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Whitepaper

Five Key Trends in the Shifting World of Search

Just as technologies like CRISPR enabled precise modification of genes for treating genetic diseases and peer-to-peer ride-sharing apps like Uber disrupted the taxi industry, information professionals have seen the world of online research become increasingly complex, requiring new skills and strategies for critical evaluation and information synthesis.

The information landscape is undergoing a seismic shift, and librarians are at the forefront of navigating this new terrain.

- Traditional online databases are weaving AI and machine learning into their fabric to personalize the search experience.
- Generative AI is reshaping search itself, demanding new skills from information professionals to discern genuine insights from bias or hallucination.
- Librarians are being called to serve not as information gatekeepers, but as knowledge navigators in a world increasingly driven by open access.
- The lines between intentional information seeking and more informal informational browsing are blurring, with social media and other platforms actively suggesting content.

This necessitates a shift in librarian roles, from information retrievers to search educators, adept at guiding users through the intricacies of prompt engineering across diverse search tools. In this dynamic environment, information professionals must be critical thinkers, creative sourcers, and discerning evaluators, ensuring their clients not only find the information they need, but also develop the skills to thrive in the ever-evolving information ecosystem.

AI: An Entirely New Search Approach

Currently, a small number of AI providers dominate the market, making generative AI tools publicly available to both casual users and professional researchers. However, concerns remain about the training data used. These systems are often trained using indiscriminately collected data, which may contain biased, misleading, or harmful information. Likewise, generative AI is notorious for "hallucinations" — made-up information that sounds plausible and appears to answer the question being asked. These factors pose a risk to users who could unknowingly rely on inaccurate or harmful outputs and require additional work on the part of researchers or information professionals to validate any results from a generative AI tool, particularly in environments where the quality of the information is critical, such as organizations in STEM (science, technology, engineering, and mathematics) fields.

For AI to have a positive impact on research and discovery, it is crucial to address these concerns. AI systems significantly benefit from using high-quality data — published books, peer-reviewed journals, reports of clinical trials, standards, and other content, much of which is copyrighted. Finding solutions that respect intellectual property rights while fostering responsible development and accessible research is critical to unlocking the full potential of generative AI for trustworthy research.

Just as legal cases in the U.S. in the 1990s addressed photocopying of articles in a for-profit setting (Basic Books, Inc. v. Kinko's Graphics Corp., 758 F.Supp. 1522 and *American Geophysical Union v. Texaco, Inc.*, 60 F.3d 913), courts are now reviewing how copyright and technology intersect in the context of AI. There are already lawsuits around the world challenging the use of copyrighted material in AI systems. With so many lawsuits unsettled, companies are understandably concerned about the outcomes of using a tool ultimately found to be infringing.

Librarians have often led initiatives within their organizations to promote responsible information practices and help employees navigate the complex landscape of intellectual property.

What Info Pros Can Do to Support AI Across the Enterprise

Librarians and info pros can draw upon their extensive experience when their organizations consider introducing generative AI tools. They can act as information guides and educators, explaining the capabilities and limitations of generative AI, potential use cases within the organization, and ethical considerations around its use.

Also, info pros can contribute to initiatives within their organizations to create institutional guidelines on the use of AI, working with stakeholders from IT, legal, regulatory, research, and data science groups to ensure that AI tools are built with reliable, licensed content. Info pros can serve as internal consultants, supporting individual projects by assessing information needs, identifying copyright-compliant content — including content the organization has already licensed — and validating the output to ensure that the results are trustworthy.

Prompt Engineering: It's Not Just Better Boolean Logic

The rise of AI has sparked a new frontier in information retrieval and exploration: prompt engineering. This process of crafting effective prompts to elicit desired outputs from AI systems requires a unique blend of domain knowledge, information literacy, and critical thinking skills — a perfect fit for the expertise of librarians. LLMs (large language models) have been trained with a wide range of content, which means that the quality and accuracy of their responses can vary significantly. A poorly crafted prompt can exacerbate these differences and potentially lead to irrelevant, nonsensical, or even biased outputs.

Particularly in data-driven enterprises in which librarians are working with researchers, engineers, scientists, and other technical staff, this requires not just knowledge of the technical terminology and concepts of their fields, but creativity and critical thinking to frame requests in a way that yields optimal results. Librarians possess this deep understanding, allowing them to formulate prompts that accurately capture the nuances of specific research areas. They also have strong critical thinking and analysis skills essential for interpreting AI-generated responses, identifying potential biases, and ensuring adherence to research standards.

The field of prompt engineering is still evolving, and awareness of its application in enterprise search and discovery tools needs to be fostered. Many librarians may not be as familiar with the latest AI tools or prompt engineering techniques as they are with searching more traditional online services. Bridging the gap between Boolean queries and prompt engineering can unlock powerful search strategies for librarians, leveraging their expertise in both traditional and AI-powered information ecosystems. With their strong focus on information ethics and critical thinking, librarians are well-positioned to ensure transparency, fairness, and neutrality in prompt engineering practices.

A simple example of the nuances in prompt engineering and how they differ from traditional Boolean queries is a request for ways to measure the success of diversity and inclusion initiatives. Though seemingly neutral, this prompt carries a subtle bias. AI algorithms, trained on massive datasets, often favor quantifiable elements, interpreting "measure" as a call for numerical data. In traditional online searches, users might notice this bias as they browse results and refine their query. They might rephrase the query to "evaluate" D&I initiatives, capturing both quantitative and qualitative aspects. However, AI responses can be deceptively definitive. A well-written answer focusing solely on metrics like demographics or retention rates might create the illusion of objectivity, masking a hidden bias against qualitative measures like employee sentiment or cultural change. Combining the strengths of both approaches — the nuanced guidance of prompt engineering and the critical thinking fostered by Boolean logic — leads to a more informed and balanced understanding of complex issues.

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Mastering these prompt engineering techniques takes practice but is essential for librarians to be proficient AI collaborators within their organizations. Their specialized knowledge allows them to guide AI tools to enhance, not replace, their work. Well-constructed prompts help ensure that AI provides reliable, relevant results that save these librarians and their clients time while underscoring their institution's value. Overall, prompt engineering elevates librarians' skills for the age of AI and optimizes outcomes for all stakeholders. Investing in developing these skills will be vital for librarians staying at the forefront of their profession.

The Search for Answers, Not Just Information

The universe of information is continuing to expand exponentially — experts are self-publishing on Substack, peer-reviewed literature is available in a variety of access formats, preprints are speeding up the visibility and availability of research by months, and conference presentations and poster sessions enable access to cutting-edge research and new experimental findings and methods years before formal journal publication. Often, the answer does not exist in a single source; rather, it needs to be gleaned from reviewing regulatory comments, clinical trial data, or patent filings.

Additionally, the internet and social media have blurred the traditional distinction between actively searching for information and passively discovering content serendipitously. In the past, discovering new information required a more deliberate effort to seek out sources through focused and intentional searching of online and print resources. While active searching still occurs, many people now increasingly rely on platforms like TikTok, Instagram, and YouTube to deliver personalized recommendations tailored to the interests of the user with no prompting at all.

Social media platform algorithms analyze user data and activity to determine preferences and predict the types of content individuals will find engaging. Videos, articles, and other media are then proactively pushed to users without any directed searching on their part. Some view this as a positive, saving them time and effort and delivering relevant information. However, this passive reliance on algorithms can trap users in “filter bubbles” that limit exposure to diverse ideas and encourage confirmation bias.

The ubiquity of personalized recommendations and passive content discovery can lead to diminished search skills among digital natives who have not needed to actively seek out information. While algorithms may surface relevant media, users still require core competencies to get quality results. This includes precisely identifying their underlying information need, not just a surface question. It requires conceptualizing what formats of information (news reports, academic journals, videos, etc.) will best serve that need.

Librarians and information professionals use these foundational search and inquiry skills to craft effective search strategies, scrutinize results for credibility, and extract meaning from sources. Their challenge today is to embrace the mantle of answer-finders and guide users through the information labyrinth. This could involve offering critical thinking bootcamps that teach users how to evaluate evidence quality, identify logical fallacies, and recognize authorial intent. Librarians can embrace advanced search techniques, leveraging specialized databases and filtering tools to identify the signal amidst the info-noise. Librarians are also called to act as interdisciplinary bridge builders. Complex research problems demand multifaceted solutions, and librarians are working to break down information silos and connect uses with diverse perspectives and information sources.

Embracing the answer-centric approach demands a transformation in librarians’ mindset and practice. It is not just about adding new skills; rather, it is about reframing their core identity. Information professionals are not simply information custodians, but active facilitators of understanding, critical thinking, and knowledge creation as they navigate an increasingly complex and diverse information environment.

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Open Access: Beyond Free Access

The emergence of open access (OA) represents a seismic shift in the research landscape, extending far beyond simply changing access models. It necessitates a proactive paradigm shift for librarians, demanding fundamental adjustments in approach, skillsets, and even their understanding of their role within the information ecosystem.

Traditionally, librarians served as guides to information, enabling access through subscriptions and databases. OA disrupts this model, placing librarians in the role of navigators, guiding users through a vast, ever-expanding sea of freely available information. Unlike traditional publishing, license terms for OA content can vary from item to item, requiring users to determine how the content should be cited and whether it can be used for commercial purposes. This requires new skills in critical evaluation, information literacy training, and data analysis to help users discern reliable and relevant content from the sheer volume available. In addition, navigating potential internal licensing agreements and balancing them with the benefits of OA resources requires a nuanced understanding of intellectual property and competitive intelligence.

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The traditional publishing model emphasized ownership and control, with librarians managing subscriptions and protecting access rights. OA, while providing control around attribution requirements and non-commercial use, for example, fosters a culture of collaboration and transparency, encouraging librarians to participate in open repositories, data-sharing initiatives, and community-driven knowledge creation. This necessitates collaboration with researchers, publishers, and other stakeholders to develop sustainable solutions for long-term information access and preservation.

The traditional methods for assessing the credibility of research publications and identifying predatory journals — impact factors, citation analysis, inclusion in bibliographic databases — may not be sufficient in the world of OA. Predatory journals exploit OA's ease of setup, churning out low-quality work. Citation metrics like impact factor can be inflated through practices like "citation stacking" (researchers citing others' or their own work excessively). Newer, legitimate OA journals lack the established reputation of traditional ones. And, the focus on rapid publication in OA might compromise thorough peer review. Info pros and search professionals must deepen their understanding of research methodologies and publication models critically evaluate the quality and trustworthiness of OA publications.

Managing OA resources demands a proactive approach, requiring librarians to anticipate user needs, curate high-quality OA collections, and actively promote open scholarship practices within their organizations. This involves advocating for internal policy changes around open access publishing such as funding for open access fees and establishing institutional repositories, educating researchers on the benefits and challenges of OA and supporting researchers in navigating the complexities of open data management.

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Traditional library subscriptions focus on the final published article. OA can encompass the entire research lifecycle, including datasets used in the research, programming code, videos and 3D models. Also unlike traditional subscriptions, which provide access to a single final published version of an article, OA allows for articles that can be continuously updated with new findings or corrections, reflecting the ongoing nature of scientific inquiry. Librarians must adapt to this dynamism by developing expertise in emerging technologies like data visualization tools, repository management platforms, and social media for scholarly communication. In addition, OA repositories play a pivotal role in disseminating research. Librarians are leveraging their knowledge of specialized repositories and subject-specific databases to streamline researcher access to these valuable resources. They must continuously update their knowledge of evolving OA trends, tools, and best practices to ensure their skills remain relevant.

One challenge that librarians face in adapting to OA resources is that they often have specialized knowledge of specific databases and resources within their field. OA opens doors to a broader range of content and formats, potentially going beyond their traditional niche expertise. This demands continuous learning and upskilling to stay current with diverse OA resources across various disciplines. Most info pros are aware that there are different types of OA licenses but many users lack an understanding of the differences between the licenses. Particularly in a for-profit company, info pros can find themselves in a position to educate users about whether different types of OA content can be used for various business purposes, in accordance with the company's copyright policies.

Embedding AI into Discovery

Librarians have struggled for years with the challenge of siloed content within their organization, hindering innovation and fresh insights. They work to ensure that users are taking advantage of licensed content, including open data resources and organization-specific proprietary information while creating as frictionless a search experience as possible.

Centralized content discovery software serves to break down the information silos and support aggregated search through a unified interface. While content aggregators of published literature have existed for decades, only recently have librarians been able to integrate a wide range of data — internal, licensed, and public — and use AI tools to enable smarter information discovery.

While users often equate AI with chatbots that answer questions, content platforms embed AI technology within the search experience, where it enhances discovery and generates data-driven insights.

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Librarians and information professionals are finding new ways to address the need for seamless information access within enterprises. The true innovation lies in the integration of AI, transforming digital content platforms from a simple aggregator to a powerful discovery tool. AI now quietly works behind the scenes, not just in chatbots but in tools that unlock deeper connections between ideas, expand search beyond literal keywords and tailor results to individual researchers' needs. This intelligent search goes beyond simple access, offering insightful connections and driving researchers towards the information that truly matters, propelling them further in their research journey.

The shifting landscape of search presents both challenges and opportunities for librarians and information professionals serving research communities. By mastering prompt engineering, embracing answer-centric approaches, and navigating the open access ecosystem, librarians can continue to thrive in this dynamic environment. They will transition from information guides to knowledge navigators, empowering researchers, fostering collaboration, and driving innovation in the age of AI.

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Exploring CCC's RightFind Navigate

Throughout this paper, we've discussed breaking down information silos and supporting aggregated search through a unified interface. RightFind Navigate from CCC meets these needs with capabilities including:

Topic Correlation, a data visualization widget, allows users to explore the relationships between topics in search results based on the vocabularies that are enabled specifically for their organization.

Semantic Search helps researchers identify relevant material more effectively by automatically including synonyms from specialized vocabularies and ontologies to a query. This semantic enrichment enables users to explore information beyond their specific search words — particularly in a self-service environment in which searchers need to conduct comprehensive research — using machine learning to support contextualized discovery.

Personalization powered by machine learning enables each researcher to uncover the content that addresses their specific information needs and to see the most highly relevant material at the top of their search results. If other users from the same organization interacted with similar content, that content will be boosted in the researcher's results as well, thus helping researchers to find relevant content more efficiently.

About CCC
A pioneer in voluntary collective licensing, CCC advances copyright, accelerates knowledge, and powers innovation. With expertise in copyright, data quality, data analytics, and FAIR data implementations, CCC and its subsidiary RightsDirect collaborate with stakeholders on innovative solutions to harness the power of data and AI.

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