Resource Guide to Assess Digital Health Platforms for COVID-19 Case Management and Contact Tracing

A virtual seminar series

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Context

• Anticipation of overwhelmed health systems and governments globally by COVID-19
  • Capacity to manage critically ill patients in hospitals and remote monitoring of patients at home
  • Planning of large-scale contact tracing programs

• Digital platforms can support case management and contact tracing
  • While also meeting needs of healthcare providers and public health officials on the frontlines

• This report fills that gap, by identifying platforms that could serve those health systems and governments
Digital Solutions for COVID-19 Response

• A rapid assessment of nine digital platforms to address COVID-19 related case management and contact tracing

• Supported by the Bill & Melinda Gates Foundation

• Platforms: CommCare, Community Health Toolkit (CHT), DHIS2 Tracker, Go.Data, ODK, OpenSRP, RapidPro, SORMAS, and WelTel
Approach

Platforms selected based on:

- number of global deployments
- flexibility in adapting platform for different use cases
- multi-lingual support
- interest from global stakeholders in reconfiguring platform for COVID-19 response

Our Assessment Strategy

- Reviewed publicly available demo videos about the platform and its adaptation for COVID-19 specific use cases.
- Downloaded and used the platforms or their COVID-19 applications, where possible, to understand dependencies, usability, and possible barriers to use for each platform.
- Conducted a series of interviews with the platform developers and stewards to get clarity around functional and non-functional aspects that are of particular importance.
- Reviewed existing documentation and community engagement around the platforms on platforms.
Use Cases for the Platforms

- COVID-19 Case Management
- Contact Registration & Follow-Up
- Port of Entry Screening & Follow-Up
- Event-based Surveillance System
- Lab Test Tracking
- Healthcare Worker Training
- Facility Readiness and Stock Tracking
COVID-19 Use Case: Workflow for Patient Triage, Referral for Testing, Contact Listing and Notification, and Follow-Up

1 Process will vary if patient is seen at home.
Platforms Overview

CommCare, Community Health Toolkit (CHT), DHIS2 Tracker, Go.Data, ODK, OpenSRP, RapidPro, SORMAS, and WelTel
CommCare

• Relevant use cases:
  • COVID-19 case management, Contact registration and follow-up, Port of entry screening and follow-up, Facility readiness and stock tracking, Healthcare worker training and monitoring, Lab test tracking

• Deployed for COVID-19 in about 30 countries, with around 20,000 users using globally

• Meant for community health, healthcare facility, and remote communication settings
Community Health Toolkit (CHT)

- Relevant use cases:
  - **Current:** Port of entry screening and follow-up, Event-based surveillance system, Contact registration and follow-up
  - **Planned:** COVID-19 case management (home-based care), healthcare worker training

- Deployed in Nepal (10,000 travelers), Kenya (~350 healthcare workers trained), and Niger (55 individuals trained) for COVID-19 response

- Meant for community health and remote SMS-based communication with patient settings
DHIS2 Tracker

• Relevant use cases:
  • COVID-19 case management, Contact registration and follow-up, Port of entry screening and follow-up, Event-based surveillance system

• Deployed in 52 countries and 17 Indian states. Deployed in 28 countries for COVID-19 specifically

• Meant for healthcare facility and community health settings
Go.Data

- Relevant use cases:
  - COVID-19 case management, Contact registration and follow-up, Lab test tracking

- Deployed in many countries for COVID-19, including Malta and the Maldives

- Meant for healthcare facility and community health settings
Go.Data

• Outbreak investigation tool for field data collection

• Includes functionality for case investigation, contact follow-up, visualization of chains of transmission, and is designed for flexibility in the field

• Adaptable to wide range of outbreak scenarios

• Developed by the WHO, in collaboration with partners in the Global Outbreak Alert and Response Network
ODK

- Relevant use cases:
  - Event-based surveillance system, Healthcare worker training and monitoring

- ODK is regularly deployed by organizations themselves, so not all deployments documented. In India, Somalia, South Sudan, Kenya, Philippines, Pakistan

- Meant for community health settings
ODK

• Free, open-source suite of tools that allows data collection using Android mobile devices, and data submission to an online server without Internet connection or mobile carrier service at time of data collection

• Strength lies in its global community of developers and ease of adaptation and installation

• Primarily optimized for use cases that involve cross-sectional point-in-time data collection, but also is used for longitudinal client follow-up

• Nafundi is primary steward and support ODK’s ongoing development
OpenSRP

• Relevant use cases:
  • **Current:** COVID-19 case management, Lab test tracking
  • **Planned:** Contact registration and follow-up, Event-based surveillance system (geospatial capacity), Facility readiness and stock trading

• Being deployed and tested in Indonesia with 200 healthcare workers for COVID-19

• Meant for healthcare facility and community health settings
RapidPro/TextIt

• Relevant use cases:
  • RapidPro can quickly be built fit-for-purpose and deployed

• No formal documentation of where COVID-19 apps are being deployed
  • Because RapidPro is easy to access, adapt, and deploy without involvement of steward organization

• Meant for remote SMS-based communication with patients setting
RapidPro/TextIt

• TextIt provides instant turn-key hosting of RapidPro

• TextIt runs very latest version of RapidPro
  • Provides hosting and support for hundreds of organizations globally

• Can visually build multi-platform messaging and voice bots to engage globally

• Flow engine allows any user to create engaging SMS and voice application without programming expertise
SORMAS

• Relevant use cases:
  • COVID-19 case management, Contact registration and follow-up, Port of entry screening and follow-up, Lab test tracking, Event-based surveillance system

• Deployed in Nigeria, Germany, Ghana, Fiji, France, and Switzerland

• Meant for healthcare facility setting
Platforms Overview

SORMAS

• Open-source Android and Web app

• Developed for case management, contact tracing, and surveillance
  • Module for management of lab samples and tests

• Includes functionality for contact and event notification, clinical case management, task management, and outbreak detection algorithms
WelTel

• Relevant use cases:
  • COVID-19 case management, Contact registration and follow-up

• Deployed in Rwanda, Uganda, Kenya, Canada, and the U.K.

• Meant for remote communication settings
WelTel

- Integrates virtual care and patient engagement
  - Connects remote outpatients with healthcare system via their mobile phones

- Public health agencies use it to monitor and support COVID-19 cases/contacts in home quarantine

- Browser-based interface can work on desktop or smartphone
  - Basic phones can also be used to connect with patients via SMS

- Supports appointment scheduling and reminders

- Broadcasts video of public health info in secure patient portal
COVID-19 Use Case: Workflow for Patient Triage, Referral for Testing, Contact Listing and Notification, and Follow-Up

1 Process will vary if patient is seen at home.
**Use Case**

Key: 1 = Yes  
0 = No

As a community healthcare worker, I may need to perform the following tasks:

1. Risk assessment for suspecting and existing COVID-19 patients

<table>
<thead>
<tr>
<th>Task</th>
<th>CommCare</th>
<th>CHYx</th>
<th>DHLS2 Tracker</th>
<th>Go.Data</th>
<th>ODKf</th>
<th>OpenSRF</th>
<th>SORMas</th>
<th>RapidPro</th>
<th>Text*</th>
<th>WerTel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Register patients in the system with a unique ID</td>
<td>1</td>
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<tr>
<td>Query patient’s past health from the system</td>
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<tr>
<td>Record patient contact information (e.g. address, phone number, emergency contacts)</td>
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<tr>
<td>Input patient demographics, vital signs, risk factors, and symptoms related to COVID-19*</td>
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<tr>
<td>Provide educational materials for patients through audio, video, and images (regarding preventative measures like quarantine, handwashing, etc.)</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
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<tr>
<td>Schedule a follow-up with patients</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Communicate with patient/contact via phone call</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
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</tr>
<tr>
<td>Communicate with patient via one-way messaging (e.g. SMS, social media, in-app, WhatsApp)</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
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<td>1</td>
</tr>
</tbody>
</table>
Patient Triage, Referral for Testing, Contact Listing and Notification, and Follow-Up

### Use Case

**Key:**
- 1 = Yes
- 0 = No

As a community healthcare worker, I may need to perform the following tasks:

#### 2. Referral for testing

<table>
<thead>
<tr>
<th>Task</th>
<th>CommCare⁺</th>
<th>CHYN</th>
<th>DHIS2 Tracker⁺</th>
<th>GoData⁺</th>
<th>ODk⁺</th>
<th>OpenSAP⁰</th>
<th>SORMAS⁰</th>
<th>Registopod Text¹</th>
<th>WebTier</th>
</tr>
</thead>
<tbody>
<tr>
<td>Order laboratory investigations</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>N/A²</td>
<td>1</td>
</tr>
<tr>
<td>Receive updates when the results are available</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>N/A²</td>
<td>1</td>
</tr>
</tbody>
</table>

#### 3. Contact listing of suspected and existing COVID-19 cases

<table>
<thead>
<tr>
<th>Task</th>
<th>CommCare⁺</th>
<th>CHYN</th>
<th>DHIS2 Tracker⁺</th>
<th>GoData⁺</th>
<th>ODk⁺</th>
<th>OpenSAP⁰</th>
<th>SORMAS⁰</th>
<th>Registopod Text¹</th>
<th>WebTier</th>
</tr>
</thead>
<tbody>
<tr>
<td>Document detailed contact history about the time, place, and person for each close encounter</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>N/A²</td>
<td>1</td>
</tr>
<tr>
<td>Create a listing of close contacts linked to the suspected and existing COVID-19 cases</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>N/A²</td>
<td>1</td>
</tr>
<tr>
<td>Create record to input demographics and risk factors of the close contact</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>N/A²</td>
<td>1</td>
</tr>
<tr>
<td>Select/modify contact record in case of errors*</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>N/A²</td>
<td>1</td>
</tr>
<tr>
<td>Query the record of the close contacts from the system</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>N/A²</td>
<td>1</td>
</tr>
</tbody>
</table>

#### 4. Exposure Notification for ‘close contacts’ of suspecting/existing COVID-19 cases

<table>
<thead>
<tr>
<th>Task</th>
<th>CommCare⁺</th>
<th>CHYN</th>
<th>DHIS2 Tracker⁺</th>
<th>GoData⁺</th>
<th>ODk⁺</th>
<th>OpenSAP⁰</th>
<th>SORMAS⁰</th>
<th>Registopod Text¹</th>
<th>WebTier</th>
</tr>
</thead>
<tbody>
<tr>
<td>Communicate (two-way) via a messaging service with the close contact (SMS, Whatsapp, others)</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>
Requirements: Patient Triage, Referral for Testing, Contact Listing and Notification, and Follow-Up

- CommCare, CHT, DHIS2 Tracker, Go.Data, OpenSRP, SORMAS, and WelTel have the majority of the functions
- ODK is primarily optimized for data collection about cases and contacts
- RapidPro is primarily optimized for remote communication via messages
Selecting an Appropriate Platform based on the Context

• The “quality attributes” of the platforms
• Refers to criteria that can be used to judge the general operation
  • E.g. system architecture, usability, security, and scalability
• Assessed via a maturity scale of 0-2, with ‘0’ indicating that the functionality does not exist, and ‘2’ indicating a well-developed functionality
Non-functional requirements

Usability:
This describes features that make it intuitive for a user to interact with the system.

Documentation, Training, and Support:
The availability of support services and training.

Open Access and Developer Community:
The number of people who can customize the software, and provide training and operational support.

Standards, Interoperability, and Data Accessibility:
Adherence to global norms and standards to facilitate operations with other healthcare systems.

Reliability:
The system’s potential to run consistently without failure.

Scalability:
The application’s ability to maintain performance over time as the number of users increases.

Devices and Operating Systems:
Types of devices and operating systems supported by the system.

Messaging:
Support for messaging services such as SMS, WhatsApp, and Facebook Messenger.

Security:
Ways in which to safeguard the security and privacy of the data.

Analytics:
Capacity of platform to support extensive reporting and analytic capabilities.

Time to Deployment:
Factors that impact the amount of time taken to get the application ready for deployment in a country.

Cost Considerations:
Factors that impact cost such as licensing fees, customization, operational support, and technical support.
### Usability

- Graphical user interface
- Forms available on mobile and computer
- Search interface
- Real-time data validation
- Ease of use
- Notification of changes made
- Font size changes
- Icons and colors
- Dropdown, radio buttons and checkboxes
- Tooltips

**User-interface for DHIS2 Tracker, CommCare, and Go.Data are easily configurable with multitude of options**

Go.Data and SORMAS have language packages, which means easy translation into language of choice
Non-Functional Requirements

Documentation, Training, and Support

• The availability of support services and trainings

• This facilitates the installation and customization of software, as well as training of users.

• All platforms reviewed have standard user and technical documentation available

• Open-source platforms publicly share product roadmaps
Open Access and Developer Community

- The community that can customize the software, and provide training and operational support

- CommCare, CHT, DHIS2 Tracker, ODK, OpenSRP, SORMAS, and RapidPro are open-source. WelTel is proprietary, and Go.Data is free-for-use (but source code not available currently)

- DHIS2 Tracker, ODK, and RapidPro have the most active global implementer communities
  - Local expertise to customize & support, without active involvement of steward organization
Reliability

• The system’s potential to run consistently without failure
• All nine platforms can be deployed on the cloud
• All nine platforms allow data to be stored locally, and uploaded when connection is available

• **Low connectivity environments:**
  • Duplication of IDs
  • Data transfer
Scalability

• The application’s ability to maintain performance over time as the number of users increases

• CHT, DHIS2 Tracker, and ODK have been deployed to thousands of users
  • Largest active ODK instance hosts 80,000 users
  • DHIS2 Tracker hosts 43,000 users
  • CommCare hosts 28,000 users
  • CommCare hosts over 600,000 active mobilization users
Standards, Interoperability, and Data Accessibility

• Adherence to global norms and standards to facilitate operations with other healthcare systems

• CommCare, DHIS2 Tracker, ODK, OpenSRP, SORMAS, and WelTel comply with industry standards for healthcare data exchange

• Most platforms have at least one instance of integrating their systems with DHIS2 (or comparable backend system)
## Non-Functional Requirements

### Devices and Operating Systems

<table>
<thead>
<tr>
<th>Functionality does not exist</th>
<th>Functionality somewhat exists</th>
<th>Functionality is well developed</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0</td>
<td>1</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>CommCare</th>
<th>CHF</th>
<th>DHIS2 Tracker</th>
<th>Go.Data</th>
<th>ODkr</th>
<th>OpenSPR</th>
<th>SORMAS</th>
<th>Ruhago/Text/Video</th>
<th>WinTerm</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Support for Smartphones</strong></td>
<td>2</td>
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<tr>
<td>No, smartphones are not supported.</td>
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<tr>
<td>Yes, smartphones are supported.</td>
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</tbody>
</table>

| **Support for Feature phone** | 2        | 2   | 0              | 0       | 0    | 0        | 0      | 2                  | 2      |
| No, feature phones are not supported. | -        | -   | -              | -       | -    | -        | -      | -                  | -      |
| Yes, feature phones are supported. | -        | -   | -              | -       | -    | -        | -      | -                  | -      |

| **Support for Basic Phones** | 2        | 2   | 0              | 0       | 0    | 0        | 0      | 2                  | 2      |
| No, basic phones are not supported. | -        | -   | -              | -       | -    | -        | -      | -                  | -      |
| Yes, basic phones are supported. | -        | -   | -              | -       | -    | -        | -      | -                  | -      |

| **Support for Android** | 2        | 2   | 2              | 2       | 2    | 2        | 2      | 2                  | 2      |
| No, Android is not supported. | -        | -   | -              | -       | -    | -        | -      | -                  | -      |
| Yes, Android is supported. | -        | -   | -              | -       | -    | -        | -      | -                  | -      |

| **Support for iOS** | 0        | 1°  | 0              | 2       | 2°  | 0        | 0      | 2                  | 2°     |
| No, iOS is not supported. | -        | -   | -              | -       | -    | -        | -      | -                  | -      |
| Yes, iOS is supported. | -        | -   | -              | -       | -    | -        | -      | -                  | -      |
Messaging Capability

• Support for messaging services such as SMS, WhatsApp, and Facebook Messenger

• CHT, CommCare, OpenSRP, RapidPro, and WelTel support two-way SMS messaging, through integration with RapidPro
  • Most platforms that have two-way messaging, use integration with RapidPro

• RapidPro has the most advanced capabilities for SMS-based communication
Security

• Ways in which to safeguard the security and privacy of the data

• All platforms have out-of-the-box authentication, authorization, and data encryption
  • CHT, ODK, OpenSRP, and SORMAS have been audited by external entities

• Most platforms can log info related to logging of access/changes to system at database/application level
Analytics

- Capacity of platform to support extensive reporting and analytic capabilities

- DHIS2 Tracker, ODK, Go.Data, and SORMAs provide R-interface for further statistical analysis

- Go.Data and SORMAS allows for COVID-19 transmission pattern visualizations

- OpenSRP uses Canopy Analytics to provide usage metrics, and can be connected to third party platforms.

- WelTel is working on integrating natural language processing and predictive analytics
Cost Considerations

- All applications, besides WelTel and Go.Data, have free open-source licensing, but they have varying support provisions.
- CommCare, CHT, ODK, Go.Data, OpenSRP, and SORMAS can provide support for a fee.
- RapidPro and DHIS2 Tracker provide advanced troubleshooting support.
- WelTel follows tiered subscription-based pricing model.
- Specific to COVID-19, these services may be available free of cost or at a highly discounted price.
## High-level features

<table>
<thead>
<tr>
<th>Feature</th>
<th>CommCare</th>
<th>CHAT</th>
<th>DHIS2 Tracker</th>
<th>Go Data</th>
<th>ODK</th>
<th>OpenSRP</th>
<th>RapidPro Text</th>
<th>SOMMAS</th>
<th>Werfel</th>
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<tr>
<td>Ease of use</td>
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<td>Active developer community</td>
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<td>Built-in analytics*</td>
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<td>Two-way messaging with patients</td>
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<td>Security</td>
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</tbody>
</table>

## Turn-key ready for COVID-19

<table>
<thead>
<tr>
<th>Feature</th>
<th>CommCare</th>
<th>CHAT</th>
<th>DHIS2 Tracker</th>
<th>Go Data</th>
<th>ODK</th>
<th>OpenSRP</th>
<th>RapidPro Text</th>
<th>SOMMAS</th>
<th>Werfel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Turn-key ready for primary COVID-19 use-case**</td>
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<tr>
<td>Integration for Lab Testing***</td>
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<tr>
<td>Several COVID-19 use cases developed and tested****</td>
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<td>Large number of global deployments (of COVID-19 apps)</td>
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* Platforms may integrate with external analytics software.
** For the use case of COVID-19 patient triage, referral for testing, contact listing and notification, and follow-up.
*** Ability to order laboratory tests, follow progress of patient sample, and receive updates when results are available.
**** Please refer to platform overview pages for list of available use cases.
Conclusion

• For COVID-19 use case (earlier workflow image), two platforms stand out for their maturity, flexibility, and large-scale deployment:
  • DHIS2 Tracker and CommCare

• DHIS2 Tracker and CommCare have turn-key ready COVID-19 applications and history of proven success with large-scale deployments

• If interested in remote communication with healthcare workers/suspected cases, RapidPro is recommended.
Access report:
https://drive.google.com/file/d/1yCP7t1di_ofQ0YhuPAD1Oqcj1aTo74k5/view

Contact:
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The resulting data workflow is very deliberate about ensuring patient privacy, including full HIPAA compliance. It also outlines clear pathways for data to flow accounting for different user permissions and data needs, following reporting requirements from the Centers for Disease Control.
COVID-19 Use Case Workflow

- User personas (right) to help contextualize the workflow

Facility-Based Provider:

*Thomas* is a 32-year-old doctor who has been working in the primary healthcare facility of Rutego for two years. As a newly trained doctor, Thomas is enthusiastic to learn more, polish his skills, and help his patients. During a routine day at work, he might see upwards of 80 patients, including pregnant women, children presenting with fevers, and older patients with chronic conditions such as diabetes and heart disease. The facility where he works has some basic laboratory services.

The news and varying information on COVID-19 has been difficult to follow and overwhelming. He has been hearing on the news about how doctors are at risk from COVID-19 and is nervous about how it will affect him and his family, including his aged mother who lives with them, and his three-year-old son. He is keen to continue to keep up his knowledge about COVID-19 and help his patients while keeping himself safe.

Clients/Caretaker:

*Grace* lives in the village of Nosaki. She is 29 years old with an elementary-level education, and a mother of four young children under seven years old. Her husband is a truck driver who transports goods between some cities and their town. Sometimes, he might be travelling for up to one week at a time.