changes could be regarded as significant, potentially having a serious negative impact on grey literature in general. For example, IT security constraints and restrictions, dynamic documents, available resources, intellectual property protection, required relevance of search results, inadequate training and limited career development options are difficult to overcome. Quite often, technical or product constraints get most of the attention and resources. However, most projects or new initiatives fail, not because of these factors, but rather because of ab untrained or unmotivated workforce, where the emphasis of actions should always have been. It would require many planned efforts to overcome all the anticipated challenges, and to make grey literature a valuable, viable and usable information future resource.

Conclusion

During the last few decades, IT developments have had an immense impact on the way we manage information in general, as well as on the way we create, disseminate and use grey literature. Based on the review of current IT trends and new solutions already in place, it can be concluded that this interdependency between IT developments and grey literature will continue in the future. Information technology will continue to define and affect the digital future of related information management activities, as well as grey literature.

In order to increase the future use of grey literature, it seems necessary (i) to open the relevant repositories and make them freely accessible to the public; (ii) to implement top performance technical solutions, such as modern databases, fast search engines, and efficient processing tools; and (iii) to provide immediate and free access to the full-text of documents, preferably in different record formats.

In order to increase access to grey literature and meet user needs, it would be beneficial (i) to simplify the basic search interface, while providing the option to use an improved advanced search; (ii) to incorporate rich features at every possible stage of grey literature processing, retrieval and use, but make them as discrete as possible; and (iii) to offer big data analysis tools so that repositories become part of a dynamic solution, rather than reference placeholders.

Finally, in order to increase the visibility of grey literature, it is necessary (i) to incorporate grey literature repositories into search engines, such as Google, Google Scholar, Baidu, Yandex, and others; (ii) to invest in the promotion of grey literature, its value and usefulness; and (iii) to promote continuous training and education at all levels, from schools and academia, to business and government.

The identified trends and emerging new digital environments have the potential to affect all aspects of the way we do business, and the way we relate to our customers and the world around us. In order to meet expectations and benefit from this challenging opportunity, information and grey literature managers need to be cognizant of new IT trends and the possibilities they offer in order to define the best strategies and action plans for their successful implementation in the future.

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