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**Innovative wikis literature review**

The wiki concept was conceived in 1994 by Ward Cunningham. The most famous site, Wikipedia, launched in January 2001. So now in 2021, Wikipedia is 20 years old. That is an eternity for most software. Additionally, a search for newly published books covering wikis produce little results. The most recent wiki dedicated book on Amazon.com was published in 2007. Safari books, a leading electronic digital library that prides itself in providing users with the most up-to-date content in technology , lists only a handful of books related to wikis. And the most recent of those books was published in 2013. These findings could lead one to deduce that wikis are becoming outdated. However that is not the case. A recent literature review discovered some innovative and state of the art uses for wikis within the past five years. So while wikis are still used primarily for knowledge management purposes, there are many categories for wikis that push the boundaries of their original intention. We can classify three of these innovative categories as 1) crowd source a problem 2) solve an issue where the problem domain requires trust and accuracy and 3) enhance citizen welfare and quality of life.

Let’s examine wikis that thrive on crowd sourcing a problem. When it comes to medical biological information, sharing within the community is essential. In the past, biological databases were typically done in an encyclopedia style format. While these databases are extremely useful, another dimension was added by elevating this knowledge to a wiki format. One example of this is defined in the article by Chen, T., Li, et. al (2017) titled *LiverWiki: A wiki-based database for human liver*. This particular wiki is called LiverWiki, and it creates a community of knowledge focused around a biological organ. One major benefit of this is the fact that links between pages can actually demonstrate biological relations between structure such as genes and proteins and disease pathways. But the biggest benefit is that multiple people in the scientific community can easily contribute to an ever growing expanding body of knowledge covering a complex human organ.

Another example of crowdsourcing problem can be found in the scientific community of carbohydrate research. According to the article *Ten years of CAZypedia* (2018), “Cazypedia is a successful example of dynamic community driven and expert based bio curation.” Cazypedia is a MediaWiki powered site for Cataloging carbohydrate active enzymes, and it is accessed by thousands of international users each week. These users are researchers interested in carbohydrates and enzyme interactions. So like LiverWiki, Cazypedia grows by contributions of a global crowd of researchers.

A final example of crowdsourcing a problem is noted in the article by Laso Bayas, J. C et.al titled *A global reference database of crowdsourced cropland data collected using the Geo-Wiki platform*. This paper describes a research project that uses GeoWiki. This project uses the combined eyes of multiple users to identify cropland data from existing satellite imagery. From satellite imagery alone there is typically a lot of disagreement upon which regions are suitable for cropland. But if you can have multiple people combing over images, you can develop a degree of accuracy when identifying potential cropland. In this project, the images and the final results were all managed by contributions to and from Geo wiki.

Now we will look at some cases where a wiki is used to solve an issue where the problem domain requires trust and accuracy. We start by again revisiting Cazypedia, the carbohydrate research site, and Liver Wiki, the wiki dedicated to human liver research. As with any research in the scientific community, accuracy is paramount. A benefit of using a wiki as a data collection repository of information is that the wiki inherently provides many levels of curation. And this curation can come in the form of academic peers from around the globe. According to the article *Ten years of CAZypedia* (2018), “To maintain editorial quality control, every family and lexicon page in CAZypedia is overseen by a responsible curator, who is primarily responsible for overall content. Responsible curators are selected by a panel of senior curators based on established expertise and a willingness to participate in the active maintenance of specific pages. In turn, responsible curators are tasked with recruiting and managing authors to participate in content creation; responsible curators may also contribute directly to composing page content.” The same can be said for LiverWiki. The natural capabilities of the wiki contribution model facilitate a natural form of managing and insuring information. According to Chen, T., Li, et.al (2017), “user participation is be included to ensure the accuracy of the information on LiverWiki following the wiki model: the quality of information is ensured and improved by multiple users reviewing and refining the same content [21]. When the user group grows bigger, pages/tables created by users are to be reviewed by peers in co-editing manners to ensure the accuracy of the information on the pages/tables.” Thus these two specific scientific wiki instances exploited the natural features of wikis to allow users to police themselves in terms of information accuracy. That provides for continual refinement of catalogued information. That is something that could not be as easily achieved in the traditional methods of archiving information such as encyclopedias and relational databases.

Another case where accuracy and trust is paramount is exhibited in the article by Plaisance, A et.al (2018) titled *Development of a decision aid for cardiopulmonary resuscitation and invasive mechanical ventilation in the intensive care unit employing user-centered design and a wiki platform for rapid prototyping*. This was a project that used a wiki to help make decisions about possible life sustaining interventions for critical care patients. This project used DokuWiki as a form of decision aid to help clinicians in their discussions with patients who were hospitalized and potentially may ventilation or resuscitation due to deteriorating condition. Decision aids typically come in the form of pamphlets or a DVD. The study tried to incorporate decision aids into the wiki itself. But in this case the study determined that traditional decision aides work best. However, the study also demonstrated that using a wiki as a knowledge management system for health care providers enabled physicians to tailor their discussions with individual patients. So the information disseminated from this wiki must be trustable and accurate because it will be needed when life sustaining medical care is needed most. It is occasionally needed to make help make decisions at the end of life stage for patients.

A final case that required accuracy involves the ever growing threat of cyber security. Nykänen, R., & Kärkkäinen, T. (2016). In the article *Supporting Cyber Resilience with Semantic Wiki,* they describe a study that used semantic wiki to mitigate threats and risk by providing a collaborative platform to disseminate information about security management. All sizes of enterprise corporations face cyber security threats. The bigger corporations have financial means to deal with this ongoing problem, but the smaller corporations may not. Cyber security can be an extremely expensive endeavor so the project documented in this study was meant as a cost effective solution for small and medium size organizations with limited resources. One approach to solve this problem would be the implementation of a wiki to capture proprietary security information. But this project takes it a step further by using semantic wiki which adds another layer of query capability. According to Wikipedia “Semantic wikis, on the other hand, provide the ability to capture or identify information about the data within pages, and the relationships between pages, in ways that can be queried or exported like a [database](https://en.wikipedia.org/wiki/Database)[[1]](https://en.wikipedia.org/wiki/Semantic_wiki#cite_note-1)[[2]](https://en.wikipedia.org/wiki/Semantic_wiki#cite_note-2) through [semantic queries](https://en.wikipedia.org/wiki/Semantic_Query).” That result is an ever growing knowledge base that provides a high level of trust in a mission critical domain. Accuracy in threat mitigation information is paramount and is difficult to achieve since threats are constantly evolving.

A final category of wikis that was illuminated by this review is that of the ability to enhance citizen life and welfare. An example of this is described in Al Helal, E., & Mokhtar, H. (2018), *Towards Smart Riyadh: Riyadh Wiki Information and Complaining System*, where we learn about a wiki implemented as a government tool to improve citizen welfare. The government of Riyadh developed a wiki platform that allowed citizens to share and discuss issues with the city. Citizens can also add information to the wiki that can be useful for any resident. According to Al Helal, E., & Mokhtar, H. (2018), “citizens act as sensor nodes and sources of data to support the government and to improve their city.” Issues would be things like a broken street light. Also citizens can post important information or even add new categories of concern to the wiki. In other words, citizens are able to collaborate and even develop their wiki program. Interestingly the study also delved heavily into usability where they considered points such as:

* Can it be used by technically inclined citizens As well as those who are not technically inclined
* can it operate on any device is
* Is accessible from anywhere or everywhere
* It must be available on different languages

The study went so far has to consider the ISO standard for web usability evaluation.

**Referenced Papers**

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