Digital adaptation kit for [health domain abbreviation]

[Title]

# Copyright

[Organization] [year]

Some rights reserved.

This work is available under the Creative Commons Attribution 4.0 licence (CC BY 4.0 <https://creativecommons.org/licenses/by/4.0>)

Under the terms of this licence, you may copy, redistribute and adapt the work, including for commercial purposes, provided the attribution notice below is included in your work. In any use of this work, there should be no suggestion that WHO endorses any specific organization, products or services. The use of the WHO logo is not permitted.

Attribution notice to include in your product:  
This Digital Adaptation Kit (DAK) was developed based on the World Health Organization (WHO) SMART Guidelines methodology, specifically the WHO Standard Operating Procedure (SOP) for developing business requirements documentation in the format of WHO SMART guidelines digital adaptation kits (DAK), available here [URL: https://smart.who.int/ig-starter-kit/index.htm]. WHO is not responsible for the content included in this DAK.

**Disclaimers**

All reasonable precautions have been taken by WHO to verify the information contained in this publication. However, the published material is being distributed without warranty of any kind, either expressed or implied. The responsibility for the interpretation and use of the material lies with the reader. In no event shall WHO be liable for damages arising from its use.

Any dispute arising from or relating to this license, including its validity, interpretation, or application, shall, unless amicably settled, be subject to conciliation. In the event the dispute is not resolved by conciliation within thirty (30) days, the dispute shall be settled by arbitration. The arbitration shall be conducted in accordance with the modalities to be agreed upon by the parties or, in the absence of agreement within thirty (30) days of written communication of the intent to commence arbitration, with the UNCITRAL Arbitration Rules. The parties shall accept the arbitral award as final.

# Contents

[Copyright ii](#_Toc195006439)

[Contents iii](#_Toc195006440)

[Implementation tools v](#_Toc195006441)

[Acknowledgements vii](#_Toc195006442)

[Abbreviations viii](#_Toc195006443)

[Glossary 9](#_Toc195006444)

[Part 1. Overview of SMART guidelines digital adaptation kits 11](#_Toc195006445)

[Background 11](#_Toc195006446)

[Objectives 11](#_Toc195006447)

[How this DAK was developed 11](#_Toc195006448)

[Assumptions 11](#_Toc195006449)

[Part 2. Digital adaptation kit content for [insert health domain abbreviation here] 11](#_Toc195006450)

[Component 1: Health interventions and recommendations 11](#_Toc195006451)

[WHO universal health coverage interventions referenced in this DAK 11](#_Toc195006452)

[Digital health interventions covered in this DAK 11](#_Toc195006453)

[WHO guidelines, recommendations and guidance 12](#_Toc195006454)

[Component 2: Generic personas 14](#_Toc195006455)

[Targeted generic personas 14](#_Toc195006456)

[Related personas 15](#_Toc195006457)

[Additional considerations for contextualizing personas 16](#_Toc195006458)

[Component 3: User scenarios 17](#_Toc195006459)

[How to interpret user scenarios 17](#_Toc195006460)

[User scenario for [a routine vaccination clinic] 18](#_Toc195006461)

[User scenario for [defaulter tracing] 19](#_Toc195006462)

[Component 4: Generic business processes and workflows 20](#_Toc195006463)

[Overview of key processes 23](#_Toc195006464)

[Workflows 27](#_Toc195006465)

[[Additional considerations for adapting workflows 36](#_Toc195006466)

[Component 5: Core data elements 37](#_Toc195006467)

[Simplified list of core data elements 37](#_Toc195006468)

[List of calculated data elements 41](#_Toc195006469)

[[Additional considerations for adapting the data dictionary 41](#_Toc195006470)

[Component 6: Decision-support logic 43](#_Toc195006471)

[Decision-support logic overview 43](#_Toc195006472)

[Decision-support tables 43](#_Toc195006473)

[Decision trees (OPTIONAL section) 47](#_Toc195006474)

[Component 7: Scheduling logic 49](#_Toc195006475)

[Scheduling logic overview 49](#_Toc195006476)

[Scheduling logic 49](#_Toc195006477)

[Component 8: Indicators and performance metrics 52](#_Toc195006478)

[Component 9: High-level functional and non-functional requirements 55](#_Toc195006479)

[Functional requirements 56](#_Toc195006480)

[Non-functional requirements 58](#_Toc195006481)

[Annexes 61](#_Toc195006482)

[Annex 1. Examples of detailed personas 62](#_Toc195006483)

[Annex 2. Additional User Scenarios 63](#_Toc195006484)

## Implementation tools

Core data dictionary [www.linkgoeshere.com](http://www.linkgoeshere.com)

Decision-support logic [www.linkgoeshere.com](http://www.linkgoeshere.com)

Scheduling logic [www.linkgoeshere.com](http://www.linkgoeshere.com)

Indicators and performance metrics www.linkgoeshere.com

High-level functional and non-functional requirements [www.linkgoeshere.com](http://www.linkgoeshere.com)

Business process and workflow diagrams [www.linkgoeshere.com](http://www.linkgoeshere.com)

**List of figures**

[Fig. 1. Overview of key [insert health domain] processesa 26](#_Toc195006485)

[Fig. 2. Workflow [include corresponding letter of the process (i.e. A)]: registration business process 27](#_Toc195006486)

[Fig. 3. Workflow [X]: referral 30](#_Toc195006487)

[Fig. 4. Workflow [Y]: aggregate reporting business process 33](#_Toc195006488)

[Fig. 5. [name of the decision tree] 48](#_Toc195006489)

**List of tables**

[Table 1. Digital health interventions incorporated into the DAK for [insert health domain here] 11](#_Toc195006490)

[Table 2. Descriptions of key generic personas 14](#_Toc195006491)

[Table 3. Descriptions of related personas 16](#_Toc195006492)

[Table 4. Interpretation of the user scenario [“a routine vaccination clinic”] 17](#_Toc195006493)

[Table 5. Interpretation of the scenario [defaulter tracing] 17](#_Toc195006494)

[Table 6. Overview of key business processesa 20](#_Toc195006495)

[Table 7. Business process symbols used in workflows 23](#_Toc195006496)

[Table 8. Workflow core data elements for identified business processes 37](#_Toc195006497)

[Table 9. Calculated data elements 41](#_Toc195006498)

[Table 10. Characteristics for local customization and configuration 41](#_Toc195006499)

[Table 11. Overview of decision-support tables for [insert health domain abbreviation here] module 43](#_Toc195006500)

[Table 12. Components of the decision-support tables 44](#_Toc195006501)

[Table 13. Example decision-support logic table for determining whether TB infection testing is relevant 46](#_Toc195006502)

[Table 14. Overview of scheduling logic 49](#_Toc195006503)

[Table 15. Components of the scheduling logic tables 49](#_Toc195006504)

[Table 16. Example scheduling logic table for “Measles, ongoing transmission schedule” 50](#_Toc195006505)

[Table 17. Indicators and performance metrics 52](#_Toc195006506)

[Table 18. Functional requirements 56](#_Toc195006507)

[Table 19. Non-functional requirements 58](#_Toc195006508)

# Acknowledgements

[Insert the list of contributors here].

# Abbreviations

|  |  |
| --- | --- |
| Abbreviation | Abbreviated term |
| BPMN | Business Process Model and Notation |
| DAK | digital adaptation kit |
| DT | decision support table |
| EMR | electronic medical record |
| FHIR | Fast Healthcare Interoperability Resources |
| HL7 | Health Level Seven International |
| ICD | International Classification of Diseases |
| ICF | International Classification of Functioning, Disability and Health |
| ICHI | International Classification of Health Interventions |
| ID | identification |
| LOINC | Logical Observation Identifiers Names and Codes |
| PCPOSS | person-centred point of service system |
| SMART | standards-based, machine-readable, adaptive, requirements-based and testable |
| SNOMED | Systematized Nomenclature of Medicine |
| WHO | World Health Organization |

# Glossary

|  |  |
| --- | --- |
| **Business process** | A set of related activities or *tasks* performed together to achieve the objectives of the health programme area, such as registration, counselling and referrals *(1, 2)*. |
| **Data dictionary** | A centralized repository of information about the *data elements* that contains their definition, relationships, origin, use and type of data. For this DAK, the data dictionary is provided as a spreadsheet. |
| **Data element** | A unit of data that has specific and precise meaning. |
| **Decision-support logic** | A set of decision rules for standard and exceptional cases that is separate from the *business process*. This would help reduce the complexity of the *business process* depiction without losing the detail necessary for coding the rules required for system functionality. |
| **Decision-support (for health workers)** | Digitized job aids that combine an individual’s health information with the health worker’s knowledge and clinical protocols to assist health workers in making diagnosis and treatment decisions *(3, 4)*. |
| **Decision-support table** | Semi-structured way to depict each discrete decision that will need to be embedded in the system. Depending on the complexity of the clinical guidelines, there will likely be multiple decision-support tables. |
| **Digital health** | The systematic application of information and communications technologies, computer science and data to support informed decision-making by individuals, the health workforce and health systems, to strengthen resilience to disease and improve health and wellness *(1, 5)*. |
| **Digital tracking** | The use of a digitized record to capture and store clients’ health information to enable follow-up of their health status and services received. This may include digital forms of paper-based registers and case management logs within specific target populations, as well as electronic medical records linked to uniquely identified individuals *(3, 4)*. |
| **Functional requirement** | Capabilities the system must have to meet the end users’ needs and achieve *tasks* within the *business process*. |
| **Health information system** | A system that integrates data collection, processing, reporting and use of the information necessary for improving health service effectiveness and efficiency through better management at all levels of the health services *(6)*. |
| **Health management information system (HMIS)** | An information system specifically designed to assist in the management and planning of health programmes, as opposed to delivery of care *(6)*. |
| **Interoperability** | The ability of different applications to access, exchange, integrate and use data in a coordinated manner through the use of shared application interfaces and standards, within and across organizational, regional and national boundaries, to provide timely and seamless portability of information and optimize health outcomes. |
| **Non-functional requirement** | General attributes and features of the digital system to ensure usability and overcome technical and physical constraints. Examples of non-functional requirements include the ability to work offline, multiple language settings and password protection. |
| **Persona** | A generic aggregate description of a person involved in or benefitting from a health programme. |
| **Person-centred point of service system (PCPOSS)** | A digital system that facilitates the provision of health services to individuals (i.e. persons, clients, patients, health-service users) at the point of service or point of care. This includes software capabilities that enable health workers to access, record and update individuals’ health information as well as software capabilities that enable health workers to communicate with individuals. PCPOSS encompass various services and application types, including community-based information systems, decision-support systems, electronic medical (or health) record systems and personal health records *(3)*. |
| **Standard** | In software, a standard is a speciﬁcation used in digital application development that has been established, approved and published by an authoritative organization. These rules allow information to be shared and processed in a uniform, consistent manner independent of a particular application. |
| **Task** | A specific action in a *business process*. |
| **Terminologies** | For clinical care, terminologies are structured vocabularies covering health-related concepts, such as diseases, diagnoses, laboratory tests and treatments, to enable the storage, analysis and exchange of data in a consistent and standard way *(7).* |
| **Workflow** | A visual representation of the progression of activities (*tasks*, events, decision points) in a logical flow illustrating the interactions within the *business process (2)*. |

*Note*: Terms in definitions that are also defined in this glossary are shown in *italics*.

# Part 1. Overview of SMART guidelines digital adaptation kits

## Background

[provide any information that helps clarifying the scope of the DAK, the rationale and the pillars on which it was developed]

## Objectives

[provide objectives here]

## How this DAK was developed

[indicate the process that was followed to develop the content of the DAK: what source documents were reviewed, what stakeholders were consulted and validated the content, declare any potential conflict of interest, etc.]

## Assumptions

[insert any relevant assumptions here, for example

# Part 2. Digital adaptation kit content for [insert health domain abbreviation here]

## Component 1: Health interventions and recommendations

This DAK focuses on the following health interventions and recommendations related to **[insert health domain abbreviation here]**.

### WHO universal health coverage interventions referenced in this DAK

The key interventions for **[insert health domain abbreviation here]** referenced in this DAK, as defined in the WHO universal health coverage list of essential interventions and WHO **[insert health domain abbreviation here]** guidelines and guidance documents, are the following:

* **Insert bulleted list of relevant interventions for the health domain here based on the UHC compendium of interventions and other resources if relevant.**

### Digital health interventions covered in this DAK

[Table 1](#Table_DHIs) lists the digital health interventions incorporated into this DAK, extracted from the WHO Classification of Digital Interventions, Services and Applications in Health *(3)*:

Table 1. Digital health interventions incorporated into the DAK for [insert health domain here]

|  |  |
| --- | --- |
| **DHI Category** | **DHIs** |
| 1.1 Targeted communication to persons | 1.1.1 Transmit health event alerts to specific population group(s)  1.1.2 Transmit targeted health information to specific person(s)based on health status or demographics  1.1.3 Transmit targeted alerts and reminders to person(s)  1.1.4 Transmit diagnostics result, or availability of result, to person(s) |
| 2.1 Identification and registration of persons | 2.1.2 Enrol person(s) for health services/clinical care plan |
| 2.10 Laboratory and diagnostics imaging management | 2.10.1 Transmit person’s diagnostic result to healthcare provider  2.10.2 Transmit and track diagnostic orders  2.10.3 Capture diagnostic results from digital devices |
| 2.2 Person-centred health records | 2.2.1 Longitudinal tracking of person’s health status and services  2.2.2 Manage person-centred structured clinical records  2.2.3 Manage person-centred unstructured clinical records (e.g. notes, images, documents)  2.2.4 Routine health indicator data collection and management |
| 2.3 Healthcare provider decision support | 2.3.1 Provide prompts and alerts based according to protocol  2.3.2 Provide checklist according to protocol  2.3.3 Screen persons by risk or other health status |
| 2.5 Healthcare provider communication | 2.5.2 Communication and performance feedback to healthcare provider(s) |
| 2.6 Referral coordination | 2.6.1 Coordinate emergency response and transport  2.6.2 Manage referrals between points of service within health sector |
| 2.7 Scheduling and activity planning for healthcare providers | 2.7.1 Identify persons in need of services |
| 4.1 Data Management | 4.1.2 Data storage and aggregation  4.1.3 Data synthesis and visualizations |

### WHO guidelines, recommendations and guidance

The DAKs are intended to reflect health recommendations and content that has already been published in WHO guidelines and guidance documents. The health content and interventions for this DAK are based on the following WHO documents:

[insert all L1 guidelines and guidance documents used to inform this DAK here. Provide thumbnail and link to original document. For WHO publications the IRIS links should be provided, if available: <https://iris.who.int/>. Add rows as necessary]

|  |  |
| --- | --- |
| **[Provide thumbnail and link to original document.]** | **[Provide thumbnail and link to original document.]** |
| **[Provide thumbnail and link to original document.]** | **[Provide thumbnail and link to original document.]** |

Other WHO guidance represented in the DAK includes the following:

* **[Provide links to other relevant document.]**
* **…**

## Component 2: Generic personas

A persona is a depiction of a relevant stakeholder or end-user of the system.

[Although the specific roles and demographic profiles of the personas will vary depending on the setting, the generic personas should be based on the WHO core competencies and credentials of different health worker personas. Please note that generic personas presented in WHO DAKs are developed based on synthesis across multiple contexts as a starting point. If the DAK team decides to reuse personas described in WHO DAKs, further contextualization will be required according to the needs, motivations and challenges of the targeted personas in each setting.]

### Targeted generic personas

The targeted personas for this **[insert health domain abbreviation here]** DAK are health workers operating in care settings that are able to provide the required essential interventions for **[insert health domain abbreviation here]** caredelivery. In the case of **[insert health domain abbreviation here]**, **[insert health worker occupational group here]** are the primary personas for the digital client health record and decision-support systems. In the health systems surveyed for this DAK, the common combination of service providers was **[Insert health worker occupational group description here]**. The key competences of **[Insert health worker occupational group description here]** are defined by WHO as follows ([Table 2](#Table_generic_personas)) *(8)*.

[Note: A “persona” is a generic depiction of a relevant stakeholder, or “end-user” of the system. As the specific roles, demographic profiles, challenges and motivations, would vary greatly depending on the context and setting, “generic” versions of a “user personas” should be included in the DAK. Thus, “generic personas” for any health area should reflect WHO task shifting guidelines, national health workforce guidelines, and general commonalities found across multiple settings. The creation of personas requires interviews with real people (i.e. real health workers), and there should be a distillation of the various interviews you’ve conducted into the “generic personas”. For example, if you’ve interviewed nurse midwives in two countries, a “generic persona” for a nurse midwife would be a combination of the commonalities between those two nurse-midwives. Note that this is the area that will require significant contextualization into “user personas” in countries. Context-specific “user personas” can be added as an additional annex.]

Table 2. Descriptions of key generic personas

| **Name** | **Description** | **Different names** | **International Standard for Classification of Occupations code** ***(9)*** |
| --- | --- | --- | --- |
| *The name of your end user that is generally understood based on language used in international guidelines e.g. Auxiliary nurse midwife, Obstetrician/ Gynecologist, etc.* | *The description should be based on WHO task shifting guidelines and/or national guidelines. This would include key information such as roles and responsibilities, key competencies, and level of training.* | T*here can be many names that are generally recognized for a single occupational title. For example, a “Nurse” can also be referred to as a “Registered Nurse” or “Nurse Practitioner” or something else. Alternatively, sometimes there has yet to be a consensus on what term should be used for a specific health worker occupational group. For example, “lay health worker” is sometimes also referred to as “community health worker”, “community health volunteer”, “village health worker”, or something else. These should be listed to facilitate understanding.* | *The ISCO code is an occupational classification system managed by the International Labour Organization (ILO) that allows for less ambiguity when defining the key personas that your digital accelerator kit is targeted towards. At the time of publication, the most current version is ISCO-08 (**[[1]](#footnote-2)).* |
| Nurse | A graduate who has been legally authorized (registered) to practise after examination by a state board of nurse examiners or similar regulatory authority. Education includes 3, 4 or more years in nursing school, and it leads to a university or postgraduate university degree, or the equivalent. A registered nurse has the full range of nursing skills. | Registered nurse, nurse practitioner, clinical nurse specialist, advance practice nurse, practice nurse, licensed nurse, diploma nurse, BS nurse, nurse clinician | 2221 (nursing professionals) |
| BS: Bachelor of Science. | | | |

### Related personas

In addition to the targeted personas detailed above, there may be value in exploring other health worker occupational groups and personas within the context of **[Insert health domain abbreviation here]** services, such as **[Insert health worker occupational group here]**. However, these were not identified as the central personas for the data and decision-support content detailed in this DAK. Additional related personas are listed in [Table 3](#Table_related_personas).

Table 3. Descriptions of related personas

| **Name** | **Description** | **Different names (if relevant)** | **International Standard for Classification of Occupations code**  **(if relevant) *(9)*** |
| --- | --- | --- | --- |
| *The name of your end user that is generally understood - this would go beyond the health care provider who would be using the person-centred point of service systems* | *The description should be a generic description of the persona. For example, an ANC client’s description would be a ‘Pregnant woman’. There wouldn’t be any specificities such as average age, etc. because those are highly context specific.* | T*here can be many names that this persona is also known as. For example, a ‘physician’ can also be referred to as a ‘doctor’.* | *If the related persona is a health care provider, then the ISCO code should also be included if relevant. At the time of publication, the most current version is ISCO-08*. |
| Client | A man or woman who intends to receive family planning services from the targeted health worker personas. A client who is under 19 years of age is considered to be an adolescent. | Family planning client | N/A |
| Community health worker | Community health workers provide health education, referral and follow-up; case management and basic preventive health care; and home visiting services to specific communities. They provide support and assistance to clients seeking TB-related services and their families in navigating the health and social services system. | Health extension worker, community health volunteer, village health worker, treatment supporter, outreach worker, lay health worker, peer counsellor | 3253 (community health workers)  3259 (health associate professionals not classified elsewhere) |
|  | | | |

### Additional considerations for contextualizing personas

Although this section provides an overview of the generic roles of the targeted personas, it will be important to contextualize these personas to your setting. The generic personas described in Tables 3 and 4 can be supplemented by reflecting on these additional considerations.

* **background and demographics:** such as gender, age, whether they are from the community, familiarity with digital devices and whether they have access to a mobile phone or smartphone;
* **local environment** **and any relevant contextual information about their surroundings** such as work-site characteristics, rural/urban location, availability of electricity, water and internet and distance from the nearest referral facility;
* **expected roles and responsibilities** based on the country context and how does these differ from the roles and responsibilities defined by WHO;
* **actual roles and responsibilities** whether there is any difference from expected roles and responsibilities;
* **context such as** internet connectivity, how personas are compensated, distance from the nearest referral facility and which other personas or health workers they interact with;
* the day-to-day **challenges** the end-user may face;
* **motivations** such as what does success looks like to them and whether there are targets they need to achieve.

See [Annex 1](#Annex_examples_personas) for examples of contextualized personas. For more details on persona development, please refer to the WHO *Digital transformation handbook for primary health care: optimizing person-centred point of service systems* *(10)*.

## Component 3: User scenarios

User scenarios are a narrative description of how the end-user could interact with the digital system. The user scenario permits a better understanding of how the system will be used and how it could fit into existing workflows. The user scenario provides context in a story telling format. Within the user scenario, it should be possible to derive the key components that are further elaborated in the rest of the DAK. This includes the core data elements, decision-support logic and core functionality of a digital system that would be needed. Although there is no clear template for a user scenario, it should:

* include personas involved based on the generic personas component;
* have narrative description of who and how a digital system would be used;
* provide details on what kinds of data are collected and what kinds of decisions are made;
* reflect the workflows that ware further elaborated in Component 4: generic business processes and workflows.

### How to interpret user scenarios

User scenarios are helpful tools for better understanding the context in which a digital tool would operate. They offer insights into the key data elements that need to be recorded and accounted for in the database. The context in which the tool would operate, illuminated by user scenarios, provides insight into some functional and non-functional requirements that the system would need. For example, highlighted in yellow are some key data elements that need to be recorded or calculated. The decision-support logic that can be automated in the system is highlighted in blue. Some key functional and non-functional requirements that should be included in the system are highlighted in green.

Tables [4](#Table_interpretation_scenario1) and [5](#Table_interpretation_scenario2) show the interpretation of the user scenarios **[****insert scenarios here]**.

Table 4. Interpretation of the user scenario [“a routine vaccination clinic”]

|  |  |  |
| --- | --- | --- |
| Data elements to be collected | Decision logic to be embedded | Functional and non-functional requirements |
| Unique identifier  Name  Date of birth  Vaccine type  Date and time of vaccination | Determine which vaccines are due at this time (taking into account last vaccine date and national vaccine schedule)  Determine which vaccines are due for the next visit (taking into account last vaccine date and national vaccine schedule) | Ability to generate SMS messages based on trigger events  Indicate consent to receive reminders |

Table 5. Interpretation of the scenario [defaulter tracing]

|  |  |  |
| --- | --- | --- |
| Data elements to be collected | Decision logic to be embedded | Functional and non-functional requirements |
| Name  Sex  Date of birth  Caregiver’s full name  Contact phone number  Administrative area  Vaccine type  Date and time of vaccination | Determine list of vaccines due for each child (taking into account last vaccine date and national vaccine schedule)  Determine if vaccines are past due (by more than a set number of days) for each child | Register children who have been vaccinated or those to be vaccinated  Generate a list of children who are due (or overdue) for a vaccine within a specific timeframe and catchment area  Send a list of children who are overdue for follow-up to another health worker  Ability to automatically send SMS messages reminders |

### User scenario for [a routine vaccination clinic]

|  |  |
| --- | --- |
| Key Personas | * Caregiver (mother): Ruth * Child: Esther * Health worker: Lucy |
| Ruth is 21 years old and Esther, her first baby, is 10 weeks old. Ruth completed primary school and has basic literacy. Her husband attended secondary school for three years, but he did not finish. They all live in a two-room house with intermittent electricity in a village near Msindo.  Esther was born at home. Although Esther’s birth was not registered (and she does not have a birth certificate), the clinic (also known as the vaccination location) assigned an ID to Esther when Ruth took her in for her first round of immunizations shortly after her birth. It takes Ruth just over an hour to walk to the Msindo clinic from her home. Ruth enjoys going to the clinic as it is a chance to talk to other new mothers, and she gets helpful information from the nurse about keeping her baby healthy.  The Msindo clinic is open five days a week in the morning. There are three nurses who work at the clinic, one of them being Lucy who has 12 years of experience and a diploma in nursing. Lucy is responsible for ensuring the delivery of scheduled vaccines to children as part of the “Under-5 Programme”. She screens and monitors children who are at risk and may require intervention to prevent future health issues. Lucy also provides preventative care (such as vaccines and other supplements) and teaches mothers about various health topics related to their child(ren).  Ruth and Esther arrive at the clinic just after 09:00, and there are already five other mothers waiting in line with their babies. When it is Ruth’s turn, she goes to the table where Lucy is sitting and hands her Esther’s paper vaccination card (or home-based record), which she received during Esther’s first clinic visit. The card contains Esther’s name, date of birth and a record of each vaccine given, as well as her weight at that visit. Lucy uses the ID on the top of the card to look up Esther’s record on her tablet. She finds the record and can see in the system that Esther is due for four vaccines at this time. Lucy weighs Esther using the scale set up beside the desk, and she records her weight on both the paper card and in the electronic immunization registry (EIR) on her tablet for growth monitoring. She tells Ruth that Esther is gaining weight well, and they briefly discuss some questions Ruth has about breastfeeding.  Lucy takes the appropriate vaccines out of the small cooler box beside her table. She filled the cooler box earlier that morning based on what she would typically need based on an average clinic day. She has access to more vaccines, but they are in the refrigerator in the storage room. She prepares each vaccine, making sure that it is not expired and that the small symbol on the vial indicates it is safe to give. Lucy administers each vaccine (starting with the ones given by mouth, then the injections) to Esther. While Ruth comforts Esther, Lucy records the vaccines given in the EIR on the tablet, as well as on Esther’s paper card. She tells Ruth when to bring Esther back for her next vaccines, and she also writes this on Esther’s paper card. Lucy also advises Ruth on what to do if Esther develops a fever or other symptom(s) following vaccination. Since the clinic operates every weekday morning, Ruth understands that while she should try to come on the date given, it is not an actual appointment and just a guideline to come within a day or two of that date. Lucy also informs her that they have a new system that can send SMS reminder when Esther is due for a vaccine to her phone if she would like. Ruth agrees that she would like this reminder, and Lucy confirms her phone number in the system and checks the box that indicates she would like to receive these notifications. | |
| Corresponding business processes (see Component 4) | This scenario refers to the following business processes:  C. Client registration  D. Administer vaccine  E. Client reminder |

### User scenario for [defaulter tracing]

|  |  |
| --- | --- |
| Key Personas | * Health worker: Lucy * Community health worker: Aminata |
| At the Msindo clinic, Lucy is responsible for ensuring the delivery of scheduled vaccines to children as part of the “Under-5 Programme”. Lucy has an estimate for the number of children that need to be vaccinated in the clinic. This estimated number is based on the population her clinic serves, as it is the only clinic in the area. Lucy works closely with Aminata, a community health worker, to find and encourage caregivers to bring their children to the clinic for vaccination. Aminata lives in the village and is the wife of the school’s headmaster. She is well respected in the community and has been a community health worker for the past 10 years. Although she is not paid for this work, she is happy to know she is helping her community raise healthy children. She is responsible for both children and pregnant women, and she regularly councils them to ensure they attend appointments and get the care they need in a timely manner. Aminata has completed secondary school, and her training for this role has been both on the job, as well as some workshops that are held a few times a year.  At the clinic, Lucy registers each child who has come for their first vaccines in the electronic immunization registry (EIR), which has been implemented to replace the cumbersome paper ledger book. The child’s name, sex, date of birth, caregivers’ name and some other identifying information are entered into the EIR, and the EIR notes which vaccine(s) are needed. Lucy enters the date each vaccine is given into the EIR and no longer needs to add the same information into a large paper ledger book.  Now with an EIR in place, Lucy no longer takes several hours each week reviewing her paper ledger and calculating overdue status to determine which children need follow-up. Lucy can see on her tablet the list of children who are overdue or late for their vaccines based on the vaccine schedules determined by national policies and their relevant contact information she may need for follow-up (e.g. caregivers’ name and contact info). This list is also sent to Aminata via an SMS message once a week so that she can help with follow-up. At the clinic, the staff started using the EIR to automatically send an SMS message to the caregiver to remind them when their child is due to come for the next vaccine. Lucy is hopeful that this will help to reduce the number of children who are brought in late for their vaccines. | |
| Corresponding business processes (see Component 4) | This scenario refers to the following business processes:  B. Plan service delivery  C. Client registration  E. Client reminder  F. Defaulter tracing  I. Report generation |

## Component 4: Generic business processes and workflows

A business process is a set of related activities or tasks performed together to achieve the objectives of the health programme area, such as registration, counselling and referrals *(1, 2)*. Workflows are a visual representation of the progression of activities (tasks, events, interactions) that are performed within the business process *(2)*. The workflow provides a story for the business process being diagrammed and is used to enhance communication and collaboration among users, stakeholders and engineers.

This DAK focuses on key business processes conducted by the personas (described in Component 2: generic personas) as part of [insert health service area here] care service provision. These generic business processes are listed in [Table 6](#Table_overview_business_processes). For each business process, the corresponding business processes, data elements and decision-support needs are detailed in the following sections of this document.

[Once all workflows are identified, start going through each workflow and do the following:

* Define the start and the end points;
* Define the workflow and describe its activities;
* For each workflow defined then derive the data elements needed, and the decision-support needed.

Note: The ‘.bpmn’ file of each business process should be exported and stored in a repository (such as a GitHub repository). The link to the repository where the BPMN files of the business processes are stored can be included in this document. In this way anyone wanting to reuse/modify/adapt the business processes based on local needs and context can easily do that.]

Table 6. Overview of key business processesa

| **Corresponding letter for process** | **Process name** | **Process ID** | **Personas** | **Objectives** | **Task set** |
| --- | --- | --- | --- | --- | --- |
| [Alphabets series from A, B, C so on and so forth.] | Title | ID used to reference this process throughout the DAK  [This will be important for referencing the other components like data elements and decision logic. It is simply the “abbreviated health domain.#” For example, “ANC.B” refers to the “Routine ANC Contact” process.] | Individuals interacting to complete the process  [Which groups of people or key functions and roles are involved in completing the process? E.g. Nurse, Head Nurse, Community Health Worker, District Health Office, Client  Note: These are the groups that should be reflected in each swim lane of your workflow diagram] | A concrete statement describing what the process seeks to achieve  [What is the purpose of this process? A short description of the process can be detailed here as well.] | The general set of activities performed within the process  [What are the key tasks, aligned with the health worker occupational groups’ roles and responsibilities that are involved in this business process? What activity triggers the start of this process? When does this process end?] |
| **A** | Registration | [health domain abbreviation].A | * Client * Data entry clerk, medical office receptionist or health worker | To identify and register or update the client’s personal details so that they can benefit from [health domain abbreviation]-related services. | *Starting point: The client arrives at the facility and checks in with clerk,* *receptionist or health worker. Another option is when the health worker makes contact with the client at his location (home, workplace, detention place)*   * Search for client record * Review and update client record * Create a new client record |
| **B** | [business process name] | [health domain abbreviation].B | * Client * Health-care provider (clinician, nurse midwife or community health worker) | To discuss possible family planning methods with client and for client to select a method that they are medically eligible for | *Starting point: Client has been registered at the health-care facility and called in for counselling. Family planning counselling can happen alongside other health services (e.g. nutrition counselling, child immunizations)*   * Take client history * Conduct a risk assessment * Discuss issues and concerns if a returning client or a client already on a method |
| **C** | [business process name] | [health domain abbreviation].C | * Client * Health-care provider | To provide the method(s) or service(s) the client requires if the client is medically eligible for them | *Starting point: Client has selected a method and is medically eligible or eligible with clinical judgement*   * Obtain informed consent * Determine when to start method * Provide method and/or explain how to use method * Discuss dual protection * Determine follow-up requirements and schedule follow-up, if needed |
| **[X]** | Referral | [health domain abbreviation.[X] | * Client * Health worker | To provide timely and appropriate referrals to another health-care facility that can provide services unavailable within this facility. | *Starting point: The clinician determines client needs for services that are not available at this facility.*   * Determine whether it is an emergency referral * Discuss referral locations * Contact destination facility * Provide information to destination facility   Discuss any questions with the client |
| **[Y]** | Aggregate reporting and data use | [health domain abbreviation.[Y] | * Health worker * District health information officer | To aggregate client-level data into validated, aggregate reports, use the data and submit reports at the facility level. | *Starting point: Time for periodic (usually monthly) reporting*   * Check data quality * Correct fixable errors * Generate and review aggregate reports * Submit for approval * Provide feedback and any changes required |
| *a The generic business processes described in the DAK are those listed in this table. Processes that are part of [health domain abbreviation] service delivery but not included in this DAK include billing, dispensing and [other specific processes] (coloured in grey in the overview of key [health domain abbreviation] processes diagram [*[*Fig. 1*](#Fig_overview_business_processes)*]). These processes may be required but are highly country and context-specific. If applicable, the billing business process could include an insurance or coverage check, which could take place at any one of many points during a [health domain abbreviation] visit. All the processes that are part of [health domain abbreviation] service delivery are shown in* [*Fig. 1*](#Fig_overview_business_processes)*. The editable files of each business process in .bpmn format are available as an implementation tool ().* | | | | | |

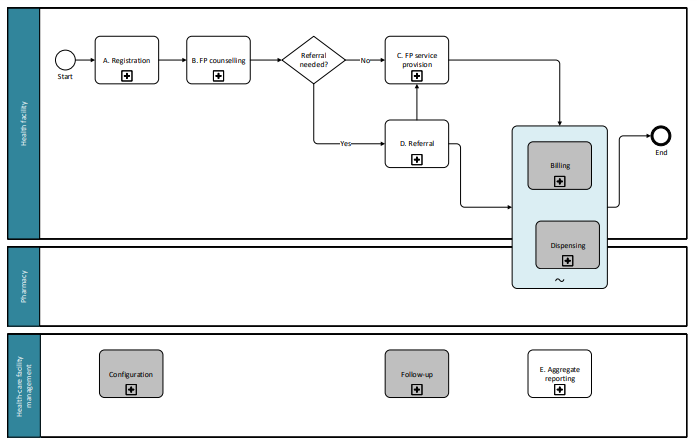
### Overview of key processes

This section illustrates the workflows of the identified processes using standardized notations for business process mapping, based on the business process model and notation (BPMN) standard *(11)*. [Table 7](#Table_BPMN_notation) provides an overview of this notation.

Table 7. Business process symbols used in workflows

| **Symbol** | **Symbol name** | **Description** |
| --- | --- | --- |
|  | **Pool** | The pool assumes process control and assigns tasks. A **pool** consists of one or more “swim lanes” that depict all the individuals or types of users involved in carrying out the business process or workflow. Diagrams should be clear, neat and easy for all viewers to understand the relationships across the different swim lanes.  For example, a pool could depict the business process of conducting an outreach activity, which involves multiple stakeholders represented by different swim lanes.  A business process diagram can contain two or more pool that connect through message flows (messages received from outside the pool) - this indicates different process owners collaborating and exchanging information.  For example, in the case of a referral, health facility “A” (the referring facility) represents the process owner that internally assigns the tasks for the actors represented as swim lanes. Health facility “B” (the receiving facility) has allocated its own pool and is considered a different process owner with the same role. These two facilities exchange information relevant for a referral (e.g. client history, referral details), represented as message flows, but each facility has control only over the internal activities, without directly impacting the activities of the other facility. |
|  | **Swim lane** | Each individual or type of user is assigned to a **swim lane**, a designated area for noting the activities performed or expected by that specific actor.  For example, a [health domain abbreviation] health worker may have one swim lane, the supervisor another swim lane and the clients another swim lane. |
|  | **Start event or trigger event** | The workflow diagram should contain a **start event** and an end event, defining the beginning and completion of the task. |
|  | **Start event message** | This is a type of a **start event**. In some instances the workflow can start with a **message**. A “message” in business process model and notation does not mean only letters, emails or calls, but includes also information exchanged between two different systems (e.g. data exchange, notifications). Any action that refers to a specific addressee and represents or contains information for the addressee is a message. |
|  | **End event** | Multiple **end events** can be depicted across multiple swim lanes in a business process diagram. For clarity, there should be only one end event per swim lane. |
|  | **Activity, process, step or task** | Each **activity** should start with a verb, such as “register client” or “calculate risk”. Between the start and end of a task, there should be a series of activities noting the successive actions performed by the actor for that swim lane. There can be subprocesses for each activity. |
|  | **Activity with subprocess** | This denotes an activity that **has a much longer subprocess,** which is detailed in another diagram. If the diagram is too complex, the subprocess symbol should be used to reference another process depicted on another page. |
|  | **Activity with business rule** | This denotes a decision-making activity that requires the **business rule**, **decision-support logic or scheduling logic** to be detailed in a decision-support table. This means that the logic described in the decision-support table will come into play during this activity as outlined in the business process. This is usually reserved for complex decisions. |
|  | **Sequence flow** | This denotes the **flow direction** from a process to the next process. The end event should not have any output arrows. All symbols (except for the start event) may have an unlimited number of input arrows. All symbols (except for the end event and gateway) should have one and only one output arrow, leading to a new symbol, looping back to a previously used symbol or to the end event symbol. Connecting arrows should not cross over each other. |
|  | **Message flow** | This denotes the **flow of data or information** from a process to another process. This is usually used for when data are shared across pools. |
|  | **Exclusive gateway** | This depicts a fork or decision point in the workflow. This may be a simple binary (e.g. yes/no) filter with two corresponding output arrows, or a different set of outputs.  Only two different outputs should originate from a decision point. If more than two output or sequence flow arrows are needed, you are likely trying to depict decision-support logic or a business rule, which should be depicted as an **activity with a business rule** instead (see above). |
|  | Parallel gateway | This is used to model concurrency in a process. This type of gateway allows forking into multiple paths of execution or joining multiple incoming paths of execution. An important difference between this and other gateway types is that the **parallel gateway** does not evaluate conditions. |
|  | **Throw – link event** | This serves as the start of an off-page connector. It is the end of the process when there is no more room on the page for that workflow. It is the end of a process on the current page or the end of a subprocess that is part of a larger process. A **catch – link** event must follow the **throw – link** event. |
|  | **Catch – link event** | This serves as the end of an off-page connector. It is the start of a new process on a different page from the **throw – link** event or the start of a subprocess that is part of a larger process. A **throw – link** event must be aligned to a **catch – link** event. |
|  | **Ad hoc subprocess** | An **ad hoc subprocess** can contain multiple activities (tasks or subprocesses), which can be executed in any order, executed several times, or skipped. However, not all these activities need to be finished before moving on to the next activity. |
|  | **Loop activity** | Thisindicates that the activity repeats until a defined condition applies or ceases to apply. The condition on which a loop executes is included as an annotation. |

Fig. 1. Overview of key [insert health domain] processesa



a For key [health domain abbreviation] processes, see [Table 6](#Table_overview_business_processes).

### Workflows

Workflows represent the progression of activities performed within the business process. They help users and stakeholders understand the relationship between activities, data elements and decision-support needs. The workflows shown here depict processes that have been generalized and may not reflect variation and nuances across different settings. The simplicity of the workflow may not adequately illustrate non-linear steps that may occur.

#### A. Business process for registration

**Objective:** To identify and register or update the client’s personal details so that they can benefit from [health domain abbreviation]-related services ([Fig. 2](#Fig_Registration_business_process)).

Fig. 2. Workflow [include corresponding letter of the process (i.e. A)]: registration business process

A diagram of a circuit

Description automatically generated

##### Registration business process notes and annotations

[For each activity in the workflow, there is often a need for clarifying or additional information that can be described in the Workflow annotations that follow each workflow. These annotations should include:

1. Key questions the health care provider should be asking the client for the purposes of service delivery.
2. Key data elements that are collected at that specific activity point.
3. Key data elements that are collected, but not recorded, for privacy reasons.
4. Any decisions that need to be made and references to the related decision logic.
5. Any references to scheduling logic tables and related communication messages.]

###### General note

Registration may be conducted as a stand-alone process by a data entry clerk or administrative persona ahead of the encounter in which [health domain abbreviation]-specific services are offered or it may be conducted directly by the health worker as part of the overall encounter. These activities can be performed either in the health-care facility or in the community (e.g. client’s home, workplace, mobile van), depending on where the encounter takes place.

1. Was the visit initiated by the client or by the provider?

* Depending on the reasons that triggered the encounter, the starting activity could be represented either by client’s arrival at the health-care facility or by the health worker’s arrival at the client’s location.
* Guidelines and guidance:
* *[health domain specific references]*

1. Client arrives at facility

* The client arrives at the health-care facility and notifies the outpatient department of their arrival to be further guided.
* The client could already be registered at the health-care facility for another service, for example, HIV, diabetes.
* When digital tools, such as video-supported treatment, are used for communicating with the client (e.g. follow-up checks) this activity could be represented by a video call, phone call or other appropriate digital interaction.

1. Arrive at the client’s location

* The health worker arrives at the client’s location.

1. Gather the client’s details

* Ask the client whether they have previously been issued with a unique identifier.
* Does the client have a card, number or barcode?
* Does client say they are a returning or referred client?
* If a referral, check for the referral slip or data from the community.
* Determine whether the client is new to the health-care facility or health post.
* For returning clients, details will be retrieved from the registry of clients or, if possible, from a central client registry.

1. Search for the client record

* This search process can be done through several different means depending on what mechanisms are available in-country. For example, clients can be searched for by using their name, unique identifier, a quick response (QR) code or even biometrics.

1. Has the correct client record been identified?

* If multiple records are found for the client, consider merging or deleting duplicate records, according to the HMIS guidelines.

1. Create a new client record

* Issue a unique identifier if used and possible at the facility.

1. Validate the client details

* Review and update client record.
* 8.1. Review the sociodemographic data with the client
  + - Review the client’s non-clinical information, that is, name, address, contact information, etc.
* 8.2. Is an update needed?
  + - Has the client moved? Have they changed their contact information or has any other sociodemographic information changed?
* 8.3. Update the client details
  + - The client can provide updated information if they have moved or changed their details recently.
* Merge or update client records.
* This activity could also happen during other [health domain abbreviation]-specific processes, for example, [health domain specific processes].

1. Checking in the client

* Record the client’s updated details in the client registry.
* Add the client to the relevant queue for [health domain abbreviation]-related services.
* Send or share intake confirmation to or with the referring facility as warranted.

#### [X]. Business process for referral

**Objective:** To provide timely and appropriate referrals to another health-care facility that can provide services unavailable within this facility ([Fig. 3](#Fig_Referral_business_process)).

Fig. 3. Workflow [X]: referral

A diagram of a computer

Description automatically generated

##### Referral business process notes and annotations

###### General notes

Examples of reasons for referral include:

* the health worker cannot provide the service because of a lack of training and skills;
* the facility does not have the supplies needed to provide the service;
* the facility cannot perform the service for other reasons;
* there is an emergency and the client needs immediate referral.

1. Emergency referral?

* If the client needs immediate referral due to an emergency situation, bypass standard referral steps.
* In an emergency, a referral can be made at any time, including during diagnosis and treatment encounters.

1. Emergency referral

* **2.1 Stabilize the client and give pre-referral treatment**

The client is assumed to need emergency referral if their condition requires immediate medical attention. Stabilize the client’s condition and provide any necessary treatment.

* **2.2 Is the client stable enough to transport?**

Once the client is stable enough to transport, immediately organize it. If the client is still not stable, provide pre-referral treatment for stabilization.

* **2.3 Organize transport**

For emergency referrals, the health-care facility usually arranges for an ambulance or other vehicle.

1. Identify and discuss referral location options

* In discussion with the client and their relatives, decide where the client will be referred to. Discussions include:
  + how to get to the referral facility, including location and transportation options;
  + who to see and what is likely to happen;
  + whether to follow up on return.
* Either the client or the client’s relatives should decide on a referral location based on their preferences.

1. Contact referral facility

* Health workers should contact the referral facility to determine whether that facility can accommodate such a referral.

1. Can the facility accommodate?

* Check whether facility can accommodate the client and provide the services needed.
* If the facility can accommodate the client, move on to step 6.
* Otherwise, find a different facility that is able to accommodate the client.
* A system can be set up to catalogue referral facilities, and what type of referral needs they can handle to accommodate a referral.

1. Provide information to the receiving facility

* Make an appointment, if needed.
* If not an emergency referral, the client or family arranges transport.
* For emergency referrals, the health-care facility arranges transport, usually by phoning the district for an ambulance or other vehicle, and informing the receiving facility that the emergency client is on the way.
* Fill out a referral form, which can include notification of the referral destination.
* Provide the necessary clinical, sociodemographic and identity information to the referral facility. This can be done digitally if the appropriate systems are in place.

1. Discuss any questions with the client

* Discuss any of the client’s questions or concerns.

1. Check whether the client can be accommodated

* The receiving facility evaluates the needs and assesses if the client can receive the services needed.

1. Is it possible to accommodate the client?

* If the receiving facility cannot accommodate the client, it will inform the source facility. If accommodation for the client is possible, move on to step 10.

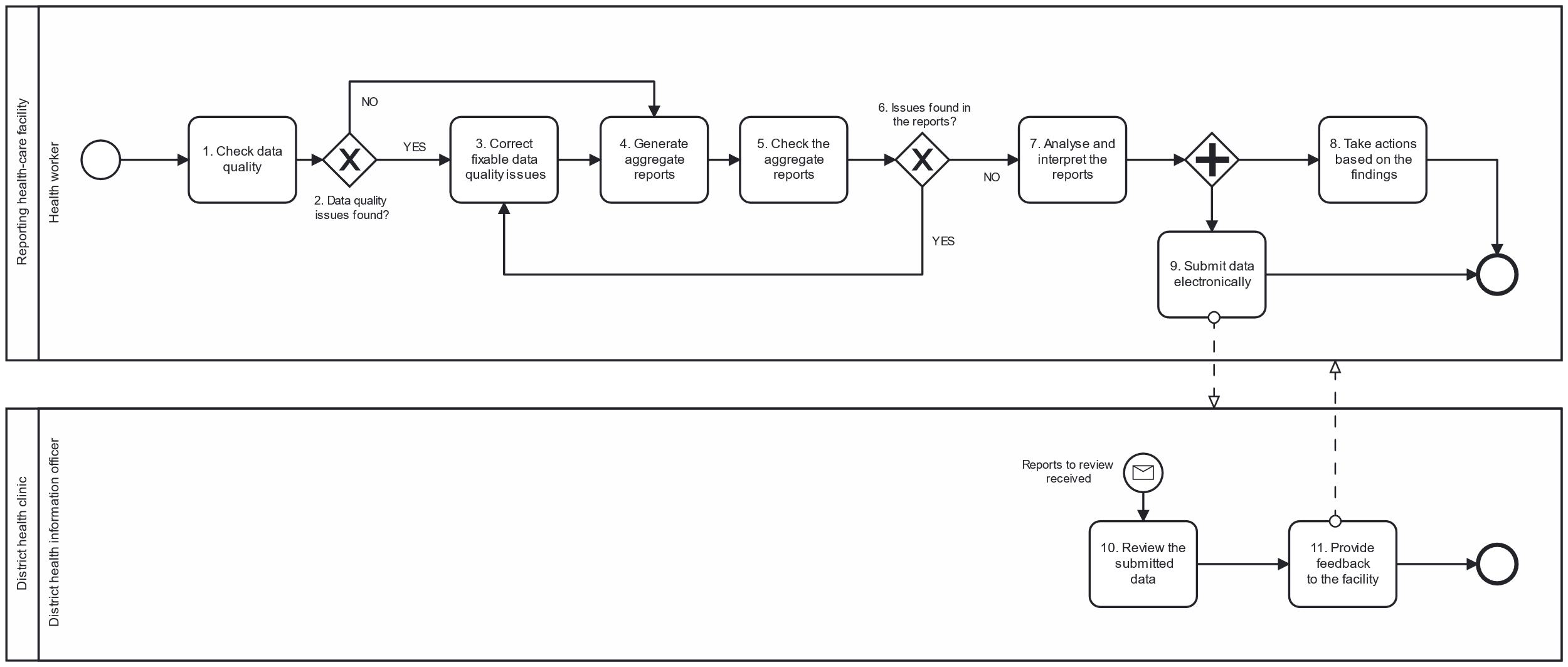
1. Receive the client

* The receiving health-care facility receives the client, along with all the necessary clinical, sociodemographic and identification information, and provides the services. If both facilities use digital systems with interoperability standards in place, the information can be exchanged digitally in a faster and more reliable way.

#### [Y]. Business process for aggregate reporting and data use

**Objective:** To aggregate client-level data into validated, aggregate reports, use the data, and submit reports ([Fig. 4](#Fig_Reporting_business_process)).

Fig. 4. Workflow [Y]: aggregate reporting business process



##### Reporting and data use business process notes and annotations

###### General notes

National, digital, case-based surveillance systems have several advantages compared with the more traditional paper-based aggregated systems, such as reductions in the recording and reporting workload of frontline workers, better data quality, faster access to data at all levels, more flexible data analysis and enhanced use of data through record linkage between databases. For this reason, WHO encourages countries to make the transition from paper-based aggregated to case-based digital surveillance.

1. Check data quality

* Health-care facility data are reviewed for accuracy, validity and completeness.
* This can be supported through automated checks in a digital system.

1. Were data quality issues found?
2. Correct fixable data quality issues

* Where possible, inaccurate, invalid or incomplete data should be checked against source records and corrected according to the national standard operating procedures.
* Depending on local policy, this step might need to be delegated to a person with the appropriate data access rights.

1. Generate aggregate reports

* The health worker generates aggregate reports of predefined indicators aligned with national monitoring and evaluation guidelines.
* This can be automated and done digitally.

1. Check the aggregate reports

* Check for any potential remaining data quality issues such as implausible values or outputs.

1. Were issues found in the reports?

* If so, return to step 3.

1. Analyse and interpret the reports

* The analyses and interpretation of the reports should identify opportunities to improve the performance of the health-care facility, such as tracing missing data or contacting patients who have not attended a clinic.
* Data analysis and interpretation can be done regularly and should not be limited to the reporting schedule.

1. Take actions based on the findings

* Findings from the reports can inform corrective actions.

1. Submit data electronically

* This can be automated and done digitally.
* Depending on the local policies and system design, an active “submission” may not be needed and the district-level, provincial-level and national-level ministry of health should be able to access data directly for reporting purposes.

1. Review the submitted data

* The district health office reviews the quality of the submitted data.

1. Provide feedback to the facility

* The focal person at the district level will provide feedback to the facility. If data quality issues are identified, the facility may be required to restart the process and resubmit the reports.

### [Additional considerations for adapting workflows

These workflows are meant to be generic and high-level. A degree of customization and adaptation will be needed as they are translated into a digital system for a specific context. The workflows are considered to be 80% complete – the other 20% will need to be done through a series of person-centred design methods and mechanisms to complete the workflows for implementation. For example, additional workflows may need to be drawn out or there may be additional activities expected of a health worker in a facility. Some workflows are not included due to the high level of contextualization required, such as including billing, dispensing (if separate from service provision), configuration (of facility-level specifics), and follow-up (which can be automated). Alternatively, there may be activities and tasks that a health worker would not be expected to do. Although these workflows can be considered a starting point, it is helpful to conduct further validation through interviews with targeted personas or by shadowing their work to obtain a better sense of the differences that need to be reflected in the digital system. ]

## Component 5: Core data elements

This section outlines the minimum set of data corresponding to different points of the workflow within the identified business processes. The data set can be used on any software system and lists the data elements relevant for service delivery and executing decision-support logic, and for populating indicators and performance metrics. Although this section provides a high-level overview of the data elements, a more complete data dictionary in spreadsheet form detailing the input options, validation checks and concept dictionary codes is available in the core data dictionary implementation tool *()*.

Inclusion of a data element in the table does not mean collection of the data is required. Additionally, some data elements are dependent on other data elements (e.g. test results are entered only when a test has been performed). Collection of data should not prevent clients from accepting [health domain specific services] or affect clinical care.

### Simplified list of core data elements

[Table 8](#Table_core_data_elements) provides a simplified list of core data elements and is a snapshot of the comprehensive data dictionary.

[As with the workflows, this data dictionary can be viewed as 80% generic, with the expectation that the other 20% will be supplemented and modified through country adaptation.]

Table 8. Workflow core data elements for identified business processes

| **Activity ID** | **Activity name** | **Data element ID** | **Data element name** | **Description and definition** |
| --- | --- | --- | --- | --- |
| The activity ID  The notation should reflect:  "Process ID""Activity number"  E.g. FP.B2 | Add the activity name  E.g. Gather client details | The running ID for each data element by health domain. This helps ensure linkages and facilitated cross references to the decision support logic  The notation should reflect:  "Process ID""Activity number".“DE”.“Sequential number of the data element” | Each unique data element should be in a separate row. | Description and definition of that specific data element. This will be important to ensuring a consistent use and understanding of what that data element comprises of. |
| **Business process FP.A: registration** | | | | |
| **FP.A1** | **Arrive at facility** | N/A – No data is recorded during this activity | | |
| **FP.A2** | **Gather client details** | **FP.A2.DE.[]** | First name | Client’s first name |
| **FP.A2.DE.[]** | Last name | Client’s family name or last name |
| **FP.A2.DE.[]** | Visit date | The date and time of the client’s visit |
| **FP.A2.DE.[]** | Referral | If client was referred for care |
| **FP.A2.DE.[]** | Referred by | How the client was referred |
| **FP.A2.DE.[]** | Unique identification | Unique identifier generated for new clients or a universal ID, if used in the country |
| **FP.A2.DE.[]** | Date of birth | The client’s date of birth (DOB), if known |
| **FP.A2.DE.[]** | Date of birth unknown | Select this if the client’s DOB is unknown |
| **FP.A2.DE.[]** | Estimated age | Age (number of years) of the client based on the DOB; if DOB is unknown, enter the client’s estimated age |
| **FP.A2.DE.[]** | Sex | Sex of the client |
| **FP.A2.DE.[]** | [Administrative Area] | This should be a context-specific list of administrative areas – villages, districts, etc. The purpose of this data element is to allow for grouping and flagging of client data to a particular facility’s catchment area. This can be input into the system by the end-user OR it can be automated in the database based on the end-user’s attributes |
| **FP.A2.DE.[]** | Co-habitants | Who the client lives with (e.g. parents, other family members, partner, friends, no one)  This is especially important for adolescents |
| **FP.A3. Search for clients** |  | N/A – No data is recorded during this activity | | |
| **FP.A4. Match found** |  | N/A – No data is recorded during this activity | | |
| **FP.A5. Create client record** |  | N/A – No data is recorded during this activity, see FP.A2. Gather client details | | |
| **FP.A6. Validate client details** |  | N/A – No data is recorded during this activity | | |
| **FP.A7. Check in client** |  | N/A – No data is recorded during this activity | | |
| **Business process FP.B: counselling** | | | | |
| **FP.B1** | **Determine reason for visit** | **FP.B1.DE.[]** | Reason for visit | Establish reason for visit |
| **FP.B1.DE.[]** | Reason for stopping contraception or method | If stopping a method, the reason why |
| **FP.B1.DE.[]** | Pregnancy intention | Client's intention or desire in the next year is either to become pregnant or to prevent a future pregnancy |
| **FP.B2** | **Take vital signs** | **FP.B2.DE.[]** | Body weight | Client’s current weight in kilograms |
| **FP.B2.DE.[]** | Height | Client’s current height in centimetres |
| **FP.B2.DE.[]** | Systolic blood pressure | Systolic blood pressure |
| **FP.B2.DE.[]** | Diastolic blood pressure | Diastolic blood pressure |
| **FP.B3** | **Capture or update client history** | **FP.B3.DE.[]** | Number of pregnancies | The number of pregnancies (gravidity), current and past, regardless of pregnancy outcome |
| **FP.B3.DE.[]** | Number of births | The number of pregnancies reaching parity  Zero births is defined as “nulliparous”; 1 or more births, the client is “parous” |
| **FP.B3.DE.[]** | Days since unprotected sex | Number of days since the client has had unprotected sex |
| **FP.B3.DE.[]** | Never used contraception | If the client has never previously used any modern method of contraception |
| **FP.B3.DE.[]** | Postpartum | Whether client delivered in the past 6 weeks  This data element can be calculated or input |
| **FP.B3.DE.[]** | Time postpartum | For a postpartum woman, the amount of time since she delivered  This data element can be calculated or input by the provider |
| **FP.B3.DE.[]** | Breastfeeding | Select if a woman is currently breastfeeding |
| **FP.B3.DE.[]** | Breastfeeding status | Describe the woman’s breastfeeding status |
| **FP.B3.DE.[]** | Recent miscarriage or abortion | Select if the woman had an abortion or a miscarriage within the past 4 weeks |
| **FP.B3.DE.[]** | Start date of last normal menses | The date when the client had her first day of her last normal menses |
| **FP.B3.DE.[]** | Days since start of last normal menses | Number of days since her last normal period started |
| **FP.B3.DE.[]** | Missed or late menses | If the woman’s monthly bleeding was missed or is late |
| **FP.B3.DE.[]** | Amenorrhoea | If the woman has never had menses or if the woman has had no menses for 3 cycles during the past 6 months |
| **FP.B3.DE.[]** | Method at intake | Family planning method the client reports currently using at intake |
| **FP.B3.DE.[]** | Implant date | Date of last implant if currently using  “Etonogestrel (ETG) one-rod” OR “Levonorgestrel (LNG) two-rod” OR “Unspecified implants” |
| **FP.B3.DE.[]** | Injection date | Date of last injection if currently using  “DMPA-IM” OR “DMPA-SC” OR “Norethisterone enanthate (NET-EN)” OR “Unspecified injectables” |
| **FP.B3.DE.[]** | Reason for no contraceptive method | If client is not currently using a method, the reason should be recorded |
| **FP.B3.DE.[]** | Methods previously used | Record all the contraceptive methods the client has a history of using |
| **FP.B4** | **Conduct risk assessment** | **FP.B4.DE.[]** | STI risk assessment | Whether or not an assessment was conducted to determine if the client is at high risk of sexually transmitted infections (STIs) |
| **FP.B6** | **Discuss issues and concerns** | **FP.B6.DE.[]** | Issues and concerns | Side-effects or symptoms with current method, administration, missed pills and late injections |
| **FP.B11.1** | **Method in mind** | **FP.B11.1.DE.[]** | Method in mind | Whether the client has a method in mind coming in to the visit |
| **FP.B11.1.DE.[]** | Client preferences | Client preferences based on values and preferences |
| **FP.B11.3** | **Select methods of interest** | **FP.B11.3.DE.[]** | Method requested | The first pick of method desired by the client, prior to medical eligibility tests – this may be the method in mind or the method selected after discussing the full range of methods |
| **FP.B11.4** | **Screen for medical eligibility** | **FP.B11.4.DE.[]** | Health condition(s) | Health conditions that are relevant to determining medical eligibility for contraceptive methods |

### List of calculated data elements

The previous section outlines the core data elements that should be included within digital systems to facilitate the decision-support logic or indicators. [Table 9](#Table_calculated_data_elements) shows the additional derived data elements based on calculations from core data elements.

[If the data element required a “Calculation” i.e. there is a formula in the related “Calculation” column in the data dictionary, there should be a separate table in the word document that lists out all the calculated data elements such as Body Mass Index or Gestational Age. This helps health programme managers ensure that the definition for key calculated fields are aligned with national policies. This is a simple table as below:]

Table 9. Calculated data elements

| **Calculated data element label** | **Core data elements used for calculation (variables)** | **Calculation** |
| --- | --- | --- |
| Body Mass Index (BMI) | * Body weight * Body height | Body weight (kg)/([Body height (cm)/100]2) |
| Postpartum | * Date of delivery * Visit date | IF “Visit date” – “Date of delivery” ≤ 6 weeks, THEN “Postpartum” = TRUE |
| Recent miscarriage or abortion | * Date of miscarriage or abortion * Visit date | IF “Visit date” – “Date of miscarriage or abortion” ≤ 4 weeks, THEN “Recent miscarriage or post-abortion” = TRUE |

### [Additional considerations for adapting the data dictionary

Some settings may require the inclusion of additional data elements into the full data set or changes to response options based on contextual differences. Additionally, the transition from paper-based forms to digital systems may require some reflection on whether data elements currently on paper forms should be incorporated into the digital system. If starting from paper-based registers and forms, additional guidance can be found in the *Digital transformation handbook for primary health care (10).*

[Table 10](#Table_local_customization) lists the initial considerations anticipated for each implementation to review and customize based on national guidelines and local context.

Table 10. Characteristics for local customization and configuration

|  |  |
| --- | --- |
| **Points of customization and configuration** | **Description** |
| Unique identifier | The unique identifier of the client can be based on a national unique ID, a national health ID, biometrics, a system-generated unique identifier or something else. |
| National ID | The format of the national ID varies from country to country. |
| Facility identifier | The unique identifier of the facility. A reference to a facility registry or a reporting system should be included where possible. |
| Facility name | The name of the different health care facilities based on a facility registry or a reporting system should be included where possible. |
| Ownership | This denotes whether the facility is public or private, where relevant. |
| Type of health care facility | Type of facility, based on country terminology (e.g. health centre, health post, dispensary, hospital). |
| Global positioning system coordinates | Latitude and longitude coordinates can be included, if relevant for mapping purposes. This can be especially helpful in the context of community health workers who could be given [insert health domain abbreviation] tasks based on their catchment area and client visit history. |
| Administrative areas | Administrative areas can be based on geographical location, catchment area or another mechanism used by the country to manage health care facilities. |
| Catchment population | If known, the catchment population would be useful to include in the automated calculation of indicators. |
| Laboratory tests available | Whether or not certain laboratory tests are available at the health care facility could impact the health worker’s workflow and the client’s [insert health domain abbreviation] service experience (e.g. haemoglobin, LFT and HIV screening tests, molecular WHO-recommended rapid diagnostic tests for TB, other rapid diagnostic tests). |

LFT: liver function test; TB: tuberculosis; WHO: World Health Organization.

]

## Component 6: Decision-support logic

The decision-support logic component of the DAK provides the decision logics and algorithms, in accordance with [L1] guidelines. In this DAK, the decision logics and algorithms deconstruct the recommendations within the [insert health domain abbreviation here] guidelines and guidance into a format that clearly labels the inputs and outputs that would be operationalized in a digital decision-support system.

### Decision-support logic overview

[Table 11](#Table_decision_tables_overview) provides an overview of the decision-support tables and algorithms for the different [insert health domain abbreviation here] module business processes. The structure of the decision-support tables is based on an adaptation of the Decision Model and Notation (DMN), an industry standard for modelling and executing decision logics *(12)*. These decision-support tables detail the business rules, data inputs and outputs to support the [insert health domain abbreviation here] module business processes.

Table 11. Overview of decision-support tables for [insert health domain abbreviation here] module

| **Activity ID** | **Activity name** | **Decision-support table ID** | **Decision name** | **Description** | **Reference(s)** |
| --- | --- | --- | --- | --- | --- |
| [The activity ID in which this decision-logic table is triggered.  E.g. TB.C24] | [The activity **name** in which this decision-logic table is triggered.  E.g. Make a diagnostic decision] | [This helps ensure linkages and facilitated cross references to the data dictionary.  The notation should reflect:  “Activity ID”.“DT”. "Sequential number of the decision-support table” | [The name describes briefly the decision for which the decision table provides the decision logic.] | [What is the description of this decision? Essentially, what is the “decision” that needs to be made? ] | [What global or national guidelines dictate this decision making process?] |
| TB.B4 | Determine the screening algorithm | TB.B4.DT.1 | Screening algorithm | Determine the screening algorithm | *WHO operational handbook on tuberculosis – Module 2: screening (systematic screening for tuberculosis disease) (foot note to the reference)* |
| TB.B7 | Evaluate the screening results | TB.B7.DT.1 | Evaluate screening | Evaluate the screening results | *WHO operational handbook on tuberculosis – Module 2: screening (systematic screening for tuberculosis disease) (foot note to the reference)* |

### Decision-support tables

Each of the decision logics listed in the overview table is elaborated in the decision-support implementation tool *()*. These decision-support tables include the components described in [Table 12](#Table_decision_tables_components). [Table 13](#Table_decision_tables_example) is an example of a decision-support logic table for [insert the description of the decision tableused as example]

Note that the decision-support logic here is translated directly from the [L1] guidelines and guidance documents and has been reviewed by the panel of experts who have created these guidelines. We do not anticipate the decision-support logic to change much as the logic has been created and reviewed by clinical experts. However, some level of adaptation may be needed depending on changes to the workflow or changes to the data dictionary.

[Any changes to the decision-support logic should be considered carefully because an embedded decision-support system can greatly affect the quality of care at the point of care. As helpful as decision-support logic can be to the health worker, an incorrect decision-support logic can also be detrimental. Thus, any new decision-support logic should be carefully reviewed and agreed on by in-country clinical experts.]

Table 12. Components of the decision-support tables

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Decision-support table ID** | The ID of the decision (e.g. “XYZ4.DT.1” where XYZ is the Process ID, 4 is the activity number, DT is the abbreviation for "decision table" and 1 is the DT running number). | | | | | | |
| **Decision name** | The name of the “decision” describing what algorithm or logic is represented. | | | | | | |
| **Activity ID** | The ID of the activity that indicates when this decision-support logic appears within the workflow and the decision is made. | | | | | | |
| **Activity name** | The name of the activity that indicates when this decision-support logic appears within the workflow. | | | | | | |
| **Hit policy indicator** | Displays the hit policy selected for the table. The hit policy determines how to interpret the output of a decision-support table.  **Unique (U)**: a "Unique" hit policy indicator applies. No overlap is possible and all “rules” are mutually exclusive. Only a single rule can be applied and only the outputs of one rule would be relevant.  **Rule order (R)**: a “Rule order” hit policy indicator applies. Multiple “rules” can apply simultaneously and the “rules” are not mutually exclusive. The result of the decision-support table depends on the sequence in which these rules are presented. The first rule in which conditions are met will be executed and then the following rules, in which conditions are met, will be executed in sequential order.  **First (F)**: a “First” hit policy indicator applies. Multiple “rules” can apply simultaneously and the “rules” are not mutually exclusive. However, unlike “Rule order”, only the first rule in which conditions are met will be executed, and the following rules in which conditions are met will not be executed. The result of the decision-support table depends on the sequence in which these rules are presented. | | | | | | |
| **U or R or F** | **Input Expression 1** | **Input Expression 2** | **Output(s)** | | | **Annotation(s)** | **Reference(s)** |
| **System action** | **Output that references data element(s)** | **Guidance displayed to the health worker** |
| **Rule ID:** “Rule number”  E.g. “1” - represents the first rule of the decision-support table. | **Input entry 1a**  The value of the input expression; the data type of the input entry cells is determined by the data type of the input expression. | **Input entry 2a**  If there are multiple input entries in the same row (such as here), these different inputs are considered as “AND”, that is, conditions that need to be in place at the same time. | **Output entry 1a** | **Output entry 2a** | **Output entry 3a** | 'This column is used for any other notes, annotations or for stating explicitly any assumptions. This can also include any additional information that does not fit into the other columns. | Reference to appropriate guidance document(s) |
|  |  |
| **Rule ID:** “Rule number”  E.g. “2” - represents the second rule of the decision-support table. | **Input entry 1b**  Inputs placed in different rows are considered as “OR” conditions that can be considered independently of the inputs on other rows. |  | **Output entry 1b** | **N/A** | **Output entry 3b** |  | Reference to appropriate guidance document(s) |

Table 13. Example decision-support logic table for determining whether TB infection testing is relevant

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Decision-support table ID** | TB.E3.1.DT.1 | | | | | |
| **Decision name** | TB infection testing recommendation | | | | | |
| **Activity ID** | TB.E3.1 | | | | | |
| **Activity name** | Determine whether TB infection testing is relevant | | | | | |
| **Hit policy indicator** | First (F): a “First” hit policy indicator applies. Multiple “rules” can apply simultaneously and the “rules” are not mutually exclusive. However, unlike “Rule order”, only the first rule in which conditions are met will be executed, and the following rules in which conditions are met will not be executed. The result of the decision-support table depends on the sequence in which these rules are presented. | | | | | |
| **F** | **Risk group** Indicates the risk group to which the client belongs | **Age** Age (number of years, rounded to the nearest integer) of the client calculated based on their date of birth | **Outputs** | | **Annotations** | **Reference(s)** | |
| **TB infection test recommended** Indicates if the client should be tested for TB infection | **Guidance displayed to health worker** |
| 1 | Risk group **has** PLHIV | - | TB infection test recommended **is** False | TB infection test is optional. WHO recommends that testing for TB infection should not be a requirement for initiating TB preventive treatment (TPT) among people living with HIV | People living with HIV who are on antiretroviral therapy (ART) benefit from TPT regardless of whether they test positive or negative for TB infection. People living with HIV who are not on ART and who test positive for TB infection are shown to benefit more from TPT than those with a negative test. However, WHO recommends that testing for TB infection should not be a requirement for initiating TPT among people living with HIV | *Operational handbook – Module 1: prevention (2)*:- Chapter 4. Testing for TB infection *Consolidated guidelines – Module 3: diagnosis: tests for TB infection (3)* | |
| 2 | Risk group **has** Contacts | Age **is** greater than or equal to 5 years | TB infection test recommended **is** True | TB infection test is recommended. Test the client for TB infection using tuberculin skin test (TST), interferon-Gamma Release Assay (IGRA) or *Mycobacterium tuberculosis* antigen-based skin test (TBST) | The use of TB infection tests limits unnecessary treatment of uninfected individuals (as in settings with low prevalence of TB infection). Availability of a positive test for TB infection among HIV-negative contacts may reassure clinicians and health workers that TB infection is likely and to start TPT |
| 3 | Age **is** less than 5 years | TB infection test recommended **is** False | TB infection test is optional. The benefits of TPT (even without testing) clearly outweigh the risks | WHO recommends that testing for TB infection should not be a requirement for initiating TPT among child contacts below 5 years of age, particularly in countries with high TB incidence, given that the benefits of treatment (even without testing) clearly outweigh the risks |
| 4 | Risk group **has** Other risk group | - | TB infection test recommended **is** True | TB infection test is recommended. Test the client for TB infection using tuberculin skin test (TST), interferon-Gamma Release Assay (IGRA) or *Mycobacterium tuberculosis* antigen-based skin test (TBST) | For individuals or populations with a higher risk of harms due to TPT or (relatively) lower risk of progression to TB disease, confirmation of TB infection may be preferred. Availability of a positive test for TB infection among individuals in other clinical risk groups (clients initiating anti-tumour necrosis factor treatment, receiving dialysis, preparing for organ or haematological transplantation) may reassure clinicians and health workers that TB infection is likely and to start TPT | *Operational handbook – Module 2: screening* *(1)*:- Chapter 3. Screening tools and algorithms *Operational handbook – Module 1: prevention* *(2)*:- Chapter 4. Testing for TB infection *Consolidated guidelines – Module 3: diagnosis: tests for TB infection (3)* | |

For all the decision-support tables that are available for the [insert health domain abbreviation here] DAK, please refer to the decision-support implementation tool *()*.

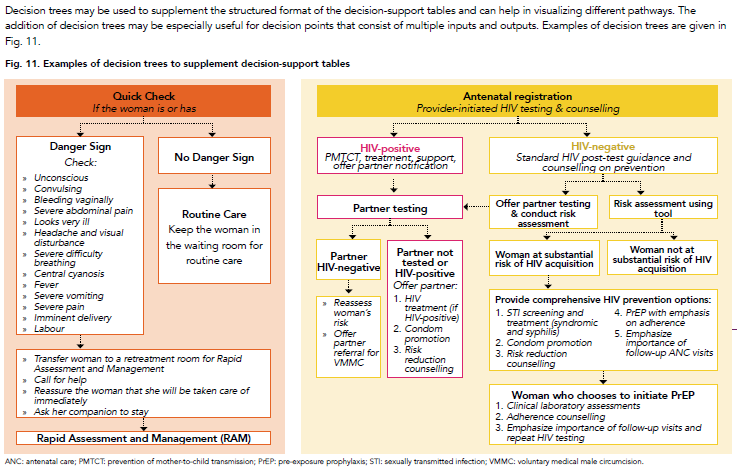
### Decision trees (OPTIONAL section)

Decision trees are a graphical depiction of your decision-support logic. Although the decision tables, linked to specific activities in the workflow, should be comprehensive in covering all the logic that will need to be included in the system, sometimes a visual depiction of the decision logic in a decision tree form can be helpful. Depending on the complexity of the care pathway algorithm, this decision tree can be too overwhelming and unhelpful. However, less complex decisions can easily also be depicted in a graphical form, which may prove helpful if included.

**Example decision tree**

Decision trees may be used to supplement the structured format of the decision-support tables and can help in visualizing different pathways. The addition of decision trees may be especially useful for decision points that consist of multiple inputs and outputs. An example of a decision tree is given in [Fig. 5](#Fig_decision_tree_example). Each box represents a single decision that needs to be made. The tree depicts how the outputs of one decision will serve as inputs to another decision that will need to be made.

Fig. 5. [name of the decision tree]



## Component 7: Scheduling logic

The scheduling logic component of the DAK provides information on scheduling of services, in accordance with [L1] guidelines. In this DAK, the scheduling logic deconstruct the recommendations within the [health domain abbreviation] guidelines and guidance into a format that describe how services should be scheduled and communicated so that they can be operationalized in a digital system.

### Scheduling logic overview

In addition to specific decision-support logic that needs to be detailed, there is also scheduling logic that can be used to facilitate the digital tracking of clients. For example, it will be important for the health worker to know when the client’s next visit is due, based on the recommendations for follow-up, and communicate this information to the client. The overview of the follow-up schedules is provided in [Table 14](#Table_scheduling_logic_overview) and the corresponding logic is elaborated in the scheduling logic implementation tool *()*.

Table 14. Overview of scheduling logic

|  |  |  |  |
| --- | --- | --- | --- |
| **Schedule name** | **Schedule-logic ID** | **Description** | **Reference(s)** |
| [Name of schedule] | [This helps ensure linkages and facilitated cross references to the data dictionary.  The notation should reflect:  “Process ID""activity number"."S"."Sequential number of the scheduling logic table”] | [What is the description of this schedule? What is the care plan being outlined?] | [What global or national guidelines dictate this?] |
| Measles, ongoing transmission schedule | IMMZ.D18.S.1 | Scheduling logic for measles immunization, ongoing transmission | *WHO recommendations for routine immunization - summary tables (March 2023) (foot note to the reference)* |

### Scheduling logic

Scheduling logic as shown in [Table 15](#Table_scheduling_logic_components), is at a much higher level than the decision support logic; it describes how services overall should be scheduled and communicated based on recommendations rather than specific decisions that need to be made at the point of care. For example, scheduling logic would include the recommended immunization schedule, the recommended antenatal care contact schedule, or the recommended follow-up times for specific contraceptive methods. This should be included in the DAK in a spreadsheet. [Table 16](#Table_scheduling_logic_example) provides an example of a scheduling logic table for [insert the schedule name used as example].

Table 15. Components of the scheduling logic tables

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Schedule ID** | This is the running number of the scheduling logic. It helps ensure linkages and facilitated cross-references to the data dictionary (e.g. “XYZ123.S.1” where XYZ is the Process ID, 123 is the activity number, S is the abbreviation for "scheduling logic" and 1 is the running number). | | | | | | |
| **Schedule name** | Describes the health service or care plan being outlined. | | | | | | |
| **Activity ID** | The identifier of the activity that indicates when this scheduling logic appears within the workflow and it is executed. | | | | | | |
| **Activity name** | The name of the activity that indicates when this scheduling logic appears within the workflow. | | | | | | |
| **Hit Policy Indicator** | Displays the hit policy selected for the table. The hit policy determines how to interpret the output of scheduling logic table.  **Unique (U):** a "Unique" hit policy indicator applies. No overlap is possible and all “rules” are mutually exclusive. Only a single rule can be applied and only the outputs of one rule would be relevant.  **Rule order (R):** a “Rule order” hit policy indicator applies. Multiple “rules” can apply simultaneously and the “rules” are not mutually exclusive. The result of the scheduling logic table depends on the sequence in which these rules are presented. The first rule in which conditions are met will be executed and then the following rules, in which conditions are met, will be executed in sequential order.  **First (F):** a “First” hit policy indicator applies. Multiple “rules” can apply simultaneously and the “rules” are not mutually exclusive. However, unlike “Rule order”, only the first rule in which conditions are met will be executed, and the following rules in which conditions are met will not be executed. The result of the scheduling logic table depends on the sequence in which these rules are presented. | | | | | | |
| **U or R or F** | **Input Expression 1** | **Input Expression 2** | **Communication message** | **Annotation(s)** | **Service(s) name and description** | **Reference(s)** |
| **Rule ID:** “Rule number” E.g. “1” - represents the first rule of the scheduling logic table. | **Input entry 1a** The value of the input expression; The data type of input entry cells is determined by the data type of the input expression. | **Input entry 2a** If there are multiple input entries in the same row (such as here), these different inputs are considered as “AND” – conditions that need to be in place at the same time. | **Output entry a** | 'This column is used for any other notes, annotations or for stating explicitly any assumptions. This can also include any additional information that does not fit into the other columns. | The name and description of the service(s) for which the schedule is relevant. | Reference to appropriate guidance document(s) |
| **Rule ID:** "Process ID"."activity number".“S”.“Rule number” E.g. “2” - represents the second rule of the scheduling logic table. | **Input entry 1b** Inputs placed in different rows are considered as “OR” conditions that can be considered independently of the inputs on other rows. | - | **Output entry b** | - |  | Reference to appropriate guidance document(s) |

Table 16. Example scheduling logic table for “Measles, ongoing transmission schedule”

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Schedule ID** | IMMZ.D18.S.1 | | | | |
| **Schedule name** | Measles, ongoing transmission schedule | | | | |
| **Activity ID** | IMMZ.D18 | | | | |
| **Activity name** | Determine time for next visit (as needed) | | | | |
| **Hit policy** | Unique (U): a "Unique" hit policy indicator applies. No overlap is possible and all “rules” are mutually exclusive. Only a single rule can be applied and only the outputs of one rule would be relevant. | | | | |
| **U** | **Number of primary series doses of measles containing vaccines** Count of prior vaccines administered to the client where "Vaccine Type" was "Measles containing vaccines" and "Type of dose" was "Primary series" | **Communication message** | **Annotations** | **Service(s) name and description** | **Reference(s)** |
| 1 | Number of primary series doses of measles containing vaccines **is** 0 | Inform the client that measles-containing vaccines should be provided using the following schedule:  - 1st dose of measles-containing vaccine (MCV 1): 9 months after birth  - 2nd dose of measles-containing vaccine (MCV 2): 15 months after birth |  | **Measles-containing vaccine (MCV) dose 1**  Provision of MCV1 from the primary series | WHO recommendations for routine immunization - summary tables (March 2023) |
| 2 | Number of primary series doses of measles containing vaccines **is** 1 | Inform the client that the 2nd dose of measles-containing vaccines (MCV 2) should be scheduled 15 months after birth. |  | **Measles-containing vaccine (MCV) dose 2**  Provision of the MCV2 from the primary series | WHO recommendations for routine immunization - summary tables (March 2023) |

## Component 8: Indicators and performance metrics

This section details indicators and performance metrics that would be aggregated from core data elements identified in Component 5: core data elements. [Table 17](#Table_indicators_example) lists a minimum set of indicators that can be aggregated for decision-making, performance metrics, and subnational and national reporting based on data collected from individual-level, routine health systems. These indicators may be aggregated automatically from the point-of-service system to populate a digital HMIS. The complete list of indicators and associated details is available in the indicators and performance metrics implementation tool *()* *.*

Table 17. Indicators and performance metrics

| Indicator unique identifier | Indicator name | Indicator short name | Indicator also known as | Indicator definition | Numerator  computation | Denominator computation | Disaggregation criteria | Reference(s) |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| If available, the Harmonized Global Unique Identifier.  If such identifier does not exist, the identifier is structured as “abbreviated health domain”, “IND” and the “number of the indicator” (e.g. “XYZ.IND.123” where XYZ is the abbreviated health domain, and 123 is the number of the indicator) | Full name/official title of the indicator. | Short name of the indicator, if available. A hyphen is included "-" if there are no short names. | Synonyms and title variations, if available. A hyphen is included "-" if there are no title variations. | This is a narrative description of the indicator to provide additional context. | Note how to calculate the indicator’s numerator here. Any specific data elements noted here should align directly with the individual-level Data Element label.  If the indicator is “number of X”, a non-percentage, or a non-ratio, then state that here, and put “-” for the denominator computation. | Note how to calculate the indicator’s denominator here. Any specific data elements noted here should align directly with the individual-level Data Element label. | Are there any dis-aggregations that you would like to be able to do in order to conduct the necessary analysis? It should include the specific data element(s) you would use to disaggregate the indicator data. Disaggregation can include:   * Geography (district, county, province) * Age * Socioeconomic status * Level of education | National, regional or global guidelines (e.g. WHO guidelines) that dictate how and why this indicator should be calculated or reported, it is noted here.  If any guidelines or recommendations change, having a clear reference listed would help in updating or restructuring data and indicators. |
| TB.IND.3 | Percentage of clients diagnosed with TB infection out of those screened | - | - | Of all the clients screened, the proportion of clients diagnosed with TB infection | COUNT of clients where "TB infection test result" = "Positive" AND ("Date of TB infection test" AND "Date of TB screening result" is within the reporting period) | COUNT of clients where "Date of TB screening result" is within the reporting period | - | *Tuberculosis surveillance (1)* |
| TB.IND.8 | Notifications: number of notifications of people diagnosed with a new episode of TB. This includes both drug-susceptible and drug-resistant TB | - | - | Number of new, recurrent or unknown previous TB treatment history case of TB (i.e. any case apart from a re-registered cases) | COUNT of clients where ("TB treatment history" = "New" OR "Recurrent" OR "Unknown") AND "Client transferred" != "In" AND "Date of TB diagnosis" is within the reporting period AND "Case de-notified" != "True" | - | * Sex * Age group * Geographical area * Type of TB * Treatment history | *Tuberculosis surveillance (1)* |
| TB.IND.49 | Contact investigation coverage: percentage of household contacts (or all close contacts) who were evaluated for TB (disease or infection)   (This indicator can be constructed for one or more subpopulations considered at particularly high risk of TB disease or infection; the example provided here is for a household contact) | - | - | Percentage of household contacts of people with a new episode of bacteriologically confirmed pulmonary TB notified in the reporting period who were evaluated for TB (disease or infection) | COUNT of clients where "TB screening result" is not null AND “Index case ID” is not null AND the linked index case has: ["Date of TB diagnosis" is within the reporting period AND ("TB treatment history" = "New" OR "Recurrent" OR "Unknown") AND "Site of TB disease" = "Pulmonary" AND "Method of diagnosis" = "Bacteriologically confirmed" AND "Case de-notified" != "True"] | COUNT of clients where “Index case ID” is not null AND the linked index case has: ["Date of TB diagnosis" is within the reporting period AND ("TB treatment history" = "New" OR "Recurrent" OR "Unknown") AND "Site of TB disease" = "Pulmonary" AND "Method of diagnosis" = "Bacteriologically confirmed" AND "Case de-notified" != "True"] | - | *Tuberculosis surveillance (1)* |

## Component 9: High-level functional and non-functional requirements

This section provides an overview of illustrative functional and non-functional requirements that may be considered to kick-start the process of designing or adapting the PCPOSS. Functional requirements describe the capabilities the system must have to meet end-user needs and achieve tasks within the business process. Non-functional requirements provide the general attributes and features of the digital system to ensure usability and overcome technical and physical constraints. Examples of non-functional requirements include ability to work offline, multiple language settings and password protection.

[Table 18](#Table_functional_req_example) highlights some of the key functional requirements for executing the business processes listed in Component 4: generic business processes and workflows. [Table 19](#Table_non_functional_req_example) provides non-functional requirements as general characteristics of the overall system. The complete set of functional and non-functional requirements can be accessed in the functional and non-functional requirements implementation tool *()*. These lists are not exhaustive and should be modified according to context and user persona needs.

[High-level system requirements consist of two types of requirements:

1. **Functional Requirements:** Functional requirements describe what the system must be able to do.   
   For example, the functional requirement of a water bottle is, “the water bottle shall be able to store liquid without leaking”.
2. **Nonfunctional Requirements:** Non-functional requirements describe how the system will work.   
   Continuing with the water bottle example, a non-functional requirement of a water bottle is, “the water bottle must not weigh more than 0.5 kg and be blue in color”.

These system requirements would vary greatly by context and the software chosen. For the DAK, it would be helpful to include, at a high-level, the initial list of functional and non-functional requirements that person-centred point-of-service systems would need at the point of care.

Based on field visits and expertise from the guideline developers, it would be possible to generate an initial list of functional and non-functional requirements. These should not only be in a table in the narrative text, but it should also be included as a table in a linked spreadsheet format. These requirements can oftentimes just be listed as a long list of functionalities. However, we recommend using the following templates to not only link the specific requirement to activities within the workflow, but to also demonstrate the human-centred need through a short explanation of why that specific requirement is needed.]

### Functional requirements

Table 18. Functional requirements

| **Requirement ID**  The running ID for each requirement by health domain. This helps ensure linkages of the functional requirement to the specific activity in a business process. Furthermore, this allows facilitated referencing.  The notation should reflect:  “Abbreviated health domain”.”FXNREQ”.“Sequential number of the functional requirement”  E.g.: TB.FXNREQ.1 | **Activity ID**  What is the ID of the activity within the above process in which this functional requirement would help automate? | **Activity name**  What is the name of the activity? | **As a…**  Which persona(s) end user would have their needs met with this requirement? The persona listed here should be one of the generic personas that have been described in Component 2: Generic Personas. | **I want…**  Describe the actual functional requirement here. It should answer the question of what the above persona(s) would want to be able to do with this digital system. | **So that…**  What is the reason the above persona(s) want this requirement. This helps contextualize the need for this requirement so implementing partners understand the true intention of including this requirement. |
| --- | --- | --- | --- | --- | --- |
| **Business process [health domain abbreviation].A: registration** | | | | | |
| [health domain abbreviation].FXNREQ.1 | [health domain abbreviation].A5 | Search for client record | Health worker | To search to see whether client is already in the system (using at least 2 identifiers) | I can check whether this is a new or existing client |
| [health domain abbreviation].FXNREQ.2 | [health domain abbreviation].A5 | Search for client record | Health worker | The system to be able to work offline | I can carry on the TB care service provision regardless of internet connection. Once the system goes back online, the data is synchronized with the central system. |
| [health domain abbreviation].FXNREQ.3 | [health domain abbreviation].A5 | Search for client record | Health worker | The system to display sufficient data to identify the client | I can confirm that it is the correct client |
| [health domain abbreviation].FXNREQ.4 | [health domain abbreviation].A5 | Search for client record | Health worker | The system to require me (a user) to search to see whether a client is already in the system prior to starting a new medical record entry | I can avoid duplicates and update information as necessary |
|  |  |  |  |  |  |
| **Business process [health domain abbreviation].B: [business process name]** | | | | | |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
| **Business process [health domain abbreviation].C: [business process name]** | | | | | |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
| **Business process [health domain abbreviation].[X]: referral** | | | | | |
| [health domain abbreviation].FXNREQ.44 | [health domain abbreviation].[X]2 | Emergency referral | Health worker (e.g. nurse) | To be able to bypass the standard flow at any point if danger signs are present or emergency care is needed; urgent cases should be flagged and seen promptly | The client can be referred, if needed. |
| [health domain abbreviation].FXNREQ.45 | [health domain abbreviation].[X]3 | Identify & discuss referral location options | Health worker (e.g. nurse) | To be able to find out in the system where the required service may be available | I can refer my client to another facility to receive the appropriate services |

For the full list of functional requirements defined for the [health domain abbreviation] DAK, please refer to the functional and non-functional requirements implementation tool *()*.

### Non-functional requirements

Table 19. Non-functional requirements

| **Requirement ID**  The running ID for each requirement by health domain. This allows facilitated referencing.  The notation should reflect:  “Abbreviated health domain”.”NFXNREQ”.“Sequential number of non-functional requirement”  E.g.: TB.NFXNREQ.1 | **Category**  There are a wide range of requirements that are not related to specific functions that need to be built into the system. Some categories can include, but are not limited to:   * Privacy & Security * User Management * Usability * Scalability * Configurability * Hardware * Interoperability * Versioning * General context | **Non-functional requirement**  The non-functional requirement should be written here. |
| --- | --- | --- |
| [health domain abbreviation].NFXNREQ.1 | Security – confidentiality | Provide password-protected access for authorized users. |
| [health domain abbreviation].NFXNREQ.2 | Security – confidentiality | Provide a means to ensure confidentiality and privacy of personal health information. |
| [health domain abbreviation].NFXNREQ.3 | Security – confidentiality | Provide ability for allowed users to view confidential data. |
| …….. | …….. | ……… |
| [health domain abbreviation].NFXNREQ.9 | Security – authentication | Notify the user to change their password the first time they log in. |
| [health domain abbreviation].NFXNREQ.10 | Security – authentication | Adhere to complex password requirements. |
|  |  |  |
| [health domain abbreviation].NFXNREQ.17 | Security – audit trail and logs | Log system logins and logouts. |
| [health domain abbreviation].NFXNREQ.26 | Security – user management | Provide role-based access. |
| …. | ….. | ….. |

For the full set of non-functional requirements defined for the [health domain abbreviation] DAK, please refer to the functional and non-functional requirements implementation tool *()*.

# References

1. Organization WH. Digital implementation investment guide (DIIG): integrating digital interventions into health programmes. Geneva: World Health Organization; 2020 (Licence: CC BY-NC-SA 3.0 IGO.

2. Institute PHI. Collaborative Requirements Development Methodology (CRDM) [website]. 2016 (<https://www.phii.org/crdm/>).

3. World Health O. Classification of digital interventions, services and applications in health: a shared language to describe the uses of digital technology for health. Geneva: World Health Organization; 2023 (Licence: CC BY-NC-SA 3.0 IGO.

4. World Health O. WHO guideline: recommendations on digital interventions for health system strengthening. Geneva: World Health Organization; 2019 (Licence: CC BY-NC-SA 3.0 IGO.

5. Key Terms and Theory of Change Small Working Group [website]. 2019 (<https://docs.google.com/presentation/d/1TnTFaunk-1WLlG4sKJQ_aSfjmfmivvcENil4mY4XxJs>).

6. World Health OROftW, Pacific. Developing health management information systems : a practical guide for developing countries. Manila: WHO Regional Office for the Western Pacific; 2004 (

7. World Health O. International Statistical Classification of Diseases and Related Health Problems (ICD) [website]. 2023 (<https://www.who.int/standards/classifications/classification-of-diseases>).

8. World Health O. Classifying health workers: mapping occupations to the international

standard classification [website]. 2019 (<https://cdn.who.int/media/docs/default-source/health-workforce/dek/classifying-health-workers.pdf>).

9. (ILO) ILO. The International Standard Classification of Occupations (ISCO) [website]. 2016 (<https://www.ilo.org/public/english/bureau/stat/isco/isco08/index.htm>).

10. World Health O. Digital transformation handbook for primary health care: optimizing person-centred point of service systems. Geneva (

11. Group OM. Business Process Model and Notation. Object Management Group; 2014.

12. (OMG) OMG. Decision Model and Notation. Milford (MA): OMG; 2023.

# Annexes

The annexes section *within* the main DAK document should include any domain specific information. For example, with family planning, annexes were added to explain the different type of contraceptives available. For Antenatal care, some *real* country specific user personas were added. Potential annexes include:

|  |  |  |
| --- | --- | --- |
| **Annex Content** | **Description** | **Purpose** |
| **User Personas** | User Personas that have been developed according to human-centred design principles. | User personas are quite context specific, hence why only Generic Personas are included in the DAK. However, User Personas will be needed as a key component of the digital accelerator kit adaptation process as they are a key tool in creating a better understanding of who the end user is. As you are developing a Generic Persona for the purpose of creating a DAK, you will inherently have to create a series of User Personas that are specific to the context in which you have studied. Including them as an annex can prove to be helpful to readers who are looking to implement the DAK content in a similar context. Similarly, it can prove to be a helpful example of a User Persona done well as well to those looking to create new User Personas. |
| **Adaptation Guidance** | Additional guidance on how to adapt this digital accelerator kit to a given context. For example, additional guidance on ‘how to create a user persona’, ‘how to map data elements from paper forms’, known deviations from the 80% generic. | Although there are additional documentation that exists, it may be helpful to include additional guidance on how to adapt the digital accelerator kit further within the digital accelerator kit itself - especially if there is health domain specificity that needs to be noted and discussed. |
| **Additional User Scenarios** | User scenarios that may not reflect the ‘80%’ generic, but the ‘20%’ adaptations and context specificity. | Throughout the process of creating a DAK, many user scenarios can be generated. They should not all be included in the DAK as they can lead to scope creep and a lack of focus for developing the person-centred point of service systems. Alternatively, additional user scenarios can prove highly useful in better contextualizing and describing all the possible use cases of how your person-centred point of service systems will be used. |

## Annex 1. Examples of detailed personas

## Annex 2. Additional User Scenarios

1. ILO. (2012). “International Standard Classification of Occupations - Structure, group definitions and correspondence tables” <https://www.ilo.org/wcmsp5/groups/public/---dgreports/---dcomm/---publ/documents/publication/wcms_172572.pdf> [↑](#footnote-ref-2)