

WHO's Community-Centered Epidemic and Pandemic Information Platform: Hive

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Abstract. Each epidemic and pandemic is accompanied by an infodemic. The infodemic during the COVID-19 pandemic was unprecedented. Accessing accurate information was difficult and misinformation harmed the pandemic response, the health of individuals and trust in science, governments and societies. WHO is building a community-centered information platform, the Hive, to deliver on the vision of ensuring that all people everywhere have access to the right information, at the right time, in the right format in order to make decisions to protect their health and the health of others. The platform provides access to credible information, a safe space for knowledge-sharing, discussion, and collaborating with others, and a forum to crowdsource solutions to problems. The platform is equipped with many collaboration features, including instant chats, event management, and data analytics tools to generate insights. The Hive platform is an innovative minimum viable product (MVP) that seeks to leverage the complex information ecosystem and the invaluable role communities play to share and access trustworthy health information during epidemics and pandemics.

Keywords. Trust, trustworthy information, powered by communities, high-impact health events preparedness, epidemic and pandemic response, health information platform, machine-learning

1. Introduction

In today's highly interconnected world, each individual is exposed to a complex information ecosystem that spans both the physical and digital environments. An *infodemic*, is an overabundance of information, accurate or not, in the digital and physical space, accompanying an acute health event such as an outbreak or epidemic [1]. During epidemics and pandemics there are changes to the information ecosystem due to the infodemic and changes to the information-seeking behaviors of individuals, due to an increase in uncertainty, the evolving situation and the need to make decisions rapidly. The infodemic that accompanied the COVID-19 pandemic presents an unprecedented example. There was an increase in volume of scientific information with more than 20,000 COVID-19 related articles published in the first six months of the pandemic [2]. Many of the articles were generated rapidly without adequate scientific rigor, and peer review. Furthermore, scientific knowledge evolved as the pandemic evolved and this

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evolution was often not explained well. There were many voices and opinions debating the science and accompanying policies, which often led to polarizing debates. In some cases, response measures were politicized and media content sensationalized, which amplified uncertainty and fear within societies. Under these circumstances, it was difficult for people to access trustworthy information in order to make decisions to protect their health and the health of their communities. All of these aspects of the infodemic impacted trust within societies, including trust in institutions, experts, health authorities, governments, and academia, thereby negatively impacting pandemic response efforts. The global health community looked to find solutions that improve access to trustworthy information, increase health and scientific literacy, and facilitate individual and community decision-making while promoting autonomy and localization of epidemic and pandemic responses.

2. Trustworthy Information Powered by Communities – “Caring is Sharing”

The scale and unpredictability of the COVID-19 pandemic placed extraordinary challenges on leaders, decision-makers, and communities. Communities and individuals need to be listened to and able to participate in broader discussions to share and understand the challenges and impediments they are facing together. If questions and concerns are not addressed adequately and information voids persist, then rumors and misinformation can flourish. For example, suppose Public Health and Social Measures being mandated by authorities are not feasible to implement in certain settings or require resources that are not available. In that case, there can be a disconnect between leadership and communities and individuals – leading to a breakdown in trust. Trust as a social capital, is fragile particularly in times of crisis. It requires specific, intentional interventions for it to be nurtured and maintained. Autonomy, consistency, and transparency in communication underpinned by the commitment and accountability of leaders and decision-makers and active community involvement are essential to developing and maintaining trust across our communities when the topic concerns lives, livelihoods, health, and well-being. Solutions are needed that build trust, are inclusive and responsive, and enable autonomy.

3. A Solution – The Hive Platform

3.1. A Space for Communities to Connect and Share Best Practice

WHO uses several strategies to disseminate information to the public and decision-makers. The WHO Information Network for Epidemics (“EPI-WIN”) [3] is one strategy that provides resources and regular updates using a whole-of-society approach. Recognizing and promoting local knowledge and expertise is critical to ensure WHO’s guidance or public-health interventions are relevant, feasible and appropriate. During the COVID-19 pandemic, a wealth of information and experience was shared between industries, decision-makers and within communities. However, it was often ad-hoc and opportunistic. WHO wants to facilitate systematic sharing of this local knowledge and expertise, capitalize on best-practice, and support decision-makers and community leaders to connect and share experiences to prepare and respond to high-impact health events.

The Hive, WHO's community-centered Epidemic and Pandemic Information Platform [4], is designed to complement the EPI-WIN approach and enhance the way that WHO supports and learns from communities. Communities are where trust is built, information is shared and collaboration happens. Particularly in times of crisis and uncertainty, people turn to those who have remained trustworthy over time. "For individuals to adopt, change and sustain new behaviors during epidemics, they need to... have the ability to enact the recommendations in their living/social/work/faith setting" [5]. The Hive platform is designed to bring together communities, while leveraging current technology and the digital information ecosystem. The Hive platform, like a beehive, has the opportunity to be space of activity, support and community.

3.2. The Hive Platform as a System

To deliver on the vision of ensuring that all people everywhere have access to the right information, at the right time and in the right format, the platform must provide access to credible and trustworthy information. Given the complex nature of the current information ecosystem, and how individuals seek, engage and share information, it would be an impossible task for WHO alone. As depicted in Figure 1. the Hive as a system is designed to leverage the power of communities and the opportunities to be gained from community participation. Moreover, the data gathered from its feedback loops will guide the machine learning functionality of the Hive, presenting personalized and appropriate information relevant to the interests of the individual. We envision the Hive platform enabling an inclusive response to public health events through multisectoral, multi-level communication and collaboration. Future development will include scaling up and rolling out to global communities; gamification to encourage community participation; advanced analytics and integrated listening tools to guide community engagement activities, support early detection and targeted response measures. Hive will place the community and the community's information needs at the center and provide the tools necessary for knowledge exchange and co-creation.

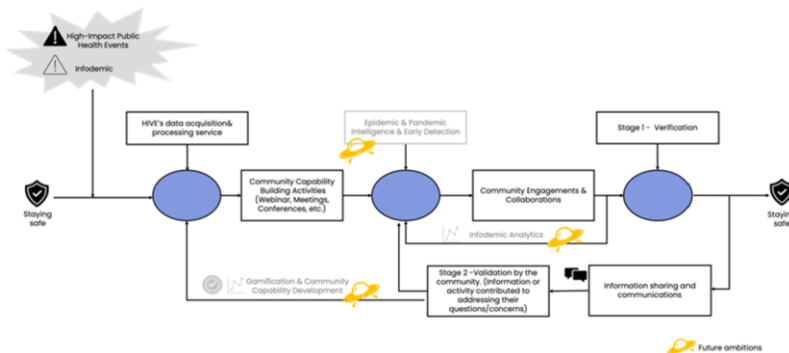


Figure 1. The Hive Platform as a System

3.3. The Technology Behind the Hive – A Process of Evolution and Refinement

The Hive system uses a continuously improving data acquisition system that gathers information from a defined list of global sources. The data acquisition service feature gathers the information from external sources, such as mainstream news outlets, and

health authority websites, using web crawling and scraping. The process is triggered regularly to ensure up-to-date information on the Hive platform. After crawling and scraping the information, the content and metadata are stored and accessed by the indexer for enrichment and indexing. Then the system tags each content and transforms texts into numerical values for machine learning.

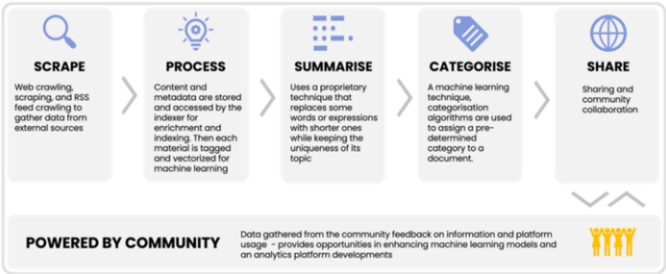


Figure 2. Data acquisition and data processing features of the HIVE

Hive's summarization feature provides a short summary of the presented information. This process uses a technique that replaces some words or expressions with shorter ones while keeping the uniqueness of its topic. A machine learning technique, categorization algorithms assign a pre-determined category to each content. Since the Hive system has been recently launched, it is currently using an unsupervised model. After onboarding early adaptors, the system should be able to receive feedback to assess and improve the classification performance. The data gathered from community feedback and usage patterns will guide machine learning models to produce personalized and appropriate information relevant to the interests of the individual. These multistep processes are depicted in Figure 2.

3.4. Identifying & Verifying Trustworthy Sources of Information

The Hive uses three main pathways to gather information from all online content and electronic media: 1) web crawling and scraping. 2) co-created content – jointly produced information between combinations of industry, research, government, and civil society. 3) the community members “suggest” sources that can be added to the platform.

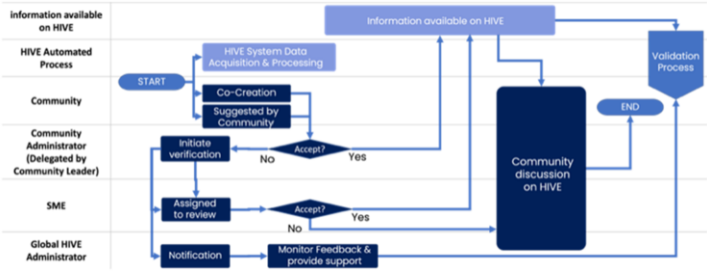


Figure 3. Verification Process

Figure 3. shows the workflow of integrating the inputs from Subject Mater Experts (SMEs) into the initial verification of information that can be included in the Hive information universe. This approach allows the communities to access large amounts of information from online media in a digestible way while generating and adding tailored information to the Hive platform through the review and acceptance process.

3.5. Process of Validating the Information

One of the platform's key attributes is that the information can address questions and concerns of the community. That is, the community's validation process can provide essential data for measuring the effectiveness of measures used to build trust during epidemics and pandemics. Figure 4. illustrates the workflow of validation by the community and the data capture workflow for measurements of the relevance of information on Hive.

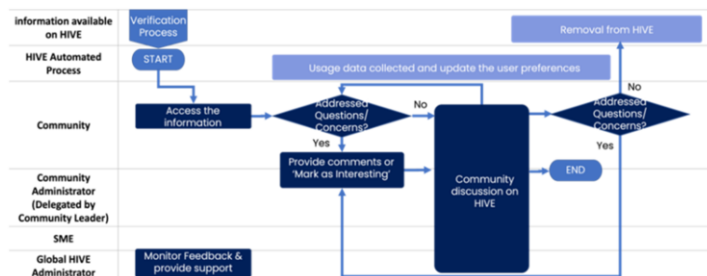


Figure 4. Validation Process

Quantitative and qualitative feedback on whether the content has contributed to addressing their questions and concerns and usage data can provide insights into the latest trend and best approaches.

4. Conclusion

The Hive is an ambitious, future-facing platform designed to transform the ways of working with communities during public health emergencies. It is an innovation that will support developing and maintaining community trust, enabling active community collaboration to address questions and concerns, and share trustworthy and relevant information. In future work, we aim to continuously improve the ways of working for the communities on Hive and bringing in the latest information technology advancements, including data analytics and machine learning to expand the role of the community in high-impact public health events and complement Epidemic & Pandemic Preparedness & Prevention.

References

- [1] World Health Organization Infodemic. Available at: https://www.who.int/health-topics/infodemic#tab=tab_1 Accessed 3 Jan 2023
- [2] Teixeira da Silva JA, Tsigaris P & Erfanmanesh M (2021) Publishing volumes in major databases related to Covid-19. *Scientometrics* 126(1):831–842. <https://doi.org/10.1007/s11192-020-03675-3>
- [3] WHO, EPI-WIN: WHO Information Network for Epidemics. Available at: <https://www.who.int/teams/epi-win>. Accessed 3 Jan 2023
- [4] WHO Hive platform, community centred health information platform. Available at <https://hivecenter.who.int/>. Accessed 3 Jan 2023
- [5] Sylvie Briand, Sarah Hess, Tim Nguyen, Elisabeth Wilhelm, Tina Purnat Managing an Infodemic, Infodemic Management. In press 2023