DEAR READER,

If there was one universal statement to sum up the year 2020 “Things did not quite pan out as planned” would probably be it. Just like for most areas of our personal and professional lives, this also is true for the EIOS initiative. Both in the technology as well as on the community pillars, many of our original plans had to be changed.

Nevertheless, a lot of progress was made in 2020 and looking back, we are rather proud of everything we were able to achieve as an initiative DESPITE and BECAUSE OF the pandemic. In this newsletter, we will provide you with an overview of 2020’s major EIOS milestones and share with you a glimpse into our plans and priorities for the EIOS initiative in 2021. We are looking forward to starting this new year with you!

With sincere greetings,

The EIOS Core Team
Technology and System

A global emergency of the scale that we are currently experiencing has been (and continues to be) a true test for the EIOS system. In 2020, 30.8 million articles were imported into the system – more than 6 times the amount ingested in 2019 (5 million). On average, articles related to Coronavirus accounted for 85% of the total number as about 26.3 million were tagged with this category in 2020.

At its peak, the system collated more than 187,000 articles in one day, averaging 2.2 articles per second.

Naturally, this massive influx of data put a severe strain on the system, leading to performance and stability issues that culminated in frequent time outs and error messages toward the end of the year. Thanks to the joined effort of colleagues at the JRC, the WHO IT department and the ECT as well as the much-appreciated patience and understanding of the EIOS user community, we were able to implement required adjustments to the system architecture to increase stability and performance. Moreover, we were able to identify and address unrelated network configuration issues that had cause additional instability in the Azure hosting environment.

On the bright side: while the COVID-19 infodemic severely stretched our human and our system’s capacity, it also pushed us to explore new solutions and innovation. Driven by these new challenges and the urgent need to augment and better equip experts in gleaning insights from data and information to catalyse appropriate action in this changed context, a number of system developments were accelerated and a great variety of new collaboration projects were initiated.

Expansion and Engagement

With the new virus spreading rapidly across the globe, the EIOS initiative’s face-to-face engagement opportunities naturally took the biggest hit. Travel bans and social distancing measures derailed the annual in-person meetings of the Coordination Group just as much as our original plans for an official EIOS launch event at the World Health Assembly. Most notably for the EIOS community, this impact was felt in the cancellation of the much anticipated EIOS Global Technical Meeting (GTM). After the big success of the 2019 GTM in the Republic of Korea, we carefully weighed alternative options to organizing a physical conference but finally took the difficult decision to cancel the event in 2020. However, we have every intention to continue convening this annual event in the future, as we are convinced the GTM is a valuable forum for strengthening not only the EIOS initiative, but the global public health intelligence community as a whole. Whether it will be in a physical or virtual format, we are looking forward to reviving the GTM in 2021!

Our expansion to Member States and related face to face EIOS system training activities had to undergo major adjustments as well. The training design and materials had to be adapted for remote delivery and the originally planned second edition of a Training of Trainers could not take place after all. Counterparts in Member States that had previously been identified for EIOS expansion in 2020 were for the most part overwhelmed with managing the pandemic, as were many of our colleagues in the regional and country offices. Nevertheless, thanks to concerted efforts of the Global EIOS Support Team (GEST), we managed to onboard five new Member States from four WHO regions in 2020 and welcomed Uganda, Singapore, Saint Lucia, Dominica and Turkey to the EIOS initiative, alongside a number of other organizations, networks and technical teams within existing EIOS communities.

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EIOS IN NUMBERS

Sources

32,243 webpages are visited every day and scraped for relevant content to import to the EIOS system.

Sources on the EIOS system by type

- General News
- Medical
- Science
- Other

Categories

26.3 million articles that entered the EIOS system in 2020 were tagged with Coronavirus. This category thus amounted to 85% of all ingested content.

Total number of articles imported into the EIOS system

2019 5 million
2020 30.8 million

Volume of articles imported into the EIOS system by top 10 categories in 2020
The first record available to WHO of the pneumonia cluster in Wuhan is a media report captured by the EIOS system just after 03h00 UTC on 31 December 2019. Within hours, prompted by a ProMED alert and WHO correspondence with the China Country Office, active information gathering and communication were well underway across the organisation. As the event continued to unfold with global impact, becoming the COVID-19 pandemic, EIOS remained at the heart of public health intelligence activities from publicly available information; supporting ongoing detection and monitoring of the evolution of the pandemic, misinformation, and potential parallel health threats to inform risk assessments, situational awareness and communication.

Innovative research and development activities were pursued with private, public and academic sector collaborators, harnessing the power of Big Data and artificial intelligence to support monitoring and response activities: machine learning projects were pursued to help with the classification of misinformation, the mining of text and the summarization of volumes of information; vulnerability risk indices were incorporated to provide context on multiple dimensions.

Global COVID-19 case count dashboard and surveillance support system

One of the first urgent needs that was expressed to the ECT when SARS-CoV2 started spreading rapidly across the globe in early 2020 was the ability to gather and compare COVID related case and death counts from various sources. This triggered the development of the COVID-19 Case and Death Count-dashboard, which allows for visualisation of the outbreak progression over time through counts of COVID-19 reported cases and deaths based on different geographic aggregations. It displays the counts as reported by different sources side by side, thus helping analysts to identify reporting differences and prompting further investigation where appropriate.

Another early request from Public Health Intelligence (PHI) analysts at the WHO led to the exploration of a global COVID-19 case count surveillance system, a web-based service to support the automatic discovery, identification and extraction of specific COVID-19 information. The aim was to design an application that helps PHI professionals to systematically collect, consolidate, analyse and disseminate specified COVID-19 data from official online sources of national and subnational health authorities worldwide, replacing the time-consuming manual extraction of this information from websites, PDF files and others using different isolated desktop applications. The solution would automate the process of data acquisition and storage, support the discovery of changes over time and differences between data sources, and facilitate the harmonisation of data from different sources and its analysis. Exploratory work on this began in March 2020 and, having undergone various iterations, the developed solution will soon be tested by a select group of PHI professionals. In the long-term, it will be developed into a fully configurable and automated open source solution, that can be customized and extended by PHI experts as required.

These are just two of the several projects initiated and accelerated in response to COVID-19 activities. Though born out of the COVID emergency, we are doing our best to ensure that the developments, wherever possible, will be of added value and re-usable beyond the current context.

Where are we going in 2021?

While 2020 has shown that there is much yet to be done to build on the foundations EIOS continues to lay, it has also demonstrated the solidity of these foundations and the initiative’s capacity to evolve in an ever-changing context, responding to old and new challenges alike. A tremendous effort is required from all of us involved in PHI activities to further push ahead, forge new alliances, dream up new solutions and make them a reality. In 2021, the EIOS initiative will be moving full speed ahead on a number of identified priorities – both short and long-term – while taking care to maintain and support existing commitments.
Boosting EIOS expansion

With regards to the EIOS community, this means further growing and nourishing the existing user base. Valuable feedback gained through the results of the EIOS implementation survey distributed in December 2020 will be used to further engage with users and communities on how to enhance their experience and workflows, inform necessary system adaptations and training needs.

While planning remains challenging with the pandemic still ongoing in 2021, expansion of the EIOS initiative and system will continue based on the capacity of both our collaborators and the EIOS technical resources to properly train and support new and existing users.

An award received from the Solidarity Response Fund to support the initiative in the context of the ongoing COVID emergency will help boost expansion activities in 2021. One of the priorities will be to consolidate capacity in the WHO regional offices to support expansion to Member States as well as the recruitment of a dedicated Training Coordinator to advance the development of professional online training materials.

Further enhancing the EIOS system

The EIOS team is also planning a number of enhancements and new features in the EIOS system to further help facilitate early detection, support monitoring activities, provide tools to cope with high volumes of information and strengthen communications and reporting. Together with our colleagues at the Joint Research Centre (JRC) as well as a range of other collaborators, we will continue working on tools to help streamline the workflow for users to allow them to adapt the system more easily to their needs and facilitate cross-community collaboration.

We are also working on providing users with the ability to build complex queries to better identify information of interest and relevance, allowing them to better tailor their filters and results.

Additional contextual information as well as the development and integration of a flexible application allowing the creation of forms and workflows connected to the EIOS system are also foreseen to support risk assessments and signal management.

Automated anomaly detection, summarization and credibility assessment

The development of automated mechanisms to identify unusual, unexpected, significant and novel occurrences, their changes and the context in which they are evolving, will be a priority for the ECT in the year ahead. Areas for the exploration of automated anomaly detection in 2021 include the emergence of new COVID-19 strains, unusual increases in counts or affected populations; events linked to vaccination; and new rumors or misinformation campaigns. The award received from the Solidarity Response Fund will support our efforts in this complex and innovative research area for public health intelligence. The exploration, identification and development of automated alerting and notification mechanisms will be closely linked to this activity.

The team will also continue to pursue several workstreams and projects that were started in 2020. Most notably the automated clustering and summarisation of articles as well as the identification and summarisation of content based on user questions. An initial algorithm has already been developed and is currently being tested.

Likewise, the machine learning classifier to assess news credibility based on their tone and writing style (currently in English only) has been enabled in the EIOS testing environment. The model analyses incoming articles using two classifiers: a “binary” one that tries to assess an article as either “credible” or “not credible” (with corresponding probability), and a “multi-class” one that tries to assign the article to one of several classes related to news credibility (e.g. clickbait, hate news, political, etc.).

Pending the results and their consistency, the features will be implemented in the EIOS system and accessible via the user interface in the coming months.

Connecting information for global public health intelligence

This ambitious, long-term project stems from the simple conviction that the timely sharing of information and knowledge between analysts and researchers is a necessary condition for the efficient and effective detection, analysis and assessment of public health events and the appropriate response to them. It aims to create a semantic network for sharing information and knowledge between humans as well as between systems, including PHI systems and those that provide contextual information.

One of the main deliverables of this multi-phased project will be a new reference public health ontology, a canonical, comprehensive public health knowledge representation and reasoning model which connects information about humans, animals and environments across sectors, institutions and geographical boundaries. The knowledge representation component would be implemented as a multi-lingual semantic network of concepts related to health determinants and public health interventions. The reasoning component would provide language-agnostic capabilities for automated computational learning and dynamic change of the knowledge representation component - an essential requirement in the ever-changing and evolving space of global public health information and emergency landscape.