Global consultation on Go.Data

Interoperability report,
7-8 June 2022
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Foreword

It is becoming increasingly important to shift from reactive to proactive approaches to better collectively prepare for outbreaks, including strengthened surveillance and information management. Go.Data is an innovative platform for outbreak response and contact tracing developed by the World Health Organization (WHO) in collaboration with Global Outbreak Alert and Response Network (GOARN) partners and built on thousands of hours of field response activities. Collaboration and technical feedback of countries and partners is central to the Go.Data development strategy, and a pressing question currently shaping this strategy is how best to facilitate interoperability with national platforms when managing health information during outbreaks and public health crises.

Designing bespoke interoperability solutions is costly, time-consuming and difficult to replicate across contexts. It remains instrumental to learn from and document country experiences with Go.Data interoperability to de-duplicate efforts. That is why WHO values forums such as this one why we work hard to promote further ownership of, and equal access to, Go.Data tools while ensuring sustainability and integration with existing information infrastructures. On this front, we are pleased to work with the newly established WHO Open Source Programme Office within the WHO Hub for Pandemic and Epidemic Intelligence to make the tool fully open source to ensure equitable and sustained adoption of Go.Data in national contexts.

We thank all Member States, GOARN partners and open-source contributors for their attendance at this consultation, which provided an excellent opportunity to examine experiences and lessons learned. It is essential that we continue to work to ensure that the development of new tools, and the optimal use of existing ones such as Go.Data, remain important pillars of how we implement and coordinate national responses to public health emergencies.

Ibrahima Socé Fall,
Assistant Director-General, Emergency Response
World Health Organization
Acknowledgements

The World Health Organization (WHO) gratefully acknowledges all the colleagues in countries, in regional offices and across Global Outbreak Alert and Response Network partner institutions who have contributed to developments in Go.Data development and roll-out.

WHO is also grateful for the work and contributions of experts who participated as session leads, panellists and facilitators in this global consultation.

Acronyms and abbreviations

API application programming interface
app application
AVE Administración de Vulnerabilidades y Emergencias [Vulnerability and Emergency Management]
BO COVID Back Office COVID (Switzerland)
DHIS2 District Health Information Software 2
eCBDS electronic case-based disease surveillance
eIDSR electronic Integrated Disease Surveillance and Response system
EIP Epidemic Intelligence Platform (Switzerland)
EWARN Early Warning Alert and Response Network
FHIR fast health interoperability resources
GOARN Global Outbreak Alert and Response Network
HL7 Health Level Seven International
HMIS health management information system
IT information technology
MOH ministry of health
PCR polymerase chain reaction
SID Système d’Information pour les Déclarations [Information System for Declarations]
SMS short message service
US CDC United States Centers for Disease Control and Prevention
UZ Leuven University Hospitals Leuven
WHO World Health Organization
Executive summary

Go.Data is an outbreak investigation tool for collecting field data in public health emergencies, designed to be flexible in the field so that it can be adapted for different outbreak scenarios. It is also designed to be simple enough to be used by any outbreak responder.

The coronavirus disease (COVID-19) pandemic shifted the focus of the Go.Data project to helping countries to rapidly implement the tool to support their responses to the pandemic. At the time of this consultation, World Health Organization (WHO) and Global Outbreak Alert and Response Network (GOARN) partners had supported Go.Data roll-out in 65 countries or territories and over 115 institutions, with implementation at national, subnational or institutional levels globally.

Given the proliferation of different Go.Data use cases around the world, it is important to consider how Go.Data can best fit within – or interoperate with – existing health information systems. There is a growing need within the Go.Data community to increase interoperability knowledge and documentation (including standards and best practices), and to find a generic, reproducible middleware interoperability solution that can be used across different countries, territories and institutions.

In June 2022, WHO organized a 2-day consultation to learn from the interoperability approaches, knowledge and experiences in use across the Go.Data community of practice. Its goal was to increase common knowledge of existing interoperability approaches, standards and best practices, and take the first documented steps towards the development and use of a reproducible middleware solution.

Over 2 days of talks and facilitated exercises, more than 70 participants from all six WHO regions, multiple WHO departments and several GOARN partner organizations came together to share Go.Data interoperability plans, approaches and solutions. Active discussion of digital health strategy and interoperability standards resulted in a list of key considerations and recommendations. These will form the basis of a roadmap for short-term and medium-term development enhancements to connect Go.Data to other tools and surveillance systems.

On the first day, seven countries presented use cases, highlighted different national, subnational and institutional contexts and experiences of interoperating Go.Data with platforms in various settings. They outlined interoperability needs and challenges, and discussed their experiences of designing and implementing solutions to those challenges. On the second day, participants discussed how work on Go.Data interoperability should align with the overarching interoperability standards already in use by relevant teams in WHO and across GOARN. Participants then generated, refined and prioritized a list of near-term actions to advance the development of a generic middleware interoperability architecture that will connect Go.Data to other national health surveillance systems.

The use cases documented in the consultation revealed a range of different approaches to integrating Go.Data with existing systems across different types (and levels of development) of health systems. Documenting and sharing current practice was one of the most important outputs of the consultation.
Three common, overarching lessons emerged:

Countries need to build national capacity to use outbreak response tools such as Go.Data, in the preparedness phase before an outbreak occurs.

Countries need standards that enable consistent, accurate collection and exchange of health information across health systems and services. These require the use of unique identifiers and metadata standardization.

Leadership, governance and multisectoral engagement are all essential to a project of this nature, and early, deep coordination with a range of interdisciplinary stakeholders is crucial. It is important to identify and engage all key stakeholders before implementing any solutions.

Day 2 of the consultation revealed a growing need within the Go.Data community to increase and share knowledge and documentation on interoperability best practices. Following a presentation on interoperability standards, participants discussed applicable standards, proposed interventions that the Go.Data community of practice could undertake, and identified which of those interventions might create high impact in the short term.

Based on outputs from this consultation, the Go.Data project team at WHO will begin to develop and validate two resources:

- a validated checklist of requirements for successful Go.Data interoperability that should be considered as part of Go.Data roll-out plans; and

- a development roadmap for short-term and medium-term adaptations to Go.Data.

The Go.Data team will seek active contributions from both the existing Go.Data community of practice and the wider open-source development community.

In addition, a working group will be assembled to address Go.Data development and standards. A principal aim of this group will be to create, enhance and sustain national and international collaboration, building and strengthening the Go.Data community of practice by developing and improving Go.Data interoperability solutions.
Process and design

Interoperability use cases

Documentation of existing use cases

Applicable standards, challenges and priorities

Intro
1. Introduction and problem statement

Go.Data is a platform for outbreak response and contact tracing developed by the World Health Organization (WHO) in collaboration with partners in the Global Outbreak Alert and Response Network (GOARN) and informed by years of field experience.

Go.Data is designed to allow field-based users (e.g. field epidemiologists, contact tracing teams and laboratory staff) to register cases, contacts and their related data, including laboratory samples and hospitalizations. Go.Data dynamically generates outputs and analyses – such as contact follow-up lists and chains of transmission – to help responders target local response efforts in real time. It is intended to be flexible in the field, so that it can be adapted to a wide range of outbreak scenarios, and is designed to be simple enough to be used by any outbreak responder.1

Although the design and development of Go.Data was completed in 2019, the onset of the coronavirus disease (COVID-19) pandemic in 2020 rapidly shifted the focus of the project towards supporting countries in Go.Data implementation for pandemic response. During 2020–2021, WHO and GOARN partners provided support to Go.Data projects in 65 countries or territories and over 115 institutions, with implementation at national, subnational or institutional levels.

Given the pressures of the pandemic and the proliferation of different Go.Data use cases around the world, it is becoming more and more urgent to consider how Go.Data can best interoperate with existing health information systems. Designing bespoke interoperability solutions is expensive, time-consuming and difficult or impossible to replicate in other settings, due to the specific architectures of different systems used for data collection and aggregation.

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1 More information on the Go.Data project can be found in the Go.Data annual report 2021 (1).
1.1. Go.Data interoperability so far

The Go.Data project has placed a strong focus on developing interoperability resources to allow the wider community of practice to access solutions easily, adapt them to different contexts or contribute back iterations. Available resources include the following:

- a “Go.Data interoperability toolkit” containing a suite of resources to enable and strengthen the interoperability of Go.Data implementation within existing health information systems, data collection tools and reporting mechanisms;

- a centralized documentation site² within the WHO Go.Data GitHub Repository,³ through which users can access:
  - implementation considerations for interoperability⁴ and real-world interoperability examples;
  - useful code for Go.Data deployment;
  - technical documentation – particularly on the Go.Data application programming interface (API); and

- a dedicated website⁵ for the Go.Data community of practice, which is the main communication forum for Go.Data users and a repository for the latest project updates and key resources.

Despite these resources, the proliferation of Go.Data implementations around the world has generated a growing need within the Go.Data community for further interoperability knowledge and documentation, including on standards and best practices, and for a generic, reproducible middleware interoperability solution that can be used across different countries, territories and institutions.

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² See https://worldhealthorganization.github.io/godata.
³ See https://github.com/WorldHealthOrganization/godata/.
⁴ See https://worldhealthorganization.github.io/godata/implementation-considerations/.
⁵ See https://community-godata.who.int/.
2. Go.Data interoperability consultation: process and design

Sharing interoperability use cases and welcoming user developments allows countries to share solutions for data exchange. In that spirit, on 7 and 8 June 2022, the Go.Data project team held a consultation to learn from the approaches, knowledge and experiences of the Go.Data community of practice, and to talk about interoperability solutions that allow Go.Data to be used as a proactive element of existing national surveillance systems and platforms.

Participants shared technical and operational experiences, sought opportunities for longer term collaboration, and produced a list of items that will form the basis of a roadmap for a middleware solution to connect Go.Data to other systems. The consultation was made as accessible as possible. It was a mixed online and on-site meeting to allow for maximum participation, with simultaneous translation in three languages. Sessions took place in Geneva, Switzerland, and were scheduled in the afternoons, to make the hours more acceptable for those attending online. The audience comprised over 70 participants from across all six WHO regions, multiple WHO departments and several GOARN partner organizations, including representatives from different Go.Data projects; technical experts in design and deployment of interoperability solutions; and experts in digital health standards for interoperability and middleware development from stakeholders such as WHO, the United Nations Children’s Fund (UNICEF), the United States Centers for Disease Control and Prevention (US CDC) and other GOARN partners.
To prepare for the consultation, a few days beforehand, participants and partners took part in an online rapid scenario planning exercise in which health system leaders work to scale digital health interventions that address the public health needs of their country. This “board game” was developed for the Digital Health: Planning National Systems course. It was created by TechChange, the United States Agency for International Development (USAID) and Digital Square based on materials from WHO and the International Telecommunication Union (ITU) to help learners to conceptualize key digital health concepts, to demonstrate the concept of interoperability, and to show how interoperability enables development of an effective digital health enterprise architecture.

The first day of the consultation was dedicated to examining different use cases for Go.Data interoperability. The second day began with a discussion of how work on Go.Data interoperability should align with the overarching standards already in use by relevant teams in WHO and GOARN. The final session was a structured brainstorming exercise across five parallel breakout groups. It was designed to generate and prioritize a list of near-term actions to move the Go.Data community of practice closer to a generic middleware interoperability architecture that will connect the Go.Data system to other national health surveillance systems.

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6 See https://digitalhealth.course.tc/catalog.
The consultation was prepared in collaboration with digital health interoperability experts within and outside WHO, and its themes were framed by established guidance and concepts. Principal among these were the seven building blocks (Fig. 1) of an enabling environment for digital health, which framed the discussions on interoperability strategy. These building blocks are a central tenet of WHO's core strategy document for digital health, the Global strategy on digital health 2020–2025 (2), which defines the capacity of national digital health systems for syntactic and semantic interoperability with WHO norms and standards “as a cornerstone of health information to enable sharing of information in a connected world”. The strategy emphasizes the importance of commonly agreed public health use cases, and a set of agreed functional and technical specifications, standards and profiles.

Fig 1. Seven building blocks of an enabling environment for digital health

3.

Day 1: Go.Data interoperability use cases

In a demonstration of high-level support for this project, the consultation was opened by Ibrahima Socé Fall, WHO Assistant Director-General for Emergency Response. He stressed the importance of Go.Data in the implementation and coordination of national responses to public health emergencies – a point reinforced by the presentations of use cases that followed.

3.1.

Go.Data interoperability with custom health management information systems

Health management information systems (HMIS) from three countries – Sierra Leone, Chile and Guatemala – were presented. These are summarised on the pages that follow. The country presentations of Go.Data interoperability with platforms follow in section 3.2.
3.1.1 Sierra Leone

The country’s Go.Data interoperability solution was implemented between May 2020 and December 2021 to integrate Go.Data with District Health Information Software 2 (DHIS2) electronic case-based disease surveillance.

Existing infrastructure

The HMIS in Sierra Leone comprises four levels:

1. Community
2. Health facility
3. District
4. National

Reports are generated in communities and health facilities (public and private). Community reports are submitted to facilities, aggregated and forwarded to district level. Facilities currently submit paper reports to be captured in DHIS2 at district level.

Electronic data capture has been piloted in some community health facilities. Each level gives feedback to lower levels.
Go.Data interoperability solution

An overview showing how Go.Data is interoperable with electronic Cased-based disease surveillance tool (eCBS), and all districts and health facilities use the electronic system for reporting. Both platforms are owned by the Ministry of Health (MOH) and hosted on a MOH server.

The platforms are synchronized and eCBDS or Go.Data can be used for data capture, case investigation, contact tracing, data analysis.

The interoperability solution includes:

**Unidirectional**
- eIDSR weekly reporting form
- eCBS
- eCBDS
- Go.Data

**Bidirectionality**
- to be added in future (importing from Go.Data to DHIS2)

The eIDSR pulls aggregate weekly reports from three sources.

- **eIDSR**
  - Electronic Integrated Disease Surveillance and Response system

- **Used for routine analysis of case investigation data.**

- **Used for outbreak data analysis and visualization.**

In confirmed outbreaks

The platforms are synchronized and eCBDS or Go.Data can be used for data capture, case investigation, contact tracing, data analysis. The interoperability solution includes:

- A DHIS2-based browser application
- Data security through encrypted credentials
- Configurable, variable mappings
- A manually initiated data migration process

In summary

Key facts, features and teachings of Sierra Leone's interoperability solution with Go.Data

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<th>Impacts</th>
<th>Challenges</th>
<th>Lessons</th>
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<td>• Maintain a central repository for all cases during outbreak investigation.</td>
<td>• Increased demand for information products that improve outbreak response.</td>
<td>• Securing acceptance and buy-in from stakeholders.</td>
<td>• Engage all key stakeholders before implementation.</td>
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<td>• Harness Go.Data’s capabilities in outbreak data management, analysis and visualization.</td>
<td>• Improved data sharing across different platforms</td>
<td>• Agreeing to terms of use for a fully functional outbreak data management platform.</td>
<td>• Clearly define the roles of each app and how they complement each other in outbreak data management.</td>
</tr>
<tr>
<td>• Facilitate international collaboration in outbreak investigation and response while satisfying local and national data needs.</td>
<td>• Streamlined process for introducing new platforms for outbreak data management.</td>
<td>• Technical difficulties in developing a customized interoperability app.</td>
<td>• Teamwork is critical in delivering a solution that is acceptable to everyone.</td>
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<tr>
<td>• Improve data management efficiency and maximize available resources.</td>
<td></td>
<td>• Securing server space for hosting the Go.Data instance.</td>
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3.1.2 Chile

In 2021, the Ministry of Health (MOH) in Chile decided to implement Go.Data to create a system for outbreak investigation, specifically contact tracing. The development of the Go.Data interoperability solution started in April 2022 and is expected to finish in December 2022. Go.Data is now in pilot in five of Chile’s 16 regions.

Existing infrastructure

Independent infrastructure solutions are in use, each with their own terminology; the main component of these solutions is a national epidemiological surveillance system called “Epivigila” through which all mandatory disease notifications are done. This is complemented with other systems for laboratories, vaccines, hospitalizations and death notifications. Epivigila currently only interoperates via application programming interfaces (APIs) with Chile’s National Civil Registry to query verified personal data. Information recorded on other platforms is integrated manually using Excel and other programmes.
Go.Data interoperability solution

An overview showing how Go.Data is being piloted as an integrated, bidirectionally interoperating module of Epivigila.

In summary

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<tr>
<td>- Provide a standardized, flexible, scalable and robust solution.</td>
<td>- Epivigila and Go.Data interoperability according to standards.</td>
<td>- Pandemic pressures.</td>
<td>- It is important to identify and coordinate with stakeholders across a range of disciplines.</td>
</tr>
<tr>
<td>- Include interoperable data from secondary sources (e.g. on vaccines, deaths, hospitalizations and genomic variant sequencing).</td>
<td>- Enhanced use of Go.Data for outbreak control.</td>
<td>- Diversity of business rules for data management, processing and treatment.</td>
<td>- Shared languages and data standardization are crucial for strengthening health care systems.</td>
</tr>
<tr>
<td>- Register or update standardized information in the target system according to the required data structure for outbreaks, events, etc.</td>
<td>- Centralized, standardized and secure information.</td>
<td>- Administrative difficulties accessing information-hosting systems.</td>
<td>- Thinking of Go.Data as a scalable platform allows longer term planning.</td>
</tr>
<tr>
<td>- Enhance security with access authorization and authentication, audit logs and data encryption in transit from the source.</td>
<td>- Elimination of double data entry and data fragmentation.</td>
<td>- Lack of human resources to develop the project.</td>
<td>- External support is needed to develop systems of this type and scale.</td>
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<td>- Go.Data mobile app enhances mobility of field investigation teams.</td>
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3.1.3 Guatemala

The Ministry of Health (MOH) in Guatemala adopted Go.Data as its main registration platform, providing a central system and a database through which to trace COVID-19 cases and contacts which was implemented from May to August 2021.

Existing infrastructure

Prior to the implementation of Go.Data, no platform was available for orderly registration of cases and contacts at central level. The existing infrastructure comprised numerous decentralized systems, including Epiweb (MoH), Administración de Vulnerabilidades y Emergencias (AVE – Vulnerability and Emergency Management, Municipality of Guatemala) and the Kawok surveillance systems (used by nongovernmental organizations).

A unique identification code (CUI) was used as the central patient identifier, but was not standardized across all systems. A dashboard allowing national analysis of real-time information was used at subnational and interinstitutional levels, providing some degree of interoperability with other entities.
Go.Data interoperability solution

An overview of the unidirectional interoperation from Epiweb, AVE and Kawok to Go.Data via APIs, with server-to-server communication.

In summary

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<tr>
<td>• Use technology to facilitate the registration of information.</td>
<td>• Registered over 100 000 patients and followed 350 000.</td>
<td>• Pandemic pressures.</td>
<td>• Go.Data is useful for COVID-19 case tracking and contact tracing, but requires human resources to be trained and coordinated.</td>
</tr>
<tr>
<td>• Interoperate with systems for collecting COVID-19 case data.</td>
<td>• Registered 11 000 contacts and followed 73 000.</td>
<td>• Poor availability of information technology (IT) equipment, telephones and stable internet connections.</td>
<td>Tools such as Go.Data and digital dashboards facilitate data recording and epidemiological analysis for decision-making.</td>
</tr>
<tr>
<td>• Visualize the results of the tracking strategy in informative dashboards.</td>
<td>• The MOH adopted Go.Data as the main platform to trace cases and contacts.</td>
<td>• Lack of professionals trained in interoperability.</td>
<td>The interoperability project required a lot of interinstitutional work with the MOH, technical agencies and local authorities – it built useful relationships that will be valuable in future emergencies.</td>
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<td>----------------------------------------------------------------------</td>
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<td>• Difficulties in understanding and using the Go.Data API.</td>
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<td>• Technical complexities of automating processes and procedures across systems and services.</td>
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<td>• Low performance of the Go.Data mobile app on lower end mobile devices.</td>
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3.2. Go.Data interoperability with platforms

3.2.1. northwest Syrian Arab Republic

In July 2020, Go.Data was chosen as a platform to manage COVID-19 data in northwest Syrian Arab Republic. Now, it is the main platform for registering all regional data on COVID-19 surveillance and laboratory results.

Existing infrastructure

Syrian Arab Republic has numerous different independent systems. After the collapse of the health system, the Early Warning Alert and Response Network (EWARN) system was established for surveillance of infectious diseases and is now the primary source of public health information in northwest Syrian Arab Republic. EWARN has managed COVID-19 surveillance and laboratory activities since the onset of the pandemic in the country in July 2020, and it needed to be scaled up to enhance the rapid response. With over 400 000 cases of COVID-19 and 85 000 contacts, an interoperability solution was needed that could provide an automated COVID-19 weekly surveillance bulletin and dashboard, and could share polymerase chain reaction (PCR) test results quickly.
Go.Data interoperability solution

An overview of the unidirectional interoperability solution between Go.Data, WhatsApp and Tableau in northwest Syrian Arab Republic.

Excel files with names, phone numbers and PCR results are manually exported from Go.Data and processed in Python to produce PDF files with quarantine instructions.

WhatsApp automatically sends the PDF with the PCR results to the beneficiaries.

Excel files with epidemiological data for tested cases are extracted from Go.Data, cleaned in Excel, and analysed via functions.

Excel files are uploaded to Tableau. Tableau visualizes data to create daily situation reports and weekly COVID-19 surveillance bulletins. These are shared widely as PDF files, and available on a digital dashboard.

In summary

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| • Share PCR results quickly and reduce the staff burden of sharing results.  
• Produce a sharable weekly bulletin of COVID-19 surveillance.  
• Provide an automated COVID-19 daily dashboard. | • PCR results were shared directly with 200 000 of 300 000 cases (67%).  
• Isolation and quarantine instructions are sent to confirmed cases within 24 hours.  
• Reduction in time spent on data analysis.  
• Improvement in data quality.  
• Timely sharing of epidemiological bulletins with partners, enhancing the outbreak response. | • Only 1000 results can be sent per day; it takes 10–15 seconds to send each file.  
• Using different tools imposed some difficulties.  
• Large Excel files (e.g. 900 MB) can be problematic. |
3.2.2. Canton de Vaud, Switzerland

The Canton de Vaud is the third biggest administrative region in Switzerland. Go.Data was implemented in June–July 2020 to manage the growing volume of COVID-19 data and number of contact tracers. It remains the primary contact tracing tool.

Existing infrastructure

A centralized federal system, the Système d’Information pour les Déclarations (Information System for Declarations) (SID), to register cases of communicable disease has been in place for years. At the start of 2020, cantonal records on COVID-19 were kept on SID and Excel sheets. When the increase in cases became unsustainable, SID was complemented with Go.Data and other systems such as BO COVID (“Back Office COVID”), Epidemic Intelligence Platform (EIP) and Grafana, to support different steps of outbreak investigation, data monitoring and analytics.
Go.Data interoperability solution

An overview of the Go.Data bidirectional interoperability solution with BO COVID and EIP. Hourly data sent automatically between all systems.

1. Hourly data are pulled from SID and into the BO COVID platform, which filters old cases and injects new ones.

2. BO COVID sends an SMS to each positive case with a link to a form that gathers additional data.

3. Form data are sent back to BO COVID, checked and pushed into Go.Data. Positive cases can request a SwissCOVID code, which is generated by BO COVID and sent to the case via SMS.

4. EIP automatically identifies and manages clusters and creates visualizations. EIP data are synced back into Go.Data.

5. Go.Data sends data back to BO COVID to keep a document history.

6. All systems interoperable with other data analytics and monitoring tools, such as Grafana to create visualizations.

In summary

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<tbody>
<tr>
<td>• Increase the efficiency and reliability of workflows to improve services for the population and meet regulations around isolation and quarantine.</td>
<td>• Moved from paper to digitalized contact tracing workflows.</td>
<td>• Little time to anticipate development needs owing to pandemic pressures.</td>
<td>• Go.Data provides a strong, purpose-built foundation for epidemic management.</td>
</tr>
<tr>
<td>• Respond to an overwhelming rise in cases.</td>
<td>• Increased reliability and efficiency of data processing.</td>
<td>• Strict cantonal IT infrastructure and rules.</td>
<td>• Go.Data's well-documented API makes adaptation and integration possible, so teams can meet evolving needs by developing custom solutions – without the API this would be impossible.</td>
</tr>
<tr>
<td>• Automatically and proactively identify clusters.</td>
<td>• Cluster monitoring and processing became possible.</td>
<td>• The need to train hundreds of laypeople in contact tracing.</td>
<td>• Go.Data is highly flexible and adaptable, but realizing its potential requires quite advanced research and development capacity.</td>
</tr>
<tr>
<td>• Monitor productivity of the tracing centre.</td>
<td>• New indicators were created to monitor the cantonal situation.</td>
<td></td>
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<tr>
<td></td>
<td>• 61% of cases were processed automatically, making contact tracing frictionless.</td>
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<tr>
<td></td>
<td>• In-house IT development allowed for small-scale testing on-site and rapid development cycles.</td>
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</table>
3.2.3.

**Cox’s Bazar, Bangladesh**

Go.Data was implemented in 33 refugee camps in Cox’s Bazar, Bangladesh to improve outbreak response in March 2020 and is currently still being tested.

**Existing infrastructure**

The digital health system for refugees was built on the Early Warning Alert and Response Network (EWARN) and DHIS2, with limited ability to handle case and contact information.

Outbreaks of diphtheria and cyclical upsurges of diseases that are vaccine preventable or have high outbreak potential are constant, but do not follow stable or predictable trends.
Go.Data interoperability solution

An overview of the current unidirectional interoperability system between Go.Data and Kobo in Cox’s Bazar. The planned solution will automatically alert when samples are positive, with laboratories pushing information into Go.Data, automatic distribution to phones and pushing of full forms into Kobo through an API.

In summary

<table>
<thead>
<tr>
<th>Aims</th>
<th>Challenges</th>
<th>Lessons</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Achieve interoperability between Kobo and Go.Data to allow submission of laboratory sample line lists and results directly into Go.Data, creating alerts for positive cases and triggering investigations.</td>
<td>• Limited internet connection in camps.</td>
<td>• Contact tracers should be subject to a minimum qualification requirement.</td>
</tr>
<tr>
<td>• Ensure reliable, efficient disease surveillance in health emergencies that is well integrated into routine health information systems.</td>
<td>• Lack of resources among implementing partners on the ground.</td>
<td>• A more user-friendly version of Go.Data is needed that allows updating of sample lists and laboratory results.</td>
</tr>
<tr>
<td>• Enhance the ability of the government and partners to access timely, complete surveillance data through a routine system.</td>
<td>• Technical complexities of providing a national server to host Go.Data.</td>
<td>• Standard unique identifiers are needed.</td>
</tr>
</tbody>
</table>

Go.Data is connected via APIs to Microsoft Power BI for data monitoring and analytics.
3.2.4.
Leuven, Belgium

In September 2020, a second COVID-19 peak hit university city, Leuven. Contact tracing for students was not being followed up by local, regional or national authorities, so the university stepped in and implemented Go.Data to follow cases and contacts.

Existing infrastructure

Belgium has a national laboratory database in which the unique identifier is the national identity (ID) number held by every citizen.

Positive COVID-19 tests are reported to regional contact tracing systems. A national contact tracing app (DP3T) is used, and results are reported through this at a government web portal.

In Leuven, a prescription programme (Mediportal) is used in the testing centre. University Hospitals Leuven (UZ Leuven) has a laboratory information system; results are reported through this and a UZ Leuven hospitals app.

Contact tracing information was gathered in unstructured emails and Excel files.
Go.Data interoperability solution

An overview of the unidirectional interoperation between Go.Data, the UZ Leuven hospital system and a web app designed for appointments and contacts (a national resource through which everyone can access test results).

1. Student books a test through a web form. This form is custom developed by the university IT team for sharing information such as vaccination status and symptoms.

2. Test centre generates a prescription, tracing collected in Go.Data and a swab is taken. Results are reported to the UZ Leuven mobile app, Go.Data and email tracers.

3. During the tracing preparation stage, student quarantines and lists recent contacts in a web form. Data stored immediately in Go.Data when web forms are submitted by students or contact tracers.

In summary

<table>
<thead>
<tr>
<th>Aims</th>
<th>Impacts</th>
<th>Challenges</th>
<th>Lessons</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Integrate, scale and decentralize testing and tracing of Leuven’s student population.</td>
<td>• Data were inputted automatically, in a well-structured format.</td>
<td>• The use of phone numbers as the primary key is problematic: inconsistent or inaccurate entries have led to data loss.</td>
<td>• The Go.Data identifier should be used as the primary key in all systems.</td>
</tr>
<tr>
<td>• Create a simple test appointment system allowing data entry by end-users to gather personal information, risk factors, test results and contact data.</td>
<td>• Constant monitoring of the pandemic became possible.</td>
<td>• Data protection and privacy considerations were an issue: users’ access to sensitive data required more granular settings or encryption.</td>
<td>• Outbreak size in the system should be kept relatively small to avoid timeout during GET and POST functions.</td>
</tr>
<tr>
<td>• Enable visualization of the epidemic and data analysis for research.</td>
<td>• The time between a positive test and the start of the quarantine period was decreased.</td>
<td>• Important automated processes are missing (e.g. inputting attendants at events and classifying cases).</td>
<td>• Success in a rapidly evolving system working under pressure requires a constant, agile methodology that involves all stakeholders.</td>
</tr>
</tbody>
</table>
Day 1: documentation of existing interoperability use cases

The use cases documented in the consultation revealed a range of different approaches to integrating Go.Data with existing systems across different types (and levels of development) of health systems, filling gaps of various kinds and showing some positive impacts (e.g. a more efficient outbreak response).

The act of gathering and showing these presentations – the documentation and sharing of current practice – was one of the most important outputs of the consultation. Overall, countries have been successful so far in meeting or beginning to meet their requirements, even though some of these systems have not been long in operation and there have been challenges.

Three common, overarching lessons emerged:

- Countries need to build national capacity to use outbreak response tools such as Go.Data.
- Countries need standards that enable consistent, accurate collection and exchange of health information across health systems and services. These require the use of unique identifiers and data standardization.
- Leadership, governance and multisectoral engagement are all essential to a project of this nature, and early, deep coordination with a range of interdisciplinary stakeholders is crucial. It is important to identify and engage all key stakeholders before implementing any solutions.

The common requirements, challenges and lessons that emerged from the use cases are summarized in Table 1.
<table>
<thead>
<tr>
<th>Requirements</th>
<th>Challenges</th>
<th>Lessons</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Facilitating collection or registration of information</td>
<td>Political (including systemic)</td>
<td>Political (including systemic)</td>
</tr>
<tr>
<td>• Maintaining a central repository for cases</td>
<td>• Obtaining acceptance of the Go.Data platform for outbreak data management and agreeing terms of use</td>
<td>• Teamwork is critical. Engaging all key stakeholders before implementation is essential</td>
</tr>
<tr>
<td>• Standardizing and storing records</td>
<td>Technical (including systemic)</td>
<td>• Interinstitutional or multisectoral work and relationship building have proved useful across contexts and can be used in future emergencies</td>
</tr>
<tr>
<td>• Gathering and recording data from secondary sources</td>
<td>• Rationalizing a variety of existing systems for data collection and diverse data, processes and standardization approaches and rules</td>
<td>• Success in a rapidly evolving system working under pressure requires a constant, agile methodology that involves all stakeholders</td>
</tr>
<tr>
<td>• Outbreak data management, analysis and visualization</td>
<td>• The need for standard unique identifiers</td>
<td>• In lower resource settings it may be necessary to impose minimum qualifications for contact tracers</td>
</tr>
<tr>
<td>• Registering or updating standardized information in the target system</td>
<td>• Adapting Go.Data forms to ensure tracking of cases</td>
<td>• Shared language and data standardization are crucial to the wider future development of health care systems</td>
</tr>
<tr>
<td>according to the required data structure for outbreaks and events</td>
<td>• Automating processes and procedures, especially in settings with multiple systems</td>
<td>Technical (including systemic)</td>
</tr>
<tr>
<td>• Facilitating international collaboration in outbreak investigations and</td>
<td>• Data privacy – users’ access to sensitive data required more granular settings or encryption</td>
<td>• Standard unique identifiers are needed (the Go.Data identifier can be used as a primary key)</td>
</tr>
<tr>
<td>responses</td>
<td></td>
<td>• The outbreak size should be kept relatively small to avoid timeout during GET and POST; to avoid this issue, the timeout should be increased</td>
</tr>
<tr>
<td>• Improving the efficiency of data management</td>
<td></td>
<td>• Clear definitions are required for the roles of each app and how the apps complement each other in outbreak data management.</td>
</tr>
<tr>
<td>• Establishing interoperation with training and information systems</td>
<td></td>
<td>• External support is often needed to develop interoperability solutions</td>
</tr>
<tr>
<td>• Increasing data security</td>
<td></td>
<td>• Go.Data’s well-documented API makes adaptation and integration possible</td>
</tr>
<tr>
<td>• Political (including systemic)</td>
<td></td>
<td>• Countries thinking of Go.Data as a scalable platform should consider its use for other diseases too</td>
</tr>
<tr>
<td>• Technical (including systemic)</td>
<td></td>
<td>COVID-19 pandemic</td>
</tr>
<tr>
<td>• Capacity and resources</td>
<td>• Technical issues or capacity limitations hinder the development of customized interoperability apps to meet country-specific needs, especially in low-resource settings</td>
<td>As was also the case in other contexts, the COVID-19 pandemic imposed a range of pressures and problems, including difficulty with logistics, meetings and administration, compressed timelines and pressure on staff and time</td>
</tr>
<tr>
<td>• Securing server space or accessing existing hosting systems can be difficult</td>
<td>• The necessary hardware and resources are often unavailable</td>
<td>• Standard unique identifiers are needed (the Go.Data identifier can be used as a primary key)</td>
</tr>
<tr>
<td>• The necessary human resources are often unavailable</td>
<td>• The Go.Data API can be difficult to understand and use</td>
<td>• The outbreak size should be kept relatively small to avoid timeout during GET and POST; to avoid this issue, the timeout should be increased</td>
</tr>
<tr>
<td>• The app functions poorly on lower end mobile devices</td>
<td>• Clear definitions are required for the roles of each app and how the apps complement each other in outbreak data management.</td>
<td>• External support is often needed to develop interoperability solutions</td>
</tr>
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</tbody>
</table>
5. Day 2: applicable interoperability standards, shared challenges and priorities for development

5.1. FHIR-HL7

Day 2 began with a presentation from Dr Carl Leitner of the WHO Digital Health & Innovation Team. Dr Leitner gave a brief overview of fast health interoperability resources (FHIR), which is a set of standards created by Health Level Seven International (HL7) that describe data formats, elements and an API for exchanging electronic health records, thereby providing a set of interoperability standards for health information systems in clinical and public health. FHIR is represented in several national and regional health information exchange frameworks, and its implementation guides and profiles are available from organizations such as Integrating the Healthcare Enterprise or HL7 (see Annex 3 for a list of useful FHIR resources and links).

There are several guidance documents describing different ways to use FHIR resources. Two that might be relevant to Go.Data are:

- **Sharing Valuesets, Codes and Maps**, which describes a set of capabilities for interacting with a terminology service to support code lookup, validation and mapping; and
- **Structured Data Capture**, which describes how to structure questionnaires and extract data for case reports, surveys and clinical data capture using FHIRPath and structure maps.

FHIR is a rich ecosystem with both open source and commercial implementations at server and software library levels, and libraries in most programming languages. Several health tools have partial FHIR support, whereas others deal with legacy data systems and questionnaires, or manage multiple health facility lists together or export them into other platforms.
5.1.1. Example: data for case reporting

Real-world interoperability problems occur in contexts where data from different collection systems have to be brought into a common repository and normalized for analysis. There are many data sources for case reports, with each system using its own data models, patient identifiers, terminologies or codings, making automated synthesis difficult.

To compare and synthesize these data, they must be normalized; that is, a standard data model (e.g. FHIR) and coding have to be agreed, and the data have to be mapped or transformed to meet the standards of that model.

Once this has been done, data can be kept in a single database where it is easy to store them, and where they are well indexed for fast searching and easily de-identified.

De-identified reports can be used to produce visualizations, alerts and data analyses to guide public health decisions. A wide choice of open-source tools can help to normalize data from different sources for use with FHIR.

OpenHIE case reporting: actors and transactions

Summarised below is an example of a basic case reporting workflow, as outlined by Dr Leitner in his presentation.

A health professional needs to submit a case report into the repository but does not yet know FHIR, and does not understand or use the specific coding requirements and value sets that the repository wants.

A FHIR case report transformer does the data mappings and transformations and stores the case report.

De-identified reports can be used to produce visualizations, alerts and data analyses to guide public health decisions. A wide choice of open-source tools can help to normalize data from different sources for use with FHIR.
OpenHIE case reporting: a comparison of case report transformation workflows

A system without FHIR might use these data to export case reports or tabular data in a comma-separated values (CSV) format, and a system with some notion of FHIR could produce questionnaire responses and store some metadata; however, a FHIR-native system could produce individual case report forms. The diagram below compares these different workflows.
5.2. Go.Data interoperability needs and generic solutions brainstorm

About the breakout sessions

The second session of Day 2 was the interoperability workshop, entailing a series of guided exercises in which participants addressed the core goal of the consultation – gathering information to guide the development of a generic middleware interoperability architecture for the Go.Data community of practice, so that Go.Data can connect easily to other national health surveillance systems and platforms.

This process took place across structured, moderator-led breakout sessions replicated in parallel across five different breakout rooms, keeping group sizes small and encouraging discussion.

An interactive online whiteboard tool, Miro®, was used to record brainstorming ideas in post-it notes captured from the discussions and placed on the shared board by session facilitators.
Breakout sessions 1 and 2: Go.Data interoperability successes, challenges, themes and trends

In breakout session 1, participants discussed the successes or challenges countries have faced in the process of implementing interoperable Go.Data systems, using the seven building blocks of a digital health enabling environment as an organizing framework and expanding on the lessons of Day 1.

In breakout session 2, they identified trends in these successes and challenges, clarifying common issues that national teams tend to face when implementing interoperable solutions for Go.Data.

Breakout session 3: Interoperability recommendations

In breakout session 3, participants proposed a range of recommendations to enable interoperability for Go.Data. At this stage, discussions involved brainstorming to generate ideas; there was no attempt to prioritize the proposals or evaluate them for feasibility.

Breakout session 4: Prioritizing interoperability interventions

In the final activity of the consultation, each group examined the solutions proposed in the previous session and prioritized them based on feasibility and impact. The goal was to identify the actions that will most effectively move the Go.Data community of practice towards interoperability with other national software systems or platforms.

Each group arranged their proposed solutions into one of four boxes on a graph, where the x-axis represented the likely impact of the proposed solution (low to high) and the y-axis represented the feasibility or ease with which it could be implemented (low to high).

Across all five groups, the most feasible, high-impact interventions that countries or the Go.Data community of practice could undertake at the present time were as shown [on page 37].

The outputs from these breakout sessions are summarized below.
5.3. Breakout session 1 and 2: interoperability successes

- Leadership and governance tend to be most successful in contexts where MOHs are fully engaged and driving the interoperability projects; surveillance teams have acknowledged the benefits Go.Data can bring; and MOHs are able to bring international partners into the conversation.

- Progress requires strong technical leadership that identifies problems and solutions, and pushes the topic forward; strong political leadership; and strong international leadership from multilateral and regional bodies such as WHO or US CDC. To achieve this level of political support it may first be necessary to educate national leaders on the usefulness and value of Go.Data.

- Successes in this area vary according to context and investment needs. Participants noted that WHO support can be particularly valuable in places where resources are restricted. Where funds and human resources are limited, successful implementation of new and complex systems is harder to achieve, making it even more important to secure the high-level buy-in mentioned above – not least to increase the chances of obtaining funds, nationally or from partners.

- Effective standards impose standardization on software across different apps, communication protocols, and main and secondary data sources. They are defined and enforced by regional and national governments.

- Go.Data adds value in data management in challenging circumstances; for example, when partners (and therefore data sources) change and data management has to adapt. Users in many contexts have filled existing gaps in their systems by automating functions, and the availability of APIs was cited as being of great value when using other apps around Go.Data.

- Where implemented successfully, Go.Data has improved the ease and quality of data sharing. Benefits included the use of a single-source data system, the ability to merge systems offline, the possibility of rapid implementation, and a quick trial and error period.
• Understanding all relevant legislation and policy that affects the implementation of Go.Data is important for its success. Again, acceptance and buy-in at ministry level are particularly valuable here, because they create a more favourable legislative and policy context.

• Effective use of Go.Data interoperability has required workforces skilled in two principal areas: the development of the interoperability solution and the implementation of the tool. Where there is low technical literacy and a rapid scale up of the workforce during a pandemic, training is needed in both areas. New workforce development activities have been rolled out across the community of practice for online education and Go.Data training.

• National bodies running COVID-19 responses with Go.Data have taken action to strengthen systems. For example:
  • putting appropriate human resources in place nationally and regionally,
  • getting APIs working quickly and beginning data entry straight away;
  • having in-house programming capacity eases the process further.
Interoperability challenges

- Challenges tended to occur in contexts where this level of buy-in had not been achieved, and where leadership and support from governments and other decision-makers was lacking. Governments often own the implementation of surveillance tools, and many governments remain reliant on and invested in classic systems, making them reluctant to change.
- Technical challenges also tend to occur in the absence of political will and guidance. Such challenges might include the uncoordinated use of different systems, confusion about what systems to use in the field and failure to define data flows and data-sharing protocols. Success can be difficult or impossible if MOHs are not committed, leaders fail to appreciate the need for interoperability or system owners are not keen to link their systems.
- Challenges tended to arise when there was no or little investment in preparedness and external support was lacking, and where IT capacity and human resources were scarce or unavailable. At the start of the pandemic, many countries or institutions lacked (and still lack) specialists who can perform integrations.
- There is a widespread need for external support, including from WHO, and including deployment and on-site support.
- The lack of clear documentation on the different types of interoperability solutions and the advantages their implementation could bring was another challenge. Such documents could also be important advocacy tools.
- Go.Data’s strengths lie in the platform’s ability to collect, streamline, store, manage, share and visualize data. However, the discussions generated a useful list of challenges found in common practice that highlight areas for improvement.

Challenges concerning the Go.Data app

- Go.Data is not yet fully open source – access to the source code would allow the community of practice to improve it.
- Importing data – especially from laboratory systems – can be hard because it requires a strong understanding of the data model.

- Accessing Go.Data for testing and development can be challenging – difficulties downloading the software are common and more detailed guidance is required.
- Improved documentation is needed to help users understand the data workflow and data recording processes, avoid creating inconsistencies within the system and better understand the nature of updates.
- Go.Data updates, including changes in the API, can break functions if they are not fully documented in the release notes. Sometimes it is difficult to synchronize all records. Users suggested that this issue may be linked to large volumes of data because that the problematic functions often do work with small data sets in the same contexts.
- Syncing administrative hierarchies within the system and georeferencing can be challenging.
- The Go.Data dashboard functions are limited in some contexts.

General digital health challenges

- Having apps that can work offline is crucial.
- Mapping data workflows between different platforms can be difficult, especially when multiple people or organizations are involved.
Interoperability challenges

- Real-world use in outbreak response often imposes a need to share unique identifiers across apps, and many of the challenges were linked to the need for these unique identifiers – not just for Go.Data but also for national systems.

- Transferring patient identifiers across apps has been challenging, especially when serving mobile populations. Interoperability is needed from both sides of an operation; to achieve interoperability, Go.Data users need to collaborate with the people working with the other system.

- In places with connectivity issues, data flow from field to national level is problematic – an issue that quickly leads to fragmentation between paper and electronic systems. Participants described problems with ensuring data quality from a range of source systems, and with configuring and manipulating that data for readability by Go.Data.

- Server space can also be a problem because hosting Go.Data on a separate server may be too expensive and having multiple applications in one server can bring some space issues. In low-resource settings, performance of the Go.Data app on low-end mobile phones posed a challenge.

- Low-resource settings would benefit from using cloud servers to overcome the technical and financial barriers using Go.Data government-hosted servers. In some contexts, however, policy or regulation do not allow data to be hosted outside national borders, ruling out the use of cloud servers.

- Compliance with national privacy and data security policies can impact Go.Data implementation – especially when countries legislate against accessing or hosting data outside national borders, but lack the capacity or resources to host it locally.

- Linking existing data with Go.Data can impose challenges, because data tracking systems must update or change to be interoperable with new standards. It can be difficult for developers to obtain a clear picture of all the systems and policies that are important or relevant, making it hard to achieve good connections for Go.Data.

- In some contexts, the decision-making structures affecting governance and structures of systems and infrastructure may be big and unwieldy, and difficult to change and update quickly enough in response to issues and problems.

- Low-resource settings often face challenges around the capacity of the IT workforce to work on interoperability apps, and challenges of low technical literacy generally, down to field level. Even in the private sector, the availability and professionalism of the e-data workforce may be an issue. The sustainability of Go.Data implementation requires capacity to be built, and people to be trained quickly in a standardized way.

- In these contexts, ministries need external support, and they often rely on partners to secure staff to operate the necessary systems. To avoid disorganization and communication issues, multisectoral workforce roles and responsibilities should be clearly laid out.
5.4. Breakout session 3: interoperability recommendations

- Ensure that interoperability projects are country-driven and country-owned.
- Use the opportunities created by COVID-19 policy and funding momentum to strengthen and invest in preparations for future outbreaks.
- Start with smaller-scale interoperability pilots to properly test, demonstrate proof-of-concept and achieve high-level support with a smaller upfront investment. This can be done with live demonstration implementations on servers, where developers can explore the implementations before setting up integration with other systems.
- Use Go.Data’s ability to track other diseases as a central argument when advocating for support at ministry level.
- Early in the process, clarify what is to be achieved through interoperability.
- Carry out a broad system overview before beginning an interoperability project, to ensure that Go.Data fits in with other systems. This should include thorough consideration of how best to align and exchange data in the context of existing data standards or the lack of such standards. To guide planning, map apps, networks and generic needs.
- Identify technical “connectors” in the given implementation context who can bring together the necessary resources, technology, personnel and other assets, and who can document and leverage those connections and connectors.
- Develop communication and coordination plans to support regular collaboration with, and connection to, the public.
- Develop a strategy to meet the need for unique identifiers and ensure that data governance is a strategic priority.
- Provide flexible on-site support.
- Make Go.Data fully open source so that the community of practice can improve it, including easily accessible installation files and an open-access sandbox instance.
- Publicize a comprehensive range of technical documents, more detailed release notes and more templates for data input. These should include Swagger documentation and pocket technical guidelines for use by host governments.
- Continue to build on existing API documentation and provide an open-access Go.Data demonstration site in which users can flexibly test integrations.
- Enhance Go.Data with support for “upsert” functionality.
- Allow more flexible configuration of the elements of the Go.Data interface.
- Add the capacity for a modification in the Go.Data system to trigger events in another system and to generate alerts.
- Consider ways for the public to interact with Go.Data features.
- Enable automatic language translation in Go.Data interface, i.e. through translation plugins.
- National or health authorities should legislate for good data governance, creating a minimum level of data standardization as a starting point. Where applicable, regulations should follow international standards that can be adapted to context.
- Consider establishing FHIR standards as minimum standards that can be built upon, and produce a FHIR implementation guide for Go.Data.
- National or health authorities should ensure standardized unique or single code identifiers across software apps that can be input once and carried through the workflow.
- Ensure the platform has the ability to retain common “core” fields across systems that can be synchronized, and are not disturbed by additional custom fields that function on top of them.
- Normalize data from other systems, i.e., laboratory information systems.
5.4. Breakout session 3: interoperability recommendations

- Where possible, host Go.Data on in-country servers (ideally, cloud-based servers). If data are going through different levels, use upstream servers.
- Run demonstration instances so that users can get started quickly.
- Provide user-friendly syncing capabilities.
- Use server-based middleware.
- Ensure that systems operate with an intranet, and that users can update when connected but can still work offline.
- Ensure a high level of data privacy and security.

- National and international normative agencies should provide templates for legislation and enforcement frameworks for national surveillance.
- Ensure that Go.Data interoperability projects comply with all relevant national privacy and security policies and regulations.
- Ensure that all systems and approaches for access to and control of data are optimized for outbreak preparedness and response, while remaining fully compliant with all relevant national legislation as well as gold standards for security and privacy.
- WHO, US CDC and others should provide dedicated interoperability training resources, including concise, targeted training materials for specific stakeholders.
- Go.Data should be incorporated into core training programmes such as field epidemiology training programmes and national training curricula.
- National and international normative agencies should provide templates and tools for coordinating between governments and different parts of the health system.
- When implementing Go.Data interoperability, start small and progress quickly by using pilot programmes.
- National and international normative agencies should provide templates for coordinating between governments and different parts of the health system.
- WHO, US CDC and others should provide dedicated interoperability training resources, including concise, targeted training materials for specific stakeholders.
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- National and international normative agencies should provide templates and tools for coordinating between governments and different parts of the health system.
- When implementing Go.Data interoperability, start small and progress quickly by using pilot programmes.
5.5. Breakout session 4: Prioritizing interoperability interventions

Feasibility

Impact

High feasibility, Low impact
High feasibility, High impact
Low feasibility, Low impact
Low feasibility, High impact

High

Low

Low High

Impact
5.5. Breakout session 4: Prioritizing interoperability interventions

**Introduction**
- Implement the capacity for modifications in Go.Data to trigger events in another system
- Provide more detailed release notes and technical roadmaps
- Add alert and upsert functionalities to Go.Data
- Provide more templates for Go.Data data input
- Improve Swagger documentation and expanded API endpoints
- Improve multi-lingual resources for Go.Data interoperability

**Process and design**
- Fully transition Go.Data to an open source license, including easily accessible installation files and an open-access sandbox instance
- Prioritize IT set-up and configuration during preparedness phase
- Propose FHIR/HL7 as a minimum set of standards
  Support small-scale interoperability pilot projects to test proof of concept
- Provide test environments in which updates can be done before being moved to production environments
- Set, share and standardize across data collections
- Normalize data from other systems, i.e., laboratory information systems

**High Impact**
- Incorporate Go.Data into core training programmes
- Publish clear WHO guidelines on digital standards for interoperability
- Advocate for increased infrastructure and implementation support for cloud servers
- Produce a FHIR/HL7 implementation guide for Go.Data
- Enable automatic translation of the Go.Data interface, i.e. through plugins

**Low Feasibility**
- Design server-based middleware to enable more flexible interoperability across a range of platforms
- Develop a coherent strategy for unique identifiers and standardize these across apps (Go.Data and other)
- Ensure that common "core" fields across systems can be synchronized and preserved despite additional custom fields that function on top of them
- Adapt international standards to country contexts
- Consider ways for the public to interact with Go.Data features
- Publicize a comprehensive range of technical documents and more detailed release notes

**High Feasibility**
- API: application programming interface; app: application; FHIR: fast health interoperability resources; WHO: World Health Organization.
5.6. Next steps

In terms of next steps, the Go.Data project team at WHO will use outputs from this consultation to develop and validate two core resources:

- a checklist of requirements for successful Go.Data interoperability (this validated checklist should be considered as part of Go.Data roll-out plans); and
- a development roadmap for short-term and medium-term adaptations to Go.Data.

Through initiatives such as the GOARN-Berlin Fellowship programme, the Go.Data team will engage active contributions from both the existing Go.Data community of practice and the wider open-source development community.

In addition, a working group will be assembled to address Go.Data development and standards. A principal aim of this group will be to create, enhance and sustain national and international collaboration, building and strengthening the Go.Data community of practice by developing and improving Go.Data interoperability solutions.

References


Annex 1: Global consultation on Go.Data interoperability agenda

## Tuesday, 7 June 2022 “Go.Data Interoperability Use Cases”
13:00–16:00h Central European Time (CET)

<table>
<thead>
<tr>
<th>Time (CET)</th>
<th>Session</th>
<th>Speaker</th>
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</table>
| 13:00–13:10 | Welcome and opening remarks | Dr Ibrahima Socé Fall  
Assistant Director-General, Emergency Response, WHO Headquarters |
| 13:10–13:13 | Rationale, aims and objectives | Ms Sara Hollis  
Epidemiologist, WHO Global Outbreak Alert and Response Network (GOARN) Secretariat, WHO Headquarters |
| 13:13–13:20 | Audience survey and warmup activity | Facilitator |
| 13:30–14:30 | Session 1: Go.Data interoperability with health management information systems  
1. Use-case presentations:  
   • Chile  
   • Sierra Leone  
   • Guatemala  
2. Panel discussion | Moderated by:  
Dr Carl Kinkade  
Business Intelligence Analyst, Health Emergency Information & Risk Assessment, WHO Regional Office for Africa v |
| 14:30–14:40 | Break | |
| 14:40–15:55 | Session 2: Go.Data interoperability with platforms and applications  
1. Use-case presentations:  
   • northwest Syrian Arab Republic  
   • Canton de Vaud, Switzerland  
   • Katholieke Universiteit Leuven, Belgium  
   • Cox’s Bazar, Bangladesh  
2. Panel discussion | Moderated by:  
Dr Carl Kinkade  
Health Scientist, US Centers for Disease Control and Prevention |
| 15:55–16:00 | Summary Day 1 and Closing | Facilitator |
### Global Consultation on Go.Data Interoperability Report

#### Annexes

1. **Process and design**
2. **Interoperability use cases**
3. **Documentation of existing use cases**
4. **Applicable standards, challenges and priorities**
5. **Annexes**

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**Wednesday, 8 June 2022 “Applicable Interoperability Standards”**

**13:00–16:00h CET**

<table>
<thead>
<tr>
<th>Time (CET)</th>
<th>Session</th>
<th>Speaker</th>
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<tbody>
<tr>
<td>13:00–13:05</td>
<td><strong>Overview of agenda, Day 2</strong></td>
<td><strong>Ms Silvia Morreale</strong>&lt;br&gt;Epidemiologist, GOARN Secretariat, WHO Headquarters</td>
</tr>
<tr>
<td>13:05–13:15</td>
<td><strong>Audience survey and warmup activity</strong></td>
<td>Facilitator</td>
</tr>
<tr>
<td>13:15–13:45</td>
<td><strong>Session 3: Applicable Interoperability Standards</strong>&lt;br&gt;• WHO Digital Health Strategy&lt;br&gt;• FHIR/HL7 Digital Adaptation Kits</td>
<td><strong>Dr Carl Leitner</strong>&lt;br&gt;Technical Officer, Public Digital Health Technology, WHO Headquarters</td>
</tr>
<tr>
<td>13:45–13:50</td>
<td>Introduction to workshop exercise and assign to breakout rooms</td>
<td>Facilitator</td>
</tr>
<tr>
<td>13:50–14:40</td>
<td><strong>Session 4: Interoperability Workshop, Part I</strong></td>
<td>All (breakout rooms)</td>
</tr>
<tr>
<td><strong>14:40–14:45</strong></td>
<td><strong>Break</strong></td>
<td></td>
</tr>
<tr>
<td>14:45–15:30</td>
<td><strong>Session 4: Interoperability Workshop, Part II</strong></td>
<td>All (breakout rooms)</td>
</tr>
<tr>
<td>15:30–15:45</td>
<td><strong>Group report-back of breakout sessions</strong></td>
<td>Facilitator</td>
</tr>
<tr>
<td>15:45–16:00</td>
<td><strong>Summary, next steps and closing remarks</strong></td>
<td><strong>Ms Silvia Morreale and Ms Sara Hollis</strong>&lt;br&gt;GOARN Secretariat, WHO Headquarters</td>
</tr>
</tbody>
</table>
Annex 2: List of participants

Session leads

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Annex 3: FHIR resources

Fast health interoperability resources (FHIR) solutions are built from a set of modular components called “resources” that are assembled into working systems to solve clinical and administrative problems cheaply. FHIR is an iterative, evolving set of standards in which different resources are developed and matured as new use cases and workflows come in. FHIR allows the generation of user interfaces, and a whole supporting ecosystem of tools allows data capture for FHIR questionnaires from a range of different sources. A WYSIWYG (“what you see is what you get”) tool allows users to develop FHIR questionnaires without needing to know the underlying resources and coding.

The main FHIR resource list page is at https://www.hl7.org/fhir/resourcelist.html.

Table A3.1. FHIR technology ecosystem

<table>
<thead>
<tr>
<th>Open source</th>
<th>Commercial</th>
</tr>
</thead>
<tbody>
<tr>
<td>• DotNet server: <a href="https://github.com/FirelyTeam/spark">https://github.com/FirelyTeam/spark</a></td>
<td>• AWS: <a href="https://aws.amazon.com/solutions/impliments/fhir-works-on-aws/">https://aws.amazon.com/solutions/impliments/fhir-works-on-aws/</a></td>
</tr>
<tr>
<td>• Java – HAPI FHIR server: <a href="https://github.com/jamesagnew/hapi-fhir">https://github.com/jamesagnew/hapi-fhir</a></td>
<td>• Oracle: <a href="https://docs.oracle.com/health-sciences/health-hdr-81/HDRFG/fhirserverarch.htm">https://docs.oracle.com/health-sciences/health-hdr-81/HDRFG/fhirserverarch.htm</a></td>
</tr>
<tr>
<td>• Java - IBM FHIR server: <a href="http://github.com/ibm/fhir">http://github.com/ibm/fhir</a></td>
<td>• SMILE CDR: <a href="https://www.smilecdr.com/smilecdr">https://www.smilecdr.com/smilecdr</a></td>
</tr>
<tr>
<td>• Java – SMART on FHIR: <a href="https://sandbox.smarthealthit.org">https://sandbox.smarthealthit.org</a></td>
<td>• Firely: <a href="https://fire.ly/products/firely-server/">https://fire.ly/products/firely-server/</a></td>
</tr>
<tr>
<td>• PHP FHIR: <a href="https://github.com/dcarbone/php-fhir">https://github.com/dcarbone/php-fhir</a></td>
<td>• PostgreSQL: <a href="https://www.health-samurai.io/fhirbase">https://www.health-samurai.io/fhirbase</a></td>
</tr>
<tr>
<td></td>
<td>• Ruby: <a href="https://github.com/fhir-crucible/fhir_client">https://github.com/fhir-crucible/fhir_client</a> and <a href="https://github.com/fhir-crucible/fhir_models">https://github.com/fhir-crucible/fhir_models</a></td>
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<td>• Swift – SMART on FHIR: <a href="https://github.com/smart-on-fhir/Swift-FHIR">https://github.com/smart-on-fhir/Swift-FHIR</a></td>
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