OPINION

Information and library professionals' roles and responsibilities in an AI-augmented world

General artificial intelligence (AI) and more specific generative AI (GenAI) label the latest wave in information technology advance. Today's developments are driven by the confluence of carefully layered deterministic and probabilistic algorithms running on networks of very high-performance processors that have access to enormous volumes of structured and unstructured inputs. Beyond the immediate excitement of new technical breakthroughs lies Engelbart's (1962) vision of the inexorable advance of our species' ability to use tools and knowledge to amplify and augment human physical and mental existence. More historically, we are in the midst of thousands of years of human appreciation for an evolving notion of intelligence (Tenen, 2024). Given this context for GenAI and related technologies, what are the roles and responsibilities for information and library science professionals?

Why ILS professionals? The responsibilities discussed here apply to information professionals in corporate, government, or other kinds of settings; however, I use the term "information and library science professional" rather than the more general "information professional" here because so many of these responsibilities flow from the historical values and practices of librarians and archivists. Information professionals in any setting will be challenged to assume these roles and responsibilities within their specific work context.

Information and Library Science (ILS) professionals have skills, perspectives, and practices that are essential to human interests in the AI-augmented world. We are especially crucial because of our human-centered approach to information and technology impact. For ILS professionals, human interest is not an add-on or afterthought but rather the reason we do the work at all—it is fundamentally baked into information generation, management, and use. We are clearly positioned to approach an AI-augmented world from a human-centered perspective based on characteristics and expertise summarized in Table 1.

What are the critical roles of ILS professionals in an AI-augmented world? Certainly, ILS professionals will learn to leverage AI augmentations to better serve their clients, organizations, and humanity's information needs.

However, given the developments and challenges that the latest wave of technology bring, together with the skills, critical perspectives, and cultures of ILS, there are several **key roles and responsibilities** that ILS professionals must accept to ensure that humanity progresses with dignity and equanimity.

Six types of roles and responsibility follow that are categorized into inputs, uses, outputs, evaluation, education, and reflection. This list is not meant to be exhaustive but represents key challenges human centered AI (Shneiderman, 2022) challenges today. One overarching responsibility not made explicit is for us to continue to learn and discover new ways to serve humanity's information needs.

- **Inputs**: Training set selection and validation (collection development policy, workflow, and data genesis documentation)

Librarians, archivists, and curators create collection development policies that align patron communities with extant and new information products and knowledge representations. These policies determine how acquisition resources are invested and thus generate scrutiny and debate, and therefore demand careful specification and justification. ILS professionals are well-suited to consider the quality and appropriateness of materials for different stakeholders and communities. ILS professionals have important roles to play in validation, curation, and selection of training data. To do so, we must build upon traditional collection development strategies to make the structure and provenance of data sets transparent or at least documentable. Just as importantly, we must work to develop understanding of the nuances of different algorithms so that training sets may be well-suited to the problem domains to which the generative tools are applied. For example, diffusion models are used to identify promising new proteins by leveraging the structures in curated protein databases, reducing the number of lab trials by orders of magnitude (Watson et al., 2023). This amplification of manual trial and error procedures is possible because biochemists and information specialists have carefully curated protein databases over decades.

TABLE 1 ILS characteristics and expertise.

Characteristics expertise
1 Concern for information integrity and trust so that humanity can advance with confidence, justice, and equality
2 Long traditions of managing large-scaled information streams and repositories
3 Active participation in pioneering information retrieval research and evaluation since the post-WWII era that gave rise to search engines, LLMs, and recommender systems
4 Take a fundamentally human-centric approach to the needs of patrons, clients, and the public
5 Active participation in advancing human-centered design and evaluation research and practice
6 Accept responsibility for managing institutions and services devoted to preserving the products of human memory and activity, and defending these institutions and services as public goods
7 Committed to a culture of sharing and equitable access—librarians, archivists, and curators operate cooperative loans (e.g., interlibrary loan) and distributed digital libraries

This is not the case for many other kinds of generative problems without carefully curated databases. ILS professionals are well-prepared to work with disciplinary experts to first tell the difference between what kinds of approach will work for different data conditions, and second, to help in the creation of curated data that lends itself to specific AI amplifications or augmentations.

- **Uses**: Prompt construction and refinement

Sometimes called prompt engineering, one of the current challenges of GenAI systems entails translating human needs and desires into signals that a complex black box computational model can understand. Information professionals help people articulate their information needs. Librarians learn how to conduct reference interviews that help people explicate their information needs, take context into account, and clarify and refine their queries through conversation and iterative consideration of preliminary results. ILS professionals who focus on interactive information retrieval investigate ways to incorporate relevance feedback in system processes and guide how people reformulate queries with an eye toward how interactive query formulation and revision improve search efficiency and effectiveness. This iterative and interactive process is nicely illustrated by Russell's (n.d.) SearchResearch blog (https://searchresearch1.blogspot.com/) that gives interesting examples of complex and useful search strategies including ways that GenAI can help or hinder searching.

Perhaps ILS professionals will want to map classical search strategies such as successive fractions, building block, and citation pearl growing to emerging prompting strategies such as least-to-most, tree-of-thought, chain of thought, and majority vote. Not only are ILS professionals well-prepared to adapt these skills to help people develop and hone prompts but we can leverage our experience to create systematic investigations of how generative models change as millions of people interact with them over time. This requires focus on the interaction of human iterations with base models that were trained on extant data. In essence we can study how human interaction affects how generative systems learn and evolve over time.

- **Outputs**: Model and output documentation, workflows, disclosure, declaration, and citation

Librarians, records managers, data stewards, and knowledge managers have deep expertise in collecting, classifying, and preserving physical and digital resources. ILS professionals have been leaders in developing standards and procedures for collecting and preserving research data and working with publishers to formalize conflict of interest statements and other disclosures. This expertise will be crucial to ensuring that AI-augmentation is documented and consequently trusted. Whether the aim is to build upon existing knowledge to create new knowledge or to protect intellectual property, ILS professionals have crucial roles to play in documenting the workflows and context of GenAI and other technologies. Public and private libraries, archives, databases, and repositories are essential to research and innovation, and sophisticated patent and copyright regimes have evolved to reward novel applications of knowledge. Twenty-first century technologies and techniques demand expanded and extended documentation efforts to continue human progress. Documentation challenges include managing records of manufacturing and supply chain events in complex, global production (e.g., Apple's micro etching of quick codes on iPhone screens); managing records of 3D printed objects and organisms (e.g., StanfordBASE Lab's additive printing of layers of cells to generate a human heart); and documentation systems for the inevitable development of bit-level watermarks. It is especially important that ILS professionals engage in documenting workflows, design decisions, inputs, outputs, applications, and other contextual factors so that trust, additional progress, and history are served by these technologies.

- **Evaluation**: AI system development and evaluation that amends traditional models and metrics with new

models and metrics appropriate to interactive generation of content, objects, and organisms

For more than 30 years, the ILS community has collaborated with the computer science and computational linguistic communities to formalize evaluation competitions for retrieval systems. These collaborations laid the foundations for model and system assessments, including the creation of metrics beyond traditional recall/precision. For example, the Text Retrieval Evaluation Conference has had ongoing evaluations for more than 30 years expanding from early text retrieval evaluations to multimedia, cross-language, question answering, social media search, and other topics (https://trec.nist.gov/). ILS professionals were active in expanding evaluation metrics beyond system performance to human performance variables and concerns (e.g., satisfaction, engagement, fatigue, learning). GenAI will require new use cases, test tasks, and outcome metrics. Already, some groups have initiated this work and ILS professionals must join in to ensure that authentic task environments and human interaction metrics are included, and that specifications use consistent vocabularies for evaluations and publication. One early example for GenAI evaluation is Liang et al. (2023), who have created an ambitious framework for evaluating LLMs, including sample cases that illustrate approaches for 16 core scenarios (e.g., IR, sentiment analysis, summarization, question answering) using 7 metrics (accuracy, calibration, robustness, fairness, bias, toxicity, and efficiency).

- **Education**: Inspire, educate, and foster critical understanding and access to stored and generated information products and streams

ILS professionals have long been champions of open access to information and proponents of literacy. Electronic information environments bring new challenges to free expression and new media for human expression and consumption. AI-augmentation will surely accelerate challenges to free speech, trust, and evidence of expertise and authority. ILS professionals' experience in advocating for and providing training for literacy to all, our incorporation of new media in public collections, our opposition to censorship, our expertise in critical assessment of knowledge assets, and our devotion to equal access have prepared us to take leadership roles as new products and outcomes of GenAI applications affect individuals and society. We also have responsibilities to be active participants in policy discussions and regulatory actions. To carry out these responsibilities we must learn and work to understand both the applications and limitations of GenAI and design clear educational programming appropriate to diverse populations of learners. There is a

plethora of courses, conference workshops, and papers from credible sources that explain the principles of large language models, deep learning, and other elements of GenAIs (e.g., Coursera alone offers dozens of courses, some with more than 100,000 students enrolled). There is also a host of papers, blogs, and conference workshops that critically discuss the technical limitations and practical implications of GenAI (e.g., Bender et al., 2021; Kapoor & Narayanan's, n.d. substack book AI Snake Oil, https://www.aisnakeoil.com/; or the Marcus's, n.d. on AI substack, https://substack.com/@garymarcus).

In addition to being advocates for responsible and human-centric applications of GenAI, we are also responsible for ensuring that people understand the importance of materiality to human existence. ILS professionals have long experience managing and preserving the physical artifacts of human creativity and endeavor. We understand why physical materials have inherent value that cannot be digitized or computed—that knowledge artifacts have sensual characteristics (feel, smell, damage) that carry meaning. We understand that people are and understand that they are embodied in temporal and physical spaces. It is our responsibility to ensure that fully intelligent and actualized people appreciate and differentiate this materiality as well as the outputs of the artificial.

- **Reflect**: Promote and advocate for equitable individual and social access to powerful AI augmentation tools and products

ILS professionals are inherently interdisciplinary bridge builders. We work across different scholarly and practitioner communities and have developed trust from both privileged and underserved populations. It is imperative that we use this expertise and perspective to ensure that an AI-augmented world serves all people rather than only those with power and privilege. Just as we have created shared libraries of resources and tools for our constituents, open access collections of GenAI tools and services are needed. Additionally, just as we advocate for open access to ideas and information resources today, we must advocate for open AI systems, policies, and practices to serve the public good.

Conclusion: We cannot know today whether in 15 years everyone on our planet will have customizable and personalized AI augmentations immediately at hand on their phones, watches, or implants, or whether these augmentations will be limited to government or large corporate entities. We can imagine that the computational power and data resources will be cheap and ubiquitous so that anyone can easily call upon a model that draws on all public data as well as all personal data from emails, social media, and other systems to answer questions or guide life activities on the fly (and plug and play

different proprietary or specialized data to generate "what if" scenarios and outputs). Regardless of the technical, economic, and social developments ahead, I suggest that all the roles and responsibilities discussed here will continue to obtain.

What we do know is that there are enormous new opportunities and challenges in an AI-augmented world. Be prepared to be awed and disappointed—be realistic. ILS professionals are prepared to play crucial roles in ensuring that all of humanity prospers and benefits. However, this is not automatic, it will require courage and energy to accept the responsibilities and challenges the coming decades will bring. We are up to the challenge.

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