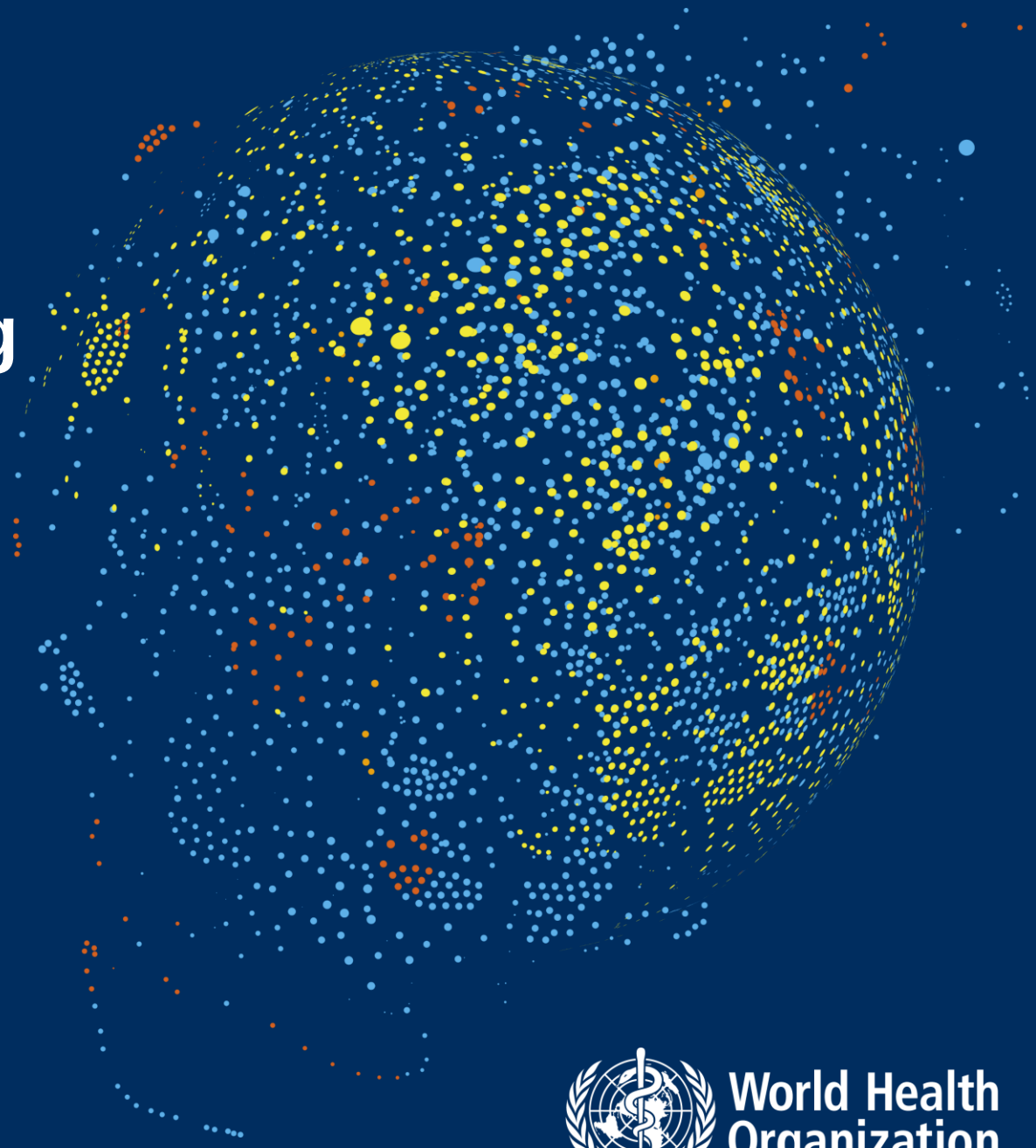
A new approach to public health surveillance: Embracing Complexity



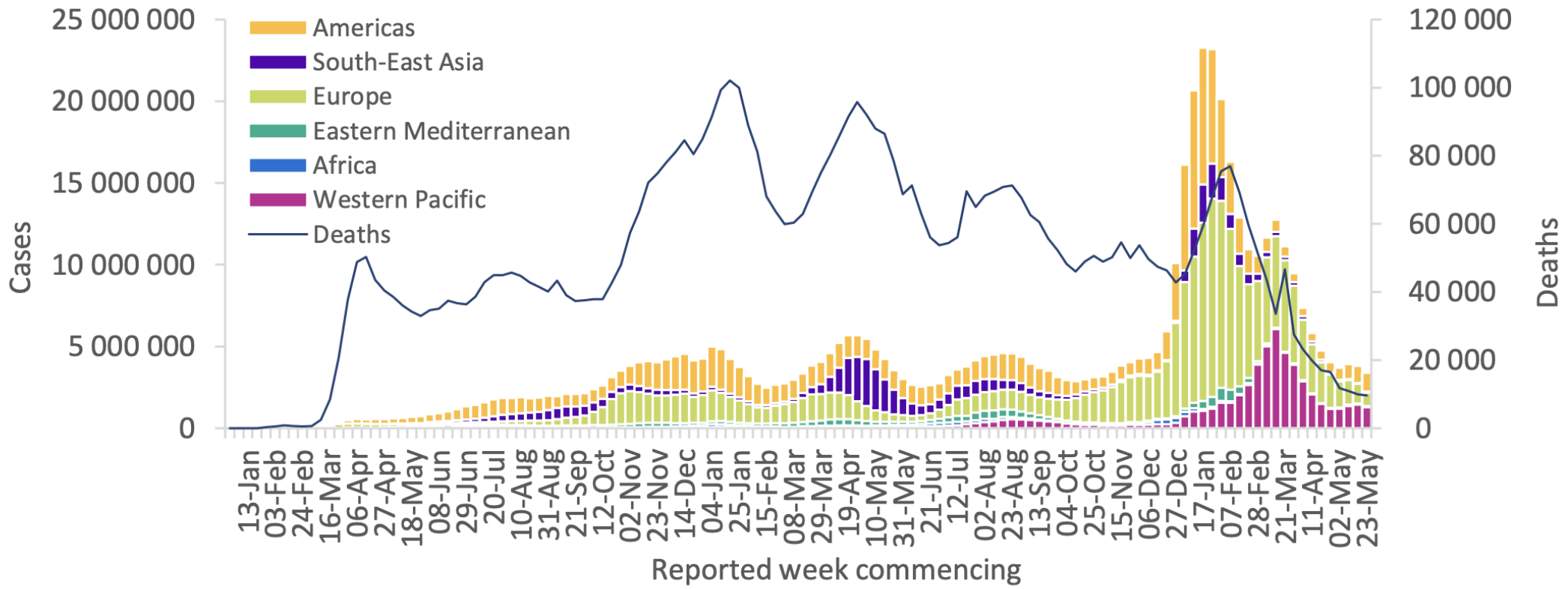
Chikwe Ihekweazu

Assistant Director General
WHO Hub for Pandemic and Epidemic Intelligence

World Health Organization

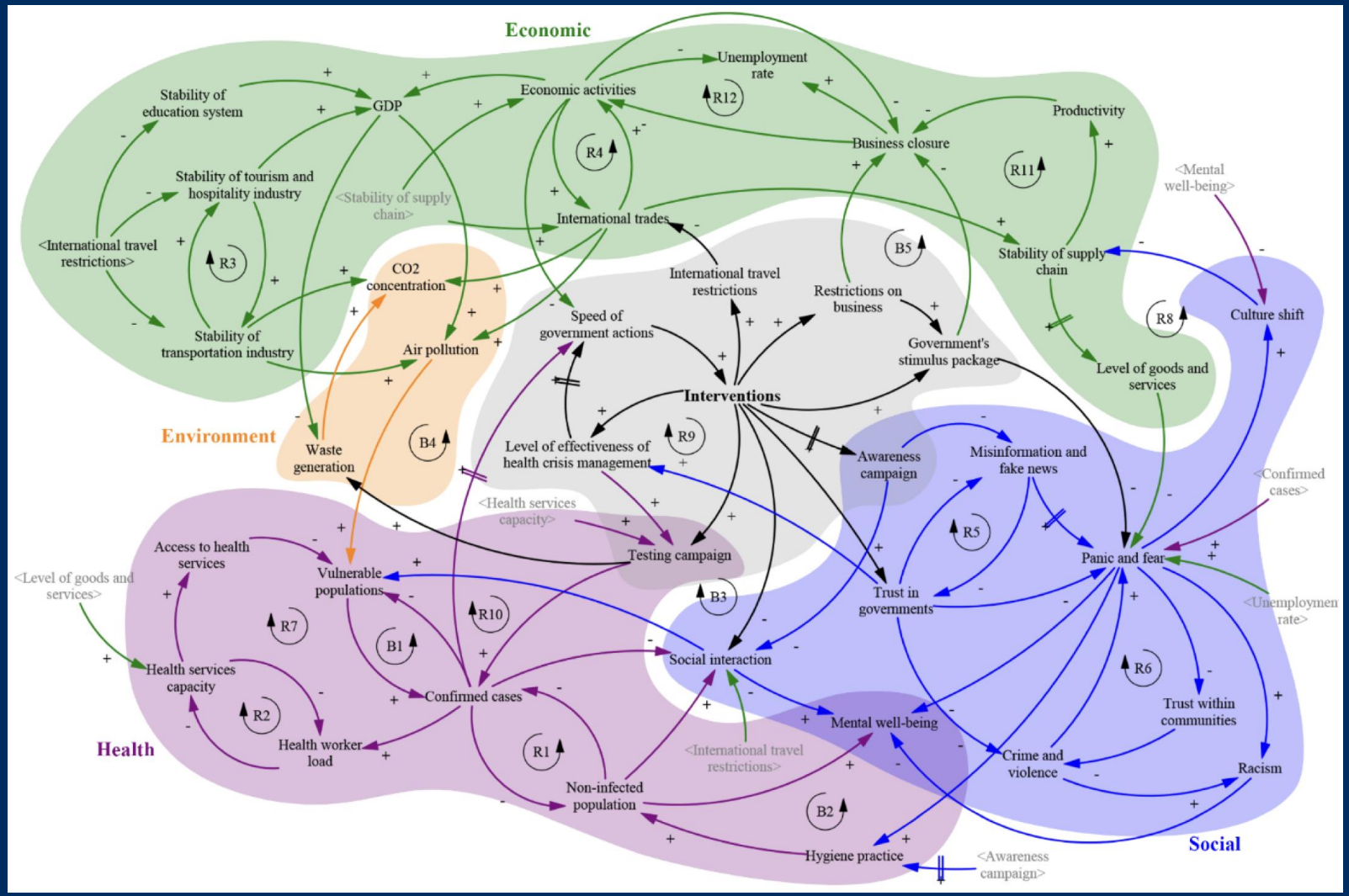
COVID-19 Surveillance as presented

Figure 1. COVID-19 cases reported weekly by WHO Region, and global deaths, as of 29 May 2022**



**See *Annex 1: Data, table, and figure notes*

COVID-19 Reality



Sahin O, Salim H, Suprun E, Richards R, MacAskill S, Heilgeist S, Rutherford S, Stewart RA, Beal CD. Developing a Preliminary Causal Loop Diagram for Understanding the Wicked Complexity of the COVID-19 Pandemic. *Systems*. 2020; 8(2):20. https://doi.org/10.3390/systems8020020

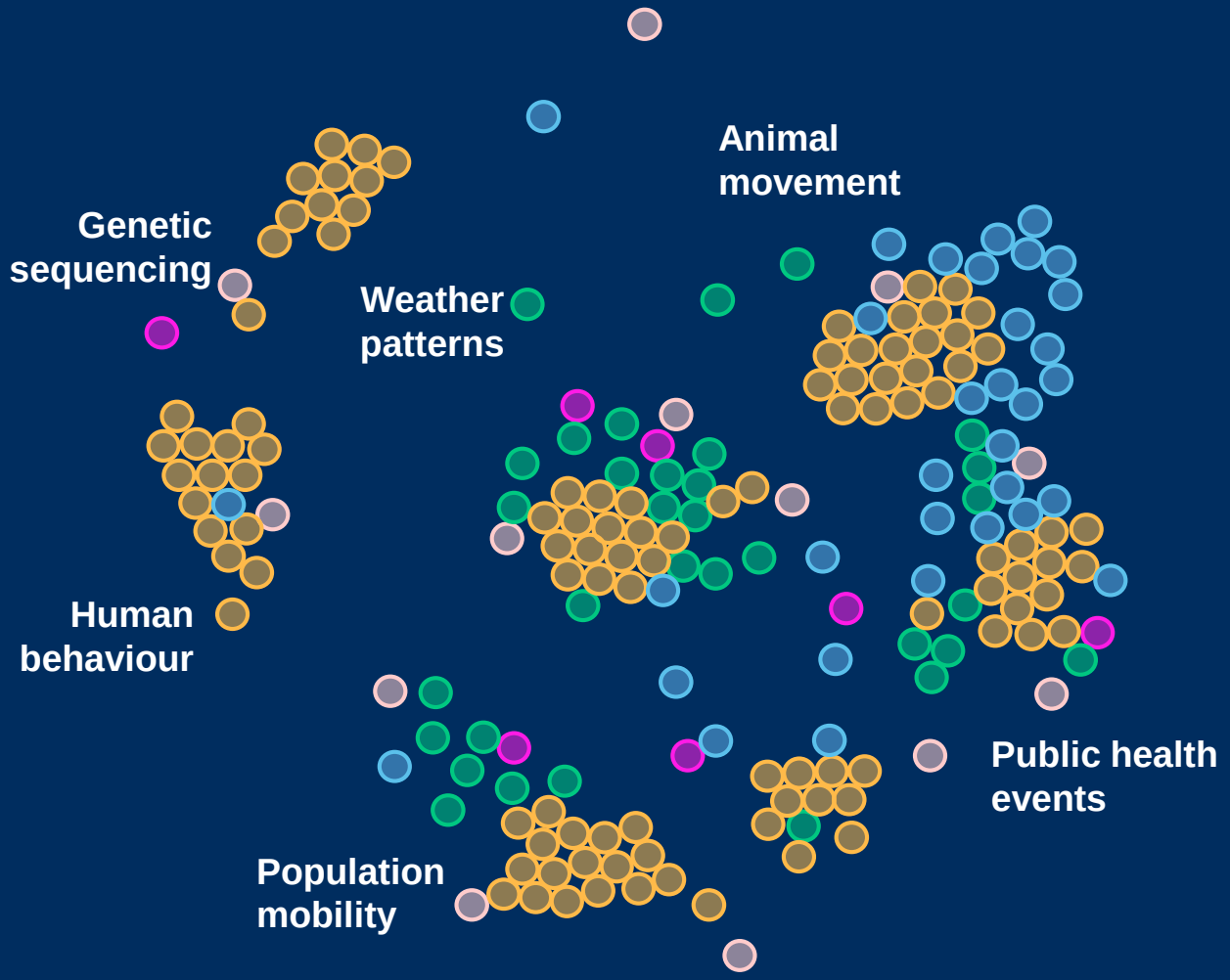
Surveillance

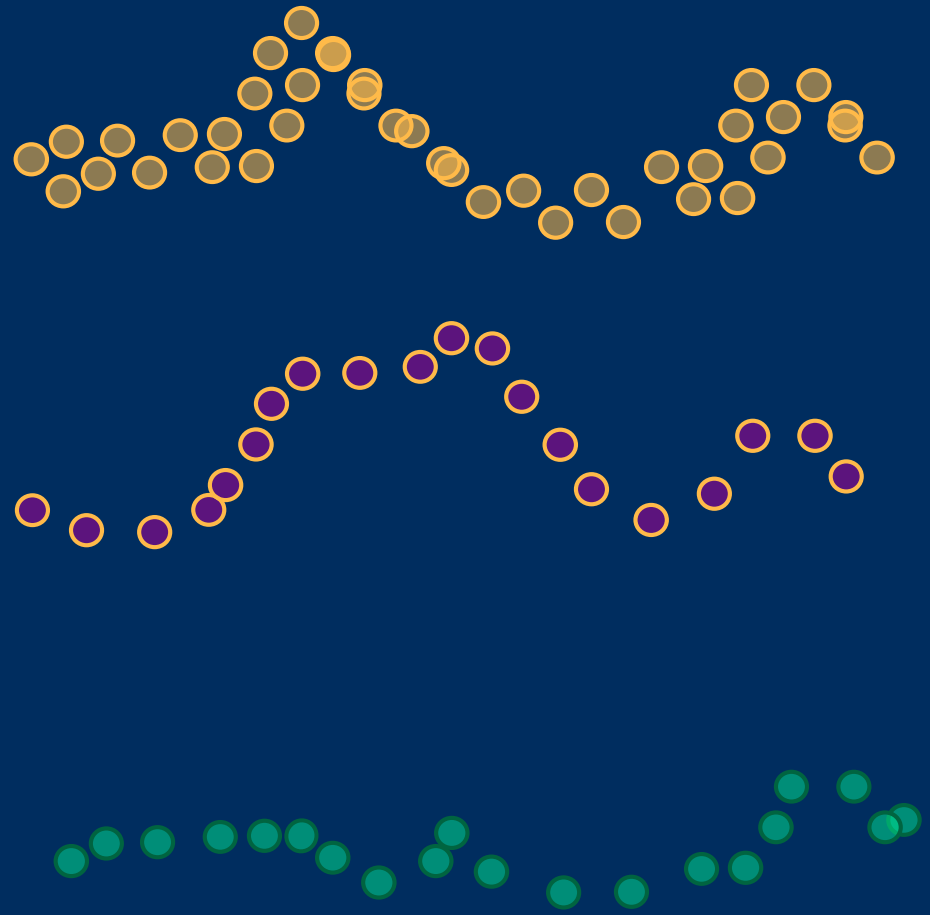
Public health surveillance is “the ongoing, systematic collection, analysis, and interpretation of health-related data essential to planning, implementation, and evaluation of public health practice.”

Adapted from Alexander Langmuir

Data related challenges during pandemic

Data Access	Data Analytics	Actionable Insights	Decisions
Data access & sharing	Data linkage to assess health threats	Limited contextual information	Varying country capacity for appropriate action
Data fragmentation	Need for new tools and methods	Delays in analysis	Data for policy making
Data sharing delays	Data accessibility in real-time	Delays/lack of insight dissemination	Evidence-based leadership


Genetic sequencing
Weather patterns
Animal movement
Human behaviour
Public health events
Population mobility



A new approach

- Embracing complexity.
- Dealing with uncertainty.
- Building learning systems.

- Collaborative approach vs. competitive approach
- Collaborative methods development vs. centralizing expertise
- Collaborative adaptive systems vs. singular problem focus

Public Health Intelligence in WHO

Monthly PHI Activity Level

9,000, 000 pieces of information retrieved

43,000 signals screened

4500 events interrogated

30 events verified

Mission and strategic objectives of the Hub

To support countries and regional and global actors to avert and manage public health threats through collaborative problem solving informed by better data and analytics.

Connect

1. **Create** a multi-disciplinary collaborative intelligence environment
2. **Build** a global system to connect data from a wide range of sources

Innovate

3. **Facilitate** the development and wide availability of robust analytic tools
4. **Drive** a global agenda for responsible R&D in pandemic & epidemic intelligence

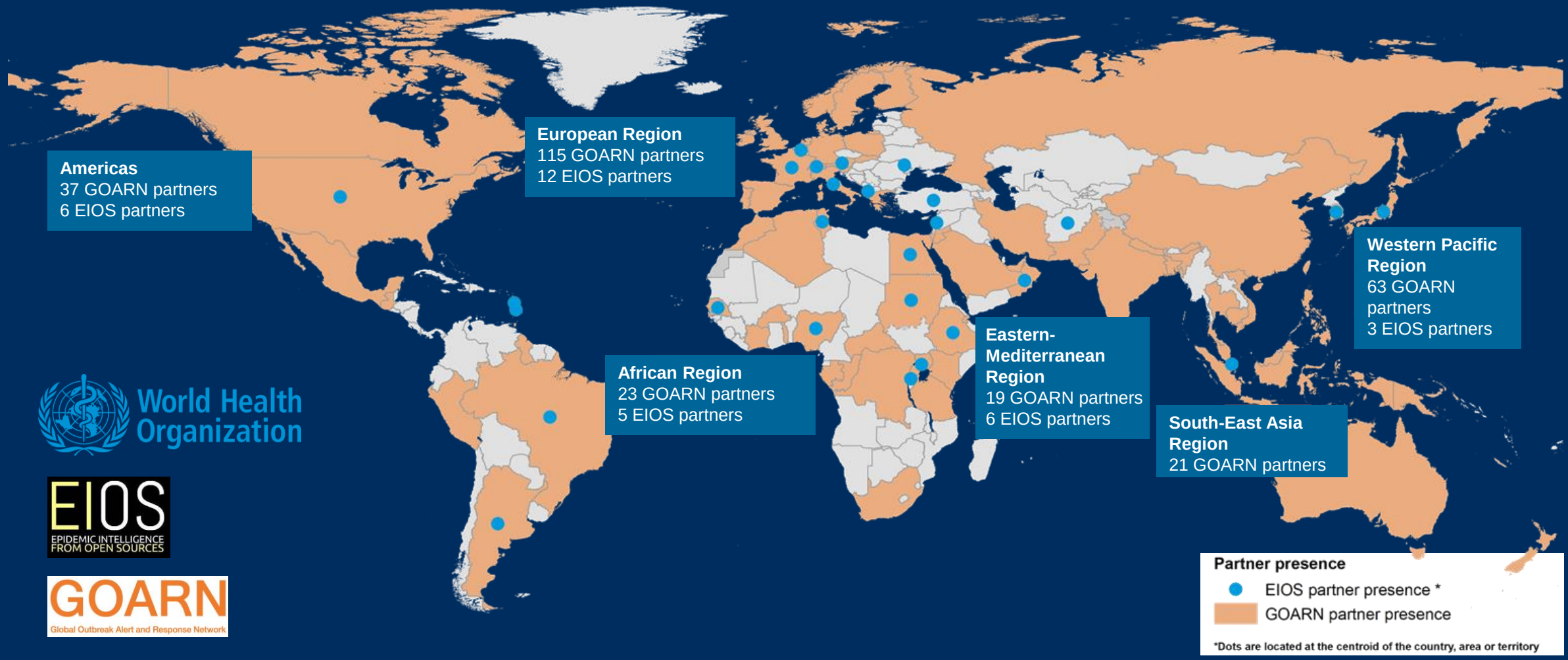
Strengthen

5. **Provide** advice, training, and capacity-building services
6. **Support** timely, effective decision making and policies

A new approach: Collaboration

Pandemic Prevention Institute	$150 million (Rockefeller Foundation)
US CDC Center for Forecasting and Outbreak Analytics	$26 million (US Government) / initial funding of $200 million from the American Rescue Plan Act
Health Emergency Preparedness & Response Authority (HERA)	€140 million for ‘threat assessments and intelligence gathering’
Africa CDC Pathogen Genomics Initiative (PGI)	€100 million
International Pathogen Surveillance Network (IPSN)	Unknown

A new approach: Connection



World Health Organization

EIOS
EPIDEMIC INTELLIGENCE FROM OPEN SOURCES

GOARN
Global Outbreak Alert and Response Network

A new approach: Communities

THE LANCET

Log in

COMMENT | VOLUME 397, ISSUE 10292, P2317-2319, JUNE 19, 2021

Disease surveillance for the COVID-19 era: time for bold changes

Oliver W Morgan • Ximena Aguilera • Andrea Ammon • John Amuasi • Ibrahima Socé Fall • Tom Frieden • David Heymann • Chikwe Ihekweazu • Eun-kyeong Jeong • Gabriel M Leung • Barbara Mahon • John Nkengasong • Farah Naz

Published: May 14, 2021 • DOI:

The COVID-19 pandemic has
Early identification of COVID
inadequate diagnostic capac
data insights for public healt
SARS-CoV-2 became widesp
undermined by weak surveil
timely adjustment of public

Innovations in public health surveillance: updates from a forum convened by the WHO Hub for Pandemic and Epidemic Intelligence, 2 and 3 February 2022

Technical contributors to the Pandemic and Epidemic Intelligence Innovation Forum February meeting and report[1]

1. The members of this group are listed under Collaborators.

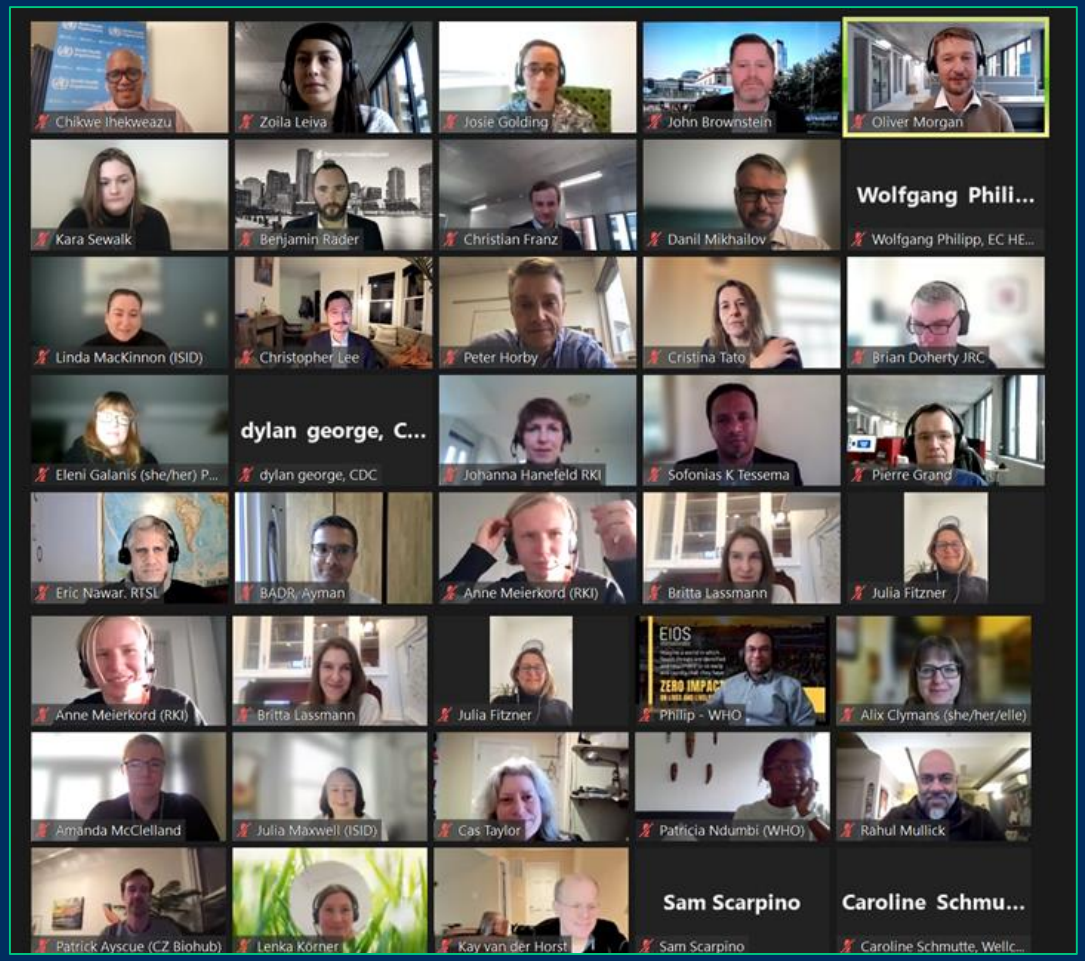
Correspondence: Oliver Morgan (omorgan@who.int)

Citation style for this article:
Technical contributors to the Pandemic and Epidemic Intelligence Innovation Forum February meeting and report. Innovations in public health surveillance: updates from a forum convened by the WHO Hub for Pandemic and Epidemic Intelligence, 2 and 3 February 2022. Euro Surveill. 2022;27(15):pii=2200302. https://doi.org/10.2807/1560-7917.ES.2022.27.15.2200302

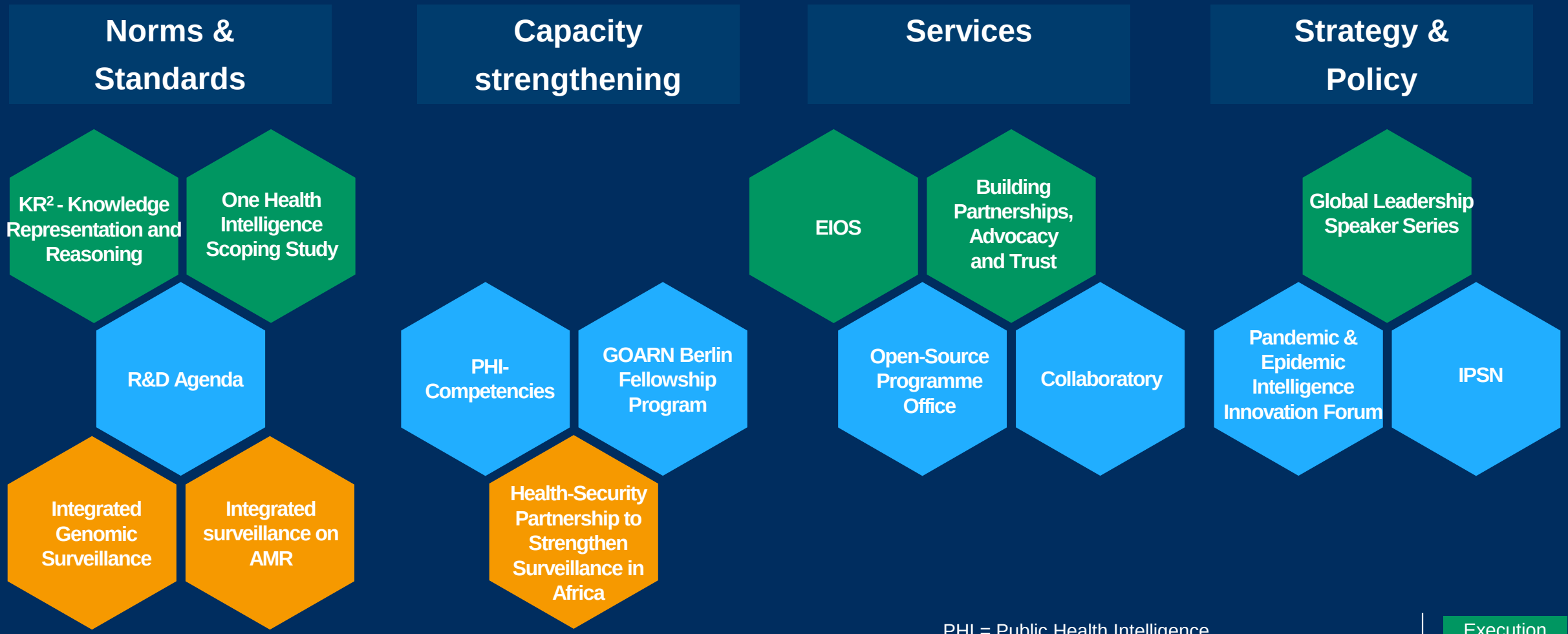
Article submitted on 07 Apr 2022 / accepted on 13 Apr 2022 / published on 14 Apr 2022

In the 2 years since the emergence of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) there has been an unprecedented collective effort from the academic, public, and private sectors to advance surveillance for pandemic preparedness and response. The coronavirus disease (COVID-19) pandemic has created momentum that will define the future of public health intelligence. On 2 and 3 February 2022, the World Health Organization (WHO) Hub for Pandemic and Epidemic Intelligence convened a meeting of a small group of surveillance innovators to share insights

organisations) is strongly associated with implementation of public health guidance, which can lead to better containment of outbreaks [1-5]. Therefore, there is an urgent need to build a trust architecture [6] between individuals, governments, the private sector, academia and non-governmental organisations (NGOs) that allows for meaningful collaboration. This trust architecture can, in turn, enhance the transparent exchange of information. However, the latter will be achieved only if information exchange results in resourceful collective action and global solidarity instead of restrictive meas-



Collaborative PH Intelligence Work plan 2022



PHI = Public Health Intelligence
IPSN = International Pathogen Surveillance Network
EIOS = Epidemic Intelligence from Open Sources

Execution
Planning
Ideation

Expansion of Epidemic Intelligence from Open Sources (EIOS)

Global initiative led by WHO to strengthen public health intelligence offering integrated services to Member States and organisations, collaboration, capacity building and innovative solutions

EIOS
EPIDEMIC INTELLIGENCE FROM OPEN SOURCES

Activities

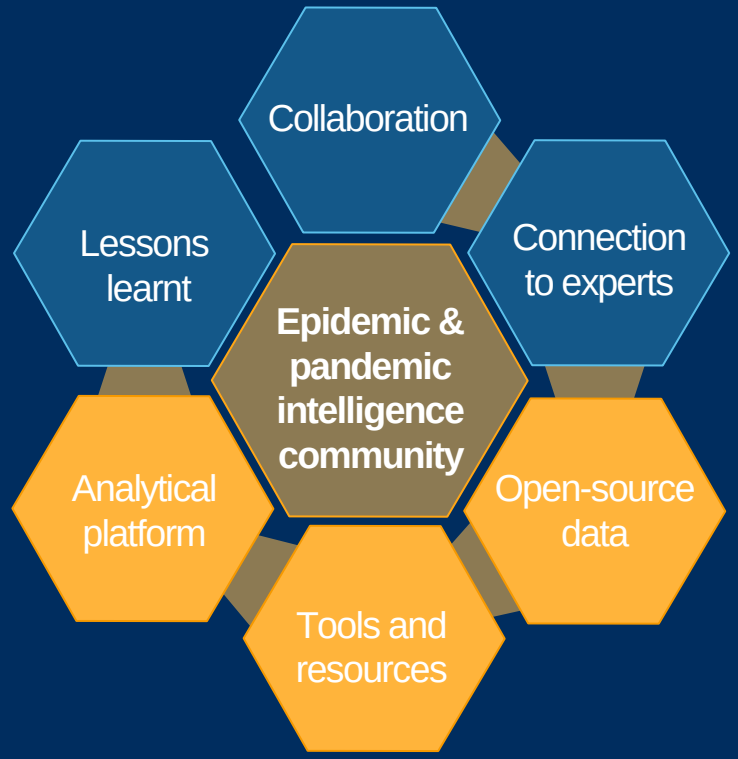
- Connecting experts around the world,
- Providing tools to detect, contextualise, analyse, assess and share information
- Building and strengthening capacity and competencies for public health intelligence

Outputs

- More colleagues using EIOS around the world
- Better ability to detect and respond locally
- Better ability to share globally

Development of the “Collaboratory”

A laboratory for collaboration: moderated interactive digital environment where subject matter experts and the epidemic intelligence community converge to collaborate, communicate, cultivate ideas, rapidly generate, improve, and share actionable insights to respond to public health risks.



Activities

- Leveraging subject matter and local knowledge experts to create a sandbox for maximizing R&D
- Creating an environment to compare analytics and capability to communicate the results
-

Outputs

- Faster sharing of actionable insights, based on decision needs

Development of Open-source Programme Office (OSPO)

Establishment of the function and of a multi-disciplinary team within the WHO Hub for the **collaborative development of sustainable and innovative open-source software solutions**.

Activities

- Provision of legal, procurement, technical, programmatic, capacity building & community management advice to projects that use or provide open-source software & open data.
- Support for open innovation projects within and beyond WHO
- Building on open innovation principles established in the EIOS community

Outputs

- Sustainable open source software

Highlights to date

1 Sep 2021

Inauguration in Berlin

Dr. Ihekweazu appointed

Strategic vision formulated

Oct 2021

WHS session on ecosystem

Nov 2021

Start-up team in place

Dec 2021

Engagements in EURO

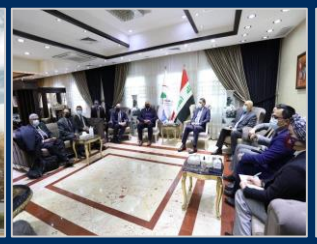
EIOS GTM

‘21

‘22

WHO Hub office

Engagements in EMRO



Jan 2022

Convening leaders in epidemic intelligence

Feb 2022

Engagements in AFRO

Engagements in PAHO (Brazil)

Mar 2022

The new WHO Pandemic Hub in Berlin