



A New Era of Disease Detection

ISID's ProMED embarks on a major technological upgrade to bring its frontline disease surveillance system in line with the latest advances while maintaining its key advantage — human insight





When the first alert for Covid-19 landed in the Program for Monitoring Emerging Diseases (ProMED)'s inbox, it looked like any other email. The platform, an innovative surveillance system hub for infectious disease outbreaks, was the first to alert the world to SARS in 2003, Chikungunya in 2005, and MERS in 2012. It receives messages like this daily from informers around the world; a true example of crowdsourcing. The email — late on December 30, 2019 — was from a trusted ProMED contributor. It flagged active chatter on the Chinese microblogging site, Weibo, about mysterious cases of pneumonia in Wuhan province, cause unknown.

To the ProMED moderator reading the message, this looked worryingly like SARS, another novel coronavirus, which infected over 8,000 people and caused 774 deaths back in the early 2000s. The ProMED team acted quickly to verify the information. Hours later, after receiving the confirmation needed to issue the world's first warning, the ProMED associate editor (or "Top Mod") published the first documented alert for what would later

become known as Covid-19. From then on, ProMED compiled and curated daily updates and monitored the spread of the disease from the Wuhan province to the rest of the world.

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Three and a half years later, the virus has infected over 275 million people and caused over 2.2 million deaths, making it one of the deadliest pandemics in history. “From what we’re currently seeing with Malaria, Anthrax, and all of the influenza going around, there is no slowing down — there’s a lot we’re keeping an eye on,” says Linda MacKinnon, CEO at the nonprofit International Society for Infectious Diseases (ISID), which runs ProMED. Covid-19 has reinforced the urgency of maintaining disease-surveillance platforms, but in the aftermath of the pandemic, it has become harder for legacy programs like ProMED to maintain

a steady flow of funding as new health-tech start-ups enter the scene. “We have been doing this successfully since 1994 so there’s this assumption that we’re well-funded, and now everyone wants to put their stamp on these shiny new entities when historically they would have prioritized something like ProMED,” explains Julia Maxwell, director of disease surveillance at ISID.

ProMED’s solution is to reduce its reliance on donors and pursue a self-sufficient funding model by modernizing its platform and technology. Working with Amazon Web Services (AWS), they are pursuing the first phase of a massive digital transformation that will enable the team to filter information faster, detect disease activity sooner and, in the future, implement artificial intelligence (AI), machine learning (ML), and natural language processing (NLP) to ensure their program remains competitive in a rapidly evolving space.

Early warning system

ProMED launched in 1994 during the early days of home internet. Having travelled widely and worked on multiple continents, one of ProMED’s founders — entomologist and virologist, John Payne Woodall — recognized the value of local information in detecting

disease outbreaks. The platform had just a handful of supporters and around 40 readers. Doctors and clinicians could share informal insights without delay, setting up an early-warning system that could stall potential outbreaks and prevent pandemics.

Today, ProMED has over 50,000 active users and is the most trusted source for event-based surveillance globally, drawing on a network of contributors across 34 countries to provide frontline data. Its subject matter expert Moderators scour the internet daily for potential signs — trawling through chat rooms, social media sites, and local news reports, where the first clues of an outbreak often lurk. They also keep an ear to the ground in their local communities and professional networks — providing vital insights that are relied on by individuals such as doctors, veterinarians, public health experts, travel agents, and institutional users to include a host of non-governmental organizations, corporations, and governments.

When the email about cases of pneumonia in Wuhan came through, it was a combination of this informal information and Moderator expertise that enabled ProMED to alert the world quickly — one day before a commercial AI program picked up on the Wuhan

cases. Speaking to the *Financial Times*, Heidi Larson, a professor at the London School of Hygiene and Tropical Medicine, describes the unique advantage of ProMED's approach, which set the standard in event-based surveillance: "ProMED has been a pioneer. Its global network of local reporters, investigators, and contributors gives a different level of confidence to the real-time alerts and reports it delivers."

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Regrettably, the value of this work is no longer reflected in the funding ProMED receives, which is patchy and project-based. The platform has provided free access to its data — many entities scrape the ProMED website for data and repackage it for commercial use, resulting in ISID giving away its most valuable asset for free. But while these new AI health start-ups attract huge amounts of venture capital, ProMED's human curators run on a shoestring budget.

"Since the Covid-19 crisis there are a lot of new players in the space, many



of whom use ProMED as an underlying data source,” says Maxwell. “This is no longer a sustainable model. If ProMED does not modernize and provide a substantial user experience and data accessibility on par with or exceeding its competitors, it will quickly become a historical footnote.”

ProMED 2.0: The next generation

ISID plans to increase analytic capacity through AI and ML to further unlock the potential of its ProMED data. With the new technology in place, anticipating outbreaks could replace early detection,

making it easier to prevent pandemics before they have a chance to spread. But first, the team needs to create a platform that meets the demands of a new era while bolstering sustainability, which means monetizing access to the site. “We are making sure we take ProMED in the right direction so it can be around for another 29 years,” says Maxwell. ISID is committed to maintaining a free version of ProMED for students and academics to access this vast catalogue of historical data, but many organizations are willing to pay for its unique combination of event-based surveillance with expert commentary. This is particularly true

now as health-tech companies seek out stockpiles of data to train natural language programs. “A lot of modellers, forecasters, and developers are interested in that data. It’s very unique, you’ve got 29 years of human-curated and vetted outbreak information with subject matter expert commentary on each post,” adds Maxwell.

When a steady stream of revenue from the new subscription model is established, the team will turn their attention to the IT infrastructure, which is now at least 15 years old, with an aging dashboard based on archaic code and fragmented architecture that regularly causes errors and delays. Currently, there is no automation, so copy editors waste valuable time tagging posts manually on an outdated system that is unable to support dynamic features like graphics and charts.

Funding such a large-scale shift was always going to be a challenge, but in 2022 ISID applied for and won the [Imagine Grant](#) from AWS, providing the initial support needed to get ProMED’s digital transformation underway. This transition began with migrating all of ProMED’s data and infrastructure over to its own AWS environment. Then, they compiled a detailed roadmap of the optimal architecture to achieve these goals, looking ahead to a time when moderators can log in to a

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personalized hub that flags signals of an outbreak ready for their review. “Being awarded the Imagine Grant was very validating...putting together that architecture with AWS was a huge step forward and has really laid the groundwork for us to see the future and what we need to do to get there,” Maxwell says.

Developing the data

Structuring 29 years of historical data is a significant undertaking. The AWS team began by identifying ISID’s business vision then worked backwards with the team to create a technology solution to solve their challenges. This includes building a data lake in the future that can be integrated to ML models to organize, process, and present the data in a way that optimizes

it for each user. “Once up and running, it will be a lot more automated — AI will go through everything before a human has to,” explains Daniel Rossi, account manager at AWS.

This will free up a significant amount of time, allowing Moderators to focus on the quality of a report rather than manually going through piles of information. The result will be quicker response times, increasing the chances of disease containment in circumstances where speed could be the difference between a handful of cases and rapid spread. “It will help us detect those potentially smouldering cases,” says MacKinnon.

For Mert Simsek, senior application architect at AWS Professional Services, implementing machine learning on 29 years of data is the most exciting aspect of the ProMED project. “It’s a huge amount of data, probably the most massive I have seen in industrial healthcare so far and right now it’s just sitting there and nobody is able to look at it in a modern fashion.”

The new system will also open opportunities to access additional services, like translating data in real-time to the user’s preferred language, further accelerating that crucial time from case number one to containment.

These opportunities will continue to evolve as ProMED benefits from the constant innovation underway across the AWS portfolio. Eventually, ISID hopes to be able to repurpose non-traditional data — like a rise in demand for key indicator products such as over-the-counter medicines and hand sanitizer — to detect outbreaks quickly and then help coordinate proactive responses on the ground.

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“Who knows what we’re going to see in the future. We need such projects to get us ready to predict what can possibly come next based on data,” Simsek adds.

The future of disease prevention

The new technology could go further. The ability to integrate historical

data combined with the Moderators' intimate knowledge of local culture and conditions could even enable ProMED to anticipate outbreaks before cases emerge. "It could alert us to the fact that conditions may be prime earlier than usual in a particular country for a particular disease — pulling all of the factors together sooner than humans are currently doing it," Maxwell says. Containment efforts could then be mobilized before the disease develops. "It could help save lives a little quicker and contain another dangerous pandemic."

ProMED's data exists at the granular level, with minute details that shed insights into the diseases themselves and the conditions surrounding their spread. Pairing this with other data streams on vectors, weather patterns, migration patterns, and climate conditions could shed light

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on what's coming before an outbreak is declared. This would mark a new era of disease detection, where AI and ML mine through data and create custom environments for Moderators to maximize their chances of stopping a spread. "The future is bright with all of the new technologies that we can potentially inherit and apply to public health," MacKinnon says.



Funding from the Imagine Grant helped make the development of ISID's project possible. [Sign up](#) to be alerted for when the grant cycle opens.

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