CLINTON HEALTH ACCESS INITIATIVE

# Practical Approach to Creating an NTD Data System and Repository

Last updated: January 2025

# Acknowledgements

We extend our sincere appreciation to the **National NTD programs from seven countries (Benin, Burkina Faso, Ethiopia, Kenya, Nigeria, Senegal, and South Sudan)** for their unwavering cooperation, leadership, and commitment to public health.

We also thank our **in-country implementing partners** for their vital collaboration, operational expertise, and dedication to delivering impactful interventions on the ground. This work would simply not be possible without their collective support—each contribution has been essential to driving progress and improving lives across affected communities

We acknowledge the generous support of the **Gates Foundation (GF)** and the **Children's Investment Fund Foundation (CIFF)**, whose funding has been instrumental in advancing our shared mission to combat neglected tropical diseases (NTDs).

Lastly, we also acknowledge the **World Health Organization's ESPEN platform** for hosting these resources and making them accessible to the global health community, further strengthening transparency, coordination, and knowledge-sharing across regions.

# 1 NTD DATA USE RESOURCE HUB

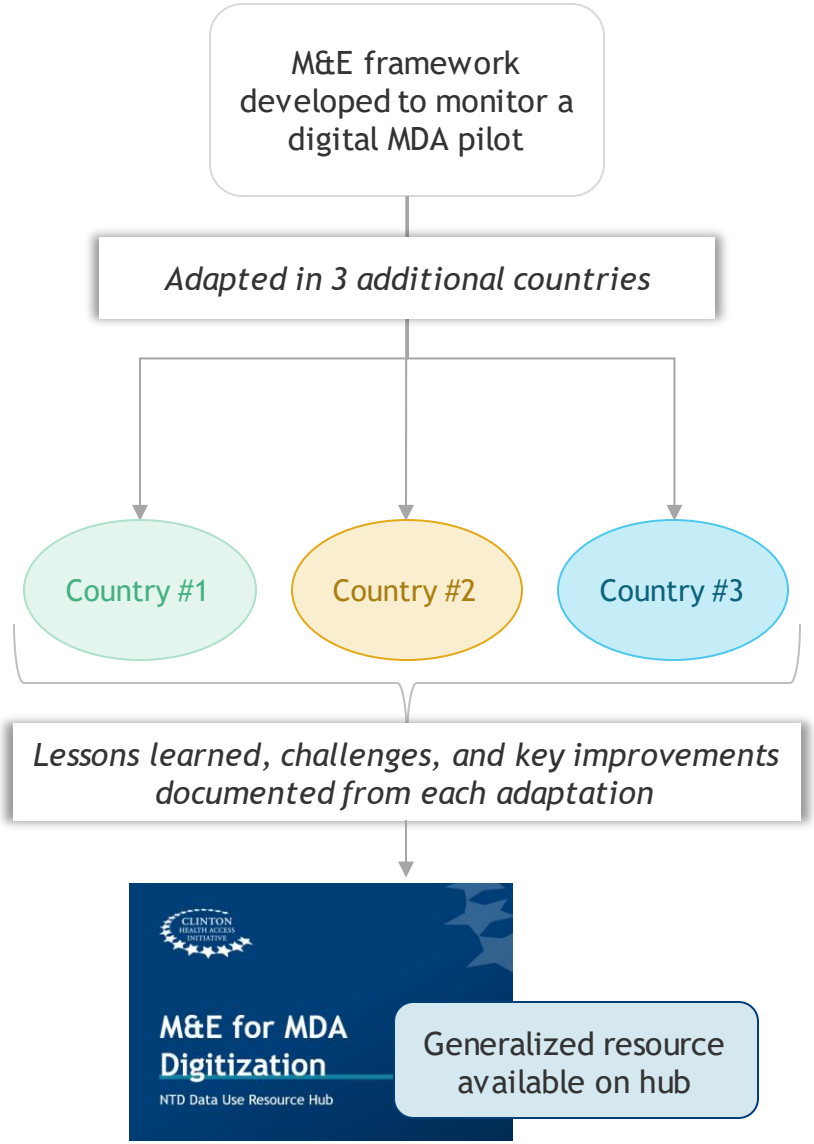
# Background: Data use support provided to 6 NTD programs

- In **2021**, CHAI started providing support to **Kenya**, **Benin** and **Nigeria** (Kano) NTD program (2021-2024) with support from BMGF to accelerate elimination of PC-NTDs by:
  - Improving sustainable **access to timely and high-quality information** across relevant levels of the health system.
  - **Capacitating programs** to **routinely use data and generated analytics** such as modeling, integrating it within existing processes and structures.
- In **2022**, the support was expanded to all ARISE countries including **Burkina Faso**, **Ethiopia, Senegal, and South Sudan*** (2022-2025) with support from CIFF and BMGF.
- CHAI staff conducted in-depth country landscaping in 6 countries to identify the specific NTD program data use gaps that were undermining campaign and intervention effectiveness.
- Based on this work, CHAI staff worked in concert with NTD programs and key implementing partners to develop customized solutions to address these key challenges.

- Direct support to 6 countries
- 15 staff embedded in country
- August 2021 – December 2025


**CHAI has no in-country presence in South Sudan. Support consisted of sharing cross-country lessons and deepening engagement through other in-country partners.*

# The NTD Data Use Resource Hub: Customized solutions → generalized guidance




- While solutions were developed for the specific goals and challenges of individual NTD programs supported through the BMGF/CIFF investment, the work revealed **significant overlaps between countries in impactful solutions**.
- Throughout implementation, **CHAI teams actively shared and adapted guidance, templates, and best practices** – showcasing the transferability of learnings and resources across countries.
- To enable broader uptake beyond grant-supported countries, these resources were **standardized and paired with concise "how-to-use" guides** to facilitate adaptation by other NTD programs.
- The tools are designed to **complement existing resources** from the WHO and key NTD partners, with a focus on bridging the gap between technical tools and day-to-day program operations.
- **Emphasis is placed on practicality and usability**: organizing planning meetings, structuring data review discussions, and improving access to and use of routine data without overburdening NTD program staff.

# Available resources and intended users

- These tools are designed for NTD program teams—**particularly program managers and M&E officers**—who want to strengthen data use to inform decision-making.
- These resources are designed to help programs **address existing challenges in how they organize, review and use data** for planning and decision-making.
- Each resource includes a brief usage guide to support customization and integration into existing workflows accompanied by generalized templates for adaptation.

*Available resources in Hub*

Creating data-driven, integrated work plans

Integrating microplanning ahead of MDA

Developing NTD data systems and repositories

Digitizing MDAs with standard XLS forms

Developing MDA digitization M&E plans

Implementing data quality support tools

Conducting effective data review meetings

Developing M&E frameworks for NTD Master Plans

# The WHO's Roadmap M&E Framework outlines key best practices for managing NTD data. Resources included in the Hub are designed to help programs put those best practices into action.

*Available resources in Hub*

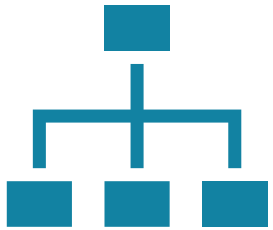
- Creating data-driven, integrated work plans
- Integrating microplanning ahead of MDA
- Developing NTD data systems and repositories
- Digitizing MDAs with standard XLS forms
- Developing MDA digitization M&E plans
- Implementing data quality support tools
- Conducting effective data review meetings
- Developing M&E frameworks for NTD Master Plans

| | |
|---|---|
| Data collection | • Integrated and standardized disease-specific and cross-cutting indicators and data collection tools<br>• Mainstreamed into health management information system/integrated disease surveillance and response<br>• Disaggregated by age, gender and location<br>• Recorded and reviewed on the same day that collected<br>• Reported to the next level in a timely manner<br>• Supervised collection of data<br>• Digital health platform used for collection |
| Data storage and aggregation | • Mainstreamed into health management information system/integrated disease surveillance and response<br>• Secured with defined users and access<br>• Updated at regular intervals |
| Data validation | • Validated at multiple levels with feedback on data quality<br>• Triangulated from various sources<br>• Checked for internal and external consistency<br>• Routine (e.g., during supportive supervision) and period exercises (e.g., coverage evaluation surveys, data quality audits) conducted |
| Data analysis | • Viewed through the lens of person, time, place to answer 4/5 Ws: "what, where, when, why and how?"<br>• Analysed at multiple levels (community, health facility, district, national, regional, global)<br>• Advanced analyses used to fill public health data gaps |
| Monitoring progress towards targets | • Progress measured with attention to geographical areas, population groups and trends over time<br>• Progress analysed as to how and why targets are being achieved or not achieved to inform decisions |

Source: Box 2, Best practices in NTD data process

# 1 OVERVIEW

# Presentation Outline



## Part 1 - Creating the Roadmap

Setting the Context: The Challenge, and the Role of Information Systems, Data Repositories, and Interoperability

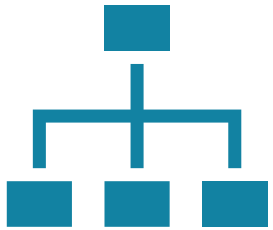
Defining a country-tailored approach and plan

Country Examples

## Part 2 - Implementing the Roadmap

Guidance on navigating the technical design, development, testing and operationalization phases

This guidance deck also includes an accompanying workbook with templates



## Part 1 - Creating the Roadmap

**Setting the Context: The Challenge, and the Role of Information Systems, Data Repositories, and Interoperability**

Defining a country-tailored approach and plan

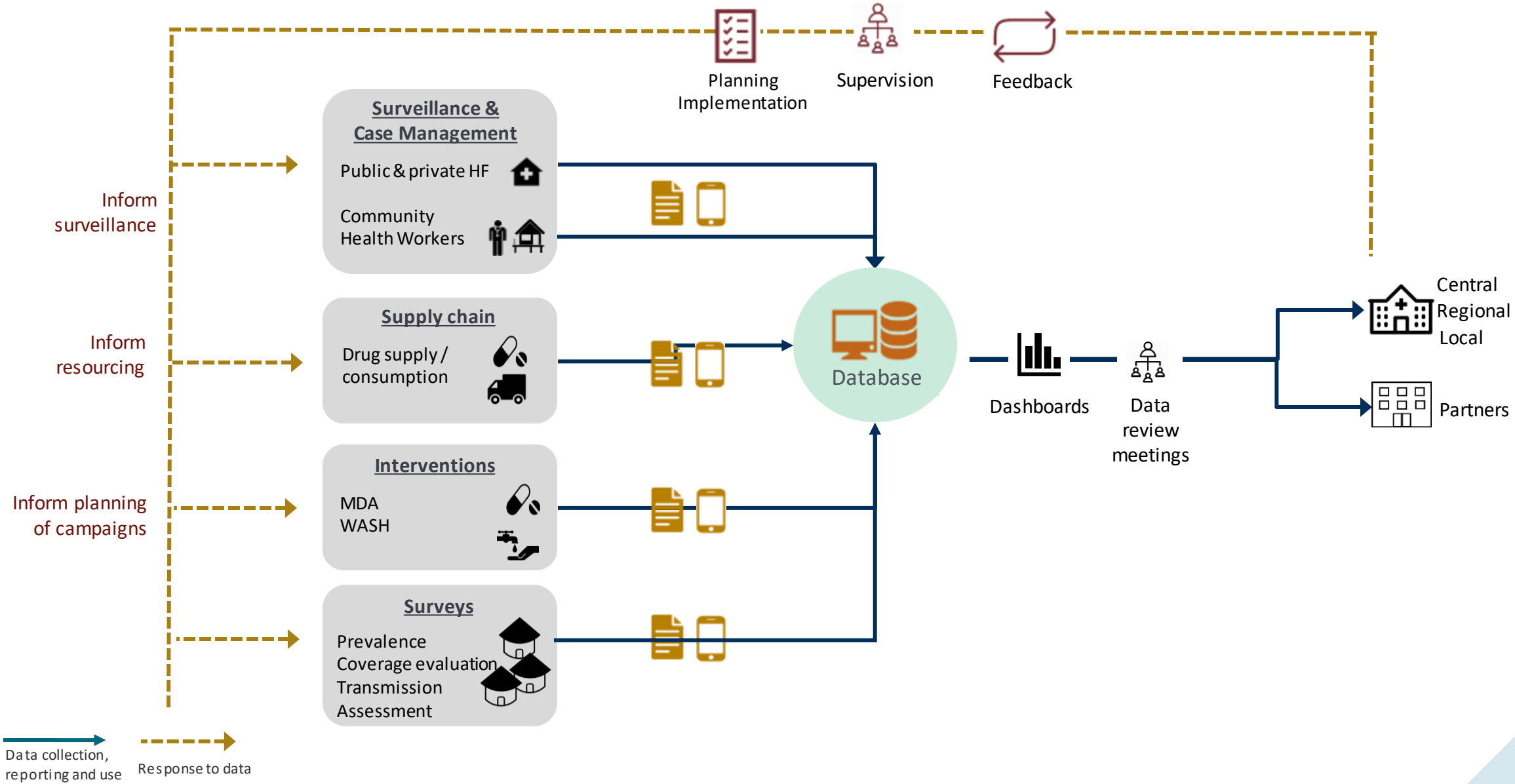
Country Examples

## Part 2 - Implementing the Roadmap

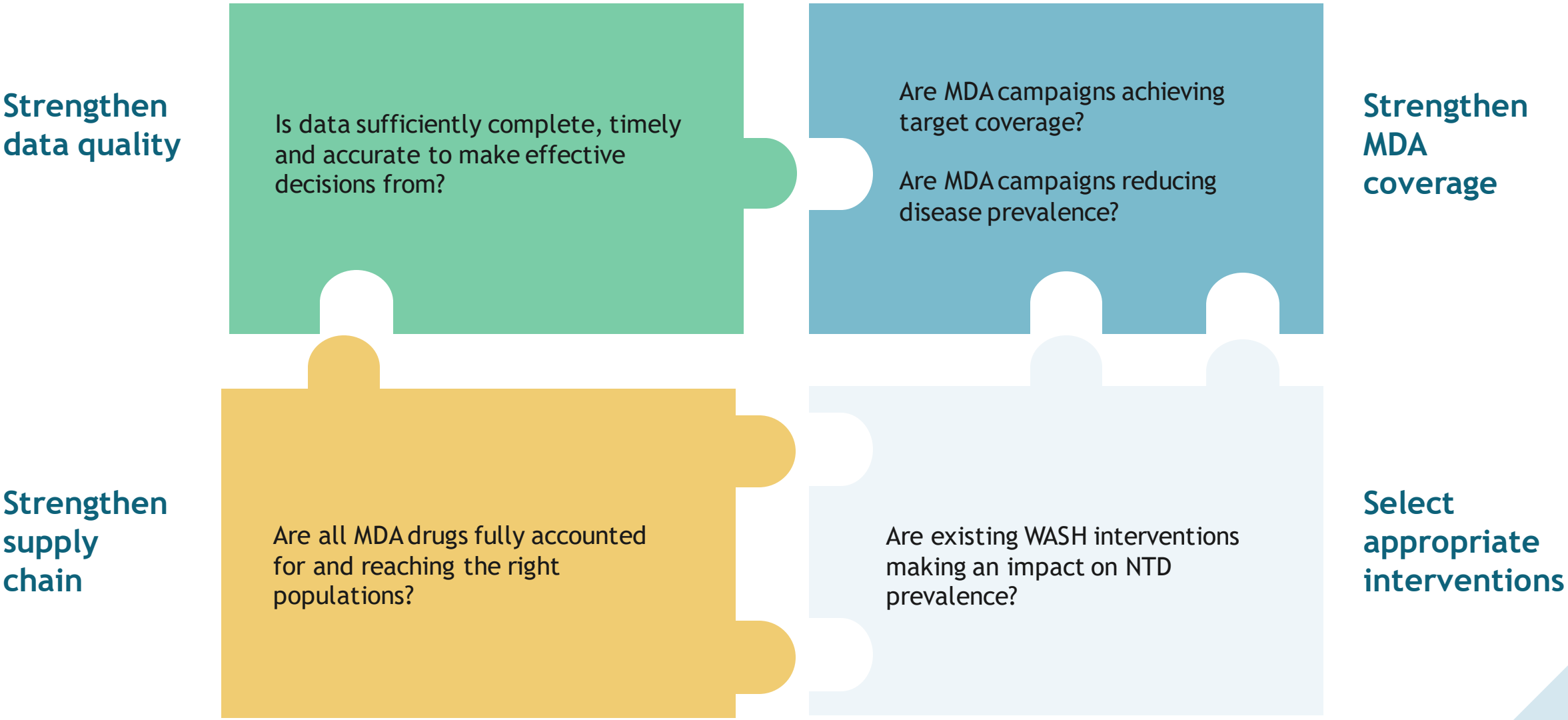
Guidance on navigating the technical design, development, testing and operationalization phases

This guidance deck also includes an accompanying workbook with templates

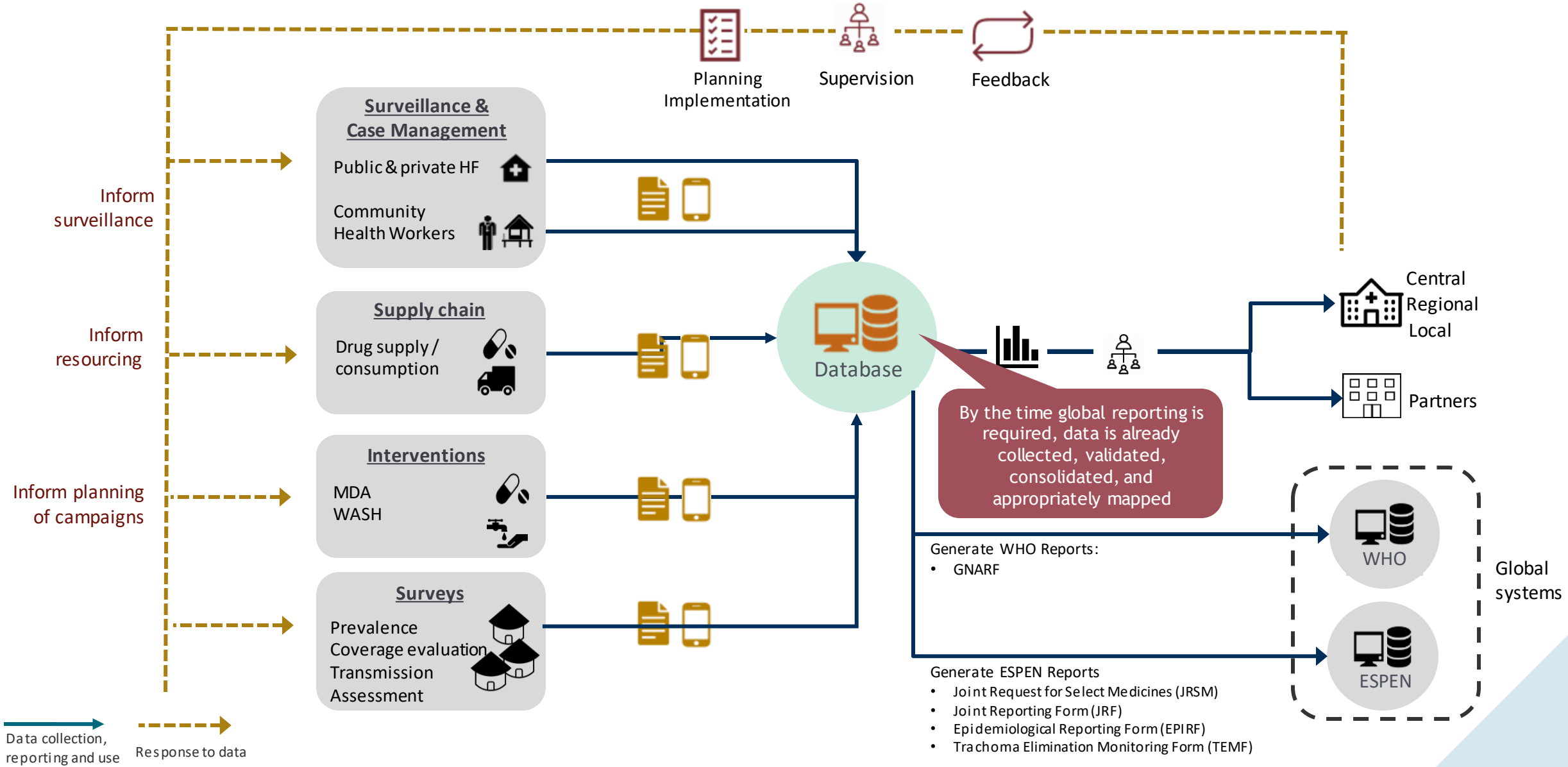
# The ideal NTD surveillance system reflects collection of high-quality data, its integration, and visualization for optimal program planning and implementation



# The integration of this information allows NTD programs to analyze related data together through a dedicated platform and make better decisions



# The ideal NTD surveillance system also improves global reporting efficiencies by automatically generating reports from collected data

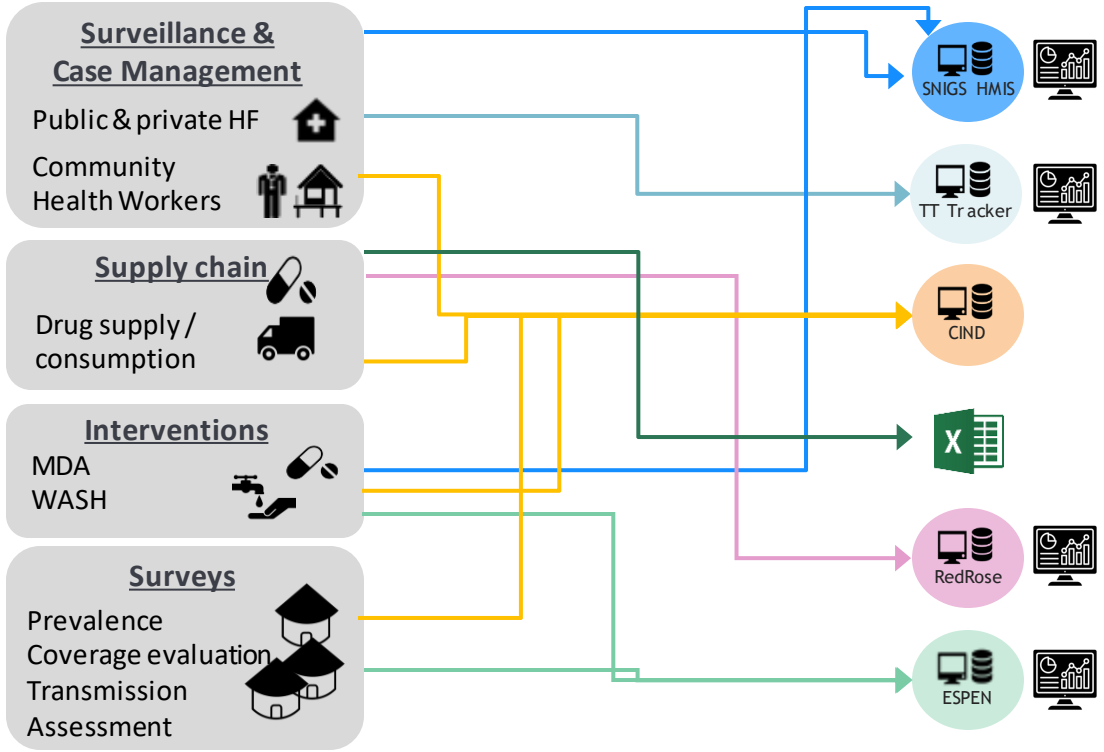


# However, programs that have not deliberately invested in integrated information systems typically see an extreme level of data fragmentation

2022 Kenya example

| Database name | CIND (Access database) | ASCEND | Tropical data | REVEAL | Google sheet | ESPEN portal |
|---|---|---|---|---|---|---|
| Author | WHO | ASCEND | ITI-GET 2020 | AKROS | MOH + partner | ESPEN |
| Platform | | dhis2 | | Reveal | | |
| NTDs covered | PC-NTDs | SCH, Trachoma &LF | Trachoma | SCH (Vihiga county, 2021) | PC-NTDs | PC - NTDs and WASH |
| Data included | Prevalence<br>MDA; Drug supply<br>Morbidity<br>NTD programmatic data | MDA<br>Case Management;<br>Morbidity management and disability prevention | Prevalence | MDA | MDA | Prevalence<br>MDA<br>WASH indicators |

2022 Benin example




## This data fragmentation hinders data use - programs spend more time compiling, cleaning, mapping, and calculating data than they do reviewing and responding to data

- Widespread redundancies in data collection and reporting tools
- NTD programs do not have timely access to data and must solicit it from partners, creating major delays in access
- Data dictionaries vary considerably, making joint analysis and cross-comparison difficult. Using NTD data therefore requires extensive technical capacity due to the messiness and inconsistencies within the varying data sets
- Lack of automated outputs

# Why do we see such severe system fragmentation in the first place?

- No strategic vision or roadmap for digitization/data systems
- Uncoordinated system design and development efforts
- Limited collaboration between MoH programs and digital health/IT units
- Disjointed funding sources
- Ad hoc tool proliferation to fill in the many gaps left behind

We need to invest in *systems*, not just tools

We need systems development to be guided by an *overarching vision*, and not be ad hoc

We need to *co-design* these systems with stakeholders and end users to align with in-country workflows

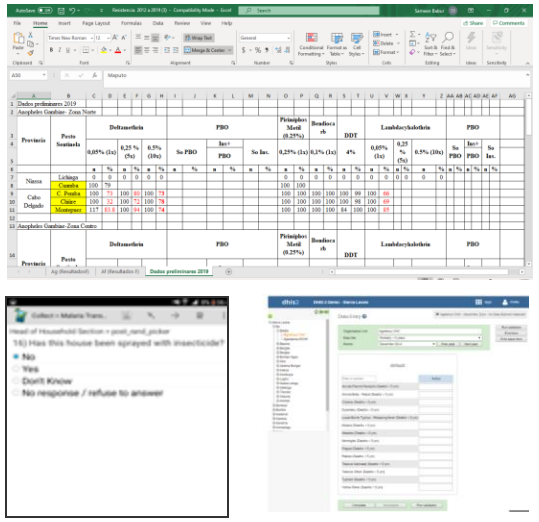
# Achieving an integrated surveillance system and data repository therefore requires solving some of the core underlying data fragmentation problems

## There are two ways you can address data fragmentation

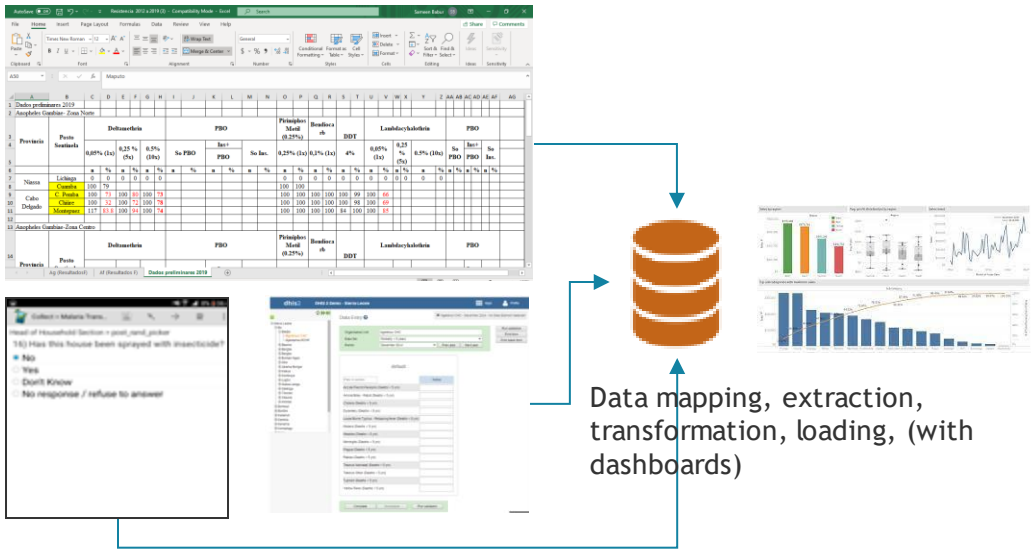
**You merge reporting tools**, so people start reporting data into a select few standardized and official systems

AND

**You integrate the data into a repository**, after applying some data processing efforts



3 fragmented data entry tools replaced with one standardized official tool (with dashboards)



Data mapping, extraction, transformation, loading, (with dashboards)

**The ultimate answer for each country is almost always a combination of both approaches:**

1. You work on improving/streamlining information systems, merging reporting tools in the process
2. You work on repository solutions, given there will always be *some* separation of information systems that serve different purposes and need to be integrated in dashboards and analytics

# Some technical concepts and terms

## INFORMATION SYSTEM (like the Healt… …em (HMIS))

A box where people have assigned responsibilities and processes for putting items into it in an organized way

An information system (IS) is a formal, sociotec… …collect, process, store, and distribute information. From a sociotechnical perspective… …ur components: task, people, structure (or roles), and technology. Information systems can be de… …collection, storage and processing of data

## REPOSITORY:

A repository is "a central place in which an aggregation of data is kept and maintained in an organized way. Both data warehouses and data lakes are considered repositories.

### DATA WAREHOUSE:

A big box that holds other well-organized boxes

- Data generators commit to keeping their boxes organized in a certain way
- Developers commit to receiving, sorting, and sorting the boxes

Central r… …more disparate… …l data in one singl… …al reports for worke…

The data… …the operation… …ng or sales)

The data… …re and may require d… …ensure data quality before it is used in the data warehouse for reporting.

### DATA LAKE:

A big box where you dump items in and worry about sorting later

When you need something from the data, you either have the data science skills to get it yourself, or you work with a developer

A system o… …aw format, us… …sually a single stor… …ystem data, sens… …data used for tasks s… …analytics and machi…

A data lak… …nal databases… …(CSV, logs, XML, … …ents, PDFs) and binary data (images, audio, video).

# NTD programs should first focus on establishing robust *information systems* to manage their routine and semi-routine data

**An Information System is oriented towards data collection, validation, and immediate use/response; It combines the expected and routine processes and functions needed to manage program operations**

## Example: MDA information system

MDA data reported

MDA data on households reached and population covered is recorded on paper in the field, and then reported electronically at the end of each day

This ensures all data adheres to the same dictionary and standards

Incomplete field flagged and corrected

Data validation rules give users feedback on data quality issues to address while entering in data

This ensures basic data quality issues are corrected during the data entry process

Data stored

Reported data securely saved and stored in an online database

This makes data instantly accessible to all users

Supervisor gives immediate feedback: drug dosing seems incorrect

Managers review incoming data, approve incoming data, give feedback to those submitting data

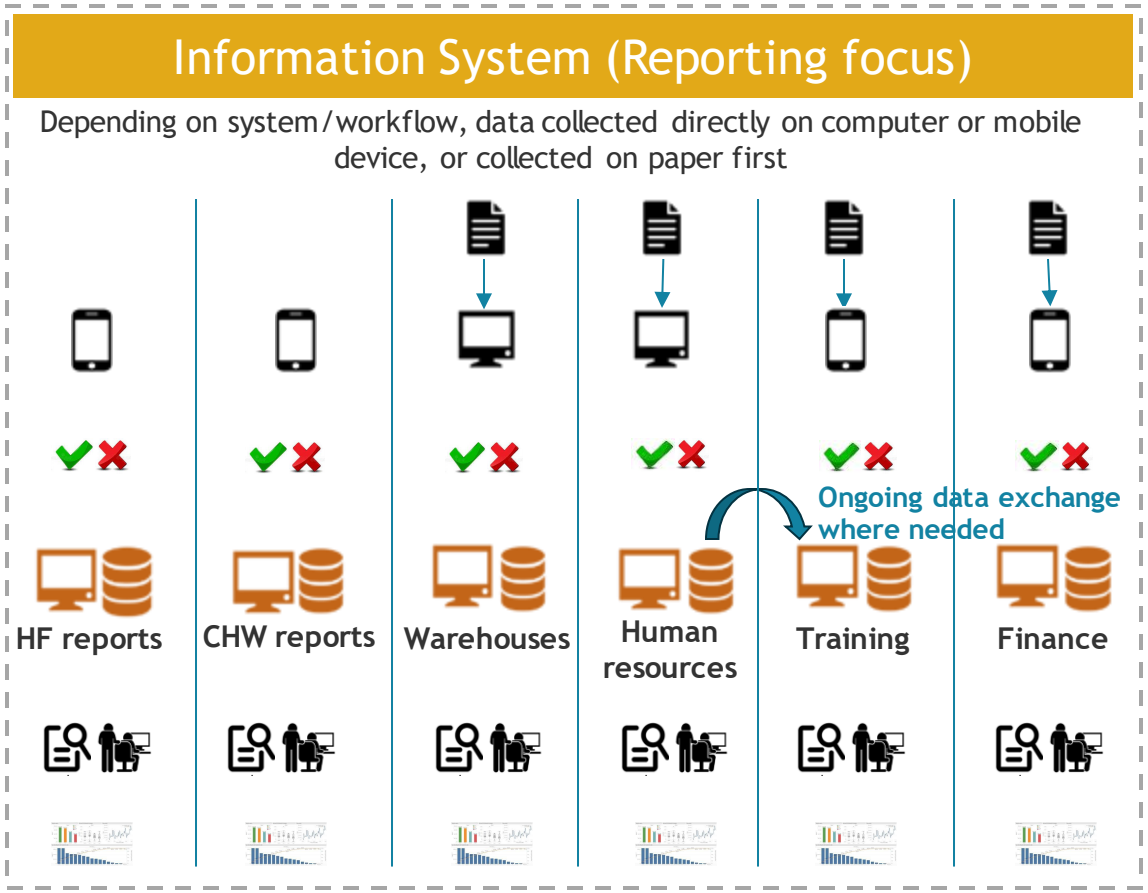
Program operations adjusted and optimized based on incoming data

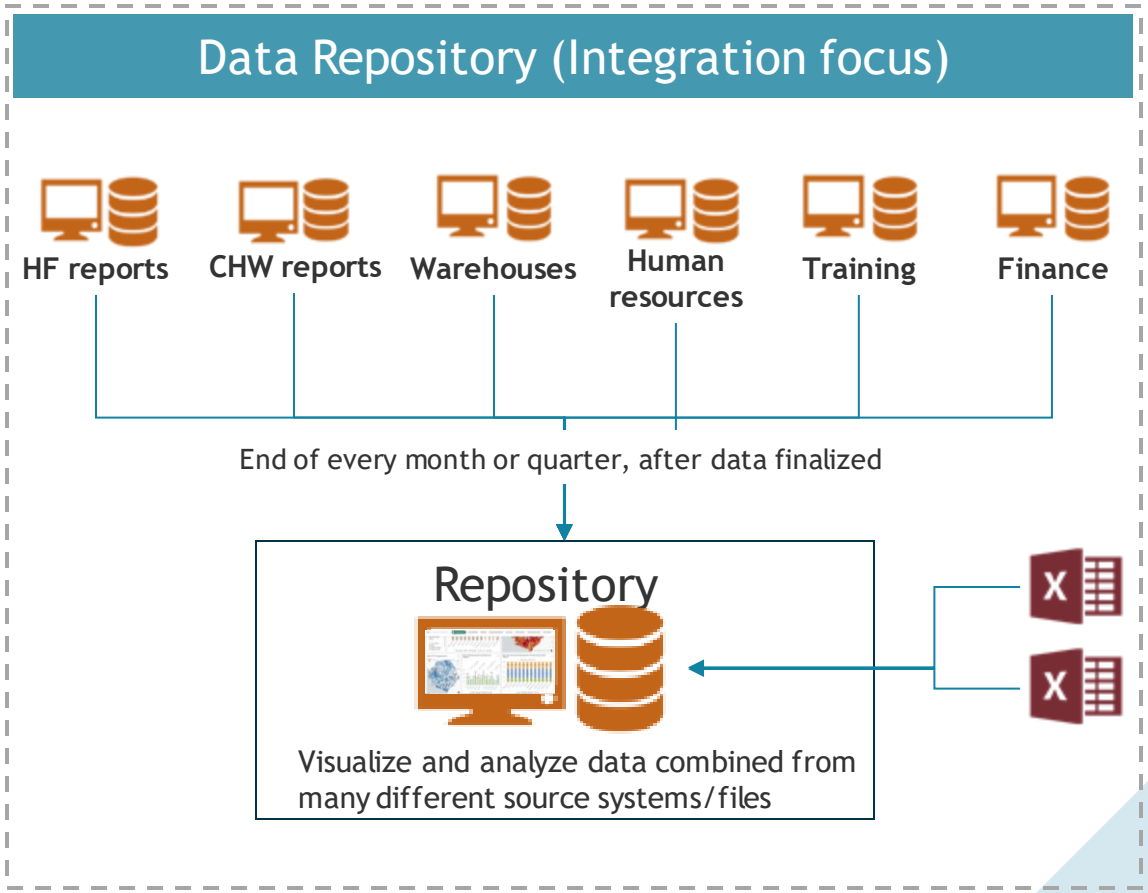
This enables rapid troubleshooting, optimizing MDA campaign operations

Campaign decision-making: Do we need to redirect drug stocks?

# A *data repository* is also be useful, but will only be sustainable if source systems are carefully considered and selected

An integrated information system and a data repository serve **distinct but related purposes** within an organization's IT infrastructure. It is possible, however, for a single platform to serve both purposes.



# Key principles on “achieving interoperability”

## CHALLENGE

In most countries we find many isolated health information systems, with a **recent explosion in uncoordinated growth** over the last decade

While modern information technology has made it less costly to implement digital solutions, this has also led to **many standalone solutions that do not share their data with the national systems and are unscalable beyond a pilot stage**

## MISCONCEPTION

This often leads to the **misconception that all systems should be connected, or that interoperability is an objective in itself**

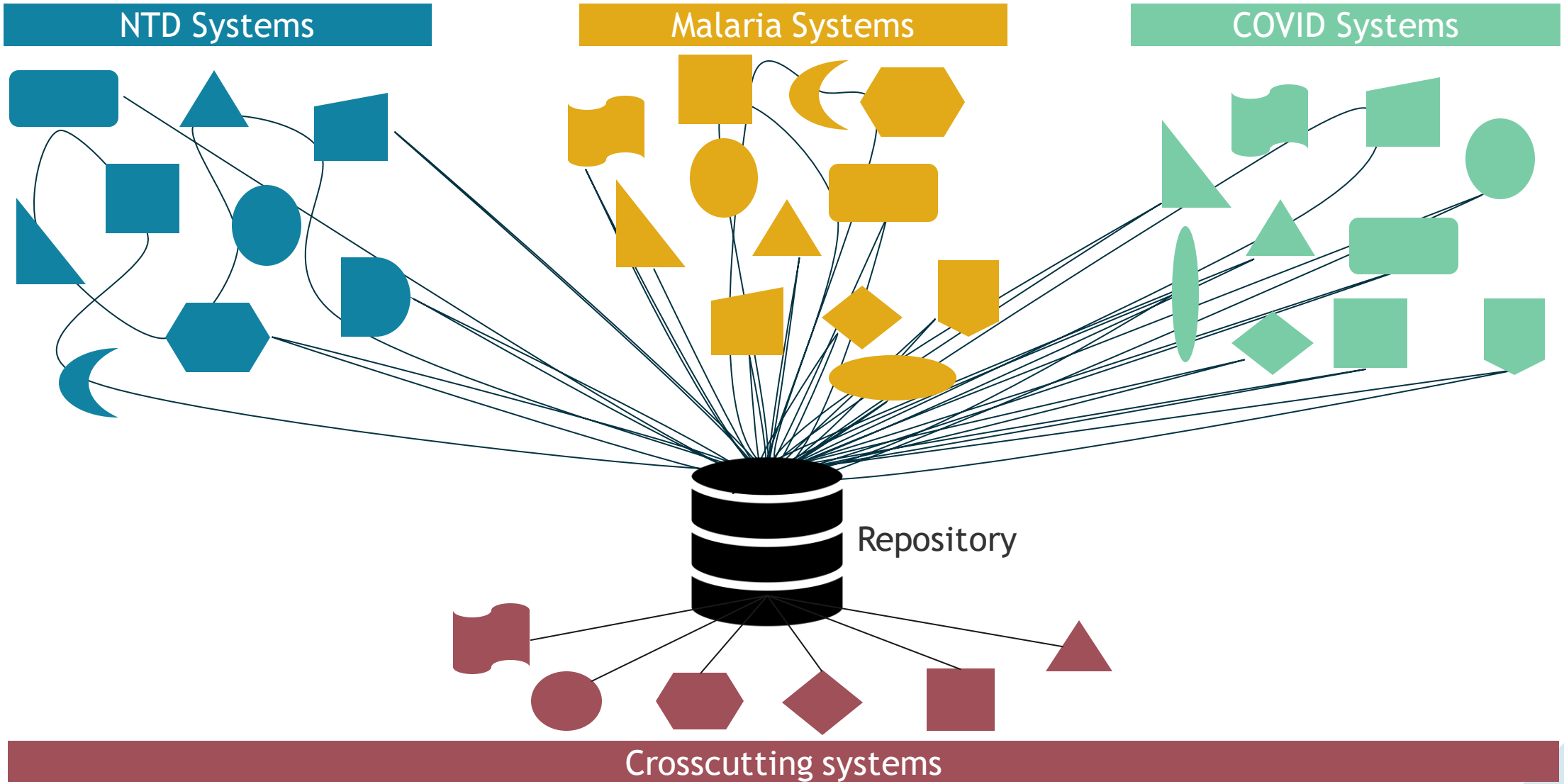
This results in another layer of complexity, however, as managing interoperability requires a lot of effort and ongoing resources to maintain

## WAY FORWARD

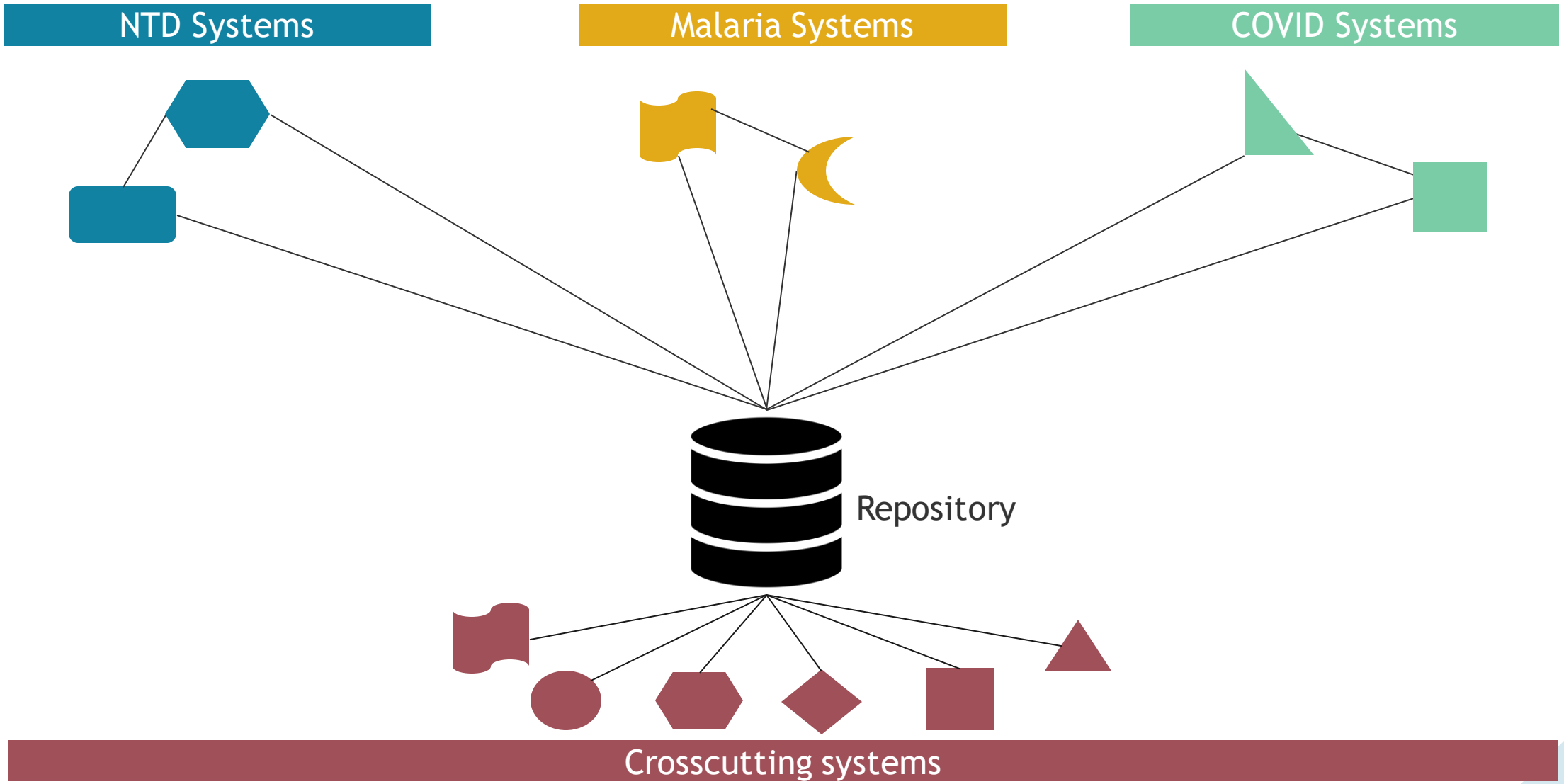
As the first step, **focus should be on reducing the number of parallel systems, through consolidation** of systems or absorption into a new one

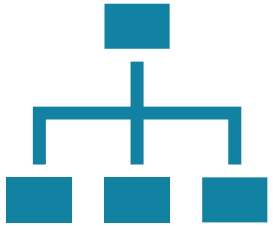
Afterwards, these relevant systems can be integrated

# Interoperability is only realistic for a select set of scalable, institutionalized systems (not every single pilot or siloed partner system)



# Interoperability is only realistic for a select set of scalable, institutionalized systems (not each and every pilot or siloed partner system)





## Part 1 - Creating the Roadmap

Setting the Context: The Challenge, and the Role of Information Systems, Data Repositories, and Interoperability

**Defining a country-tailored approach and plan**

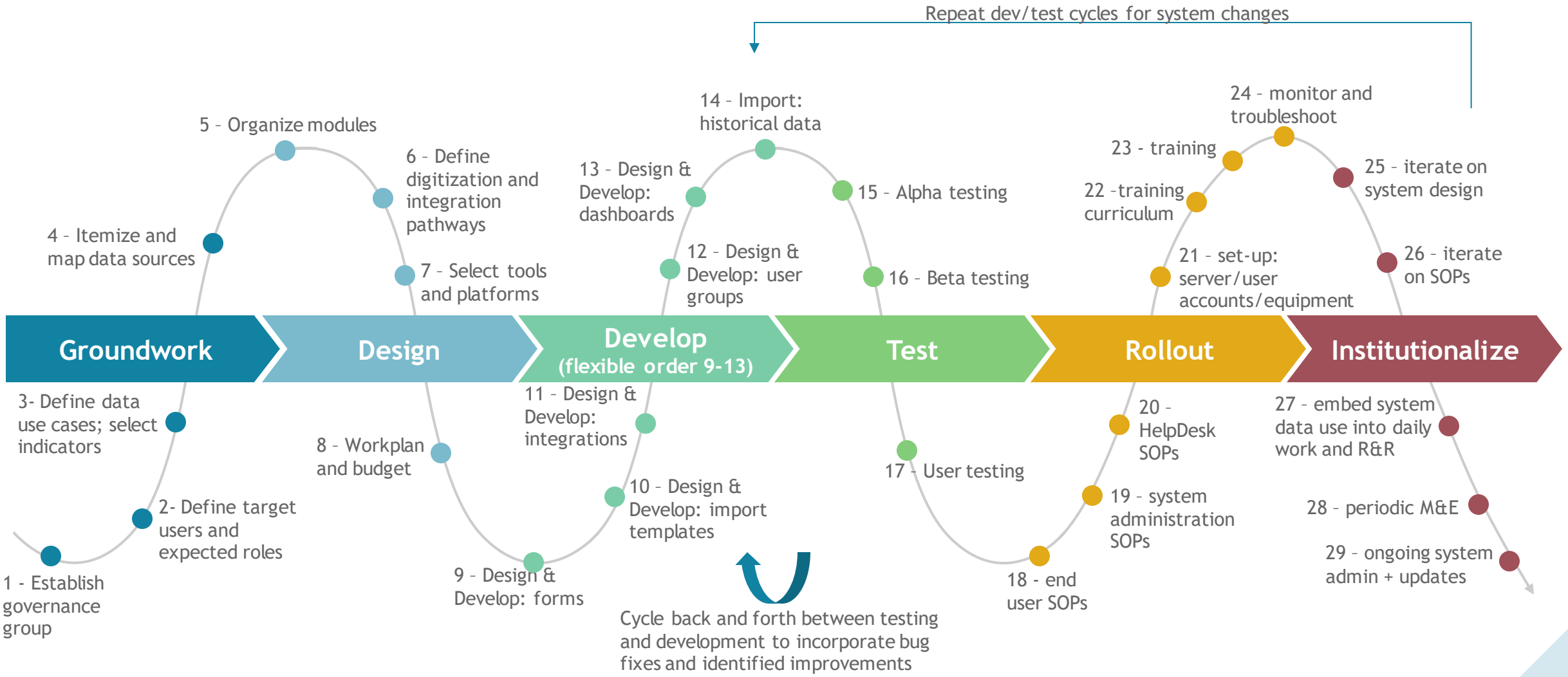
Country Examples

## Part 2 - Implementing the Roadmap

Guidance on navigating the technical design, development, testing and operationalization phases

This guidance deck also includes an accompanying workbook with templates

# Achieving the ideal state for integrated NTD data management in any country should follow the below process




The typical development trajectory takes ~1-2 years for groundwork and development, and ~5 years to reach maturity and institutionalization

# First, an NTD systems governance group should be established, with representation from all data generators and data uses

Groundwork | Design | Develop | Test | Rollout | Institutionalize

Establish governance group > Define target users and expected roles > Define data use cases; select indicators > Itemize and map data sources

- Create a technical working group, spearheaded by a project manager with experience in software project management
- Define roles and responsibilities for all working group members and expectations for participation across entire project lifecycle

## Ministry of Health representation needed

- NTD program champion and digitization project focal point
- NTD program focal points across each disease and thematic area (e.g. MDA, WASH, SCH, LF, Oncho)
- MoH Department of Information Systems
- MoH IT Department

## Partner representation needed

Partners involved in data generation or data analysis efforts.

Why?

- Partners collect a lot of data in-country – partner data will not fit into the system unless they are aligned on common data dictionaries and indicator definitions
- Involving partners will help secure their buy-in to report/push data into the appropriate systems
- A strong government-driven coordinating body will also help ensure partners are not developing and implementing parallel tools

# First, an NTD systems governance group should be established, with representation from all data generators and data uses

Groundwork | Design | Develop | Test | Rollout | Institutionalize

Establish governance group > Define target users and expected roles > Define data use cases; select indicators > Itemize and map data sources

- Create a technical working group, spearheaded by a project manager with experience in software project management
- Ministry of Health representation needed:
  - NTD program champion and digitization project focal point
  - NTD program focal points across each disease and thematic area (e.g. MDA, WASH, SCH, LF, Oncho)
  - MoH Department of Information Systems
  - MoH IT Department
- Partner representation needed
  - Partners involved in data generation or data analysis efforts
  - Why?
    - Partners collect a lot of data in-country – **partner data will not fit into the system unless they are aligned** on common data dictionaries and indicator definitions
    - Involving partners will help **secure their buy-in to report/push data** into the appropriate systems
    - A strong government-driven coordinating body will also help **ensure partners are not developing and implementing parallel tools**
- Define roles and responsibilities for all working group members and expectations for participation across entire project lifecycle

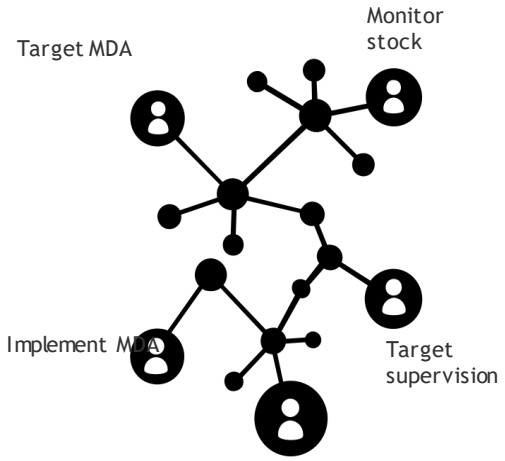
# With the stakeholder group, map out all the data generators and data users, and what their data use needs are

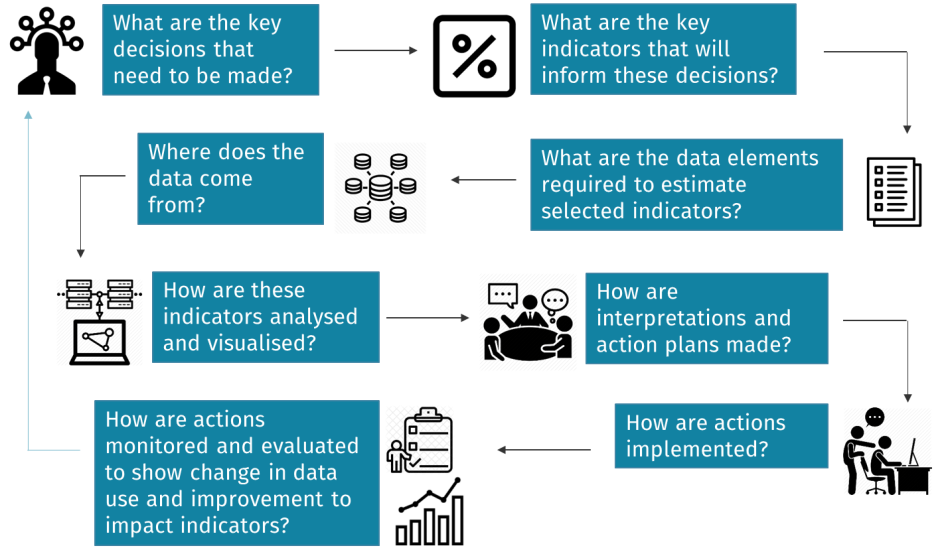
Groundwork | Design | Develop | Test | Rollout | Institutionalize

Establish governance group > Define target users and expected roles > Define data use cases; select indicators > Itemize and map data sources

**Define target end users at all levels of the health system and across all functional areas** (e.g. health facility staff, community drug distributors, logistics managers)

**Define specific data needs of each target user, across all levels of the health system** (including level of analysis needed (e.g. health facility level vs. provincial level), leveraging a data-to-action framework



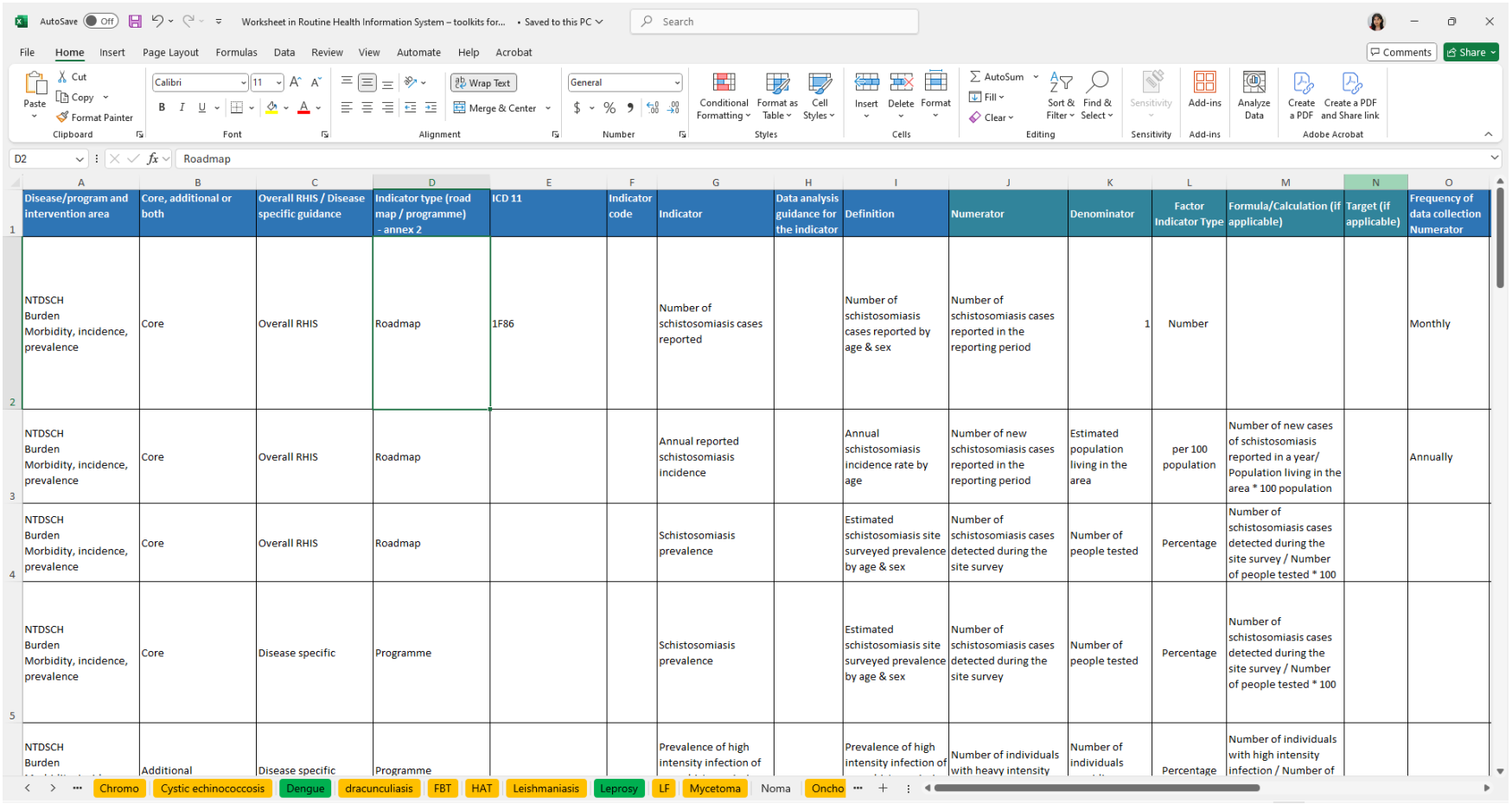




**From these specific data use objectives identified, map the indicators needed and cross-reference with the minimum indicators WHO recommends to ensure you aren't missing anything.** You can use the WHO indicators as a starting point, but usually programs need much more than that for managing program operations.

# The basis of all NTD data systems work should be reporting and M&E needs; select indicators based on these needs, and align them with WHO standards

Groundwork | Design | Develop | Test | Rollout | Institutionalize

Establish governance group > Define target users and expected roles > Define data use cases; select indicators > Itemize and map data sources



| Disease/program and intervention area | Core, additional or both | Overall RHIS / Disease specific guidance | Indicator type (road map / programme) - annex 2 | ICD 11 | Indicator code | Indicator | Data analysis guidance for the indicator | Definition | Numerator | Denominator | Factor Indicator Type | Formula/Calculation (if applicable) | Target (if applicable) | Frequency of data collection Numerator |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NTDSCH Burden Morbidity, incidence, prevalence | Core | Overall RHIS | Roadmap | 1F86 | | Number of schistosomiasis cases reported | | Number of schistosomiasis cases reported by age & sex | Number of schistosomiasis cases reported in the reporting period | 1 | Number | | | Monthly |
| NTDSCH Burden Morbidity, incidence, prevalence | Core | Overall RHIS | Roadmap | | | Annual reported schistosomiasis incidence | | Annual schistosomiasis incidence rate by age | Number of new schistosomiasis cases reported in the reporting period | Estimated population living in the area | per 100 population | Number of new cases of schistosomiasis reported in a year/ Population living in the area * 100 population | | Annually |
| NTDSCH Burden Morbidity, incidence, prevalence | Core | Overall RHIS | Roadmap | | | Schistosomiasis prevalence | | Estimated schistosomiasis site surveyed prevalence by age & sex | Number of schistosomiasis cases detected during the site survey | Number of people tested | Percentage | Number of schistosomiasis cases detected during the site survey / Number of people tested * 100 | | |
| NTDSCH Burden Morbidity, incidence, prevalence | Core | Disease specific | Programme | | | Schistosomiasis prevalence | | Estimated schistosomiasis site surveyed prevalence by age & sex | Number of schistosomiasis cases detected during the site survey | Number of people tested | Percentage | Number of schistosomiasis cases detected during the site survey / Number of people tested * 100 | | |
| NTDSCH Burden | Additional | Disease specific | Programme | | | Prevalence of high intensity infection of | | Prevalence of high intensity infection of | Number of individuals with heavy intensity | Number of individuals | Percentage | Number of individuals with high intensity infection / Number of | | |

Chromo | Cystic echinococcosis | Dengue | dracunculiasis | FBT | HAT | Leishmaniasis | Leprosy | LF | Mycetoma | Noma | Oncho

Pictured left: Snapshot of recommended indicators from WHO (from the Routine Health Information Systems toolkit)

See Data Repository for NTDs - Planning Workbook for pictured templates

# Data source mapping: from the list of indicators, map out all the distinct electronic systems and databases currently storing these NTD indicators

Groundwork | Design | Develop | Test | Rollout | Institutionalize

Establish governance group > Define target users and expected roles > Define data use cases; select indicators > Itemize and map data sources

- This allows stakeholders to understand WHERE and HOW all the desired data is currently managed
- Refer to **both system's common name and the technology**
  - HMIS DHIS2 vs. vertical NTD MDA DHIS2
  - Country-specific NTD supervision ODK vs. ESPEN Collect ODK
- It is possible multiple systems store similar indicators (e.g. both there may be multiple systems used by the program and partners to STC MDA in different parts of the country.

| Database name | CIND (Access database) | ASCEND | Tropical data | REVEAL | Google sheet | ESPEN portal |
|---|---|---|---|---|---|---|
| Author | WHO | ASCEND | ITI-GET 2020 | AKROS | MOH + partner | ESPEN |
| Platform | | dhis2 | | QReveal | | |
| NTDs covered | PC-NTDs | SCH, Trachoma &LF | Trachoma | SCH (Vihiga county, 2021) | PC-NTDs | PC - NTDs and WASH |
| Data included | Prevalence<br>MDA; Drug supply<br>Morbidity<br>NTD programmatic data | MDA<br>Case Management;<br>Morbidity management | Prevalence | MDA | MDA | Prevalence<br>MDA<br>WASH indicators |

Kenya data source mapping

| Database name | SNIGS | TT Tracker | RedRose | ESPEN | CIND | EXCEL |
|---|---|---|---|---|---|---|
| Author | MOH (NTD Program + DSI) | SightSavers | CRS | WHO | WHO | MOH and Partners |
| Platform | dhis2 | CommCare | RED ROSE | | | |
| NTDs covered | Oncho, SCH, STH, Trachoma, LF, THA | Trachoma | Oncho | Oncho, SCH, STH, Trachoma, LF | Oncho, SCH, STH, Trachoma, LF | Oncho, SCH, STH, Trachoma, LF |
| Summary of Data included | MDA<br>Morbidity<br>NTD programmatic data<br>MMDP | MMDP (Morbidity management and disability prevention) | MDA | Prevalence<br>MDA<br>WASH indicators | Prevalence<br>MDA<br>Drug supply<br>Morbidity<br>NTD programmatic data | |

Benin data source mapping

# The final data mapping and itemization output demonstrates the full breadth of source data to develop a cohesive vision/roadmap for

Groundwork | Design | Develop | Test | Rollout | Institutionalize

Establish governance group > Define target users and expected roles > Define data use cases; select indicators > Itemize and map data sources

| Module | Name of Form, Data Set, or Report | Description | Data Periodicity or Frequency | Historical Data? | Data Geographic Granularity | Current electronic storage method |
|---|---|---|---|---|---|---|
| **Case surveillance** | Monthly lymphatic filariasis (LF) report | Aggregated lymphatic filariasis data from health facility registers | Monthly | Y | Facility | Excel |
| | Monthly leprosy report | Aggregated leprosy case data from health facility registers | Monthly | Y | Facility | Excel |
| | TT Tracker | Trachomatous trichiasis (TT) surgery and patient follow-up | Patient-level | Y | Facility | SightSavers CommCare |
| | LF Hydrocele Tracker | | | Y | Facility | SightSavers CommCare |
| **Stocks and commodities** | Monthly health facility stock requisition report | | | Y | Facility | eLMIS OpenLMIS |
| | MDA Community Drug Distributor (CDD) stock report | | | Y | District | Excel |
| | MDA Reverse Logistics form | | | Y | District | Excel |
| **Population** | Census Data | | | Y | District | HMIS DHIS2 |
| **Mass Drug Administration** | Oncho MDA coverage report | | | Y | Program-led districts | Excel |
| | SCH MDA coverage report | | | Y | Program-led districts | Excel |
| | STH MDA coverage report | | | Y | Program-led districts | Excel |
| | Oncho MDA register | | | Y | Select partner districts | Partner ODK |
| | Combined MDA register | | | Y | Select partner districts | Partner ODK |
| **Entomological Surveillance** | Blackfly surveillance | | | Y | Sentinel site | EspenCollect ODK |
| **Surveys** | LF Transmission Assessment Survey 1 (TAS1) | Disease-specific survey to evaluate MDA targeting | Every ~5 years | Y | Facility | EspenCollect ODK |
| | Oncho Phase (Pre-Stop MDA) Surveillance | Disease-specific survey to evaluate MDA targeting | Every ~5 years | Y | Household clusters | EspenCollect ODK |
| | SCH Impact Assessment | Disease-specific survey to evaluate MDA targeting | Every ~5 years | Y | Facility | EspenCollect ODK |

In a typical country, we observe a mixture of data sources:

1) Ministry of Health Information systems like the DHIS2 HMIS and OpenLMIS eLMIS
2) Ad hoc solutions like Excel files, Microsoft Access, or Google Sheets
3) Global partner-managed systems like ESPEN Collect and TT Tracker
4) Siloed country-level partner systems like ODK, DHIS2, KoboCollect, Reveal, CommCare, etc. platforms used for specific campaigns or diseases

See Data System and Repository for NTDs - Planning Workbook for pictured templates

# We can then organize the work into thematic areas or “modules”

Groundwork | **Design** | Develop | Test | Rollout | Institutionalize

Organize modules > Define digitization and integration pathways > Select tools and platforms > Workplan and budget

Indicators and data sets can then be organized into thematic “modules”

A module is essentially a set of data elements, indicators, reporting forms, dashboards, and end users pertaining to a specific NTD program area

**Organizing the work into modules helps create a structure for specific stakeholders (e.g. SCH vs. WASH vs. MDA) to convene, align, and build consensus on different technical design and operational decisions or actions needed for that thematic area.**

These can be flexibly organized based on what makes more sense in-country (e.g. can do by disease area instead).

| Module | Name of Form, Data Set, or Report | Description | Data Periodicity or Frequency | Historical Data? | Data Geographic Granularity | Current electronic storage method |
|---|---|---|---|---|---|---|
| **Case surveillance** | Monthly lymphatic filariasis (LF) report | Aggregated lymphatic filariasis data from health facility registers | Monthly | Y | Facility | Excel |
| | Monthly leprosy report | Aggregated leprosy case data from health facility registers | Monthly | Y | Facility | Excel |
| | TT Tracker | Trachomatous trichiasis (TT) surgery and patient follow-up | Patient-level | Y | Facility | SightSavers CommCare |
| | LF Hydrocele Tracker | Hydrocele treatment and patient follow-up | Patient-level | Y | Facility | SightSavers CommCare |
| **Stocks and commodities** | Monthly health facility stock requisition report | Monthly stock requisition | Monthly | Y | Facility | eLMIS OpenLMIS |
| | MDA Community Drug Distributor (CDD) stock report | Drug stock received and distributed | Daily, by CDD, during campaigns | Y | District | Excel |
| | MDA Reverse Logistics form | Excess MDA drug supply returned | Per campaign | Y | District | Excel |
| **Population** | Census Data | Population | Annual, for 10 years | Y | District | HMIS DHIS2 |
| **Mass Drug Administration** | Oncho MDA coverage report | Population visited and covered during Oncho MDA campaign (implemented by NTD program) | Specific campaign period | Y | Program-led districts | Excel |
| | SCH MDA coverage report | Same as above, for SCH | Specific campaign period | Y | Program-led districts | Excel |
| | STH MDA coverage report | Same as above, for STH | Specific campaign period | Y | Program-led districts | Excel |
| | Oncho MDA register | Population visited and covered during Oncho MDA campaign (implemented by partner in select areas) | Specific campaign period | Y | Select partner districts | Partner ODK |
| | Combined MDA register | Population visited and covered during Oncho, SCH, and/or MDA campaign | Specific campaign period | Y | Select partner districts | Partner ODK |
| **Entomological Surveillance** | Blackfly surveillance | Monthly stock requisition | Per breeding site | Y | Sentinel site | EspenCollect ODK |
| **Surveys** | LF Transmission Assessment Survey 1 (TAS1) | Disease-specific survey to evaluate MDA targeting | Every ~5 years | Y | Facility | EspenCollect ODK |
| | Oncho Phase (Pre-Stop MDA) Surveillance | Disease-specific survey to evaluate MDA targeting | Every ~5 years | Y | Household clusters | EspenCollect ODK |
| | SCH Impact Assessment | Disease-specific survey to evaluate MDA targeting | Every ~5 years | Y | Facility | EspenCollect ODK |

See Data System and Repository for NTDs - Planning Workbook for pictured templates

# From this mapping, we can begin to assess and define different options for digitization and integration pathways

Groundwork | **Design** | Develop | Test | Rollout | Institutionalize

Organize modules > Define digitization and integration pathways > Select tools and platforms > Workplan and budget

| Module | Name of Form, Data Set, or Report | Description | Data Periodicity or Frequency | Historical Data? | Data Geographic Granularity | Current electronic storage method |
|---|---|---|---|---|---|---|
| **Case surveillance** | Monthly lymphatic filariasis (LF) report | Aggregated lymphatic filariasis data from health facility registers | Monthly | Y | Facility | Excel |
| | Monthly leprosy report | Aggregated leprosy case data from health facility registers | Monthly | Y | Facility | Excel |
| | TT Tracker | Trachomatous trichiasis (TT) surgery and patient follow-up | Patient-level | Y | Facility | SightSavers CommCare |
| | LF Hydrocele Tracker | Hydrocele treatment and patient follow-up | Patient-level | Y | Facility | SightSavers CommCare |
| **Stocks and commodities** | Monthly health facility stock requisition report | Monthly stock requisition | Monthly | Y | Facility | eLMIS OpenLMIS |
| | MDA Community Drug Distributor (CDD) stock report | Drug stock received and distributed | Daily, by CDD, during campaigns | Y | District | Excel |
| | MDA Reverse Logistics form | Excess MDA drug supply returned | Per campaign | Y | District | Excel |
| **Population** | Census Data | Population | Annual, for 10 years | Y | District | HMIS DHIS2 |
| **Mass Drug Administration** | Oncho MDA coverage report | Population visited and covered during Oncho MDA campaign (implemented by NTD program) | Specific campaign period | Y | Program-led districts | Excel |
| | SCH MDA coverage report | Same as above, for SCH | Specific campaign period | Y | Program-led districts | Excel |
| | STH MDA coverage report | Same as above, for STH | Specific campaign period | Y | Program-led districts | Excel |
| | Oncho MDA register | Population visited and covered during Oncho MDA campaign (implemented by partner in select areas) | Specific campaign period | Y | Select partner districts | Partner ODK |
| | Combined MDA register | Population visited and covered during Oncho, SCH, and/or MDA campaign | Specific campaign period | Y | Select partner districts | Partner ODK |
| **Entomological Surveillance** | Blackfly surveillance | Monthly stock requisition | Per breeding site | Y | Sentinel site | EspenCollect ODK |
| **Surveys** | LF Transmission Assessment Survey 1 (TAS1) | Disease-specific survey to evaluate MDA targeting | Every ~5 years | Y | Facility | EspenCollect ODK |
| | Oncho Phase (Pre-Stop MDA) Surveillance | Disease-specific survey to evaluate MDA targeting | Every ~5 years | Y | Household clusters | EspenCollect ODK |
| | SCH Impact Assessment | Disease-specific survey to evaluate MDA targeting | Every ~5 years | Y | Facility | EspenCollect ODK |

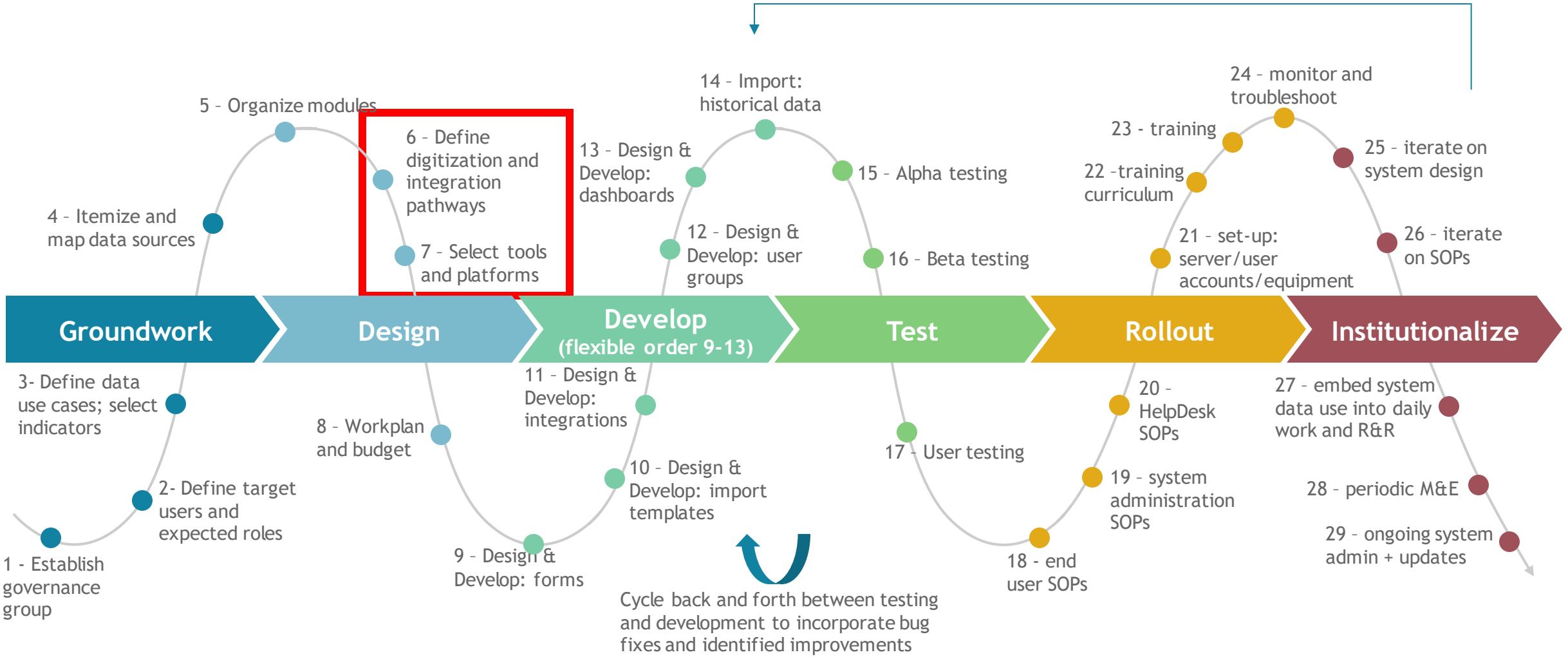
What should we digitize?

What should we harmonize and consolidate?

Where should we target system integrations?

Pay special attention to semi-routine data being managed in Excel, as this points to an *absence* of information systems

See Data System and Repository for NTDs - Planning Workbook for pictured templates




The typical development trajectory takes ~1-2 years for groundwork and development, and ~5 years to reach maturity and institutionalization

# When defining a way forward, NTD programs should first assess how NTDs can be incorporated into the major MoH systems, like the HMIS and LMIS

Groundwork | **Design** | Develop | Test | Rollout | Institutionalize

Organize modules > Define digitization and integration pathways > Select tools and platforms > Workplan and budget

The WHO 2030 roadmap calls for the mainstreaming of NTDs into national systems.

A core pillar of this call is to **intensify cross-cutting approaches**, including:

1. Integrating NTDs **in common delivery platforms** that combine work on several diseases
2. **Mainstreaming within national health systems** to improve the quality of NTD management in the context of universal health coverage

And to **change operating models** and culture to facilitate **country ownership**

To align data systems with this overarching vision, NTD programs should therefore prioritize the following challenges:
1. Core MoH systems like the HMIS and LMIS not including NTDs
2. Partner-driven siloed NTD systems exacerbating fragmentation


Figure credit: WHO

# To start this mainstreaming process, identify which data sources from the mapping exercise would logically fit within routine systems

Groundwork | **Design** | Develop | Test | Rollout | Institutionalize

Organize modules > Define digitization and integration pathways > Select tools and platforms > Workplan and budget

| Module | Name of Form, Data Set, or Report | Description | Current electronic storage method |
|---|---|---|---|
| **Case surveillance** | Monthly lymphatic filariasis (LF) report | Aggregated lymphatic filariasis data from health facility registers | Excel |
| | Monthly leprosy report | Aggregated leprosy case data from health facility registers | Excel |
| | TT Tracker | Trachomatous trichiasis (TT) surgery and patient follow-up | SightSavers CommCare |
| | LF Hydrocele Tracker | Hydrocele treatment and patient follow-up | SightSavers CommCare |
| **Stocks and commodities** | Monthly health facility stock requisition report | Monthly stock requisition | eLMIS OpenLMIS |
| | MDA Community Drug Distributor (CDD) stock report | Drug stock received and distributed | Excel |
| | MDA Reverse Logistics form | Excess MDA drug supply returned | Excel |
| **Population** | Census Data | Population | HMIS DHIS2 |
| **Mass Drug Administration** | Oncho MDA coverage report | Population visited and covered during Oncho MDA campaign (implemented by NTD program) | Excel |
| | SCH MDA coverage report | Same as above, for SCH | Excel |
| | STH MDA coverage report | Same as above, for STH | Excel |
| | Oncho MDA register | Population visited and covered during Oncho MDA campaign (implemented by partner in select areas) | Partner Redrose |
| | Combined MDA register | Population visited and covered during Oncho, SCH, and/or MDA campaign | Partner DHIS2 |
| **Entomological Surveillance** | Blackfly surveillance | Monthly stock requisition | Partner Commcare |
| **Surveys** | Oncho Phase (Pre-Stop MDA) Surveillance | Disease-specific survey to evaluate MDA targeting | EspenCollect ODK |
| | SCH Impact Assessment | Disease-specific survey to evaluate MDA targeting | EspenCollect ODK |

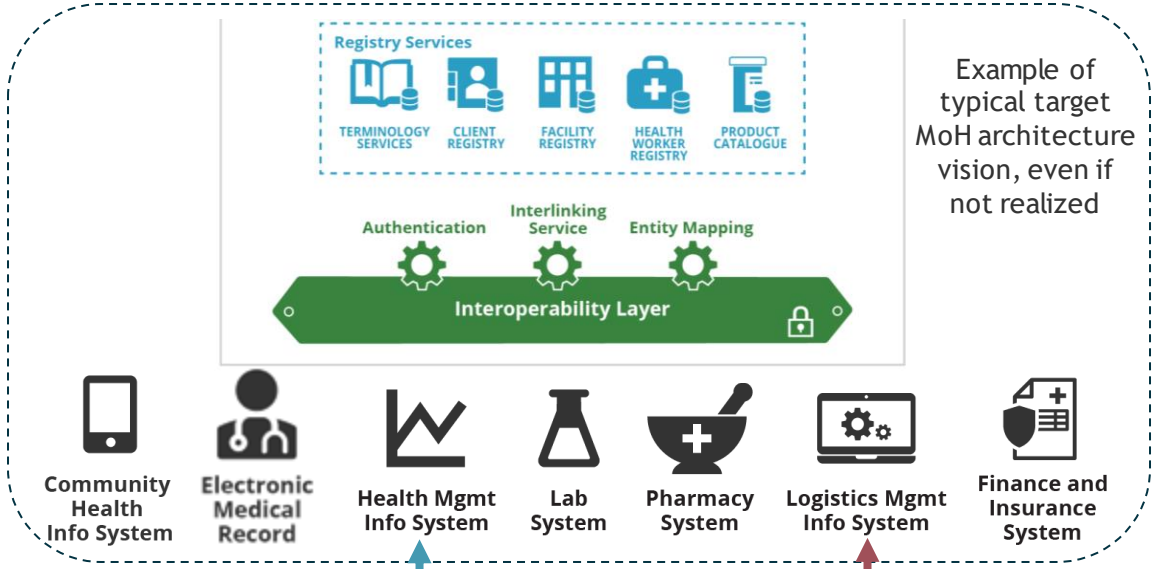


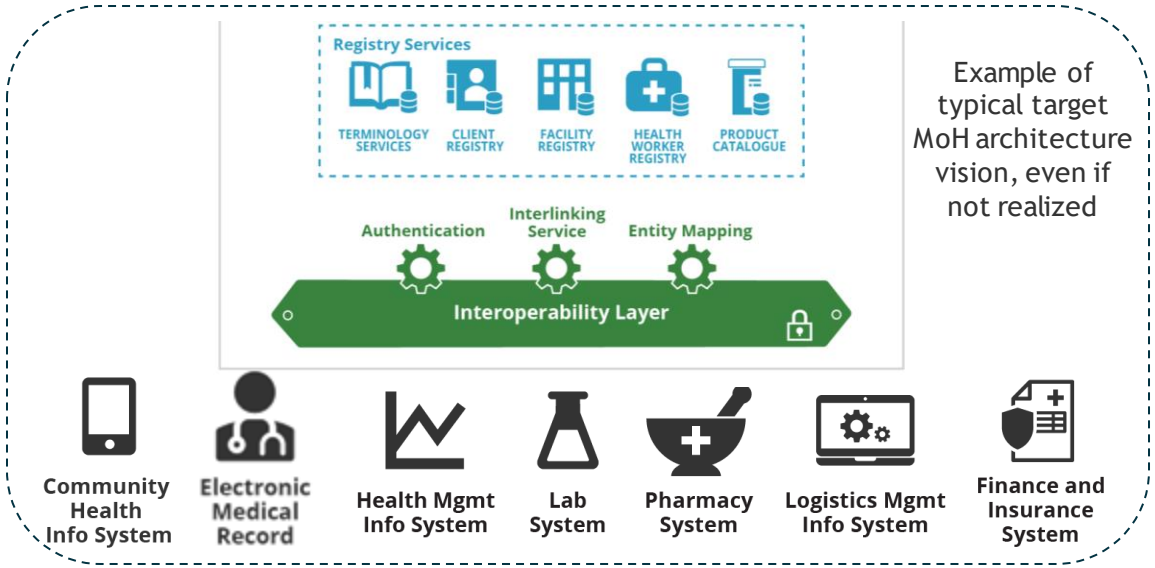



Figure adapted from OpenHIE framework

# This must be a joint effort and dialogue with the MoH Digital Departments that manage these systems

Groundwork | **Design** | Develop | Test | Rollout | Institutionalize

Organize modules > Define digitization and integration pathways > Select tools and platforms > Workplan and budget




Example of typical target MoH architecture vision, even if not realized

They will advise on:

- what data fits within existing systems, (thematically and capacity-wise)
- where alternative or standalone solutions may make sense
- where system integrations/interoperability can play a role.

This is because the MoH Digital Department manage the broader digital ecosystem and the mainstream cross-cutting systems. They also often have the mandate/authority to approve or reject systems.



Figure adapted from OpenHIE framework

36

# To assist with HMIS mainstreaming, WHO has published the first version of HMIS-focused DHIS2 configuration package, as part of the broader RHIS Toolkit

Groundwork | **Design** | Develop | Test | Rollout | Institutionalize

Organize modules > Define digitization and integration pathways > Select tools and platforms > Workplan and budget


The WHO Routine Health Informat
is **a collection of resources** for c
designed to enhance the collectio
utilization of routine facility data.

- **Guidance documents** including general principles, standard, and core indicators for measurement and analysis
- **Software configuration packages for DHIS2**, to help expedite software development for countries who choose to use DHIS2

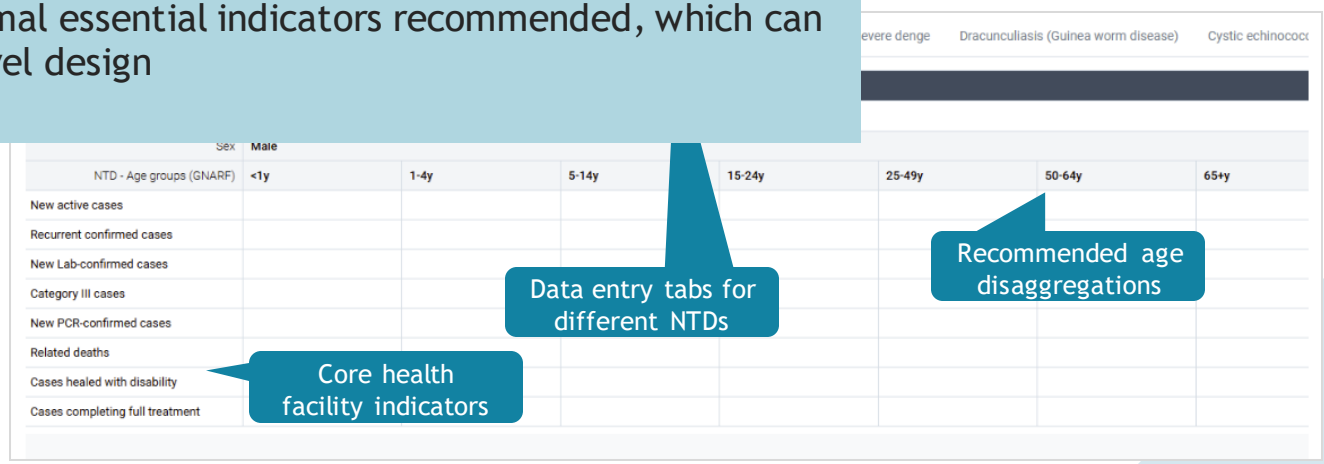
While WHO is still developing broader guidance documents for the NTD data ecosystem as a whole, they have released an HMIS DHIS2-based configuration package to help expedite and standardized **health facility-level reporting and data visualization.**

- Note that the **NTD DHIS2 package only covers health facility-level reporting** and data visualization. For all other data sources, countries need to design forms and dashboards themselves
- When using the NTD DHIS2 package, note that it is **only useful if carefully tailored** according to the country context: consider existing forms, workflows, and processes and do not just implement it as-is.
- WHO does have a list of minimal essential indicators recommended, which can inform a country's ground-level design

or merged with other HMIS
**y Report)** - contains the core
different NTDs - cases
nents
ontains the core data points for
TDs - cases (suspected,

mile health facility-level

o monitor staff and trainings

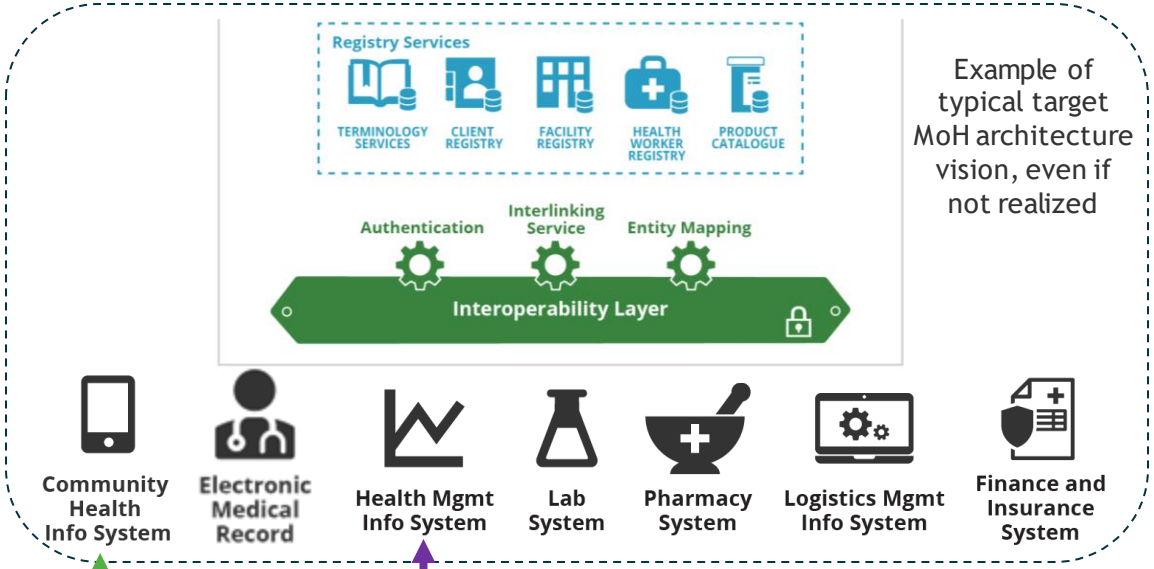


# Returning to the mainstreaming process, continue to identify which data sources from the mapping exercise would logically fit within routine systems

Groundwork | **Design** | Develop | Test | Rollout | Institutionalize

Organize modules > Define digitization and integration pathways > Select tools and platforms > Workplan and budget

| Module | Name of Form, Data Set, or Report | Description | Current electronic storage method |
|---|---|---|---|
| **Case surveillance** | Monthly lymphatic filariasis (LF) report | Aggregated lymphatic filariasis data from health facility registers | Excel |
| | Monthly leprosy report | Aggregated leprosy case data from health facility registers | Excel |
| | TT Tracker | Trachomatous trichiasis (TT) surgery and patient follow-up | SightSavers CommCare |
| | LF Hydrocele Tracker | Hydrocele treatment and patient follow-up | SightSavers CommCare |
| **Stocks and commodities** | Monthly health facility stock requisition report | Monthly stock requisition | eLMIS OpenLMIS |
| | MDA Community Drug Distributor (CDD) stock report | Drug stock received and distributed | Excel |
| | MDA Reverse Logistics form | Excess MDA drug supply returned | Excel |
| **Population** | Census Data | Population | HMIS DHIS2 |
| **Mass Drug Administration** | Oncho MDA coverage report | Population visited and covered during Oncho MDA campaign (implemented by NTD program) | Excel |
| | SCH MDA coverage report | Same as above, for SCH | Excel |
| | STH MDA coverage report | Same as above, for STH | Excel |
| | Oncho MDA register | Population visited and covered during Oncho MDA campaign (implemented by partner in select areas) | Partner Redrose |
| | Combined MDA register | Population visited and covered during Oncho, SCH, and/or MDA campaign | Partner DHIS2 |
| **Entomological Surveillance** | Blackfly surveillance | Monthly stock requisition | Partner Commcare |
| **Surveys** | Oncho Phase (Pre-Stop MDA) Surveillance | Disease-specific survey to evaluate MDA targeting | EspenCollect ODK |
| | SCH Impact Assessment | Disease-specific survey to evaluate MDA targeting | EspenCollect ODK |




Example of typical target MoH architecture vision, even if not realized

Should MDA data be reported into the CHIS if CDDs are also CHWs?

Can district-aggregated MDA data be routinely entered into the HMIS?

Partners could potentially enter data directly into the HMIS during or immediately after the campaign



Figure adapted from OpenHIE framework

# Through this exercise, it is possible MoH stakeholders identify a role for a complementary NTD-specific information system or data repository

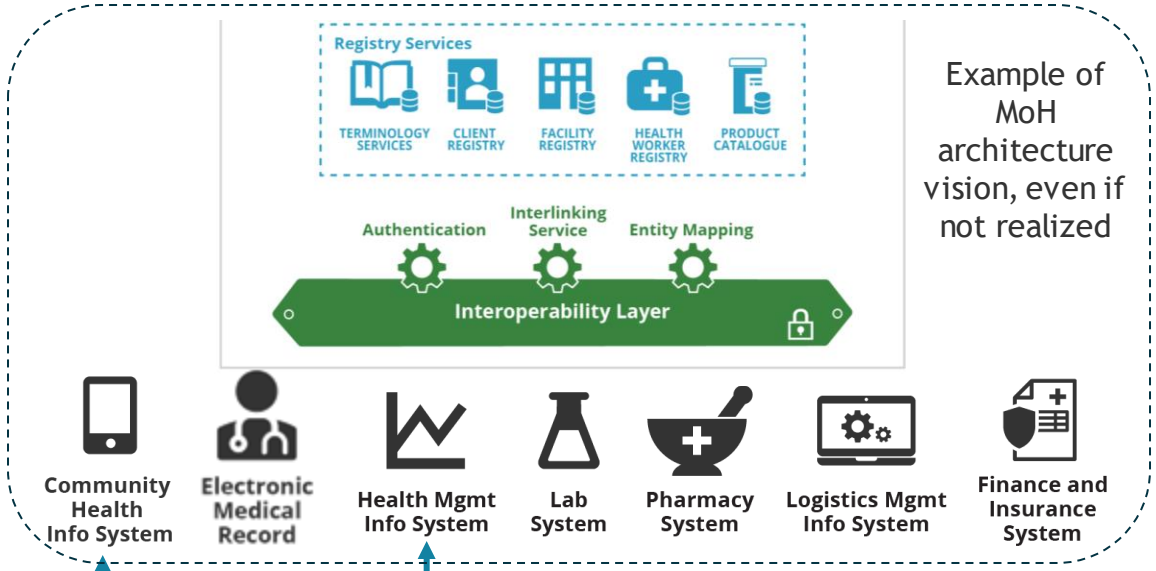
Groundwork | Design | Develop | Test | Rollout | Institutionalize

Organize modules > Define digitization and integration pathways > Select tools and platforms > Workplan and budget

**Key points:**

1. **This must be a dialogue with the MoH Informatics/Digital Health Unit:**
   - **To what extent can and should this data be accommodated by an existing information system?**
   - **To what extent is this data so disease specific a separate "NTD information system" should be considered?**

2. **This discussion is only effective after the data source mapping has been completed**




Example of MoH architecture vision, even if not realized

Does WASH data fit into the CHIS or HMIS?
- Similar end users?
- Cross-cutting data use cases?
- Platform fit for use case?

Separate NTD Information System

Or is it considered too disease-specific?

# Through this exercise, it is possible MoH stakeholders identify a role for a complementary NTD-specific information system or data repository

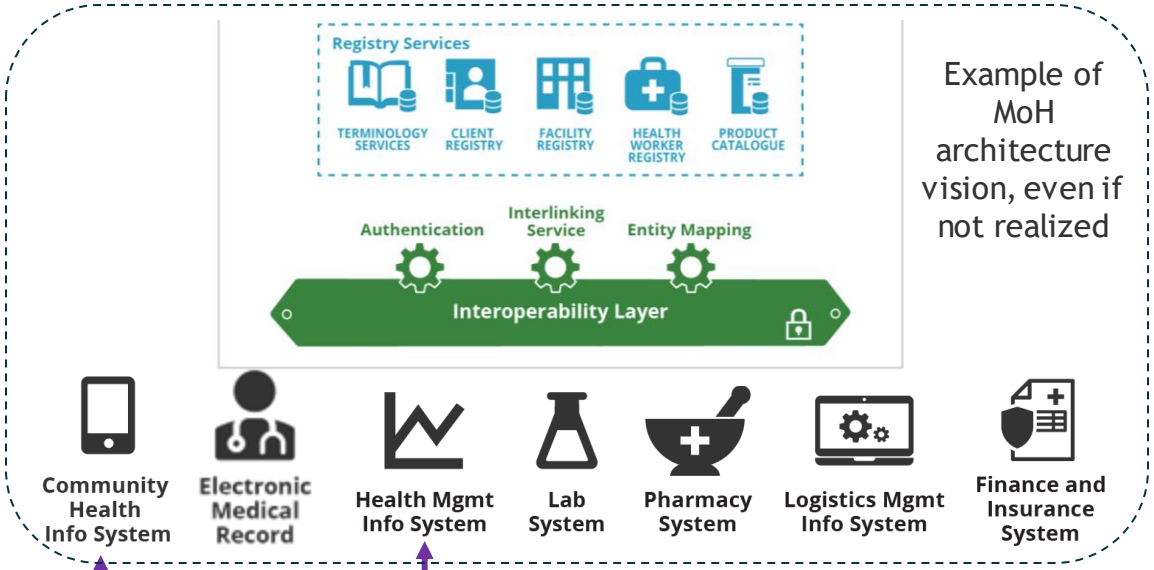
Groundwork | Design | Develop | Test | Rollout | Institutionalize

Organize modules > Define digitization and integration pathways > Select tools and platforms > Workplan and budget

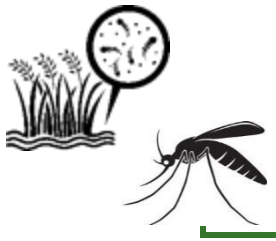
**Key points:**

1. **This must be a dialogue with the MoH Informatics/Digital Health Unit:**
   - **To what extent can and should this data be accommodated by an existing information system?**
   - **To what extent is this data so disease specific a separate "NTD information system" should be considered?**

2. **This discussion is only effective after the data source mapping has been completed**




Example of MoH architecture vision, even if not realized



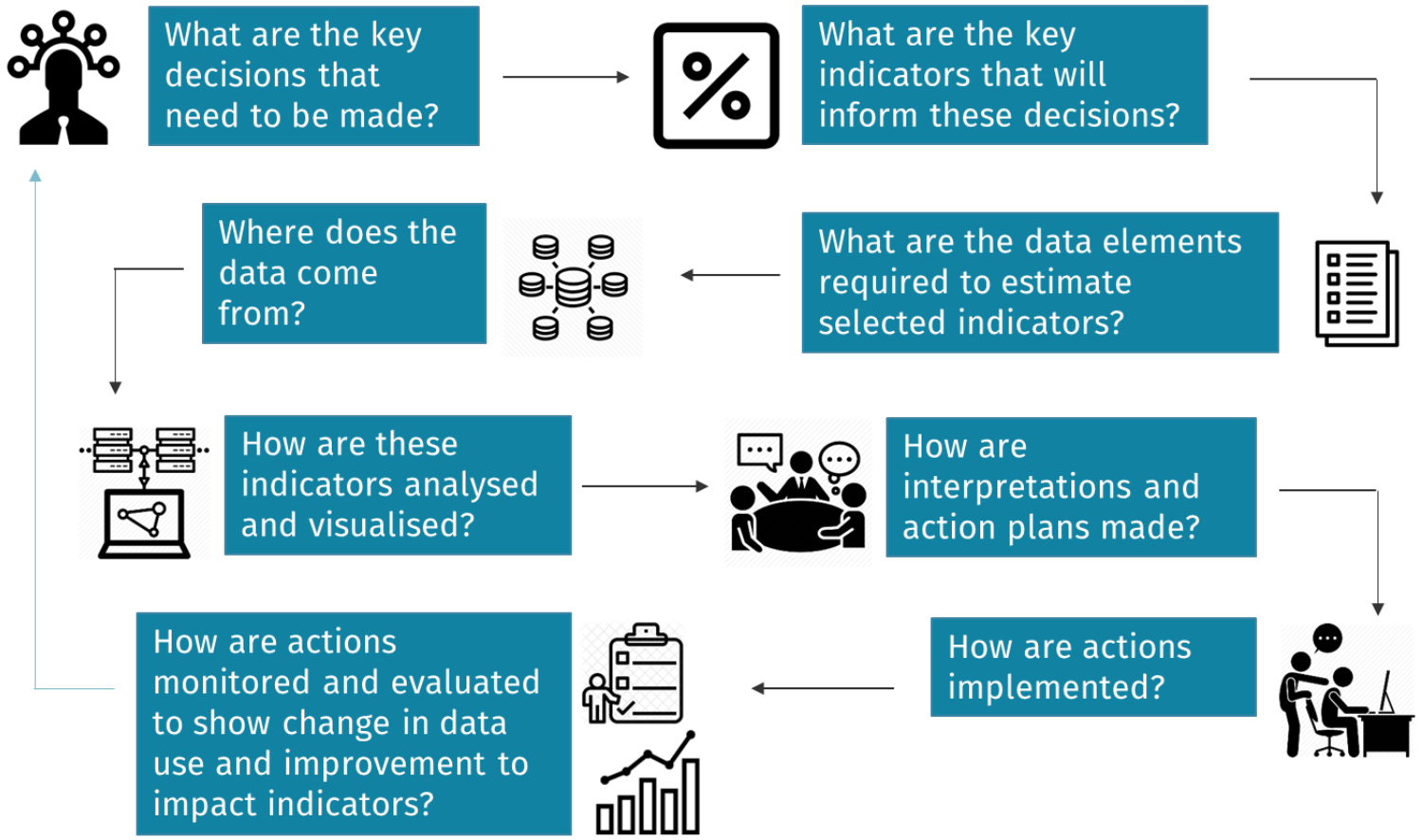
Does ento surveillance data fit into the CHIS or HMIS?
- Similar end users?
- Cross-cutting data use cases?
- Platform fit for use case?

Or is it considered too disease-specific?

Separate NTD Information System

# Reminder 1

## Don’t fall into the trap of trying to integrate all data that exists, simply because its there. Focus on the data that is *truly important* for monitoring, evaluation and decision-making

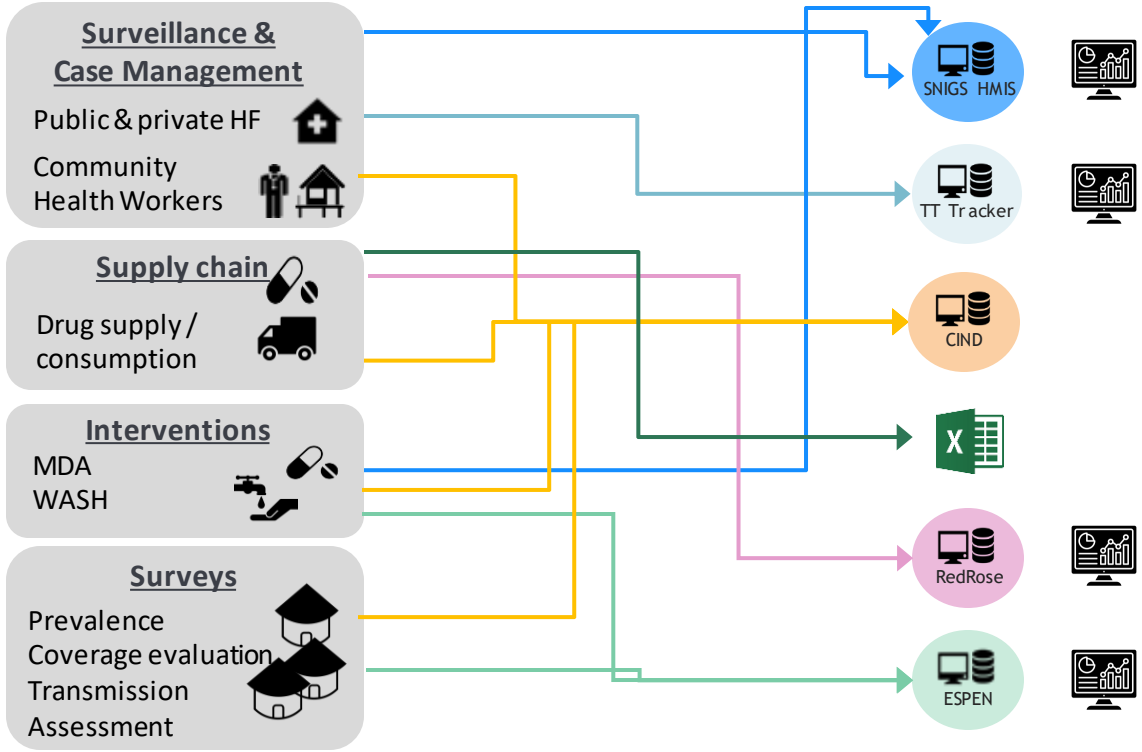


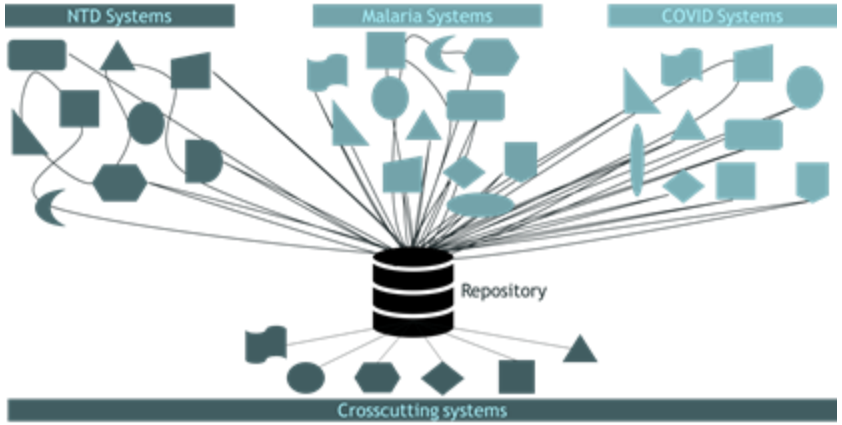
# Reminder 2

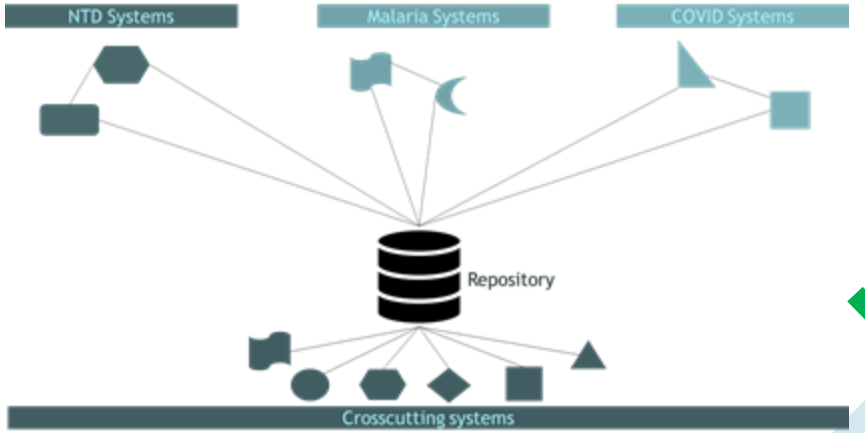
## *Sustainable interoperability* is only realistic for a very small set of mature systems, especially for NTDs with its limited resources

### 2022 Benin example

| Database name | SNIGS | TT Tracker | RedRose | ESPEN | CIND | EXCEL |
|---|---|---|---|---|---|---|
| Author | MOH (NTD Program + DSI) | SightSavers | CRS | WHO | WHO | MOH and Partners |
| Platform | dhis2 | CommCare | RED ROSE | | | |
| NTDs covered | Oncho, SCH, STH, Trachoma, LF, THA | Trachoma | Oncho | Oncho, SCH, STH, Trachoma, LF | Oncho, SCH, STH, Trachoma, LF | Oncho, SCH, STH, Trachoma, LF |
| Summary of Data included | MDA<br>Morbidity<br>NTD programmatic data<br>MMDP | MMDP (Morbidity management and disability prevention) | MDA | Prevalence<br>MDA<br>WASH indicators | Prevalence<br>MDA<br>Drug supply<br>Morbidity<br>NTD programmatic data | |



# Reminder 3

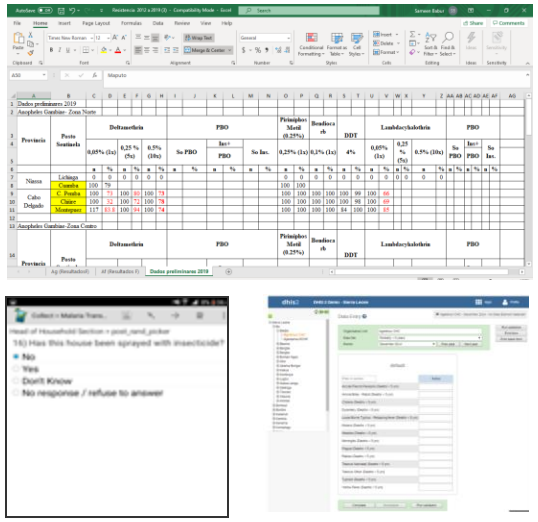
## Achieving an integrated surveillance system and data repository requires solving some of the core underlying data fragmentation problems

### There are two ways you can address data fragmentation

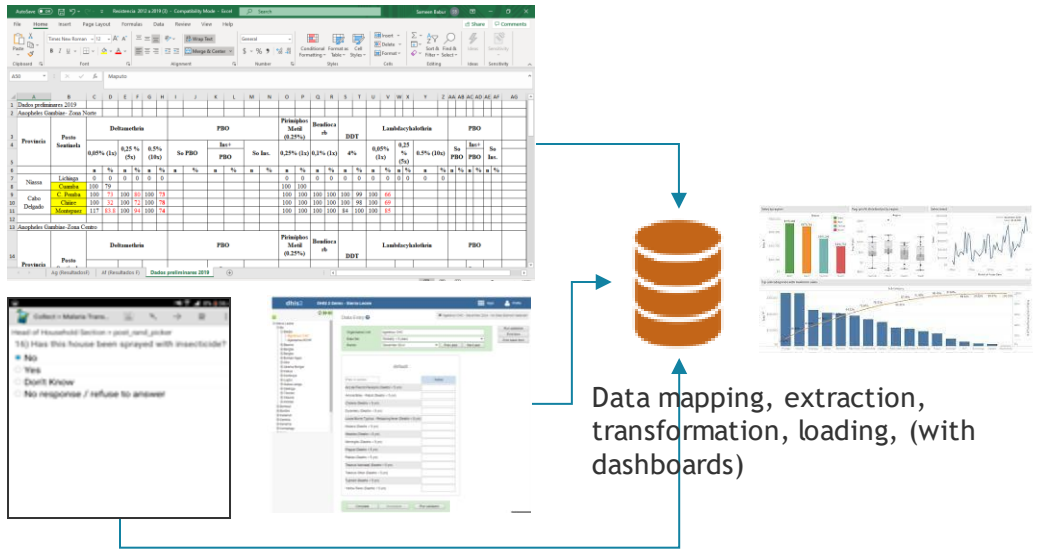
**You merge reporting tools**, so people start reporting data into a select few standardized and official systems

AND

**You integrate the data into a repository**, after applying some data science efforts



3 fragmented data entry tools replaced with one standardized official tool (with dashboards)



Data mapping, extraction, transformation, loading, (with dashboards)

**The ultimate answer for each country is almost always a combination of both approaches:**

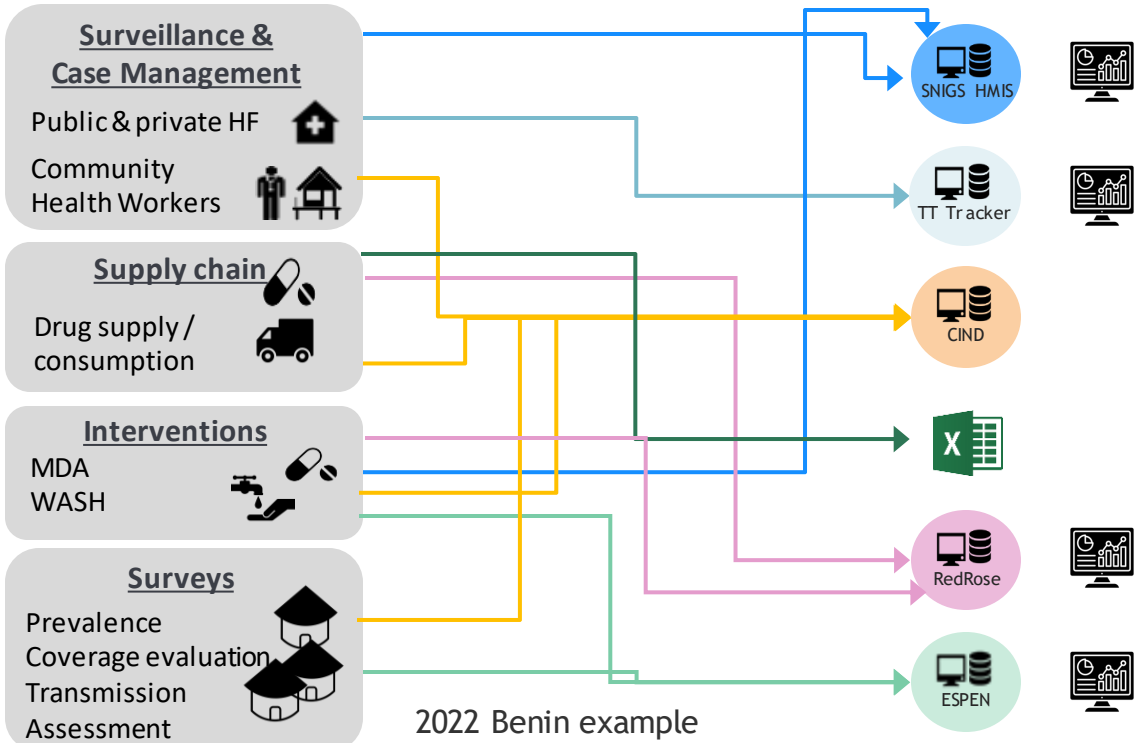
1. You work on improving/streamlining information systems, merging reporting tools in the process
2. You work on repository solutions, given there will always be *some* separation of information systems that serve different purposes and need to be integrated in dashboards and analytics

# How to design a way forward?

Groundwork | **Design** | Develop | Test | Rollout | Institutionalize

Organize modules > Define digitization and integration pathways > Select tools and platforms > Workplan and budget

| Database name | SNIGS | TT Tracker | RedRose | ESPEN | CIND | EXCEL |
|---|---|---|---|---|---|---|
| Author | MOH (NTD Program + DSI) | SightSavers | CRS | WHO | WHO | MOH and Partners |
| Platform | dhis2 | CommCare | RED ROSE | | | |
| NTDs covered | Oncho, SCH, STH, Trachoma, LF, THA | Trachoma | Oncho | Oncho, SCH, STH, Trachoma, LF | Oncho, SCH, STH, Trachoma, LF | Oncho, SCH, STH, Trachoma, LF |
| Summary of Data included | MDA<br>Morbidity<br>NTD programmatic data<br>MMDP | MMDP (Morbidity management and disability prevention) | MDA | Prevalence<br>MDA<br>WASH indicators | Prevalence<br>MDA<br>Drug supply<br>Morbidity<br>NTD programmatic data | |




2022 Benin example

**Consolidate tools and *mainstream NTDs at the same time*: which tools can be replaced with reporting forms hosted in the HMIS or LMIS instead? This includes ad hoc tools like Excel which are often used in the absence of a proper NTD information systems.**

**Consolidate tools: what other tools can be consolidated or replaced, such that some tools are retired in the process?**

**Prioritize integrations: which systems should not be replaced and instead integrated? Can we rely on them to have resources that will maintain the integration?**

- An HMIS <> LMIS integration is more likely to be sustained compared to an NTD-specific KoboCollect <> HMIS

**Use reporting SOPs as a path to integration: is some granular partner data best shared as monthly summaries in a government-owned system**

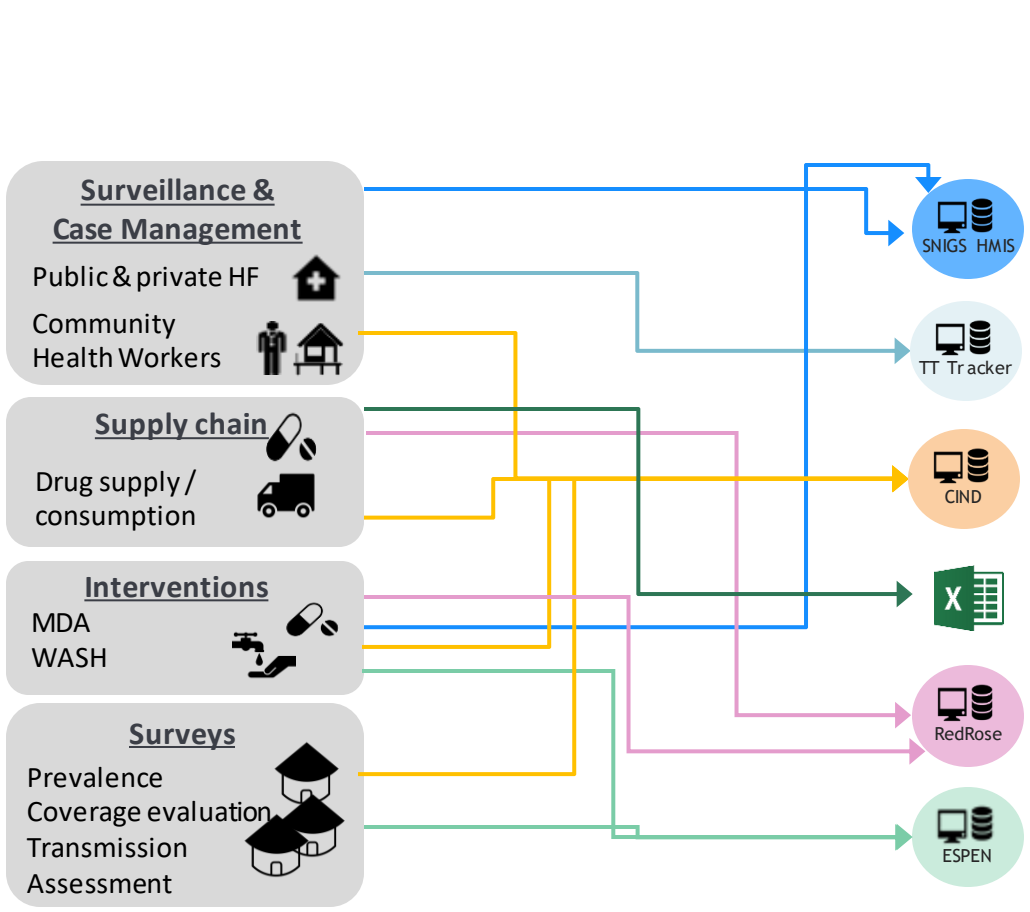
- A partner using a patient-level tracking tool shares or directly enters a monthly summary indicators for the HMIS

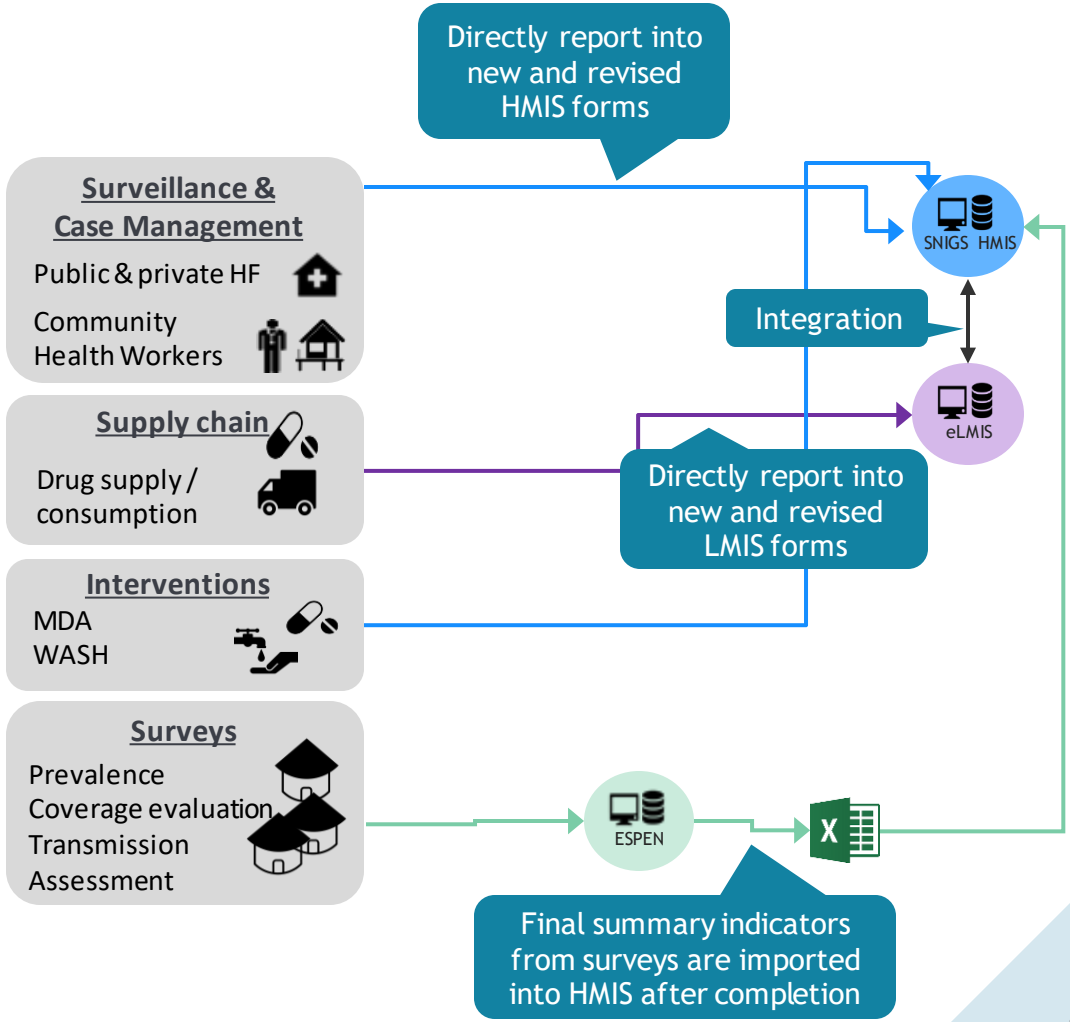
# Integration Approach, example 1:

## HMIS and LMIS expanded to accommodate NTD data

Groundwork | Design | Develop | Test | Rollout | Institutionalize

Organize modules > Define digitization and integration pathways > Select tools and platforms > Workplan and budget



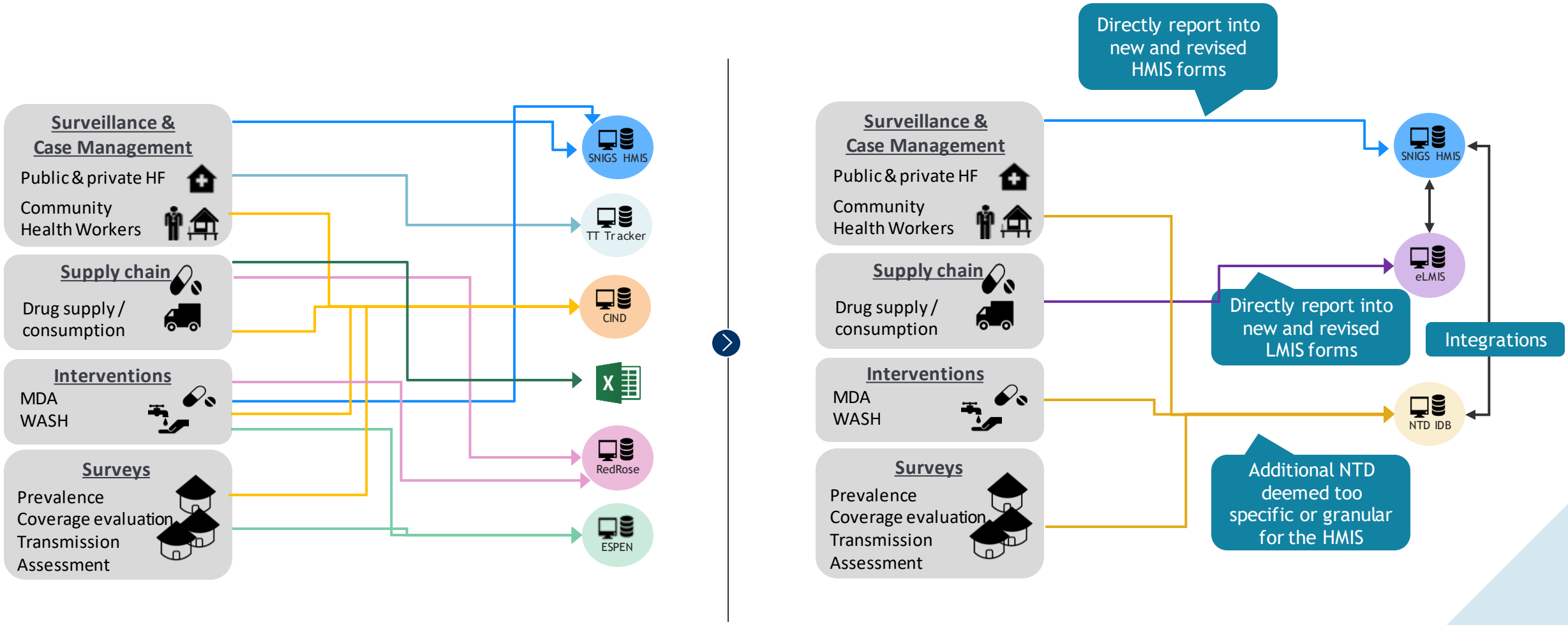



# Integration Approach, example 2:

## HMIS + LMIS expanded to accommodate NTD data, additional data reported into an NTD information system

Groundwork | **Design** | Develop | Test | Rollout | Institutionalize

Organize modules > Define digitization and integration pathways > Select tools and platforms > Workplan and budget



# Integration Approach, example 3:

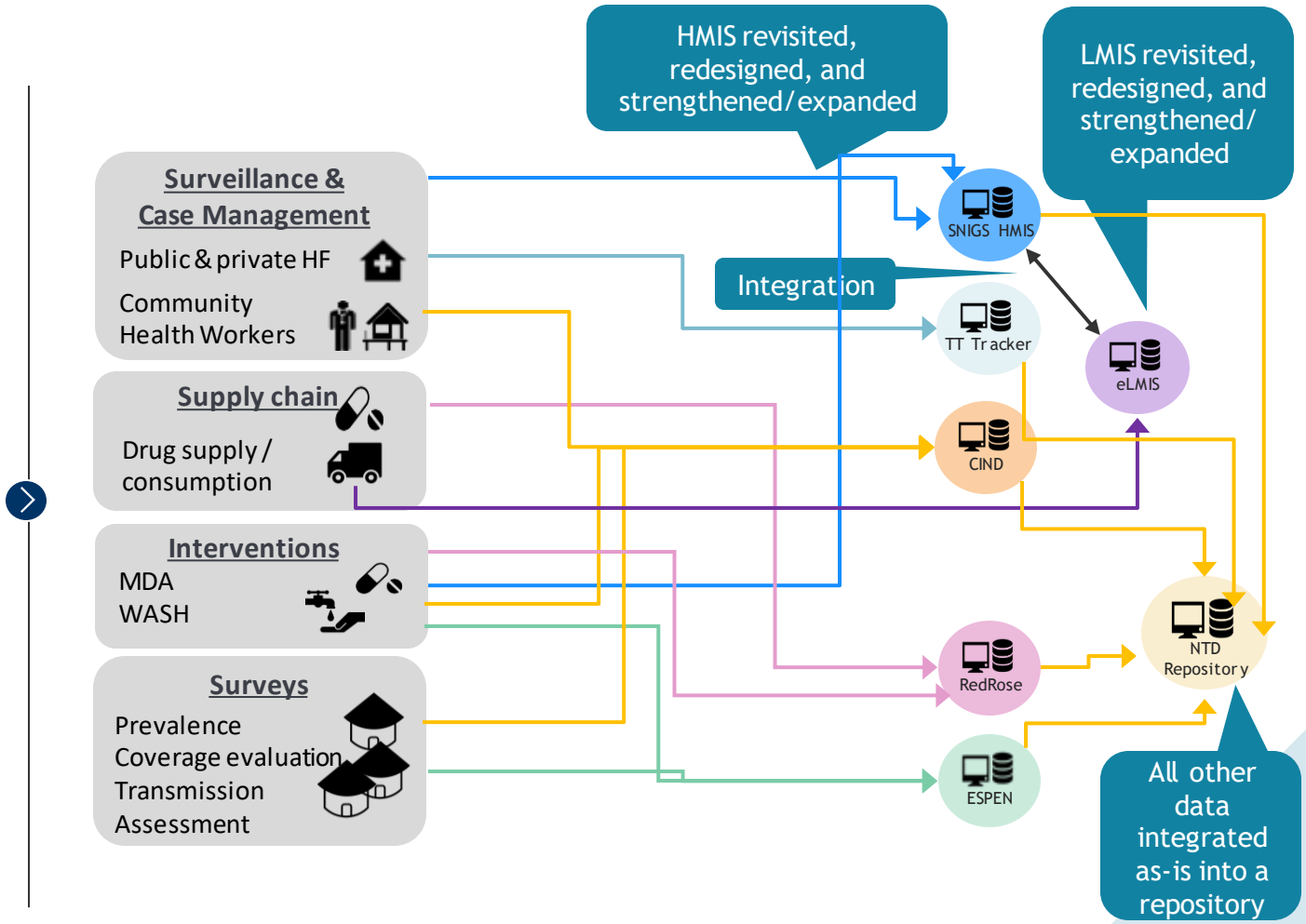
## HMIS + LMIS expanded to accommodate NTD data, additional data imported into a repository

Groundwork | Design | Develop | Test | Rollout | Institutionalize

Organize modules > Define digitization and integration pathways > Select tools and platforms > Workplan and budget

This approach is NOT recommended, as it:

- Does not address the root causes of data fragmentation
- Requires more extensive and ongoing data science resources, given each and every data pipeline needs to be individually developed and maintained
- The more data pipelines present, the more often one will break and require maintenance



# Ultimately, the data source mapping and joint evaluation process enables the Ministry of Health (NTD program + Dept of Information Systems) to develop a proper *systems roadmap*

Groundwork | **Design** | Develop | Test | Rollout | Institutionalize

Organize modules > Define digitization and integration pathways > Select tools and platforms > Workplan and budget

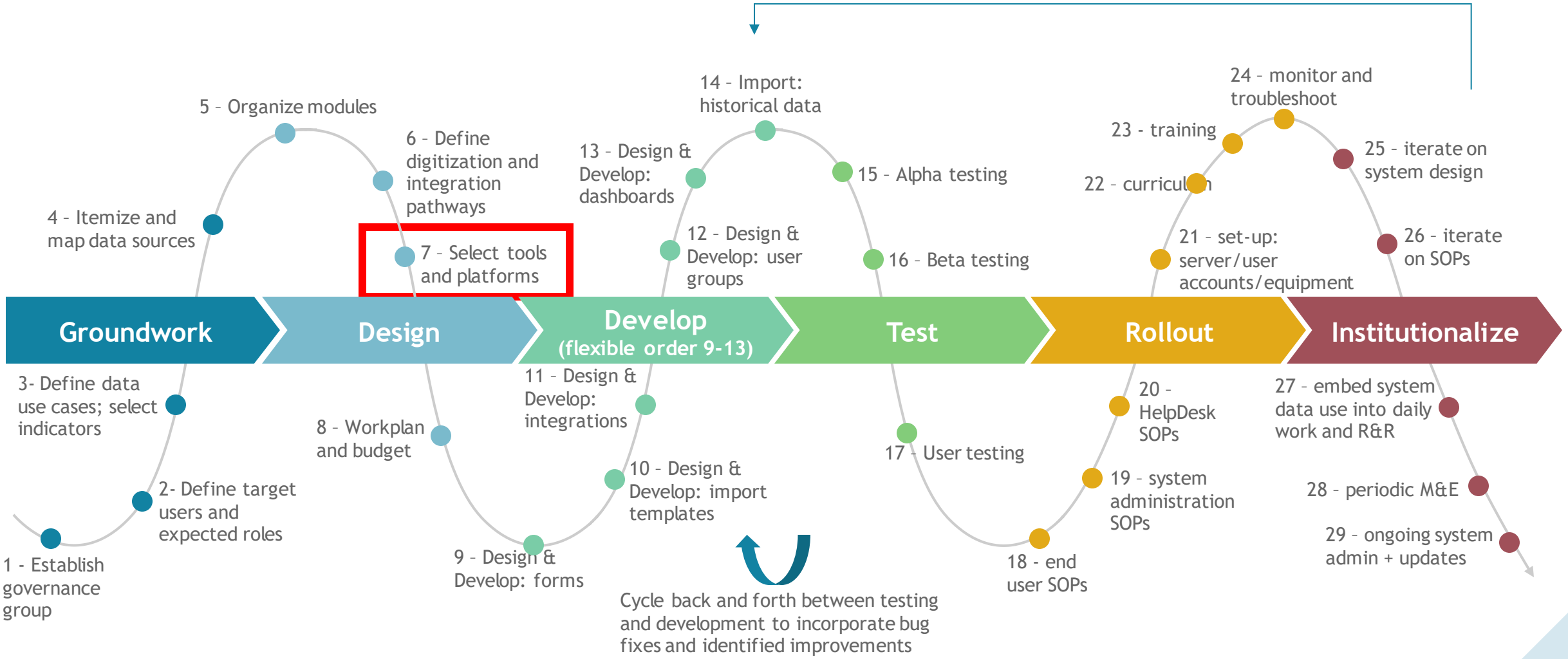
| Module | Name of Form, Data Set, or Report | Current electronic storage method | Proposed electronic reporting flow | Digitization effort required | Integration effort required |
|---|---|---|---|---|---|
| **Case surveillance** (HMIS and other sources) | Monthly lymphatic filariasis (LF) report | Excel | HMIS form | Digitize and test HMIS; import historical data | HMIS > NTD-IS integration |
| | Monthly leprosy report | Excel | HMIS form | | |
| | TT Tracker | SightSavers CommCare | NTD-IS form to replace OR Monthly aggregates in HMIS form | Digitize and test NTD-IS form; import historical data | |
| | LF Hydrocele Tracker | | | t HMIS; import | |
| **Stocks and commodities** (LMIS and other sources) | Monthly health facility requisition report | | | | LMIS > HMIS integration |
| | MDA Community Drug (CDD) stock report | | | t eLMIS form; import | LMIS > NTD-IS integration |
| | MDA Reverse Logistics | | | | |
| **Population** | Census Data | | | | |
| **Mass Drug Administration** | Oncho MDA coverage | | | t HMIS forms; import | |
| | SCH MDA coverage re | | | | |
| | STH MDA coverage re | | | | |
| | Oncho MDA register | | | | |
| | Combined MDA register | Partner DHIS2 | Partners upload data to HMIS at the end of each campaign | | |
| **Entomological Surveillance** | Blackfly surveillance | Partner Commcare | NTD-IS Form | Digitize and test NTD-IS form; import historical data | |
| **Surveys** | LF Transmission Assessment Survey 1 (TAS1) | EspenCollect ODK | EspenCollect ODK + final survey results imported into NTD-IS | Digitize and test NTD-IS form; import historical data | |
| | Oncho Phase (Pre-Stop MDA) Surveillance | EspenCollect ODK | EspenCollect ODK + final survey results imported into NTD-IS | | |
| | SCH Impact Assessment | EspenCollect ODK | EspenCollect ODK + final survey results imported into NTD-IS | | |

Development is expected to be incremental and iterative – don't try to do everything at once.

- Plan and phase work appropriately
- Start with priority components, or with low-hanging fruit
- Design for end user needs, workflows, and outputs – make work more efficient, not more cumbersome

See Data System and Repository for NTDs - Planning Workbook for pictured

# A few notes on selecting technology…




The typical development trajectory takes ~1-2 years for groundwork and development, and ~5 years to reach maturity and institutionalization

# Countries already using DHIS2 as an information system often debate whether the platform would be a good fit for these integration/warehousing needs



## DHIS2 can function as both an information system and an integration/warehousing platform, but not a data lake. You can get data into the system in one of three ways

Electronic reporting forms allow users at different levels to submit data as part of routine reporting responsibilities, through either a computer or mobile device

Data integration capabilities (via an API and computability with middleware layers such as OpenHIM) allows data from other information systems to automatically flow into the system


Data can also be manually imported into DHIS2 through Excel files and formats including JSON, CSV, XML, ADX


## Considerations and potential limitations:

- Data visualization and dashboarding capabilities are built-in and offer easy analysis capabilities for end users, but **visualization options are less extensive compared to dedicated Business Intelligence (BI) tools** like Tableau, PowerBI, Superset (though these tools can be connected to DHIS2 to supplement visualization options)
- **Data can only be entered or imported into the system once a data dictionary has been defined and configured** in the system using DHIS2's native data model and schema
- Platform will **encounter performance issues with very large volumes of data**, therefore most DHIS2 instances contain a specific thematic area of data (e.g. HMIS vs. CHIS instance)

# While WHO has released a basic HMIS DHIS2 package, this only supports health facility-level NTD data management

Groundwork | **Design** | Develop | Test | Rollout | Institutionalize

Organize modules > Define digitization and integration pathways > Select tools and platforms > Workplan and budget


- WHO does not specifically endorse DHIS2, however they have developed some standard packages to support countries already using DHIS2
- These packages can provide a helpful starting point but do require careful tailoring and adaption for each individual country's reporting structures and data flow
- Can be used for information system (i.e. standard reporting forms) or repository (just integrate data against) purposes, but **countries still need to define the data flow processes themselves and tailor:**
  - e.g. directly report data, import data from Excel, pull data from other information systems
- And for remaining indicators not accommodated by these packages, countries will still need to internally decide how to collect, report, and manage this data

# For countries using DHIS2 to integrate NTD data, they must also decide if ALL prioritized NTD data will go in the HMIS, or if there is a role for a supplemental "NTD DHIS2" instance

Groundwork | **Design** | Develop | Test | Rollout | Institutionalize

Organize modules > Define digitization and integration pathways > Select tools and platforms > Workplan and budget

- An instance of DHIS2 is a specific URL, set of forms, users and dashboard
- For example, the Uganda HMIS and the Kenya HMIS are each distinct "instances" of DHIS2 as they are independent
- A country may have multiple instances of DHIS2 that serve different functional needs or end user groups
- A repository can be built i…t some consideration points are below to help in this deci… each country

- Ultimately, the relevant technical units within the Ministry of Health (e.g., Department of Information Systems, Department of IT, Digital Health Unit) must advise on the appropriate architecture, R&R, and resourcing.
- They can only effectively do this if they have a full view of the data sources (via the data mapping exercise conducted during groundwork)
- Systems will be unsustainable and partner-dependent without clear buy-in and alignment with broader MOH digital initiatives and priorities.

| Key Points | | |
|---|---|---|
| **Build on top of HMIS** | • **Simplified system** operating multipl… two. This may be … resource-constrai… • **Data-coexistence** management of a… because other dis… streamlines data … platform to mana… | …D programs may have less direct …ally operates under a broader scope …sions related to HMIS management, …s may be influenced by a larger group …**ead**: As more data elements and …modate various health topics, the …is can lead to a larger dataset to …and computational resources, as well …nized and usable |
| **Create a separate "NTD" DHIS2 instance** | • **Greater control o**… autonomy and co… ensures that the r… data managemen… • **Less overhead:** With this approach, there is less overhead in terms of data elements, indicators, and other system configurations. This streamlining reduces the complexity of managing the repository, making it more efficient and user-friendly. • **Faster system on equivalent hardware**: Separating the repository from the routine HMIS can lead to improved system performance, even when using equivalent hardware. | …arate DHIS2 instance means that …n and manage. This entails regular …urces committed to managing this • **Clarity amongst end users:** end users may require additional support understanding and differentiating between when to use different DHIS2 instances for different activities and responsibilities, and being able to seamlessly transition and work within multiple DHIS2 instances |

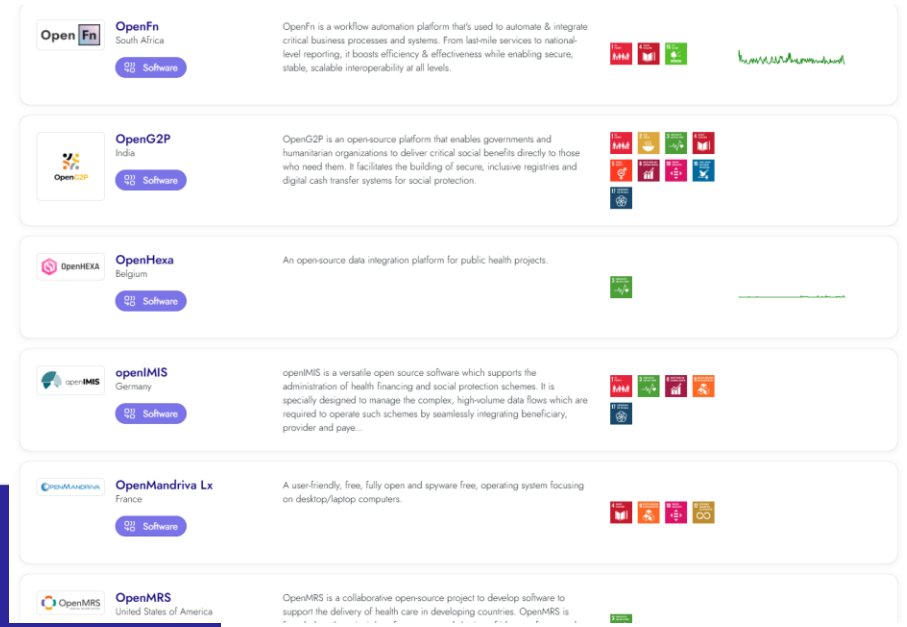
# Many other software solutions categorized as Digital Public Goods are used in the NTD space, but the initial emphasis should be on *mainstreaming*

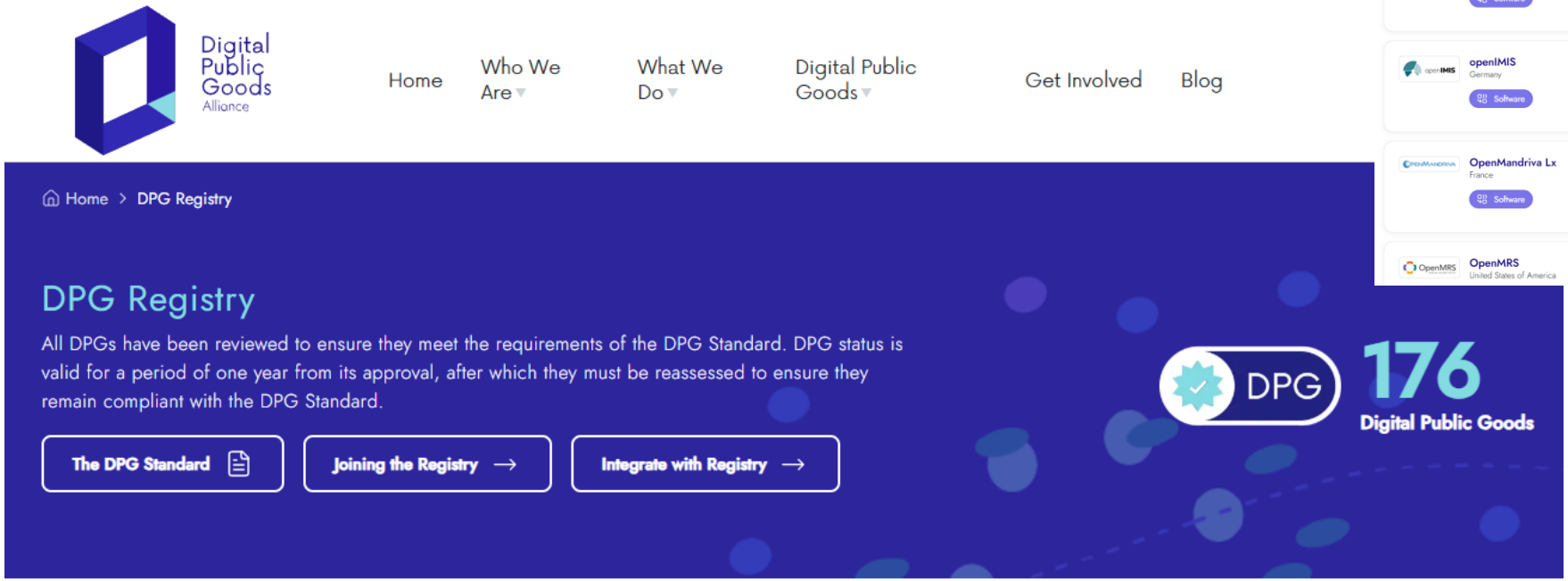
Groundwork | **Design** | Develop | Test | Rollout | Institutionalize

Organize modules > Define digitization and integration pathways > Select tools and platforms > Workplan and budget

Software should only be shortlisted and evaluated after the full breadth of user needs have been identified and **should not replace or interfere with mainstreaming NTDs into core existing MoH systems like the HMIS, LMIS, CHIS, etc.**

Standalone and bespoke NTD solutions are unlikely to be sustainable and government-owned unless they fit into the broader MOH vision and are accepted by the digital health units.




https://www.digitalpublicgoods.net/registry

# Once the scope of data, target user base, and platforms are known, a more accurate workplan and budget can be developed



Budget categories to consider:

- **Developer time and effort** needed for the different components identified (number and complexity of forms, system integrations, dashboards and other outputs, historical data that needs to be mapped, etc.); once the scope is defined, technical counterparts in the Department of Information Systems or technical vendors can provide cost estimates
- **Workshops and meetings** needed for to convene stakeholders during the different phases across groundwork, design, development and testing, roll-out, as well as institutionalization activities like supervision, data review meetings, refreshers
- **Testing budget** to ensure a representative cross-section of stakeholders and end users can pressure test the system components – this can be a combination of centralized testing, de-centralized testing, field testing.
- **Training budget** to ensure all target end users receive effective training on the system and are given ample time to practice and get comfortable
- **Computers, mobile devices, data plans, internet bundles** and any other hardware needed for end users to access the system (along with accessories like phone cases or external battery packs/solar chargers)
- Potential costs associated with **supporting software systems** such as Mobile Device Management software (for centralized device control), HelpDesk systems, or advanced analytics
- **Server and hosting costs**, taking into consideration performance and storage needs over the next 5-10 years for the volume of data and quantity of users envisioned.
- **Supporting staff costs** that may be needed to increase program capacity to conduct supervisions, conduct M&E, maintain data pipelines, etc.
- **Potential scale-ups** envisioned in the future (e.g. moving reporting from district > facility level, or introducing digital reporting to Community Drug Distribution team levels

The largest cost drivers are always devices, training, and supportive supervision. For this reason, is it important to ensure you have taken the time to quantify the target number of end users across data collection, reporting, and use responsibilities.

Mainstreaming into existing systems can save costs by re-using and sharing across: devices, staff, infrastructure, and developer resources. End users will also already be familiar with the software, which significantly reduces training requirements.

# A more detailed budget table is in this guide's accompanying workbook



| Phase | Component | Description of need |
|---|---|---|
| Pre-rollout | Start-up development costs | Costs associated with engaging developers to support the technical design, development, testing, training, and roll-out steps needed establish the system components and ensure all feedback is incorporated before roll-out. External Developers typically charge by the day and use the requirements/scoping information to estimate the number of days needed to develop each component. In-house MoH developers may require programs to contribute some budget to their department to be able to provide support. Post-rollout maintenance support should also be expected, and note there are often a high volume of issues and feedback reported in the first ~12 months of any new system or system component |
| Pre-rollout | Server hosting costs | Monthly server cost to host development, test/training, and live production instances, whether that be a cloud or local solution. Existing MoH systems should ideally have these environments set-up already but may require some additional budget to scale-up the capacity to accommodate additional data, users, and traffic. |
| Pre-rollout | Workshops and meetings | Venue costs, travel costs, and other associated meeting costs to ensure the right stakeholders can convene to provide scoping and design input. Should be complemented with virtual meetings to reduce costs. Can expect each thematic group to require 3-5 sessions for scoping and design iteration. |
| Pre-rollout | User testing | Venue costs, travel costs, and other associated meeting costs to ensure the right representative subset of actual end users are given an opportunity to rigorously pressure test the system and provide feedback. This can also be coordinated remotely to save on costs. |
| Roll-out | Training | Venue costs, travel costs, and other associated meeting costs to ensure the right users receive adequate training. Dedicate plenty of time to hands-on practice and going over SOPs. Typically recommend 2 full days for 1 new digitized module (e.g. MDA data collection > reporting > use) and 5 full days for an integrated NTD data repository when orienting new users. Training existing users (e.g. existing HMIS data officers to manage new NTD data in the HMIS) will require less training. |
| Pre-rollout | Equipment - laptops, mobile devices, accessories | Initial procurement + replacement of devices and accessories (20% annual replacement rate typically used) - actual device, cover, charges, battery packs, solar chargers. As needed to equip target end users with the hardware they need to interact with the system. |
| Pre-rollout | Ongoing data/internet costs | Sim cards, monthly/annual data plans to cover devices in the field. As needed to equip target end users with the connection they need to interact with the system. |
| Pre-rollout | Mobile device management software | Licenses (whether annual or perpetual) to centrally view and manage devices in the field. This becomes quite critical when managing a large volume of devices used at the facility or community level. |
| Post-rollout | Server capacity upgrades | Annual server upgrades to ensure infrastructure scales up as the volume of data and end users increases over time (e.g. additional RAM/memory). If adding NTD data to existing systems, the IT department may require additional budget to expand their existing hosting capacity. |
| Post-rollout | Software maintenance agreement | Software maintenance support from technical vendor or other support staff to ensure the system is continuously being improved, is being periodically upgraded, and all integrations are functioning correctly (whether external developers or in-house MoH developers) |
| Post-rollout | Trainings/ refresher trainings | Periodic refresher trainings; strongly recommended to also develop of a central knowledge repository and e-learning solutions to address staff turnover |
| All phases | MoH support staff | Staff needed within digital health units or NTD program in order to maintain system and its usage, including helpdesk/user support staff, data managers and M&E staff, IT/dev ops staff, project managers, and supervisors. |
| All phases | Other software licenses | Licensed software, e.g. for supplemental BI dashboard tools, HelpDesk or project management software, costs for domain names, SSL certificates, etc. Typical in-country needs are for domain names, SSL certificates, Mobile Device Management and sometimes BI dashboard tools. |
| Post-rollout | Supervision | Supportive supervision visits to support system usage and user performance |



See Data System and Repository for NTDs - Planning Workbook for template

# Once the scope of data, target user base, and platforms are known, a more accurate workplan and budget can be developed (also in workbook)

Groundwork | **Design** | Develop | Test | Rollout | Institutionalize

Organize modules > Define digitization and integration pathways > Select tools and platforms > Workplan and budget

***Timelines are illustrative only - delays may arise from limited stakeholder availability to make critical design decisions, provide clarifications, test and provide input, etc. Stakeholder and user input and consensus is critical across all stages and should be prioritized***

| | | M1 | | | | M2 | | | | M3 | | | | M4 | | | | M5 | | | | M6 | | | | M7 | | | | M8 | | | | M9 | | | | M10 | | | | M11 | | | | M12 | | | | M13 Onwards | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Activities | Relevant outputs, resources, and templates | S1 | S2 | S3 | S4 | S1 | S2 | S3 | S4 | S1 | S2 | S3 | S4 | S1 | S2 | S3 | S4 | S1 | S2 | S3 | S4 | S1 | S2 | S3 | S4 | S1 | S2 | S3 | S4 | S1 | S2 | S3 | S4 | S1 | S2 | S3 | S4 | S1 | S2 | S3 | S4 | S1 | S2 | S3 | S4 | S1 | S2 | S3 | S4 | S1 | S2 | S3 | S4 |
| **Groundwork** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Establishment of a technical project committee and a coordination committee | Governance framework (no template) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Routine project committee tocuhpoints | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Selection of key indicators and identification of user needs with the different programmatic areas | Indicator selection (worksheet 1) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Mapping of data sources, identification of current state information flow and electronic data systems | Data Source Mapping (template: worksheet 2) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Design** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Define future-state data flow: which tools to consolidate, what to transfer to existing MoH systems for mainstreamng (e.g. HMIS/LMIS), where system integrations will be needed | Digitization pathway (template: worksheet 3) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Itemize functional design and development work needed: harmonizing paper form design, electronic reporting form/data dictionary design, indicator configurations/calculations, system interoperability and data exchange requirements | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Organize data inputs into logical thematic modules based on clusters of stakeholders, thematic areas, etc. to decide on order of development | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Agree on prioritization and order of development, with timelines | Workplan (template: this worksheet 4) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Design + Development** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Requirement elaboration:<br>Define **data inputs**: design/harmonize paper forms, define data dictionaries for electronic reporting forms (including validation) rules | Form design (template: worksheet 6a) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Requirement elaboration:<br>For each new/revised form, define: **roles and responsibilities** for who will enter the data, what the reporting admin unit will be (e.g. health facility vs. district) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Requirement elaboration:<br>Document **indicator calculations** (these should explcitly reference/be linked to the electronic data dictionary designs so that there is no ambiguity regarding numerator and denominator sources | Indicator design (template: worksheet 6b) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Requirement elaboration:<br>**System integrations** and data exchange requirements: what data is exchanged, when, how often, and for which periods; | Interoperability design (template: worksheet 6c) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

See Data System and Repository for NTDs - Planning Workbook for pictured templates

# Once the scope of data, target user base, and platforms are known, a more accurate workplan and budget can be developed (also in workbook)

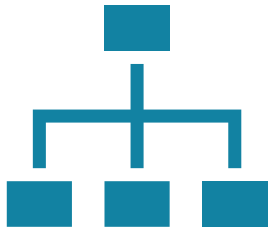
Groundwork | **Design** | Develop | Test | Rollout | Institutionalize

Organize modules > Define digitization and integration pathways > Select tools and platforms > Workplan and budget

***Timelines are illustrative only - delays may arise from limited stakeholder availability to make critical design decisions, provide clarifications, test and provide input, etc. Stakeholder and user input and consensus is critical across all stages and should be prioritized***

| | | M1 | | | | M2 | | | | M3 | | | | M4 | | | | M5 | | | | M6 | | | | M7 | | | | M8 | | | | M9 | | | | M10 | | | | M11 | | | | M12 | | | | M13 Onwards | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Activities | Relevant outputs, resources, and templates | S1 | S2 | S3 | S4 | S1 | S2 | S3 | S4 | S1 | S2 | S3 | S4 | S1 | S2 | S3 | S4 | S1 | S2 | S3 | S4 | S1 | S2 | S3 | S4 | S1 | S2 | S3 | S4 | S1 | S2 | S3 | S4 | S1 | S2 | S3 | S4 | S1 | S2 | S3 | S4 | S1 | S2 | S3 | S4 | S1 | S2 | S3 | S4 | S1 | S2 | S3 | S4 |
| **Development (modules below are illustrative only)** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Set up development environment and ensure admin hierarchy is loaded in | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Example Module 1: Case surveillance | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Example Module 2: MDA | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Example Module 3: Surveys | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Example Module 4: Supply chain | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Consolidation/cleaning/mapping of historical data to import | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Dashboard drafting | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Iterative User Testing** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Ongoing configuration of test environment (if needed to be separate from dev) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Development of the user test plan (test scenarios, observation grid, sampling, duration…) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Iterative functionality testing with users and collecting feedback (the committee will have to participate in user testing.) | Consolidated feedback documentation and updates tracker | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Improvement of the modules based on iterative user testing | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| End user testing (testing with actual end users (e.g. distict staff) to gather feedback at sub-national level | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Incorporate end user feedback | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| User acceptance testing (for final sign off of system. If further feedback is collected, keep cycling through feedback incorporation + test cycles until the system is where it needs to be) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Dashboard iterations | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Training and deployment** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Product documentation (tutorials and standard operating procedures, governance framework…) | SOPs, data-to-action guides, and training materials<br><br>Data review meeting action trackers | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Deployment to live sever | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Training of trainers workshop at central level | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Trainings at sub-national level | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Data collection launch (for new reporting forms) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Supervision and quality control of recorded data | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Data review meetings | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Maintenance and continuous feedback to improve the system, including dashboard iterations | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Monitoring and evaluation to understand the use of the system, measure its impact and its overall usefulness for NTD surveillance. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

See Data System and Repository for NTDs - Planning Workbook for pictured templates



## Part 1 - Creating the Roadmap

Setting the Context: The Challenge, and the Role of Information Systems, Data Repositories, and Interoperability

Defining a country-tailored approach and plan

**Country Examples**

## Part 2 - Implementing the Roadmap

Guidance on navigating the technical design, development, testing and operationalization phases

This guidance deck also includes an accompanying workbook with templates

# Kenya

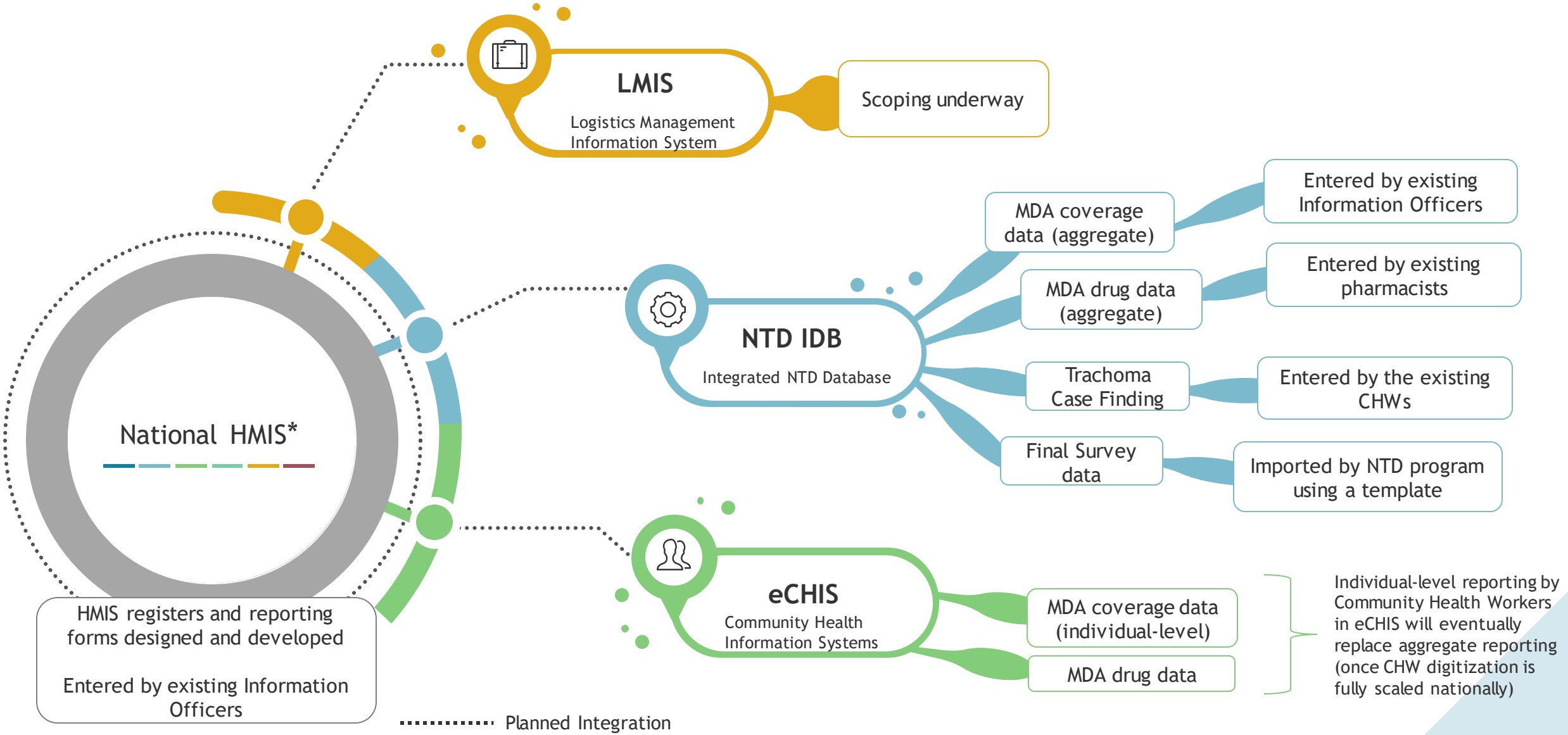
## In 2022, different databases were used by different partners to serve specific data needs

| Database name | CIND (Access database) | ASCEND DHIS2 | Power BI/CHIPS (Country Health Information Platform) | Tropical data | REVEAL | Google sheet | ESPEN portal |
|---|---|---|---|---|---|---|---|
| Author | WHO | ASCEND | Sight Savers | ITI-GET 2020 | AKROS | MOH + partner | WHO |
| Platform |  |  |  | |  |  |  |
| NTDs covered | PC-NTDs | SCH, Trachoma &LF | PC-NTDs and WASH | Trachoma | SCH (Vihiga county, 2021) | PC-NTDs | PC – NTDs and WASH |
| Data included | Prevalence<br>MDA<br>Drug supply<br>Morbidity<br>NTD programmatic data | MDA<br>MMD<br>man<br>disa | Prevalence | Prevalence | | | Prevalence<br>MDA<br>WASH indicators |
| Collect Data (Computer) | ✓ | | | | | | |
| Collect Data (Mobile Device) | | | | | | ✓ | |
| Import Data | ✓ | ✓ | ✓ | | | ✓ | ✓ |
| Visualize Data (using dashboards) | | ✓ | ✓ | | ✓ | | ✓ |

- No NTD mainstreaming into core Ministry of Health Systems
- Mostly siloed partner systems and ad hoc tools like good sheets
- Usual challenges with no standardization, fragmentation, lack of automated outputs, over-emphasis on global reporting

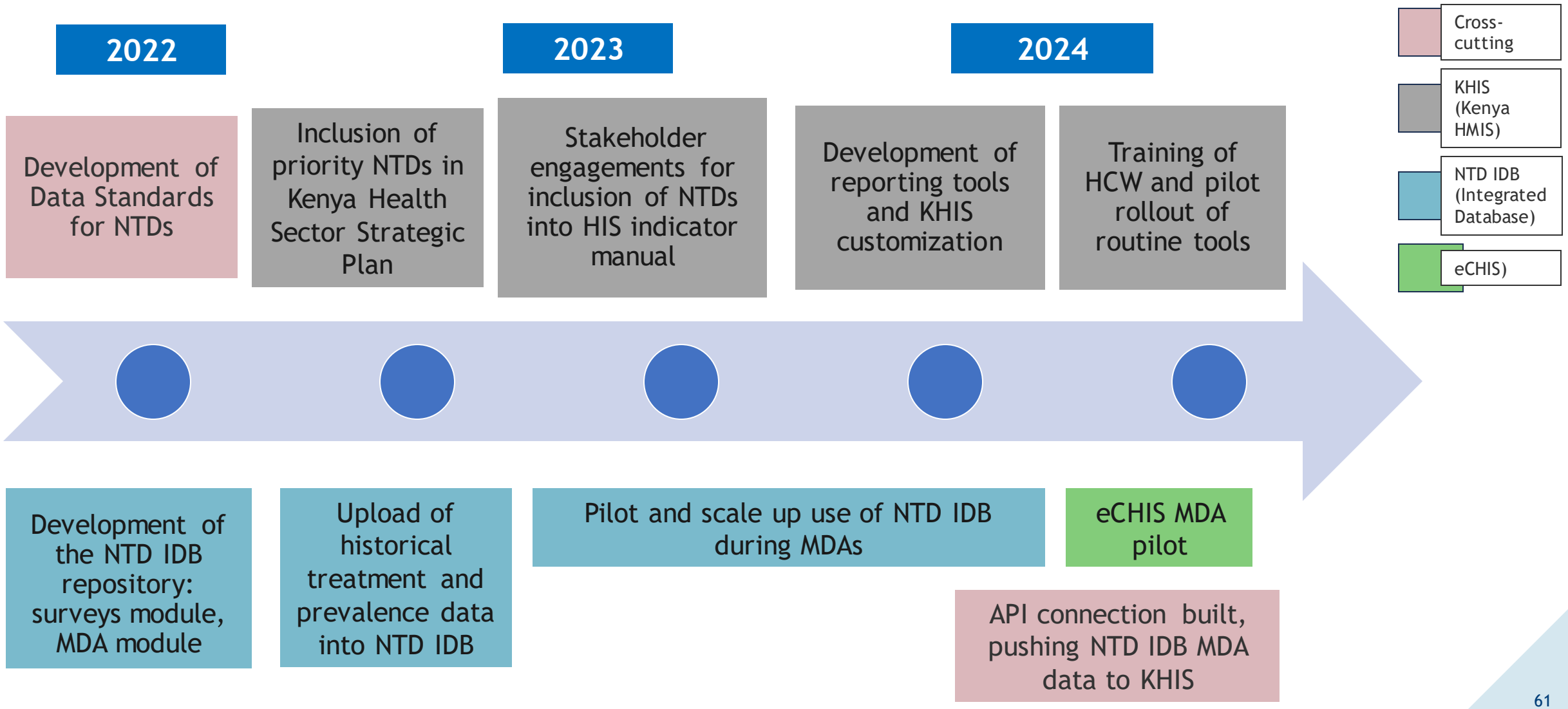
# Kenya

## The NTD program began consolidating data into existing Ministry of Health systems, while also creating a dedicated integrated NTD DHIS2 instance, together with the Digital Health Unit



# Kenya

## Steady progress against this vision has been achieved incrementally



# Ethiopia

## The MoH in Ethiopia has been making similar steady progress on a vision for NTD data mainstreaming and integration

### National HMIS

- The **national HMIS since 2018 includes some priority NTD data** on MDA coverage, visceral and cutaneous leishmaniasis cases treated, and trachomatous trichiasis surgery cases
- These are routinely reported through standard HMIS channels quarterly and annually

### eCHIS

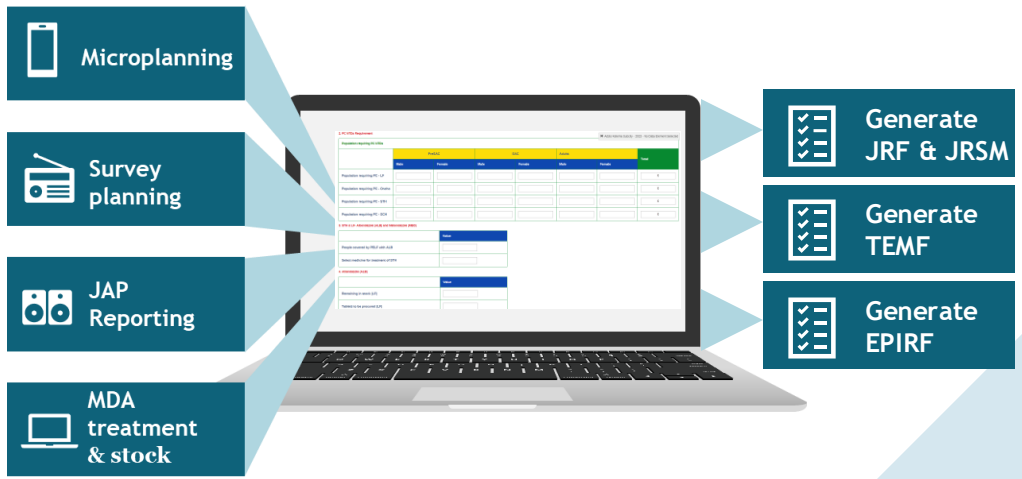
- Mobile-first application used by Community Health Extension Workers to record household data and services delivered.
- An **NTD module has been incorporated in the eCHIS platform** and is currently awaiting operationalization alongside the broader CHEW digitization initiative.

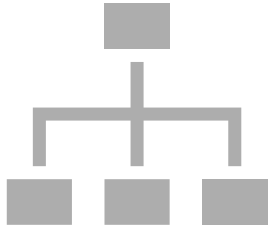
Additional scoping underway:

- Interoperability between these MoH systems
- Potentially integrate NTDs in mBrana (LMIS used at district level)

### Integrated NTD Database

- A supplemental NTD-specific integrated information system was created to complement the HMIS and accommodate much broader NTD data required by the program for effective program management.
- This system allows for both:
  - **digitization of newly generated data** through embedded reporting forms
  - **integration of existing data from other systems** through periodic export > import processes
- Strengthens data management for ESPEN program reporting





## Part 1 - Creating the Roadmap

Setting the Context: The Challenge, and the Role of Information Systems, Data Repositories, and Interoperability

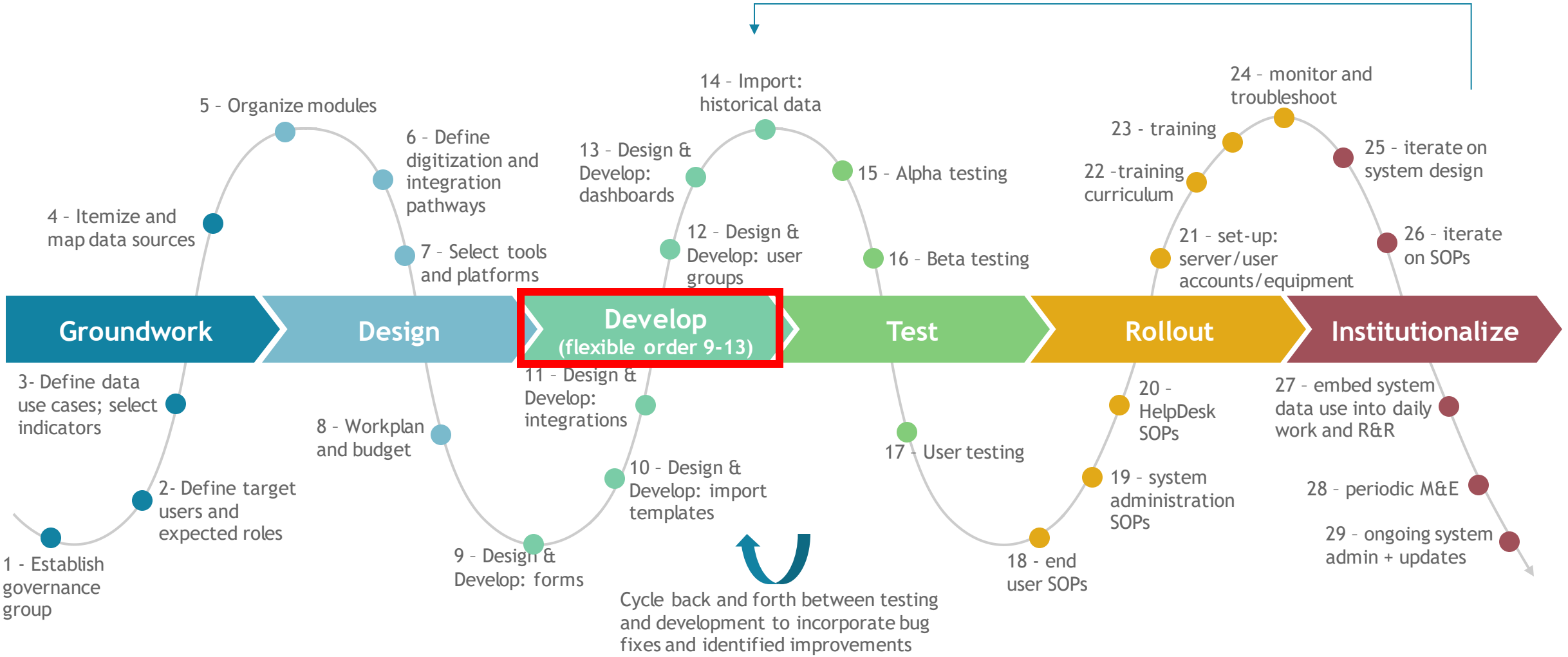
Defining a country-tailored approach and plan

Country Examples

## Part 2 - Implementing the Roadmap

➡ **Guidance on navigating the technical design, development, testing and operationalization phases**

This guidance deck also includes an accompanying workbook with templates




The typical development trajectory takes ~1-2 years for groundwork and development, and ~5 years to reach maturity and institutionalization

# Develop: *electronic reporting forms* as defined during scoping to streamline reporting and strengthen data quality

Groundwork | Design | **Develop** | Test | Rollout | Institutionalize

Develop: forms > import templates > integrations > user groups > dashboards > import historical data

**This is an example template for documenting the design of new reporting forms that will be digitized. The design documentation will then serve as the source of truth to guide developers and testers, and to document stakeholder design decisions.**

| | |
|---|---|
| **Form Name:** | STH Campaign Drug Allocation |
| **Admin Unit:** | District |
| **Period:** | Daily |
| | |
| **Capturer:** | User/role responsible for capturing data |
| **Validator:** | User/role responsible for continuously monitoring and validating incoming data |

## Design aspects to pay close attention to:

- ✓ Logical flow of questions and intuitive organization
- ✓ Alignment with paper form (also consider paper form improvements in parallel, such as transitioning fields from free text to check boxes for easier entry/analysis)
- ✓ Alignment with operational workflow of data capturer
- ✓ Clear intuitive labeling of fields; description/definition of fields used in dictionary reference
- ✓ Data validation rules to trigger warnings and errors
- ✓ Data validation rules to auto-calculate fields
- ✓ Whether a field requires a response or is optional
- ✓ Filtering of questions based on responses given

| Form Section | Variable system ID | Variable label | Variable definition | Variable Type | Dropdown options | Mandatory | Validation or logic rules |
|---|---|---|---|---|---|---|---|
| CDD PZQ allocation | STHdate | Campaign date | Date of campaign for which PZQ drug allocation is being recorded | Date | | Yes | Cannot be future date;<br>Date must be within 30 days of today's date |
| | STHteam | Name of CDD team lead | Name of the Community Drug Distribution team lead (first and last) | Text | | Yes | |
| | nPZQreceivedtins | Number of PZQ tins provided to CDD team | Enter the number of individual PZQ tins received by thej CDD team | Integer | | Yes | Must be <=200 |
| | nPZQreceivedtinsize | Number of tablets per tin | Select the number of PZQ tablets found per tin | Dropdown | 500<br>1000 | Yes | |
| | nPZQreceivedtables | Number of PZQ tablets received | Auto-calcuated field reflecting the total number of PZQ tablets (as determined by the numver of tins x quantity of tablets in each tin | Integer | | | Auto-calculate and fill field:<br>nPZQreceivedtins x nPZQreceivedtinsize |

# Develop: *indicators* as defined during scoping



**This is an example template for documenting the design of calculated indicators that will be configured in the system. The design documentation will then serve as the source of truth to guide developers and testers, and to document stakeholder design decisions.**

| Indicator ID | Indicator Name | Indicator Definition | Numerator | Numerator Source | Denominator | Denominator Source |
|---|---|---|---|---|---|---|
| nPZQreceivedtables | PZQ Tablets Received by CDDs | Total number of PZQ tablets allocated to the Community Drug Distribution teams, as reported from the STH Campaign Drug Allocation form | nPZQreceivedtinsize * nPZQreceivedtables | STH Campaign Drug Allocation form | 1 | STH Campaign Drug Allocation form |

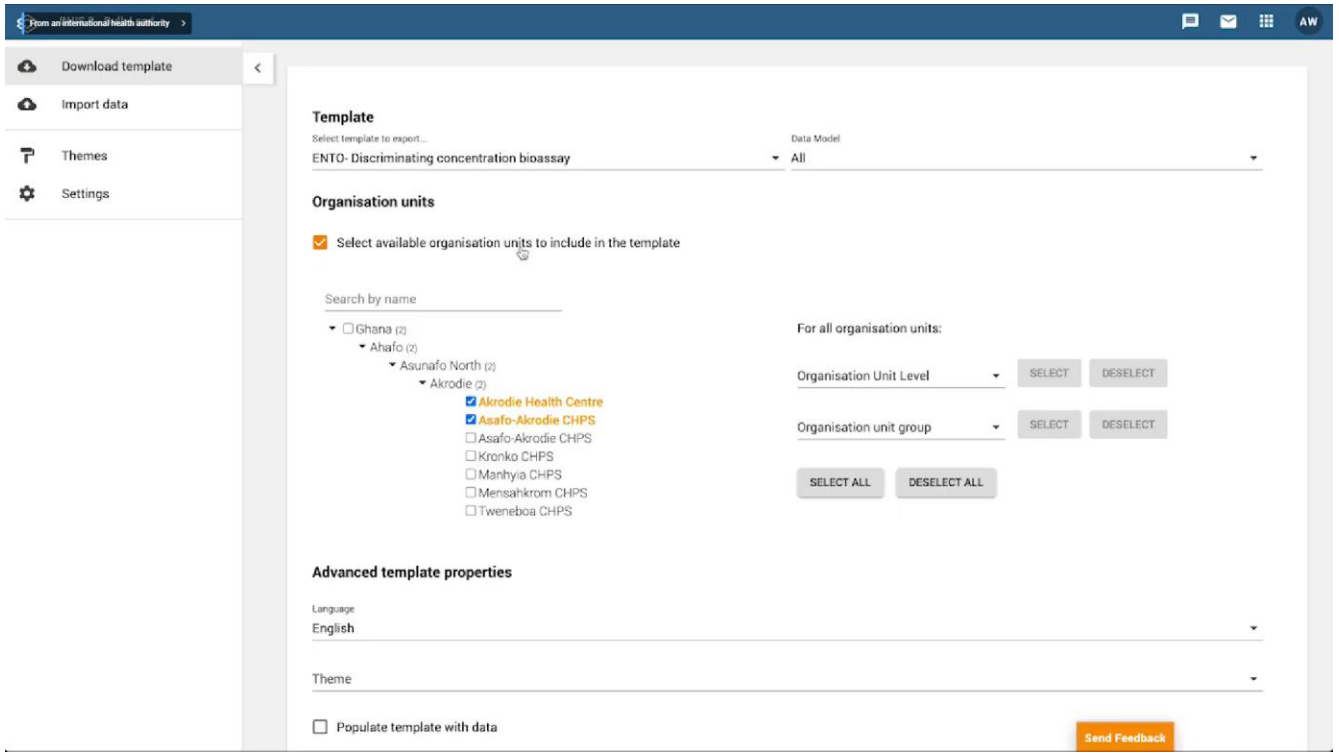
**Notice how indicator calculations are linked to input variables from the form definition example on the previous slide. This is to ensure accurate and consensus-based indicator calculations from the developers**

| Form Section | Variable system ID | Variable label | Variable definition | Variable Type | Dropdown options | Mandatory | Validation or logic rules |
|---|---|---|---|---|---|---|---|
| CDD PZQ allocation | STHdate | Campaign date | Date of campaign for which PZQ drug allocation is being recorded | Date | | Yes | Cannot be future date; Date must be within 30 days of today's date |
| | STHteam | Name of CDD team lead | Name of the Community Drug Distribution team lead (first and last) | Text | | Yes | |
| | nPZQreceivedtins | Number of PZQ tins provided to CDD team | Enter the number of individual PZQ tins received by the CDD team | Integer | | Yes | Must be <=200 |
| | nPZQreceivedtinsize | Number of tablets per tin | Select the number of PZQ tablets found per tin | Dropdown | 500<br>1000 | Yes | |
| | nPZQreceivedtables | Number of PZQ tablets received | Auto-calcuated field reflecting the total number of PZQ tablets (as determined by the numver of tins x quantity of tablets in each tin | Integer | | | Auto-calculate and fill field: nPZQreceivedtins x nPZQreceivedtinsize |

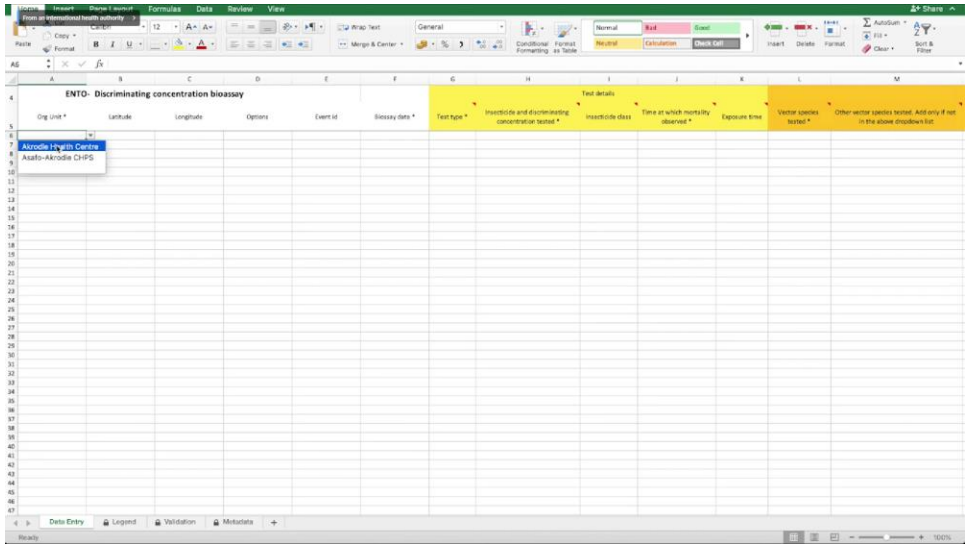
# Develop: *import templates* to facilitate ad hoc or periodic data uploads

Groundwork | Design | **Develop** | Test | Rollout | Institutionalize

Develop: forms > import templates > integrations > user groups > dashboards > import historical data




Screenshots from DHIS2 Bulk Load app. Template generation (left) and Excel-based template output (bottom)




- If entering data directly into the system is not a viable long-term process for getting certain future data into the system, developers can implement a variety of solutions to make it possible for the generation of import templates.
- This minimizes the need for maintaining complex data transformation scripts, providing a low effort solution for periodically importing data in bulk.
- This is particularly helpful to uploading partner or survey data that only comes in a few times per year.

# Develop: *integrations* with other key systems

Groundwork | Design | **Develop** | Test | Rollout | Institutionalize

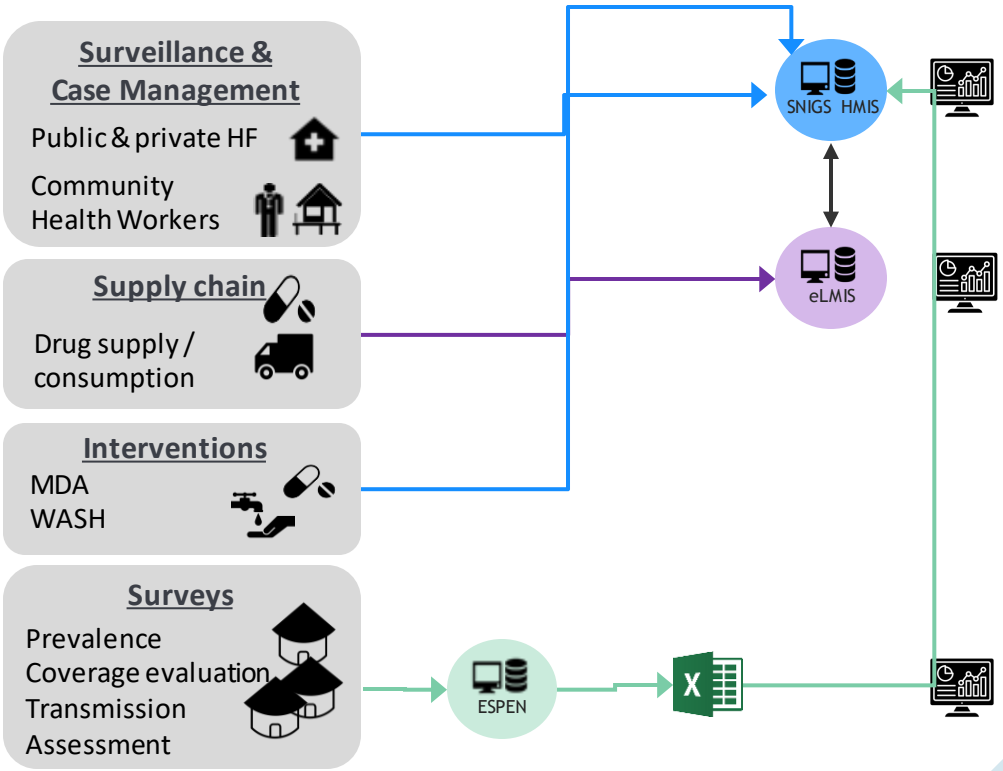
Develop: forms > import templates > integrations > user groups > dashboards > import historical data

In the example architecture on the right, most NTD data is hosted in the HMIS (i.e. the HMIS is the NTD data repository). However, critical stock and commodities data is reported into the LMIS, requiring a HMIS-LMIS integration.

Developers can establish integrations between systems to ensure data can flow between them. The main components the program must guide them on is:

- Which variables and indicators need to be exchanged between the two systems
- Whether any transformations or aggregations should be applied to the data before it is exchanged
- How often the data should be exchanged
- Whether to replace/refresh already imported data (to account for potential corrections that may have been made) and how

The HMIS/Digital Health Unit can advise on whether there are bigger interoperability layers used to manage broad MoH integration needs.



# Develop: *user groups* so forms, dashboards, and system permissions can appropriately be assigned to distinct user profiles/levels

Groundwork | Design | **Develop** | Test | Rollout | Institutionalize

Develop: forms > import templates > integrations > user groups > dashboards > import historical data

| Level | | Manage form configurations | Manage indicator configuration | Manage NTD users | Manage NTD dashboards | Report health facility surveillance data | Visualize health facility surveillance data | Manage dashboards specific to health facility surveillance data | Report entomology data | Visualize entomology data | Manage dashboards specific to entomology | Manage entomology module users |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Central | Digital Health Unit (System Admin) | X | X | X | X | | | | | | | |
| | NTD Focal Point (System Admin) | | | X | X | | | | | | | |
| | Surveillance and M&E focal point | | | | | | X | X | | | | |
| | Entomology focal point | | | | | | | | | X | X | X |
| Provincial | Provincial Surveillance and M&E data managers | | | | | X | X | X | | | | |
| | Provincial Entomology focal point | | | | | | | | | X | X | X |
| District | District Surveillance and M&E focal point | | | | | X | X | | | | | |
| | District Entomology focal point | | | | | | | | | X | | |
| Field | Entomology field agents and data collectors | | | | | | | | X | X | | |

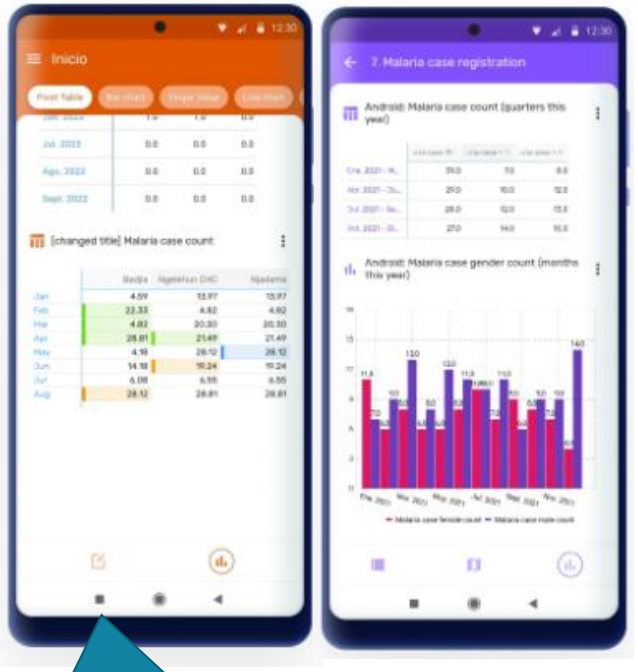
- Designing effective user groups means all actors have the right permissions in the system needed to do their jobs, without extraneous/distracting/confusions system permissions and features that are not relevant to them
- Developing a matrix of each user profile, level, and expected system responsibilities is one way to design this
- Developers should then take this information to set up the appropriate user groups and associated permissions within the actual system

# Develop: *dashboards* specifically designed for decision-making needs for each unique user level



**IRS coverage, district, current campaign**

| Organisation unit / Data | Jul 2019 to Jun 2020 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | IRS - Total structures targeted (microplan) | IRS - Total structures found (routine) | IRS - Total structures sprayed (routine) | IRS - Found coverage (routine) (%) | IRS - Target coverage microplan (routine) (%) | IRS - Total structures locked (routine) | IRS - Locked rate (routine) (%) | IRS - Total structures refused (routine) | IRS - Refusal rate (routine) (%) |
| District 1 | 973 196 | 456 250 | 379 276 | 83.13 | 38.87 | 59 848 | 13.12 | 17 166 | 3.76 |
| District 2 | 31 037 | 11 133 | 9 674 | 86.89 | 31.08 | 1 106 | 9.93 | 353 | 3.17 |
| District 3 | 46 669 | 11 103 | 8 986 | 80.93 | 19.2 | 1 260 | 11.35 | 863 | 7.77 |
| District 4 | 33 088 | 13 522 | 12 977 | 95.97 | 39.11 | 504 | 3.73 | 41 | 0.3 |
| District 5 | 104 626 | 55 024 | 43 991 | 79.95 | 41.93 | 7 706 | 14 | 3 355 | 6.1 |



- Carefully design the level of data disaggregation needed for each user type
- Looking at data by district may be fine for a national or provincial level user, but a district level user might only see a single row for their own district, which may give them a high-level summary of how they are performing, but does not help them monitor the performance of their own teams and pinpoint where there may be gaps
- A district level user needs to see their own data disaggregated at a level relevant for making decisions within their district – e.g. village level, health facility level

Offline mobile dashboards are extremely helpful for field-based users

For example, showing data collectors a summary report of what they have submitted can help them correct data quality errors or anticipate a looming stock out.

# Develop: *import historical data* to ensure the completeness of data

Groundwork | Design | **Develop** | Test | Rollout | Institutionalize

Develop: forms > import templates > integrations > user groups > dashboards > import historical data


Historical data importation typically requires a significant initial effort, often with support from individuals with advanced data wrangling skills.

Data must be:

- Solicited and compiled from different sources
- Structured and transformed to align with the repository's data dictionary (unless using a data lake)
- Cleaned and enriched to address errors, nonsensical values, etc.
- Validated to ensure the final transformed data set meets all expectations and is error-free

Each data set is ultimately then published.

Programs may choose to conduct this step before designing dashboards, so that the dashboard design can be done using real historical data, but you may need to re-transform and re-import if the data dictionary is adjusted based on feedback

# Test: Progressive testing across alpha, beta and user

Groundwork | Design | Develop | **Test** | Rollout | Institutionalize

Alpha testing > Beta testing > user testing

## Development Phase

### Quality Assurance

- Developers should be testing their outputs before passing along to any stakeholders to ensure they faithfully comply with the communicated requirements and design.
- This is **basic quality assurance expected of developers** and is part of the development process.
- Only after development quality assurance should features be sent to stakeholders for testing.

## Testing Phase

### Alpha Testing

Initial testing conducted by internal project stakeholders – e.g. NTD digitization governance group

Intended to catch and iron out obvious issues before bothering to pass along to wider stakeholders.

**If something is clearly broken or clearly does not align with the requirements, you don't want to waste resources testing with a wide group.**

Alpha testers should expect bugs, performance issues, crashes, and little-to-no documentation.

### Beta

Testing with a wider range of stakeholders, often key NTD staff and partners at central-level and sub-national level who can provide input and suggestions, and uncover any lingering bugs

↕ Can be combined

### User

Testing that is specifically done with **the actual individuals who are responsible for using the module to enter, validate and use the data.**

This is to ensure the module fulfills their needs and aligns well with their operational workflows.

It is best to include a strong representative sample of real users, at ALL levels. Do not just test with national users.

# Test: best practices

Groundwork | Design | Develop | **Test** | Rollout | Institutionalize

Alpha testing > Beta testing > user testing

1. Develop testing guides and instructions/scripts to help ensure users are properly oriented and testing the right components

2. Don't just test for bugs, test to ensure the product will work for REAL users in their REAL context, workflows, and day-to-day scenarios. **Most requirements and designs are thought up in a conference room among a small group of people guessing at what their end users will be looking for.** Though this is a great starting point, but the product will only be successful if we take the time to understand actual user behaviors and needs.

3. Ensure a decent sample and representation of users across different health system levels, from different regions of the country, and with varying levels of tech proficiency.

4. Ensure feedback is carefully and clearly documented and consolidated for assessment. We do not want to lose valuable feedback, and **this is often a big process gap** within countries

5. The project team should expect to spend time combing through, organizing, elaborating on, and prioritizing the feedback for the next stage of development

# Rollout: 20% technical-readiness, 80% operational-readiness to prepare users

Groundwork | Design | Develop | Test | **Rollout** | Institutionalize

End user SOP's > system administration SOP's > HelpDesk SOP's > Set-up: server/user accounts/equipment > Training curriculum > Training > Monitor and troubleshoot

## Technical Readiness

Set-up servers and instances for training + the live production instance

Create user accounts

Set-up equipment (mobile devices and laptops); note that managing devices at scale **without** a Mobile Device Management solution is not advised.

## Operational Readiness

**SOPs tailored to each individual actor/end user profile**, clearly describing Ing how they are expected to use and interact with the system as part of their job responsibilities:

- What data they should be collecting, when and how often
- What data they should be reviewing, validating and correcting
- What dashboards they should be looking at
- What decisions they are expected to make based on the dashboards
- What users they are expected to support
- When and how they should reach out for help or to report issues

**Management SOPs around system administration**, clearly describing processes and responsibilities for:

- User account creation/management
- Dashboard creation/management
- Health facility and admin unit management
- Assigning form access to end users
- Responding to user requests/challenges reported via the HelpDesk
- Liaising with developers to implement enhancements/bug fixes

**HelpDesk SOPs** detailing how issues/challenges should be reported, assigned, triaged, resolved, and communicated.

# Rollout: 20% technical-readiness, 80% operational-readiness to prepare users

Groundwork | Design | Develop | Test | **Rollout** | Institutionalize

End user SOP's > system administration SOP's > HelpDesk SOP's > Set-up: server/user accounts/equipment > Training curriculum > Training > Monitor and troubleshoot

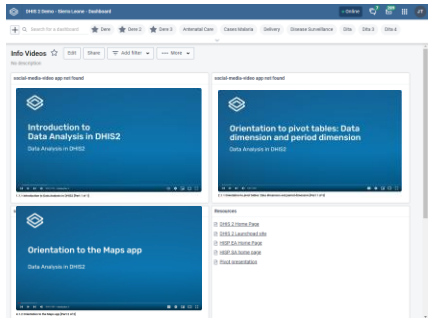
## Designing the training curriculum

Design an agenda and curriculum that:

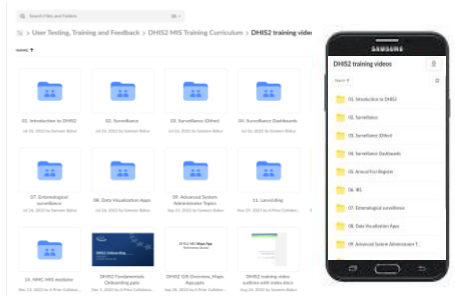
- **Covers basic system navigation, data entry, and data visualization**
- **Adequately integrates and connects the *operational activity* the user is conducting with the *digitization workflows*** – i.e. digitization should not be a separate training and should not be divorced from topics covering how activities are conducted, what data should be captured, what data should be reviewed
- **Allows for a lot of time to practice** so end users leave the training feeling confident
- **Covers user support and HelpDesk SOPs** so users know how to access support
- **Clearly explains to each end user how they are expected to use the system** as part of their routine job responsibilities, via SOPs
- Is connected to **decision-making scenarios** and **data use** practice
- Involved subnational support staff (e.g. HelpDesk point persons)

## Developing the training materials

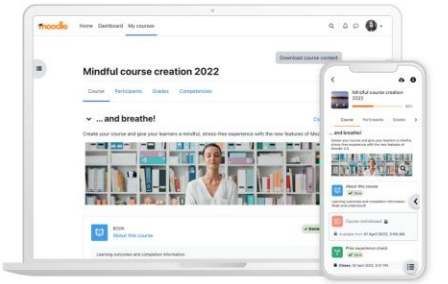
- Training materials can take the form of documents, PowerPoint presentations, videos, and interactive online courses
- **Think about the user experience when deciding on the format** – some groups find it easier to review a document, but many others would prefer to watch a video
- **Ensure all training content is available is a centralized knowledge repository** – don't make users have to ask around to find the materials!
- **Consider how you can make the materials even more accessible** – add links to training materials on dashboards, add soft copies directly onto mobile devices for offline access in the field




DHIS2 dashboard "homepage" with links to training guides, videos, and SOPs



Knowledge repository on Box, Google Drive, etc. to store organized materials, accessible on web and mobile devices (with offline storage options too for field access)




eLearning (pictured is Moodle, an open-source Learning Management System)

*See sample training materials and manuals*

# Rollout: 20% technical-readiness, 80% operational-readiness to prepare users

Groundwork | Design | Develop | Test | **Rollout** | Institutionalize

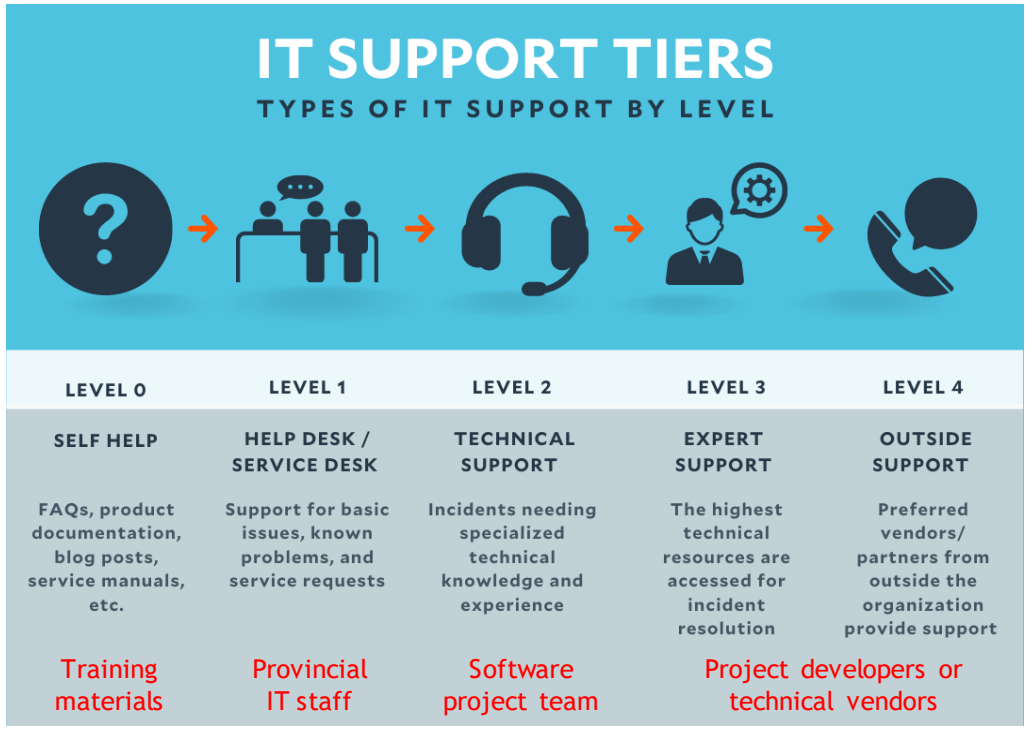
End user SOP's > system administration SOP's > HelpDesk SOP's > Set-up: server/user accounts/equipment > Training curriculum > Training > Monitor and troubleshoot

**Most Common issues**

- Forgot credentials
- Incorrect access levels granted to user account
- Internet connectivity
- Facing blockers in using system due to user error
- System errors due to untested workflow or conditions
- User is unable to move forward with workflow due to design constraints

**Resolutions**

- System administration (user accounts, sharing, access)
- Training tips (strengthening needed for training materials?)
- Bug fix (develop > test > communicate > release)
- Enhancement (develop > test > communicate > release)




The first few days, weeks and months after an initial rollout are when the project team can expect to see the highest volume of issues reported from end users as they get accustomed to using the system

Remember, this is normal and to be expected. What is important is to PLAN for it and make sure you have set up the appropriate tools, processes and expectations to manage this in the form of a solid HelpDesk with multiple escalation levels

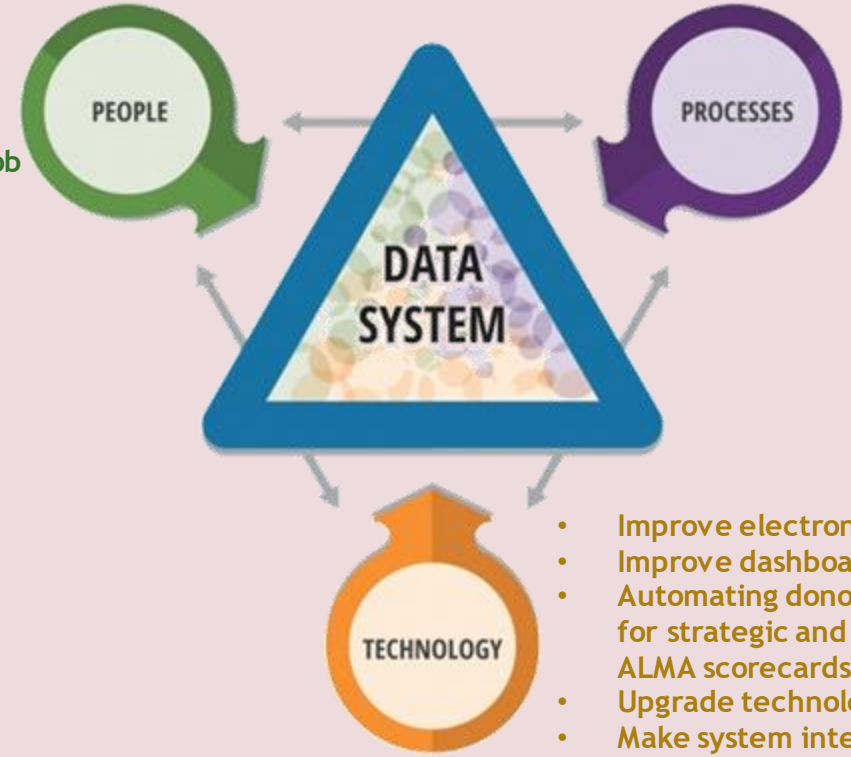
# It will always take time for a system to mature and institutionalize (3-4 years is very common) and reach a strong steady state of consistent use

Groundwork | Design | Develop | Test | Rollout | **Institutionalize**

Iterate on system design > Iterate on SOP's > Embed system data use into daily work and R&R > Periodic M&E > Ongoing system admin + updates

However, this can only happen when the project team dedicated time and effort towards **iterating on the People, Processes, and Technology aspects of the system**

- Iterate on training materials
- Iterate on knowledge repository
- Get feedback on training, SOPs, staff challenges, staff concerns
- Embed system use expectations into job descriptions
- Embed system governance and oversight into TWGs




- Iterate on SOPs
- Update all relevant policies and guidelines to be well-aligned with system
- Ensure HelpDesk and user support processes are robust and feedback/support requests are not being lost
- Ensure processes for day-to-day system administration and periodic updates/enhancements are being coordinated properly across stakeholders

- Improve electronic reporting forms
- Improve dashboards to better align with real-world data use needs
- Automating donor reporting requirements or discrete analysis required for strategic and operational planning (e.g. JAP/JRSM/TEMPF forms, ALMA scorecards, National Strategic Plan)
- Upgrade technology as new features/advancements become available
- Make system interoperable with other key systems

# Tip:

## Because change management is the most difficult part of any system roll-out, embrace quick wins and don't necessarily wait for a system to be "finished" before using it

Groundwork | Design | Develop | Test | Rollout | **Institutionalize**

Iterate on system design > Iterate on SOP's > Embed system data use into daily work and R&R > Periodic M&E > Ongoing system admin + updates

- A sustainable information system requires operational **changes to the way data is reported, managed and accessed**, such as:
  - Reporting via electronic forms instead of emailing Excel reports
  - Accessing dashboards instead of asking staff for reports
  - Monitoring data quality and correcting data on an ongoing basis instead of one-off cleaning exercises to fulfill reporting obligations
  - Providing end user support with device and system usage

- This requires revisions to **SOPs, guidelines, supervision activities, and job descriptions**, and takes years to institutionalize

- Planning system development and roll-out in incremental stages helps substantially in **"piloting" operational changes** – these operational refinements and iterations are just as important as the system-specific ones and can reveal critical challenges with stakeholder buy-in

- You may spend a whole year building a system, only to find out a LOT of rework needs to be done once it is released to real world users – **a phased approach catches design and workflow issues early on**, while getting users into **the habit of using a system**

- A large system with many moving parts can be overwhelming – **start simple and let users gradually increase their skills, competencies, and confidence**

# As part of ongoing improvements, work to align the repository with the types of donor reporting and analytical efforts staff dedicate time towards

Groundwork | Design | Develop | Test | Rollout | **Institutionalize**

Iterate on system design > Iterate on SOP's > Embed system data use into daily work and R&R > Periodic M&E > Ongoing system admin + updates

Pay attention to moments where end users defer to extracting/downloading data from the repository and conducting additional analyses and transformations. How can we help automate the reports and analyses?

- Organize the data so its easier to extract and plug into external templates
- Create ready-to-go outputs to automate and save time on reporting obligations
- Build pipelines with more sophisticated analytical tools like Tableau or R Shiny

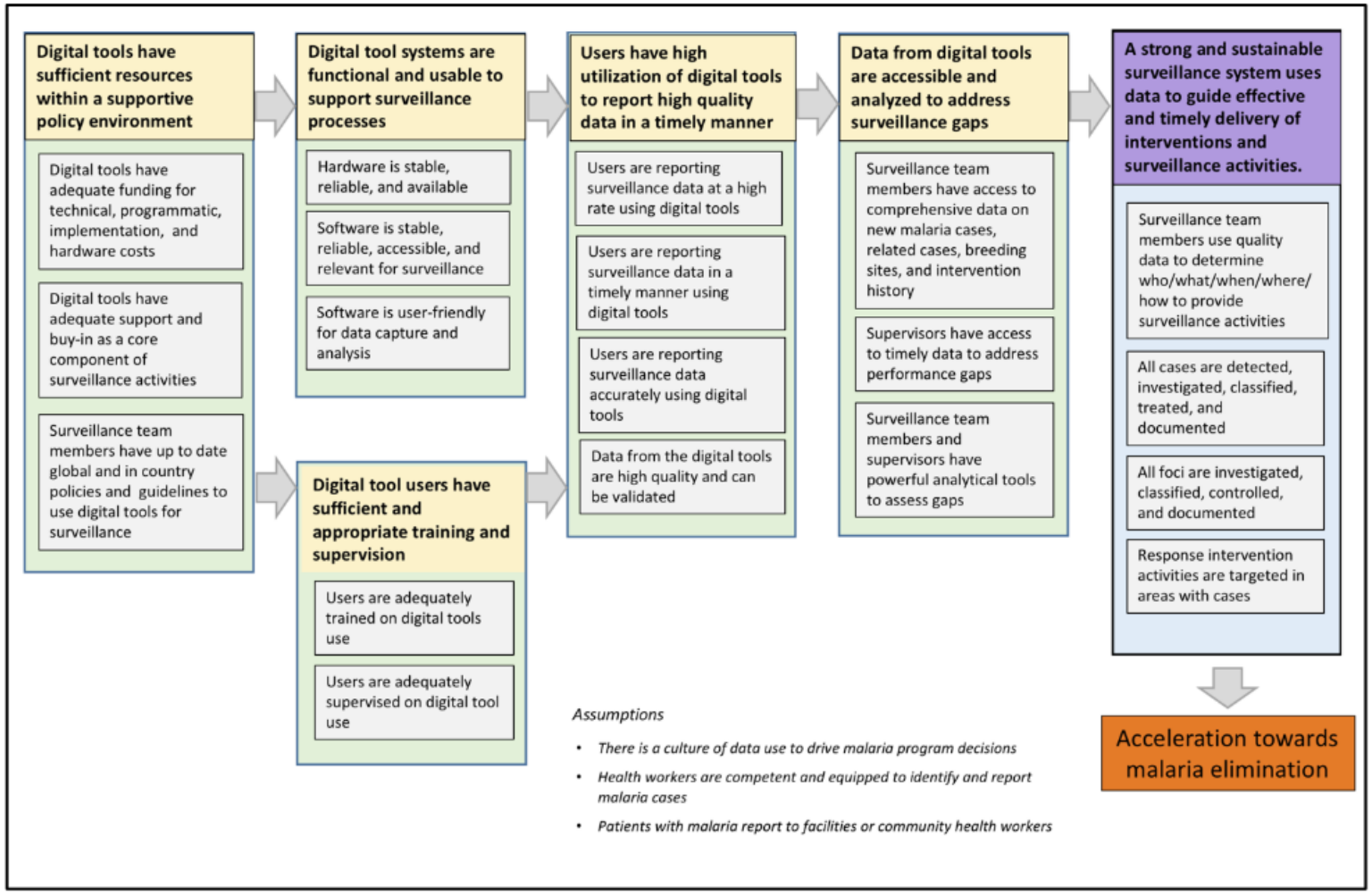
Specific areas to align with:

- GNARF reports to WHO
- JAP, JRSM, EPIRF, TEMPF reports to ESPEN

# Programs should continuously monitor and periodically evaluate the performance of the data system and use results to drive improvements

Groundwork | Design | Develop | Test | Rollout | Institutionalize

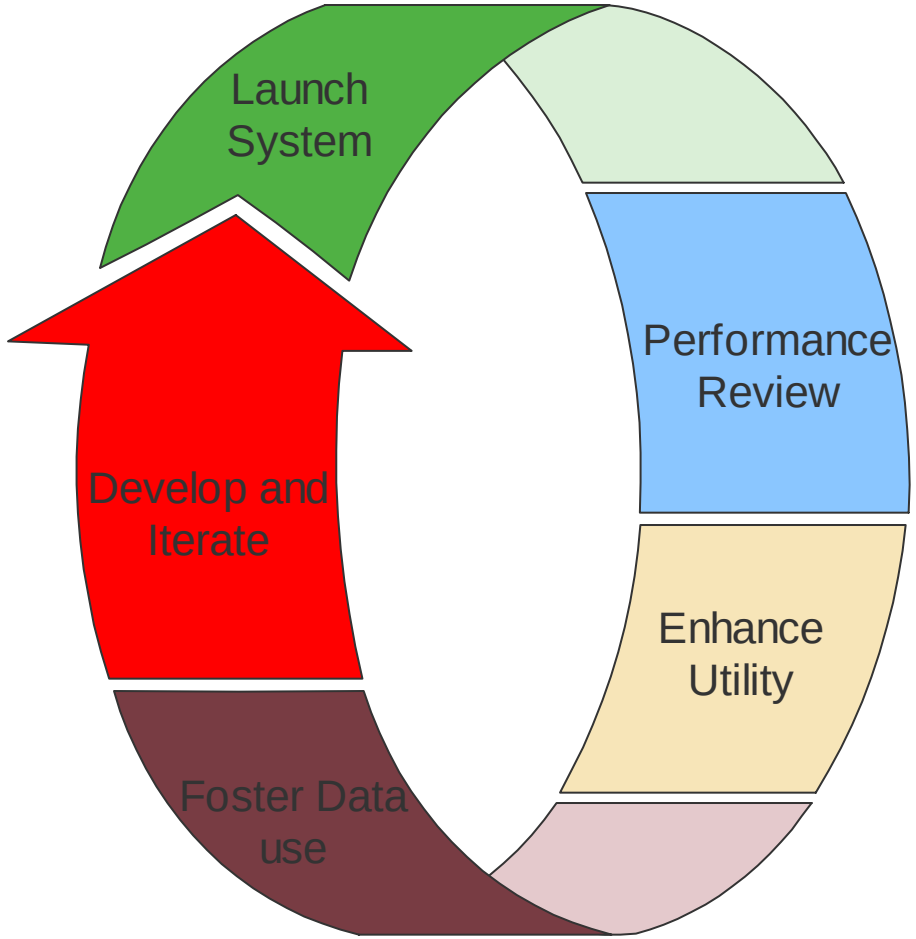
Iterate on system design > Iterate on SOP's > Embed system data use into daily work and R&R > Periodic M&E > Ongoing system admin + updates




This type of system evaluation should be guided by the NTD program's broader National Strategic Plan and accompanying M&E framework

Figure from Digital Solutions for Malaria Elimination M&E Framework, which can be further adapted for NTDs

# Keep iterating - use data review activities to unpack what is not working well




- **Despite data accessibility, data use is not intuitive**. Significant efforts are needed post-launch to optimize system performance.
- Analyze areas of strength and potential weaknesses. **Continuously enhance** utility based on findings from review phase.
- It's not a one-time process, but a **commitment to continuous improvement**
- Fostering data use is more than simply making it available. It demands ongoing **engagement and system refinement**.

# See Data System and Repository for NTDs - Planning Workbook for templates

**WORKBOOK INTRODUCTION**

**This workbook provides Excel templates designed to help countries scope, design, and plan for the development of 1) NTD mainstreaming into core MoH systems and 2) integration of NTD data into a data repository. For background, explanations, and detailed process guidance around end-to-end steps, refer to the guidance deck linked below. The templates presented in the deck are all found within this workbook.**

Link: Practical Approach to Creating an NTD Data Repository

**SHEET NAVIGATION**

| # | Label | Explanation and Intended Use | Intended Outputs/Outcomes |
|---|---|---|---|
| N/A | START HERE | Provide orientation on workbook and instructions for use | |
| 1 | WHO NTD Indicator List | This is the full list of indicators across all diseases and programmatic areas that the WHO Global NTD Program suggests for consideration and inclusion in government information systems<br><br>NTD programs can use the linked WHO workbook as a starting point, and indicate:<br>1. Whether the indicator is considered an **applicable and priority indicator** for the country NTD program<br>2. Whether data for the indicator is currently **available**<br>3. What the country's current data source for the indicator's **numerator** is (name of data set/report, e.g. Daily SCH Coverage Report), and how it is currently stored (name of electronic system and storage platform, e.g. HMIS DHIS2, eCHIS CommCare, eLMIS OpenLMIS, Excel, ODK, etc.)<br>4. What the country's current data source of the indicator's **denominator** is, and how it is currently stored (name of data set or report, and name of electronic system and storage platform) | 1. A **high-level target scope** for NTD indicators to include in digital information systems<br><br>2. An **itemization of all data streams** that must be reconciled to achieve an integrated NTD data repository<br><br>3. An itemization of the number of existing unique systems, databases, and reporting files containing the necessary data, for the purposes of mapping out the **degree of data fragmentation.** |
| 2 | Data Source Mapping | This template is intended to consolidate and summarize the **itemized data streams** (from worksheet 1) that must be integrated to achieve the NTD repository's full target scope, and provide further details around frequency, granularity, and years' of historical data available.<br><br>It is organized by thematic area, to help organize the repository work into thematic packages or "modules".<br><br>How to use:<br>1. **List out all the unique data sets/reports identified** from the indicator selection and mapping exercise conducted via the WHO NTD Indicator List (worksheet 1), and organize according to a thematic area that aligns with program organization (e.g. by disease area, or by activity such as MDA/WASH)<br>2. **Document the current reporting flow of the data** (including frequency and temporal/geo-spatial granularity)<br><br>Refer to comments on individual column headers for further details on how to interpret and fill out | **A comprehensive "as-is" data source mapping or data itemization output that ensures all target data sources and their current data flow mechanisms are known.** |

START HERE | 1. WHO NTD Indicator List | 2. Data Source Mapping | 3. Digitization Pathway | 4. Workplan | 5. Budget Categories | 6a. Form Design | 6b. Indicator Design | 6c. Interoperability Design



See Data Repository for NTDs - Planning Workbook for pictured templates