Challenges of Integrating Emerging Technologies in Libraries: Between the AI Race and the Imperative of Creative Industries Reform

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Abstract

The digital transformation of public libraries is a complex process, situated at the intersection of accelerated technological progress and the need for creative industries to adapt. The implementation of emerging technologies, particularly artificial intelligence (AI), presents both significant opportunities and challenges for the library ecosystem. On the one hand, AI is the guarantor of rapid access to knowledge, promising important steps towards the automation of operational processes and the improvement of the user experience through personalized solutions. On the other hand, this race for innovation comes with risks related to ethics, data security and the unprecedented transformation of librarians' professional skills. In this context, this paper analyses the practical and strategic challenges of integrating AI into libraries, based on the experience of ANBPR (anbpr.org.ro) within the SHIFT: MetamorphoSis of cultural Heritage Into augmented hypermedia assets For enhanced accessibiliTy and inclusion. The pre-pilot, representing a Romanian use case, led by ANBPR within the ANBPR BiblioPublica National Conference (11-12 November 2024, National Library of Romania), provided a space for analysis and dialogue on how the Romanian public library network can become a dynamic infrastructure for testing and validating the latest AI-based technological solutions. Through the presentations and technological demonstrations carried out during this pre-pilot – in particular those dedicated to the Romanian case study for libraries, facilitated by Iosif Tsangko, researcher in the field of artificial intelligence at the Technical University of Munich, technical partner within the SHIFT consortium - highlighted the importance of collaboration between libraries and technology partners in testing and implementing artificial intelligence solutions.

Keywords: emerging technologies, library ecosystems, library services, creative industries, AI race, SHIFT use case

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Introduction

Public libraries are in the midst of a complex period of change, involving persistent digitisation, the globalization of information sources and the development of hybrid knowledge ecosystems. In this environment, the use of artificial intelligence and other related technologies is transforming the logic of library services and the way libraries interact with creative industries. The potential of AI to automate tasks and personalize systems for users (Mhlanga, 2023) also raises concerns about transparency, security and the skills needed to achieve ethical and responsible intermediation of technologies (Floridi & Chiriatti, 2020).

The transition of public libraries to the digital age is one of the most complex and debated topics in information science and modern cultural studies. Under pressure from emerging technologies, particularly AI, libraries need to redefine their mission, services and value to their communities. In this sense, this article reflects on the potential obstacles to the introduction of new digital trends in library spaces, a territory that lies between two major forces: the "AI race" marked by the explosion of technological advances and the need to transform creative industries by introducing new models for the creation, distribution and conferral of value to cultural goods.

For terminological accuracy, the term emerging technologies refers to innovations that are recently instantiated but are likely to have a substantial socio-institutional impact (Rotolo et al., 2015). For libraries, such applications range from AI, augmented reality (AR) or blockchain to semantic technologies, any of which could profoundly change the ways in which information and interaction with it are structured.

Given a broad definition of artificial intelligence for this purpose, this article refers to a wider collection of algorithmic approaches and applications capable of emulating cognitive tasks, such as reasoning, learning or recognition, from a human perspective (Russell & Norvig, 2021). In libraries, AI is currently seen both as a means of optimizing operational processes (e.g. automatic cataloguing, assisted translation, personalized recommendations) and as a driver of innovation in terms of user interaction (Fernández-Ramos & Calzada-Prado, 2022).

The concept of creative industries includes sectors of the economy that combine creativity, culture and technology. The creative industries ecosystem not only produces economic benefits, but also symbolic values (UNESCO, 2022). In the digital age, these industries are in dire need of reform. New forms of cultural consumption and new ways of monetizing content are emerging. Libraries must play the role of intermediary between producers and users.

Therefore, the main objective of this article is to analyze the intersection between technological innovation and the need for cultural and organizational adjustment. The example of the SHIFT pre-pilot project initiated and coordinated by ANBPR in Romania provides an excellent vantage point from which to observe this intersection. The event illustrated the potential of AI in opening up cultural heritage and personalizing services for users, but it also highlighted the complex ethical, strategic and professional issues that libraries need to address (Crihana, 2024).

In consequence, this article attempts to construct a theoretical and empirical framework for understanding how libraries can serve as dynamic infrastructures for testing and validating emerging technologies, while maintaining the dual pressures of technological races and cultural responsibilities involved in reforming creative industries.

The Race for Artificial Intelligence and Libraries

Globally, libraries are under pressure to introduce AI to respond to new information and collection demands. They use AI in many aspects of their work: semantic searches and chatbots in user interaction (Fernández Raños & Cal Zadan Biao, 2024) that provide better predictions of community needs. However, the literature draws attention to the "AI race" that may perpetuate its own inequalities and institutionalize dependence on giant technology companies (Crawford, 2021). In libraries, these tensions are expressed as dilemmas about data sovereignty, transparent algorithms and their impact on freedom of access to information.

The most visible projects involving AI and libraries come from national library organisations and university coalitions. For example, the Library of Congress in the United States has undertaken projects involving automatic image recognition for the digitization of massive archive volumes (using convolutional neural networks to extract metadata and improve accessibility) and even occasional experiments in text digitization with mixed results (Library of Congress, 2021).

Across Europe, there are AI-based projects such as EuropeanaTech. These investigate, for example, how machine learning can be used for the automatic classification of digital objects and the generation of descriptions accessible to users with disabilities (Europeana Foundation, 2022). These examples show that libraries are not just consumers of technology but are also living laboratories where the relevance of AI applications can be tested in cultural and educational contexts.

In Romania, interest in integrating AI with libraries has been boosted by European initiatives such as the SHIFT pre-pilot, which took place at the BiblioPublica 2024 conference. Here, with practical examples from the Technical University of Munich, demonstrations were given to show how AI algorithms can be used to create augmented versions of cultural assets that are accessible to everyone, not just those with full sight or hearing (Crihana, 2024). In the ANBPR network, AI-based SHIFT solutions were tested that could provide individual tools for both curators and readers, thus easing the workload of staff.

Such cases confirm that the "race for AI" in libraries is more than a global trend – it is also our local situation now, with direct implications for how communities interact with and come to terms with their knowledge.

Reform of the Creative Industries and Its Interdependence With the Library Sector

The pressure of digitization and new models of cultural consumption is being felt strongly by the creative industries. As infrastructures for access to and democratization of culture, libraries are in a unique position to mediate between technology and the public (UNESCO, 2022). If the creative industries are to undergo major reform, libraries, as strategic partners in the dissemination and reuse of digital content, must be taken into account. Therefore, even this year, the National Library of Romania invited a number of librarians from across Europe to participate in workshops and presentations. Those who understand intellectual property law or how to best prepare materials for digital conversion were particularly welcome, as there was a certain degree of. Vargo and Lusch (2017) and Lindestrom (2013) write that co-creation and open innovation approaches can generate shared value between libraries and the cultural sector.

Case Study: The Shift Project and a Pre-pilot in Romania

An example that further illustrates this point is the European project entitled SHIFT: MetamorphoSis of cultural Heritage Into augmented hypermedia assets For enhanced accessibiliTy and inclusion. As part of this project, ANBPR carried out a pre-pilot in November 2004 at BiblioPublica Conference entitled Public Library Network - a dynamic support infrastructure for sustainable development priorities. This event, co-organized by ANBPR in collaboration with the National Library of Romania, also achieved a standard of quality well above what is normally expected from library conferences. The SHIFT project contributed significantly to these results. Not only did it bring in SHIFT's technical partner, the Technical University of Munich, but by sharing its experiences and perspectives, it made significant contributions to other partners in terms of the direction they took on key issues. The professional meeting in Bucharest also demonstrated how libraries can serve as a testing ground for AI solutions that are applicable to creating personalized cultural heritage experiences with users and highlighted the need for cooperation between librarians and IT experts, as well as digital literacy skills among communities (Crihana, 2024).

Scaled Methodological Questions

The integration of emerging technology, especially AI, into library infrastructure cannot be reduced to a question of practical and operational benefits. This process must also be viewed in strategic terms - and those strategies must be ethically grounded. The use case of the SHIFT pre-pilot organized by ANBPR within the BiblioPublica 2024 Conference in Bucharest perfectly illustrates this point: the technology demonstrations carried out together with the Technical University of Munich proved not only the ability of AI to make cultural heritage available, but also the complex challenges related to data, transparency and skills that librarians need to mediate in these processes (Crihana, 2024). But one of the most frequently debated topics in the literature is ethics in algorithms. AI models operate by training on large data sets, and the quality and variety of this data significantly influences the objectivity of the results. The dangers involved in creating algorithmic biases or perpetuating structural inequalities are already well known (Crawford, 2021; Jobin et al., 2019). However, when we think about libraries whose mission is to ensure equal access to information for all, adopting technologies that could generate discriminatory results is simply not in line with the core principles of that profession. This is why, during the SHIFT pre-pilot and technical demonstrations, a continuous dialogue was established between people who want to use AI as part of new levels of cultural heritage development and librarians responsible for guiding this process in an ethical and transparent manner.

Data Security and Sovereignty

Another important aspect is data protection and management. As libraries collect and manage large amounts of user data, the integration of AI into this process requires additional processing, analysis and storage of this data. But if there are no clear data protection frameworks for AI-based work, as suggested by the articles cited in the literature, this vulnerability would not only pose risks to institutions in terms of law and ethics, but could also affect their reputation (Floridi & Chiriatti, 2020).

In Romania, BiblioPublica Conference has shown that public libraries are aware of such risks and want to establish technological links to comply with security and privacy standards. They do not simply want a service provider to manage everything for them, but rather one they can

rely on if things go wrong. Libraries are therefore beginning to see that they need to become active agents in negotiating the terms for using AI machines and protecting the data sovereignty of their customer communities.

Professional Skills and Institutional Resilience

Digital transformation requires a significant shift in professional skills. Today, librarians are not only mediators of knowledge in the traditional sense, but also intermediaries for digital technologies, able to understand and explain the principles behind how an AI machine works to the average user. Given the lack of recent developments, it is imperative for librarians to acquire these new skills or adapt. Recent research indicates that training and retraining will be necessary for librarians if they are to adapt to the changed circumstances (Azevedo & Santos, 2021).

In this regard, the SHIFT pre-pilot initiated and coordinated by ANBPR Romnia (www.anbpr.org.ro) in its capacity as a use case provider also had a learning dimension. It provided library staff with direct contacts with AI experts so that the practical applicability of the technologies became clear to them. This approach is therefore in line with UNESCO's recommendations (2022), which emphasize the importance of human resource development as a prerequisite for success in digitization.

Strategic Challenges of Sustainability

But there are also strategic challenges if we want the innovation process of large global countries to be sustainable. This is not surprising, as it has not been effectively tried outside campuses across the country. According to Bertot et al. (2016), libraries are ecosystems of innovation. They integrate research, social services, production, technical support and managerial expertise.

However, the absence or inadequacy of public policies populating the landscape will prevent AI from feeding and developing itself. The SHIFT pre-pilot showed how numerous European collaborations could overcome these limitations. It demonstrated that international partners can bring access to talent and infrastructure that would otherwise be difficult to obtain outside transnational partnerships. In conclusion, the strategic and ethical issues of AI integration in libraries are inseparable from these practical aspects of such processes. The SHIFT example illustrates that empirical complexity requires accompanying ethics; it is no longer able to fulfil its role on its own, as it can in professionalism cultivated in new territories. Libraries must embody democratic, inclusive and flexible organizations in order to fulfil their social responsibilities, as Raymond Rapp's review points out.

Conclusions and Development Perspectives

In recent literature, libraries are increasingly conceptualized as innovation ecosystems (Bertot et al., 2022). In Romania, the SHIFT experience indicates that libraries can act as “knowledge brokers” and mediators between communities and emerging technologies. In this model, their function is to be more than mere data repositories: they serve as experimental spaces where solutions can be tried out without risk before being implemented on a large scale.

The challenges of integrating new technologies and AI into libraries are, on the one hand, to accelerate the “AI era” within traditional industries (at this stage, truly the IT era, we are

mainly talking about network and software companies); on the other hand, with the future reform needed for business model issues. Whose development trajectory is being rationalized?

The ANBPR's experience in the SHIFT project proves that libraries can play a crucial role in shaping inclusive digital ecosystems, with a skills base, strong strategic partnerships and ethical governance. In the future, the success of AI integration in libraries will largely depend on their ability to function simultaneously as experimental platforms, creative spaces and catalysts for cultural innovation.

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