

Charcoal Burning in Zambia: User Narratives for Successful and Equitable Information Services

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Abstract

The International Nuclear Information System (INIS) is a repository managed by the International Atomic Energy Agency that provides bibliographic information and full-text documents related to nuclear science and technology. This repository is an open platform that receives contributions of grey literature from its member states and is accessible to the public through the INIS Repository Search website.

Site administrators use Google Search Console to track the queries that led users to specific documents or bibliographic references within the repository. Administrators have observed that certain queries recur dozens to hundreds of times in a matter of a few days, then disappear. The queries use an identical phrase or slight variations and come from a single country. Examples include, "How is Carbon 13 used in medicine?", or "What are methods for detecting heavy metals in water", or "What is the environmental effect of charcoal burning in Zambia."

Through the data gathered from these queries, it is possible to construct user narratives to determine if the repository is meeting the needs of its various audiences. A user narrative is an extended description of the user, their circumstances, and their wants, which is distinct from a user story – a more formal and short description of a user's needs used in system design.

As an example, consider the query related to charcoal burning in Zambia. Based on the frequent queries related to this topic, it can be inferred that the user is likely a student researching a school assignment. Additionally, it is possible that the user is accessing the repository from a mobile device or school computer and is seeking authoritative and user-friendly information that answers their specific question. By accessing the repository as the described user, we can understand their experience and identify areas where the repository could be improved.

In a repository, success can be defined as meeting the user's needs and providing information in a user-friendly manner. By conducting this exercise for underrepresented or non-represented groups and addressing the problems identified, the repository can increase its success, equity, and opportunity. Overall, constructing user narratives based on actual queries can provide valuable insights into how to improve information services and make them more equitable and accessible.

Keywords: *Repositories; Grey Literature Resources; System Design; User Narratives*

Background

The International Nuclear Information System (INIS) has existed since 1970. It provides grey literature and bibliographic records to the public through the INIS Collection Search website. Approximately 435,000 PDFs are available to the public, and in 2023 there were over 15 million downloads through this open platform. In all, 4.7 million knowledge products (both full text and bibliographic-only) are available. The content is either provided to INIS by member states or is harvested from online publishers.

For bibliographic records, approximately 84% of sessions are the result of a Google search, including on Google Scholar. A user has searched for a topic by typing in a keyword or series of keywords. A record in INIS has appeared as a result, and the user has clicked on the result, sending them to an HTML page or PDF in INIS.

Google Search Console provides website administrators with reports on queries that led to a particular page on the subject website. Using this, administrators can monitor trends,

and derive cumulative statistics on site usage. Another commonly used tool is Google Analytics. However, direct PDF downloads are not easily tracked, so the Search Console is used.

In Search Console, administrators noticed that there were sometimes identical long textual queries, all happening within a day or two, and all from the same country. Table 1 lists some of the queries, the countries where users accessed the site, and the page linked by Google. The Table also lists, only for general interest, the contributing country of each item.

Query	User Country	Linked Page	Contributing Country
What is the history of nuclear power in Asia	India	Nuclear Power in Asia: Experience and Plans	Rep. of Korea
How can we provide dry season feeding of ruminants in Africa	Nigeria	Some Tools to Combat Dry Season Nutritional Stress in Ruminants Under African Conditions	United Kingdom
How is Carbon 13 used in medicine	United Kingdom	C 13 Application in Medical Diagnostics	Uzbekistan
What are methods for detecting heavy metals in water	Nigeria, India	A Laboratory Manual for The Determination of Metals in Water and Wastewater By Atomic Absorption Spectrophotometry	South Africa
How long does it take to build a nuclear power plant	United States	Construction time of PWRs	Brazil
What is the environmental effect of charcoal burning on the environment in Zambia	Zambia	Environmental Impact Assessment of The Charcoal Production and Utilization System in Central Zambia	Sweden

Table 1: Selected Queries and Resulting Pages

Taking one or all the examples, we can construct “user narratives” to see what the user experience is like in interacting with the system. More importantly, we can determine if the system is meeting the needs of the user, or if the system needs to be improved.

User Narratives

User narratives are a way to visualize or imagine the experience of a user going through their usage of a product or website. Developers and administrators have natural biases and their own preferred ways of using information technology products. The result is that a product most closely matches and meets the needs of the developer, and not necessarily other audiences of users. User narratives are a way to break out of the developers own experiences through an empathetic journey of a disparate group’s usage of the product.

As Kelly Payne (2016) writes, “A user narrative describes a particular person’s (i.e. persona’s) fictionalized journey through the use of your intended product. Aptly named, it reads more like a short story. Most user narratives are between 500 and 1,500 words.”

Jack Dorsey (2011), the founder of Twitter, is also a great advocate of user narratives writing, “If you do that story well, then all of the prioritization, all of the product, all of the design, and all of the coordination that you need to do with these products just falls out naturally.”

Charcoal Burning in Zambia

Taking the last query as an example, a user narrative can then be built to assess whether the repository is meeting the needs of the user. First, it could be supposed that the identical wording, timing, and length of the phrase, indicates that the searches were done as part of a school assignment. All queries came from Zambia, so we can begin to construct the user narrative as below:

I am a 14-year-old student in Zambia. I was given an assignment at school, to write a one-page paper on "the effects of charcoal burning on the environment in Zambia." I used my...

At this point, some research may be required. Did the student use a mobile phone or a computer? Looking at International Telecommunications Union statistics on mobile phone uptake in Zambia, it shows that there are over 100 mobile subscriptions per 100 people.

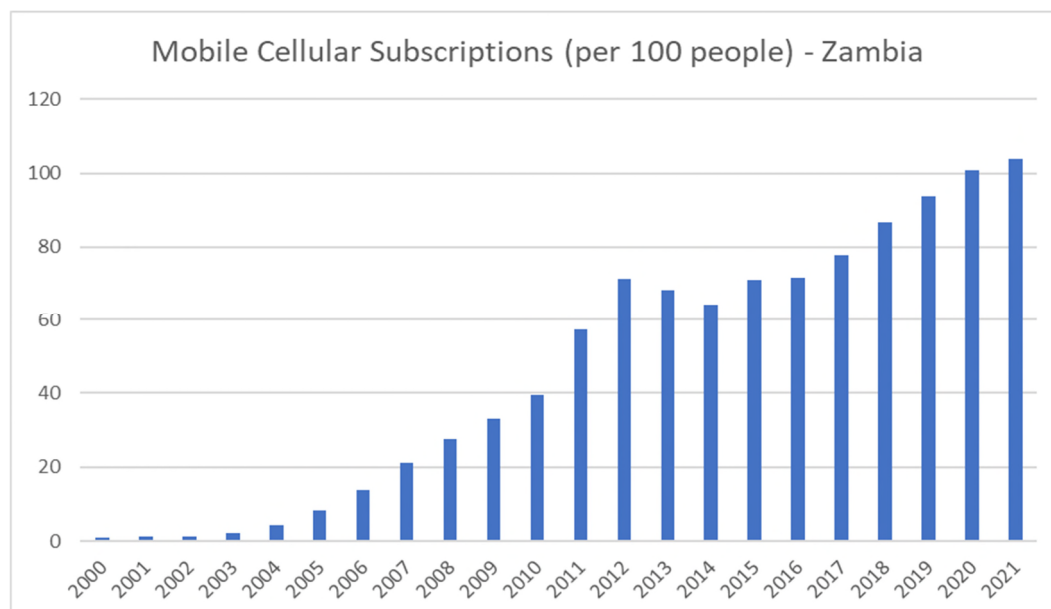


Figure 1: International Telecommunications Union, CC BY-4.0
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It can be supposed, therefore, that the student was likely to use a mobile phone, or perhaps a school computer, to do the research. The narrative is now:

I am a 14-year-old student in Zambia. I was given an assignment at school, to write a one-page paper on "the effects of charcoal burning on the environment in Zambia." I used my mobile phone to search for that phrase in Google. I clicked on one of the links and it took me to a PDF on the INIS Repository.

Trying the Narrative

With the user narrative created, site administrators can put themselves in the place of a user and experience the repository as they would. Using a mobile browser, an identical search can be performed, "the effects of charcoal burning on the environment in Zambia". The search produces the result in figure 2.

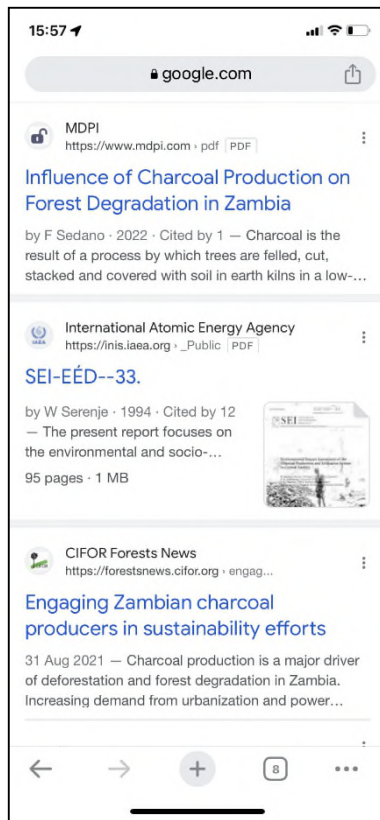


Figure 2: Result of the Google Search



Figure 3: PDF viewed on a mobile phone

The result in Google is unsatisfactory from the user perspective. First, the PDF from INIS (the second result) has an odd title, “SEI-EED—33”. This comes from the PDF metadata and represents the report number. It is not descriptive for the user.

Clicking on the link provided, the user is presented with a PDF of 95 pages. The document, which is a detailed study of the practice of charcoal burning and its environmental impacts, does not give a straightforward answer to the question posed. The student doing research would have to sift through the document, scanning for an answer. For this audience, the PDF provided is also unsatisfactory. For such a user, it would be preferable to be able to pose a question, and receive a citable, authoritative, yet concise answer.

Potential Improvements

Having looked at the user experience and determined that the current configuration does not meet the needs of the audience, solutions can be proposed. One quick improvement would be to edit PDF metadata to match the title given for each record. This would eventually improve the entries on the Google search.

One possibility for improving the overall user experience would be to provide a wiki with pages on various topics. The pages could be developed and edited by experts. This could serve for a limited number of topics. However, for the example topic – that of charcoal burning in Zambia – it is very specific and on the edge of topicality for the organization. It is unlikely that a wiki could meet all such needs.

One possible solution would be the use of Large Language Models (LLMs) such as ChatGPT. Such models are conversational in nature and can provide condensed and direct answers to questions. However, as Irons et. al. (2023) write, “the well-known limitations of LLMs, particularly their ability to ‘hallucinate’ (create factually incorrect information), may make them ill-suited for science work.” Among other problems, such as biases caused by materials used in training, LLMs fabricate references and facts so that their products cannot be trusted or cited. It is to be hoped that this problem will be addressed in coming years.

Conclusion

User narratives can be helpful in designing grey literature repositories, so that other user perspectives are considered. In the selected case, the repository does not currently meet the needs of the audience. Some small improvements can be made. However, there is not currently a satisfactory technical solution. It is hoped that future enhancements to artificial intelligence will make further improvement possible.

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