

Harnessing the Power of AI for Managing Grey Literature

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Abstract

The use of artificial intelligence (AI) is already redefining the ways we engage with various types of information and data. In the wake of AI's unprecedented influence, its impact on grey literature (GL) remains an important yet underexplored domain. It is up to all GL professionals to integrate AI into their work and harness its power. This paper delves into the innovative applications of AI to bolster the efficiency of GL management, elevate metadata quality, and enhance user experiences. Four fundamental GL management facets, namely collection of GL, metadata creation, summarization, and user experience, offer great potential and a good starting point for using the power of AI. By harnessing AI's transformative capabilities, GL professionals can spearhead a paradigm shift in managing grey literature, promising extensive and far-reaching implications for the field. **Keywords** AI, artificial intelligence, ChatGPT, grey literature, digital transformation

Introduction

When encountering a new topic in an article, book, illustration, or presentation, there are typically three questions that come to mind. Firstly, we often wonder, "What is this all about?" This paper focuses on the power of ChatGPT and related AI systems, which belong to a group of Large Language Models (LLMs).

Immediately following is a somewhat provocative question: "So what?" Many experts predict that 30 percent of all jobs will be replaced by AI in just a few years, while many others will undergo substantial transformation. Enough reasons to take this topic seriously.

Lastly, we might ask ourselves, "What's in it for me?" This paper caters specifically to information and knowledge managers operating in the realm of grey literature management. Apart from providing a brief overview of ChatGPT, it offers insights into potential ways of managing grey literature using this new technology, transitioning from current information management practices to Al-driven transformations.

Importance of Grey Literature

Let's briefly look at the definition of GL, its main facets, and some advantages.

Grey literature refers to any recorded, referable, and sustainable data or information resource of current or future value made publicly available without undergoing the traditional peer-review process (Savic, 2018).

According to GreyNet, there exist over 150 types of grey literature (GreyNet, 2004). These encompass reports, feasibility studies, dissertations, proceedings, news releases, newsletters, brochures, notes, posters, blogs, datasets, databases, and various others.

Grey literature originates from diverse sources, including individuals, businesses, public institutions, research centers, and local, national, or global organizations. It can exist in electronic or paper-based formats, generated by either machines or individuals.

The volume of GL is vast and boundless. Millions upon millions of GL items are already accessible, with more being generated daily.

However, a significant challenge lies in locating and identifying specific GL documents. One of the primary reasons for this challenge is that search engines lack mechanisms to distinguish GL specifically. Nevertheless, GL offers several significant advantages (Exeter, 2023):

- **Diverse Perspective:** GL provides valuable insights from non-traditional sources such as government reports, conference proceedings, and unpublished research, thereby offering a broader perspective on a given topic.
- Filling Information Gaps: It often contains specialized and niche knowledge not readily available in mainstream publications, helping to address gaps in existing research.
- **Timely and Current Information:** GL is typically produced more rapidly than formal publications, serving as a valuable resource for staying abreast of the latest developments and trends in a particular field.
- **Supports Evidence-Based Decision-Making:** Access to GL empowers researchers, policymakers, and practitioners to make well-informed decisions by incorporating a wider range of evidence beyond peer-reviewed journals and books.

The Power of ChatGPT

Let's now delve into the capabilities of ChatGPT, beginning with a concise overview.

Chat Generative Pre-trained Transformer (ChatGPT) represents a sophisticated AI machine learning model adept at executing natural language processing (NLP) tasks with remarkable precision. It simulates human conversation, exhibiting a level of fluency that enables it to pass the Turing Test (McKinsey & Company, 2023).

Developed by OpenAI in 2021 and launched in November 2022, ChatGPT rapidly garnered an immense user base (OpenAI, 2023). Within a week of its release, it accrued 1 million users, reaching a staggering 57 million users in its inaugural month. By January 2023, it surpassed the 100 million user milestone. While over 180 million individuals have created ChatGPT accounts to date, approximately 100 million remain active users. Currently, the website experiences a staggering 1.8 billion visitors per month.

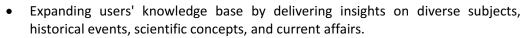
GPT-3 was trained on 175 billion parameters. However, its successor, GPT-4, launched on 14 March 2023, was trained on a colossal 170 trillion parameters (Bastian, 2023).

Notably, ChatGPT isn't the solitary Large Language Model (LLM) in circulation. Numerous major IT corporations have either developed or are in the process of developing their own iterations (Akshay, 2023). For instance, Baidu has the Ernie bot, Google's AI is referred to as Bard, Microsoft Bing incorporates GPT technology, Amazon unveiled Bedrock with Titan Text, similar to ChatGPT, and Elon Musk's AI startup, xAI, recently introduced its inaugural AI model named Grok.

This prompts the question: What attributes contribute to ChatGPT's widespread popularity, and how can it benefit us?

The scope of potential applications for ChatGPT is extensive (Nazarov, 2023):

- Integration and utilization of extensive knowledge from diverse sources like books, articles, and websites.
- Providing comprehensive answers across various topics.
- Generating coherent and contextually relevant texts, drafting emails, and crafting creative written content.
- Assisting in coding by offering snippets, code suggestions, explanations, and debugging aid.
- Facilitating multilingual text translation.
- Engaging in simulated conversations with users.
- Automating customer support, offering round-the-clock assistance sans human intervention.
- Categorizing, classifying, tagging, and auto-generating metadata.
- Summarizing lengthy texts, extracting pivotal information into concise summaries.



- Facilitating meetings by providing summaries and identifying key decisions and action items.
- Generating diverse content including images, jokes, stories, and poems.
- Adapting explanations to specific styles and successfully executing a multitude of other tasks.

The Power of ChatGPT - Examples

Here are just some notable instances showcasing the diverse applications of ChatGPT:

- Microsoft effectively employs ChatGPT to enable users to conduct searches and obtain results using a conversational interface.
- Duolingo, recognized as the world's largest platform for learning foreign languages, leverages ChatGPT to offer students comprehensive explanations in natural language, akin to guidance from a human tutor.
- Slack integrates ChatGPT to streamline workflow management, project administration, enhance productivity, and facilitate communication among team members.
- Octopus Energy, a prominent British renewable energy group specializing in sustainable energy solutions, delegates 44 percent of its customer inquiries to ChatGPT.
- Cheggmate harnesses ChatGPT's capabilities to assist students with assignments, providing support akin to interacting with human professionals.
- Freshworks significantly slashed the development time for complex software applications from 10 weeks to less than a week by utilizing ChatGPT.
- Udacity employs GPT-4 to craft an intelligent virtual tutor capable of delivering personalized guidance and feedback to students.
- Air India utilizes ChatGPT to elevate customer-centric offerings on their website, including FAQs, pilot briefings, and other related services.

These examples underscore the versatility and effectiveness of ChatGPT across diverse industries and applications, showcasing its ability to enhance processes, improve user experiences, and streamline operations.

Managing GL with ChatGPT

Upon reviewing the fundamental characteristics of GL and the capabilities of ChatGPT, let's explore how ChatGPT can enhance the management of GL.

To achieve this, we will first examine the primary workflow phases involved in managing GL. Subsequently, we will outline the current key functions performed within each phase. Finally, we'll explore the potential role ChatGPT can play in transforming these phases while fulfilling the necessary functions associated with each.



A high-level overview of the workflow for GL reveals four primary phases: preprocessing, processing, post-processing, and the utilization phase.

The preprocessing phase, involving the collection of grey literature, encompasses key functions such as identification, selection, acquisition (purchasing or requesting), obtaining items, formatting, and scanning, if necessary.

The processing phase is pivotal for creating metadata, achieved primarily through descriptive cataloging, preparing bibliographic descriptions, assigning subject categories and keywords, and crafting abstracts.

Post-processing activities entail managing a repository for grey literature. This includes sending and receiving documents, repository management, and maintaining associated IT systems on both the back and front ends.

The utilization phase, the final and probably the most important phase, is the phase when GR becomes available for search and retrieval. The search is typically accomplished through keyword-based queries that match search terms with document metadata or content. Results are usually sorted by potential relevance or date.

After identifying the basic phases, let's explore how ChatGPT can transform each phase of GL management and the improvements and benefits it can offer.

The traditional preprocessing phase, involving the collection of GL, can transition towards web scraping. ChatGPT, when appropriately directed, can efficiently extract information from various online sources like websites, databases, journals, conference proceedings, and preprint servers.

Metadata creation can potentially be replaced by automated tagging and metadata generation, alongside contextual analysis and summarization. This approach is already widely adopted by several information database and repository providers.

A significant shift in user experience will occur, moving from a database-style Boolean and keyword search user interface to conversational interfaces. A ChatGPT-based interface will offer specific replies through dialogue instead of merely providing a list of information sources for further search.

Closely related to user experience and maximizing the use of valuable information resources is ChatGPT's ability in natural language processing. It can comprehend context-

based queries, conduct exploratory searches on related subjects, offer personalized recommendations, and expand searches in unforeseen directions, uncovering unexpected facets and possibilities for the user's attention.

Web Scraping

Let's delve deeper into the techniques of web scraping, particularly exploring its significant features that render it highly valuable for enhancing the management of GL.

Web scraping offers **direct targeting of GL**. By fine-tuning the ChatGPT model through pertinent training data and specific prompts relevant to GL, it can effectively aid in retrieving and extracting targeted information from websites. This encompasses a wide range of parameters, including different geographical locations, organizations, specific journals, topics, and other predefined access frequencies.

ChatGPT possesses the ability to **cross-reference and verify** scraped information against reputable sources, ensuring the accuracy and reliability of publications. This validation process ensures that the gathered information is credible and meets requisite quality standards.



Another notable feature of ChatGPT is its capacity for **knowledge integration**. It can seamlessly integrate scraped grey literature with its existing knowledge base, providing supplementary context, related articles, historical data, or scientific background. This enrichment significantly enhances the overall comprehension of the topic.

Furthermore, ChatGPT's **multilingual capabilities** empower it to scrape grey literature from websites in diverse languages. This versatility broadens the scope of data collection and analysis, enabling a more comprehensive understanding across various linguistic domains.

Metadata Creation

Metadata creation stands as an area where leveraging ChatGPT can yield swift and substantial benefits. Through an analysis of specific document content and context, ChatGPT can automatically generate pertinent metadata, including author names, publication dates, journal titles, and other essential citation information. This automated process significantly streamlines cataloging and referencing of grey literature, resulting in considerable time and effort savings.

Capitalizing on its adept **contextual comprehension**, ChatGPT excels in identifying relationships between concepts, detecting nuances in terminology usage, and establishing connections across various research domains. Such capabilities empower researchers to attain comprehensive insights into specific topics, pinpoint knowledge gaps, and explore potential research trajectories.

The process of **automated tagging** involves ChatGPT analyzing the content of grey literature to extract key topics, concepts, and keywords that precisely represent the document's subject matter. These tags, when integrated with relevant knowledge organization systems, serve as



invaluable metadata, enhancing efficient document organization, searchability, and retrieval.



ChatGPT's ability to generate concise summaries encapsulating the essence of lengthy scientific articles proves immensely beneficial. These summaries furnish researchers with an overview of a document's content, expediting the review of pertinent literature. They aid in filtering relevant resources and significantly contribute to informed decision-making concerning the document's relevance and significance.

Metadata Creation - Example

Here is an illustration of how ChatGPT can effortlessly generate Dublin Core (ALA, 2003) metadata from an article.

In this instance, the article under consideration was one of my previous works titled "When is 'grey' too 'grey'? A case of grey data." This article was featured in the Conference Proceedings of the Twentieth International Conference on Grey Literature held in New Orleans, USA, in December 2018.

When is 'grey' too 'grey'? A case of grey data

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Abstract

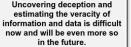
Conformity to facts, accuracy, habitual truthfulness, authenticity, information source reliability, and security have become important concerns. Trustworthiness of news and information, and of grey and other literature types has become of interest to the public, as well as to many information science and technology researchers. Starting with a definition of grey literature, and continuing with white, dark and grey data, this paper concentrates mainly on grey data as an emerging grey literature data type and its various 'shades' of trust. Special attention is given to data in the context of grey systems theory, anonymous data, and unstructured and unmanaged data. Based on a review of relevant literature and current practices, trustworthiness of grey data is analysed and elaborated. Guidelines and warning signs of grey data trustworthiness are identified, and conclusions offered. Keywords: grey literature, grey data

Why are we concerned about the greying of grey data?

Recent research by the European Broadcasting Union (EBU) on misinformation shows that only 59% of people in the European Union (EU) believe what they hear on the radio, 51% believe the television news, and only 47% believe what they read (Financial Times, 2018). Widespread fake news, misinformation, disinformation, spam emails, computer bots, botnets, web spiders, crawlers, and viruses erode our trust in the information and data we encounter in our daily lives, making trustworthiness a concern.

To further illustrate the concern of trustworthiness, consider that 269 billion emails are sent and received each day, of which 60% is spam. 56% of all internet traffic is from automated sources - hacking tools, scrapers and spammers, bots, and other malicious programs. Therefore, conformity to facts, accuracy, habitual truthfulness, authenticity, information source reliability, and security are of increasing importance

Another factor impacting trust is the amount of data surrounding us. 2.5 exabytes of data are produced every day, the equivalent of 250,000 Libraries of Congress and 90% of all the data in the world that has been generated over the last two years. 13 million text messages are sent every minute, 4.4 million videos are watched on YouTube every minute and 1.7 megabytes of new information are created every second for each human being on the planet. Although the amount of information and data¹ around us is enormous, 99.5% of all data



created is not currently being analysed and used. Still, we are hungry for information, demonstrated by over 6.6 billion Google queries daily, 15% of which have never before been searched.

Grey literature Various definitions of grey literature exist. The 12th International Conference on Grey Literature (GL12), held in Prague in 2010, defined it as "manifold document types produced on all levels of government, academics, business and industry in print and electronic formats that are protected by intellectual property rights, of sufficient quality to be collected and preserved by library holdings or institutional repositories, but not controlled by commercial publishers, i. e., where publishing is not the primary activity of the producing body" (Farace, D. and Schoepfel, J., 2010).

¹ Data is 'facts or figures from which conclusions can be drawn'. Information is 'data that have been recorded, classified, organized, related, or interpreted within a framework so that meaning emerges'. www.statcan.gc.ca

Please create Dublin Core metadata from the article?

Full-text of the following article: When is 'grey' too 'grey'? A case of grey data by Dobrica Savić. Conference Proceedings: Twentieth International Conference on Grey Literature. New Orleans, USA. December 3-4, 2018. }

Here is the ChatGPT output which captured a comprehensive set of Dublin Core metadata.

DUBLIN CORE RECORD Title: When is 'grey' too 'grey'? A case of grey data Creator: Dobrica Savić Contributor: Nuclear Information Section, International Atomic Energy Agency, NIS-IAEA, United Nations Abstract: This paper discusses the importance of trustworthiness in news and information, particularly in the context of grey data. It covers various aspects of grey data, including its definition, characteristics, and challenges in ensuring its veracity and usability. Keywords: grey literature, grey data, trustworthiness, information reliability, data integrity Date: 2019 Type: Text Format: PDF Identifier: ISBN 978-90-77484-33-3 Source: Conference Proceedings: Twentieth International Conference on Grey Literature. New Orleans, USA. December 3-4, 2018. Language: English Coverage: European Union, United States, Russia, China, Japan Rights: © TextRelease 2019

Beyond its proficiency in creating valid Dublin Core data records, ChatGPT showcases its capability to generate the entire metadata in a JSON format (w3schools.com, 2023) with a simple command. Here is an example of such a record in JSON format.

JSON format "Title": "When is 'grey' too 'grey'? A case of grey data", "Creator": "Dobrica Savić" "Contributor": "Nuclear Information Section, International Atomic Energy Agency, NIS-IAEA, United Nations", "Abstract": "This paper discusses the importance of trustworthiness in news and information, particularly in the context of grey data. It covers various aspects of grey data, including its definition, characteristics, and challenges in ensuring its veracity and usability.", "Keywords": "grey literature, grey data, trustworthiness, information reliability, data integrity", "Date": "2019", "Type": "Text" "Format": "PDF" "Identifier": "ISBN 978-90-77484-33-3", "Source": " Conference Proceedings: Twentieth International Conference on Grey Literature. New Orleans, USA. December 3-4, 2018.", "Language": "English", "Coverage": "European Union, United States, Russia, China, Japan", "Rights": "© TextRelease 2019" }

User Experience

To illustrate the disparity between future user experiences and current interfaces, let's examine a sophisticated and widely used search interface within the INIS (International Nuclear Information System) repository (INIS, 2023). Additionally, we'll explore an example of utilizing ChatGPT to inquire about the same subject, specifically, 'nuclear information.'

The INIS repository's search interface offers diverse search options, allowing users to explore all content, bibliographic records, or exclusively access full-text content. Furthermore, it provides the ability to refine results to those with full-text access. Boasting nearly 700,000 identified results, users can sort findings by relevance, date, and the number of records displayed per page. Further granularity is available through primary subjects, subject areas, record and literature types, conference and journal titles, publication years and ranges, country of publication, language, descriptors, and INIS volume. It stands as a robust and all-encompassing search engine offering numerous



search facets. However, the user's specific requirement was simply a definition and potential clarification of 'nuclear information.'

	Search the INIS Re	pository
nuclear	formation	Search
Ye	Latest Records Advanced	d Search
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Search the INIS Repository	Iclear information	€ <u>Clear All</u> ä <u>Insert Unicode</u> : Search
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Subject Area	1997	目 🛇 🕹 …
Nuclear Physics (146366) Life & Sciences (87865) Nuclear Power & Safety (86289)	Information scanning and processing at the Parks, C.; Julian, C. Oak Ridge National Lab., Tenn. (USA) 1971	
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In contrast, ChatGPT swiftly analyzed the search prompt, providing a succinct definition of nuclear information accompanied by a descriptive overview of its coverage, associations, likely related areas, and significance. This stark contrast in output signifies the potential time-saving for searchers aiming to grasp the initial definition and core elements of nuclear information. In contrast, ChatGPT swiftly analyzed the search prompt, providing a succinct definition of nuclear information accompanied by a descriptive overview of its coverage, associations, likely related areas, and significance. This stark contrast in output signifies the potential time-saving for searchers aiming to grasp the initial definition and core elements of nuclear information.

Can you define nuclear information for me?			
technology, and applications. It encompasses various aspects of nuclear physics, nuclear engineering, and the use of nuclear energy. Nuclear information includes a wide range of data, theories, and experimental results that contribute to the understanding of the behavior and properties of atomic nuclei, as well as the processes that involve nuclear reactions and interactions. This information can be			£
Additionally, nuclear information also involves details about nuclear power generation, nuclear reactors, radiation protection, nuclear safety, nuclear waste management, and nuclear non-proliferation measures. It encompasses technical specifications, operational guidelines, regulatory frameworks, and safety standards that govern the use of nuclear technology.			
Nuclear information is crucial for researchers, engineers, policymakers, and organizations involved in nuclear science and technology. It helps facilitate scientific advancements, technological developments, and informed decision-making in areas such as energy production, medical applications, industrial processes, and scientific research.			
	Nuclear information generally refers to the knowledge and data related to nuclear science technology, and applications. It encompasses various aspects of nuclear physics, nuclear engineering, and the use of nuclear energy. Nuclear information includes a wide range of data, theories, and experimental results that contribute to the understanding of the behavior and properties of atomic nuclei, as well as the processes that involve nuclear reactions and interactions. This information can be related to nuclear structure, nuclear decay, nuclear fission, nuclear fusion, and other nucle phenomena. Additionally, nuclear information also involves details about nuclear power generation, nuclear reactors, radiation protection, nuclear safety, nuclear waste management, and nuclear non-proliferation measures. It encompasses technical specifications, operational guidelines, regulatory frameworks, and safety standards that govern the use of nuclear technology.	Nuclear information generally refers to the knowledge and data related to nuclear science, technology, and applications. It encompasses various aspects of nuclear physics, nuclear engineering, and the use of nuclear energy. Nuclear information includes a wide range of data, theories, and experimental results that contribute to the understanding of the behavior and properties of atomic nuclei, as well as the processes that involve nuclear reactions and interactions. This information can be related to nuclear structure, nuclear decay, nuclear fission, nuclear fusion, and other nuclear phenomena. Additionally, nuclear information also involves details about nuclear power generation, nuclear reactors, radiation protection, nuclear safety, nuclear waste management, and nuclear non-proliferation measures. It encompasses technical specifications, operational guidelines, regulatory frameworks, and safety standards that govern the use of nuclear technology. Nuclear information is crucial for researchers, engineers, policymakers, and organizations involved in nuclear science and technology. It helps facilitate scientific advancements, technological developments, and informed decision-making in areas such as energy	 Nuclear information generally refers to the knowledge and data related to nuclear science, technology, and applications. It encompasses various aspects of nuclear physics, nuclear engineering, and the use of nuclear energy. Nuclear information includes a wide range of data, theories, and experimental results that contribute to the understanding of the behavior and properties of atomic nuclei, as well as the processes that involve nuclear reactions and interactions. This information can be related to nuclear structure, nuclear decay, nuclear fission, nuclear fusion, and other nuclear phenomena. Additionally, nuclear information also involves details about nuclear power generation, nuclear reactors, radiation protection, nuclear safety, nuclear waste management, and nuclear non-proliferation measures. It encompasses technical specifications, operational guidelines, regulatory frameworks, and safety standards that govern the use of nuclear technology. Nuclear information is crucial for researchers, engineers, policymakers, and organizations involved in nuclear science and technology. It helps facilitate scientific advancements, technological developments, and informed decision-making in areas such as energy

It's important to note that this comparison doesn't establish superiority but highlights a distinct approach. Ultimately, users can determine which method best aligns with their needs. A blend of both interfaces might present the most advantageous and practical solution.

Dialog

Moving from a DB-type Boolean search (Socialtalent, 2023) user interface to a ChatGPT interface offers several advantages. Here are five major benefits of a search system that provides replies instead of simply pointing to external info-sources:

Natural language interaction: ChatGPT's conversational interface allows users to interact with the system using natural language queries and receive responses in a conversational manner. This eliminates the need for users to formulate complex Boolean queries or understand the underlying database structure. It also makes the search process more intuitive and user-friendly, resembling a conversation with an expert rather than navigating through a rigid search interface.

Contextual Understanding: ChatGPT's advanced language model enables it to understand the context of user queries and provide relevant and contextualized responses. Instead of providing a list of potential sources for further search, ChatGPT can directly address user queries, offer explanations, or provide specific information within the conversation. This contextual understanding enhances the user experience by reducing the cognitive load associated with searching for and evaluating multiple sources.

Personalized recommendations: ChatGPT can leverage its understanding of user preferences and previous search queries to offer personalized recommendations. By analyzing user behavior and feedback, the system can adapt and refine its responses,



ensuring that the information provided aligns with the user's needs and interests. This personalized approach enhances the user experience by tailoring the search results to individual requirements and increasing the relevance and usefulness of the information provided.

Improved efficiency and time saving: With a ChatGPT interface, users can quickly obtain relevant information without the need to browse through multiple sources or sift through lengthy search results. The conversational interface allows users to directly ask questions and receive concise answers or summaries, saving time and effort. Additionally, the system can provide additional context, related information, or follow-up questions to further refine the search and provide a more comprehensive understanding of the topic.

Collaboration and knowledge sharing: ChatGPT can facilitate collaboration among users by enabling features like document sharing, commenting, and annotation. Users can engage in discussions, share insights, and collectively contribute to the repository's content.

Conclusions

In conclusion, it is evident that grey literature is a valuable information resource. It provides diverse perspectives, bridges existing information gaps, delivers timely and current information, and substantiates evidence-based decision-making.

ChatGPT presents an exceptional opportunity for leveraging grey literature. It boasts outstanding natural language processing capabilities, contextual understanding, human-like response generation, widespread use across diverse domains, and immense potential to revolutionize information systems while enhancing user experiences.

The collaboration between grey literature and ChatGPT can yield excellent synergy. ChatGPT can enhance all phases and functions of information management, offering web scraping for pertinent publications, automatic tagging, and metadata creation. It augments user experiences with improved interfaces and valuable natural language dialogues.

The future of grey literature remains a shared responsibility. While acknowledging the need for further enhancements and developments in grey literature management, progress must be built upon the successes already attained. Advocacy for the significance of grey literature needs amplification alongside the development of standards and guidance materials. The potency of grey literature hinges on collective cooperation, necessitating innovative leadership. In summary, the future of grey literature is contingent upon our collective actions.



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