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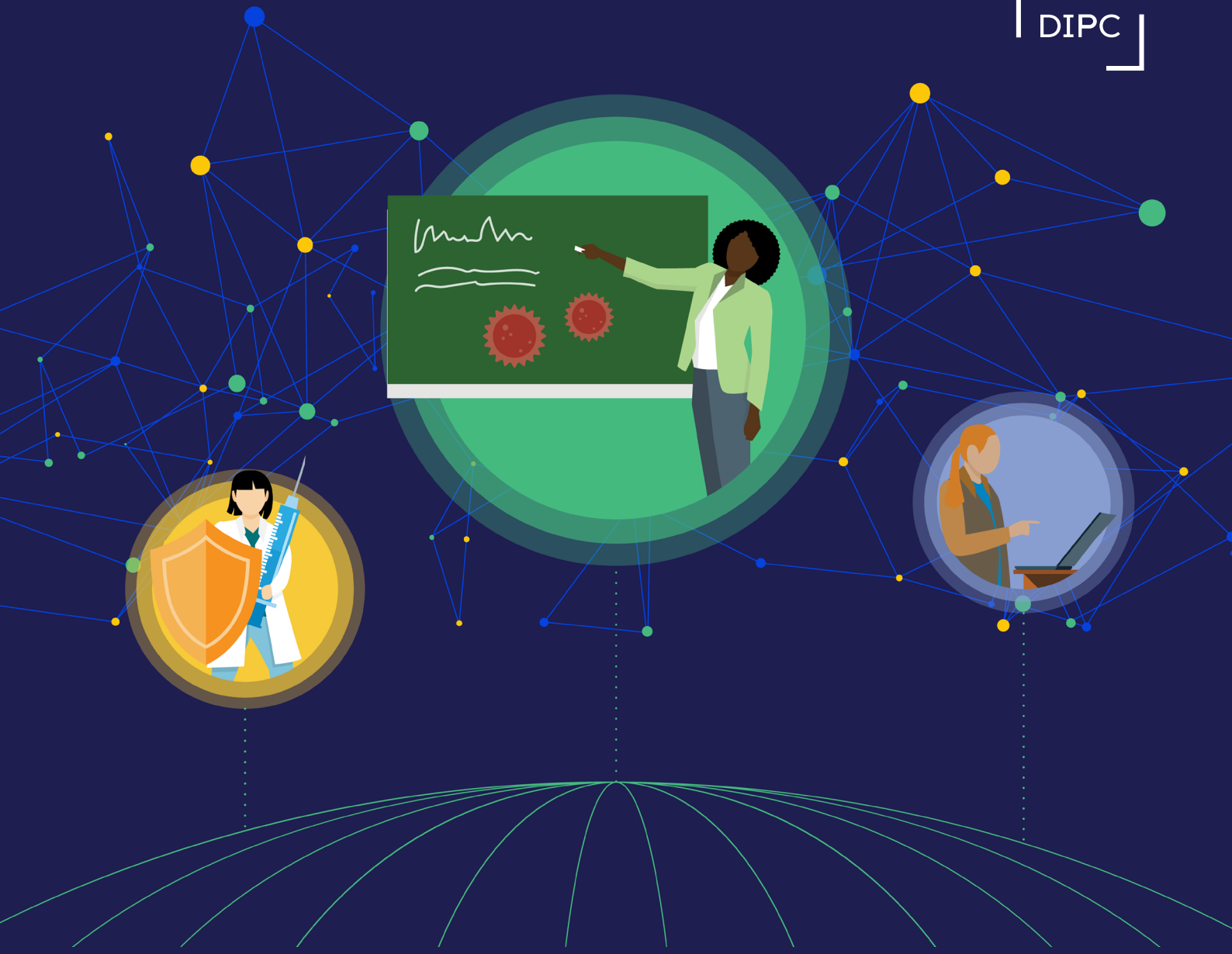

Digital Innovation in Pandemic Control

Understanding Training Needs and Barriers

DIPC Project

Regenstrief Institute Global Health Informatics Team

September, 2023

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July 2025

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01. PROJECT OVERVIEW

The **Digital Innovation in Pandemic Control (DIPC)** project is focused on supporting equitable delivery of vaccines to populations at risk and supporting pandemic preparedness. To continue to build upon the digital health investments in tooling or technical solutions to address pandemic needs, there are needs to build capacity for on-the-ground implementers to be able to support the continued operation and maintenance of digital health investments. Those who plan, implement and support technical solutions will need the ability to continue to build their skills to support the application development lifecycle for deploying, and managing technical solutions within their environments.

The objective of this portion of the **Regenstrief Institute** DIPC project is focused on developing and deploying methods to gather and analyze capacity strengthening needs. While the Digital Health workforce as defined by WHO is broad, the scope of this DIPC team is on the WHO Digital Health Workforce layer that plans, designs, develops and sustains HIS solutions in low and middle income countries.

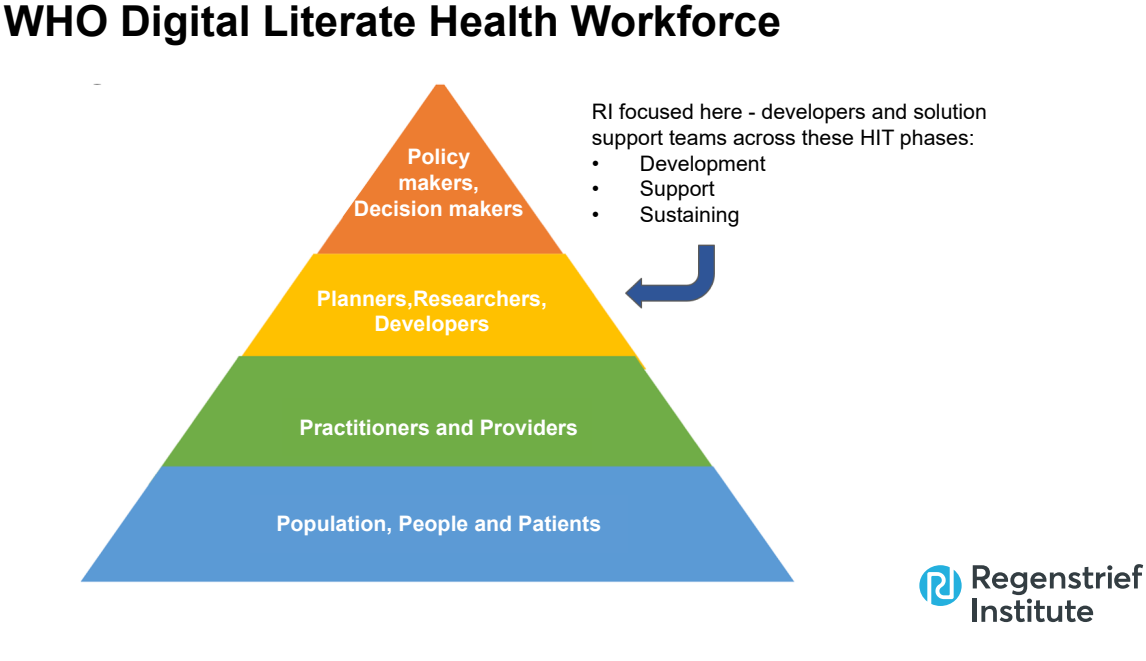


Figure 1. WHO Digital Literacy Workforce

02. METHODS FOR UNDERSTANDING TRAINING NEEDS

To understand the global needs for implementing and supporting data collection, the Regenstrief team sought after qualitative information on training needs from different perspectives, including the following: those in leadership positions who are planning digital health strategies, those implementing systems, and those building global goods. To capture these diverse perspectives, three methods were deployed in May and June of 2023; a survey, interviews of global good creators and a workshop in Peru.

The survey "Building Capacity to Support Vaccine Logistics and Pandemic Preparedness in Low-income and Middle-income Countries" was developed by the Regenstrief Global Health Informatics team, informed by the project goals and objectives. This survey primarily asked open-ended questions to learn more about potential participants of course content and their training needs, along with targeted questions about the need for more training with specific learning areas like "Standards and Interoperability". Accessibility and survey fatigue were important considerations during survey construction, as was maintaining question relevancy to the broad target audience. Survey content was validated and improved with feedback from DIPC partners and submitted the finalized version to the Indiana University Institutional Review Board (IRB) for review. After an IRB exemption was received, the Regenstrief GHI team released the survey tool using Qualtrics. A DIPC partner also translated the survey questions into Spanish, which were made available in the same Qualtrics survey method. Responses were collected within April, May, and June, 2023 (Indiana University, 2023).

The Regenstrief GHI team contacted their network of collaborators, health information system (HIS) implementers, and DIPC partners to request their assistance in distributing the surveys to their contacts predominately in Latin America, South East Asia and Africa.

In order to gain a deeper understanding of the perspective of the teams that create and manage global goods, qualitative interviews were arranged by the Regenstrief GHI team with those who develop and deploy health information system global goods that are implemented in multiple countries. The Regenstrief GHI team identified global goods creators based on relevance to the DIPC3 project goals, and region of their work. Interviews were independently conducted in 45-60 minute sessions. The interviews were loosely structured with prompts to ensure that the conversation would capture the global good team members' experience with implementers and their perspectives for capacity needs with their products. Interviews were conducted between May and June, 2023 with the following organizations:

- AKROS / REVEAL
- DHIS2
- Jembi
- OpenELIS
- OpenFN
- OpenIMIS
- OpenMRS
- PSI
- Sante Suite
- SmileCDR
- SORMAS

The DIPC project partners working in Peru were holding several in-person workshops during the period of survey distribution. To better accommodate the in-person setting and address language barriers, the PAHO team in Peru held a face-to-face workshop in June 2023. Their discussion was designed to capture many of the same elements as the original survey, but in a way that facilitated discussion and captured feedback from in-person participants. Responses to this workshop were combined with those from the Qualtrics survey and were generally treated in the same manner.

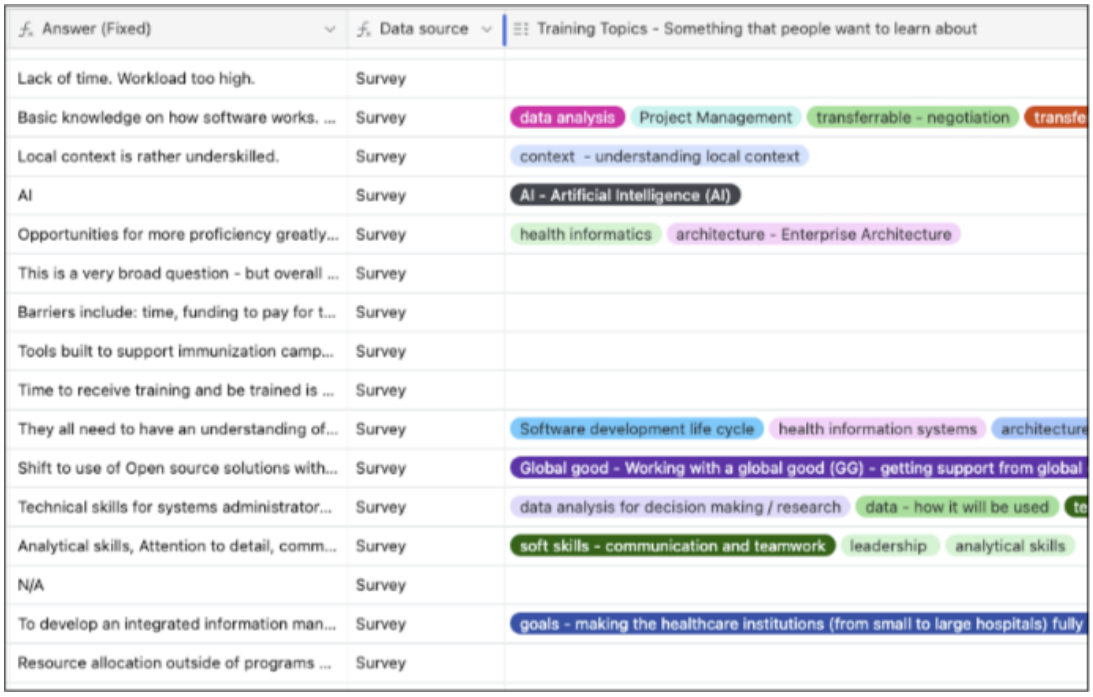
03. ANALYZING AND SYNTHESIZING

Once the data from the survey, interviews, and face-to-face workshop had been collected, the team worked toward performing analysis and synthesis of the data. The goal of the analysis and synthesis phase was to identify themes that would inform training material needs and desired learning pathways as well as informing the team of barriers and challenges to consider when creating the content and designing dissemination methods. Results were synthesized and shared with DIPC partners and stakeholders in July 2023.

3.1 Analysis and Synthesis Process and Methods

All survey responses and interview data were prepared for qualitative analysis. Data from the survey were reviewed and incomplete and empty responses were omitted from analysis if the user did not answer any open-ended questions. In total, 85 “blank” responses were omitted in this way, leaving 99 survey responses to be included in analysis along with the Peru face-to-face responses and global good interviews. Data from the different sources were then transformed into a consistent format and uploaded to an Airtable space. Airtable is a secure, online spreadsheet-based tool that facilitates tagging of qualitative data. Survey and interview responses were separated by the Regenstrief GHI team into distinct topical categories, such as learning topics, frustrations, and challenges to learning.

When responses were provided in Spanish, Google Translate was used to create English translations. Participant’s responses were then tagged by the team to summarize the main ideas of each. Figure 2.0 below shows an example of how the training topics were tagged. During the process, the team reviewed the data for any inconsistencies in tagging. After completing the tagging in Airtable, the tags were given an additional reviewed and grouped to facilitate further analysis of the themes. For example, the tags “Gathering business logic”, “Meeting user needs”, and “Business Process Modeling Notation (BPMN)” were grouped under “Business Analysis”.



Answer (Fixed)	Data source	Training Topics - Something that people want to learn about
Lack of time. Workload too high.	Survey	
Basic knowledge on how software works. ...	Survey	data analysis · Project Management · transferrable - negotiation · transfe
Local context is rather underskilled.	Survey	context - understanding local context
AI	Survey	AI - Artificial Intelligence (AI)
Opportunities for more proficiency greatly...	Survey	health informatics · architecture - Enterprise Architecture
This is a very broad question - but overall ...	Survey	
Barriers include: time, funding to pay for t...	Survey	
Tools built to support immunization camp...	Survey	
Time to receive training and be trained is ...	Survey	
They all need to have an understanding of...	Survey	Software development life cycle · health information systems · architecture
Shift to use of Open source solutions with...	Survey	Global good - Working with a global good (GG) - getting support from global
Technical skills for systems administrator...	Survey	data analysis for decision making / research · data - how it will be used · te
Analytical skills, Attention to detail, comm...	Survey	soft skills - communication and teamwork · leadership · analytical skills
N/A	Survey	
To develop an integrated information man...	Survey	goals - making the healthcare institutions (from small to large hospitals) fully
Resource allocation outside of programs ...	Survey	

Figure 2. Screenshot of Airtable tagging of training topics

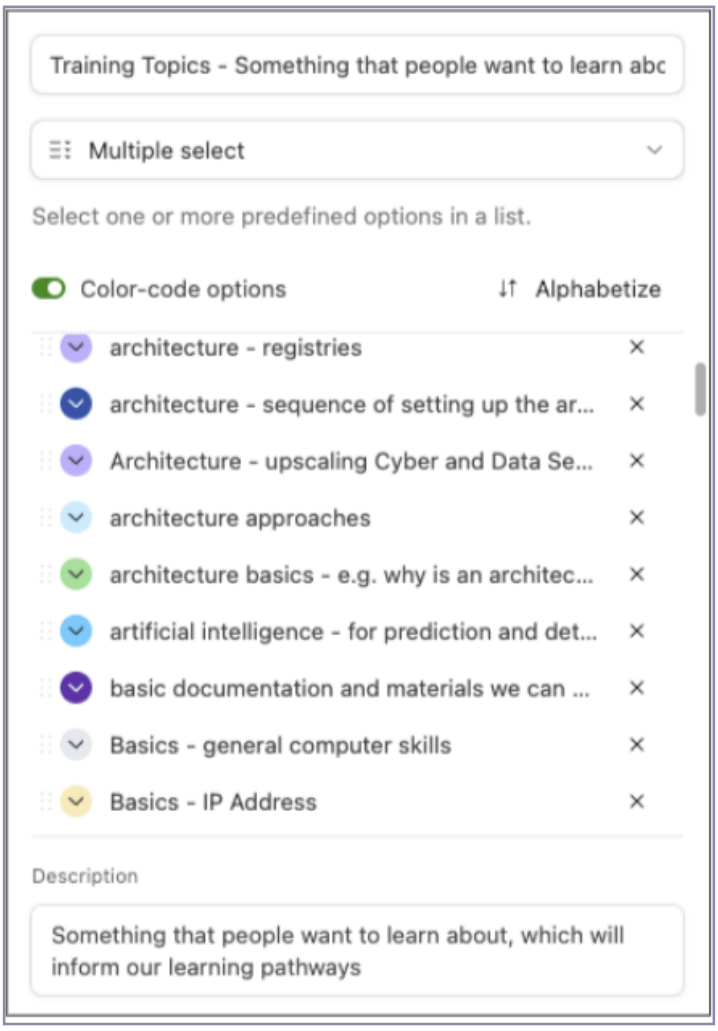


Figure 2.1 Screenshot of an alphabetical review of the types of tags in Airtable.

Once the initial tagging in Airtable was complete, the tags were imported into a Miro board for Affinity Mapping. Miro is a shared online workspace that enables teams to coordinate and collaborate. Affinity Mapping, also known as an affinity diagram or KJ method, is a method of organizing data to uncover deeper meaning. It is often used as a road-mapping activity or a lead-in to more detailed analyses. Once data is placed into groups, it becomes easier to determine intragroup and intergroup relationships between data (ASQ, 2023).The Regenstrief GHI team split the tags into the topical categories that were created for the questions. Connections between data groups were then established by team members (see figure 2.2).

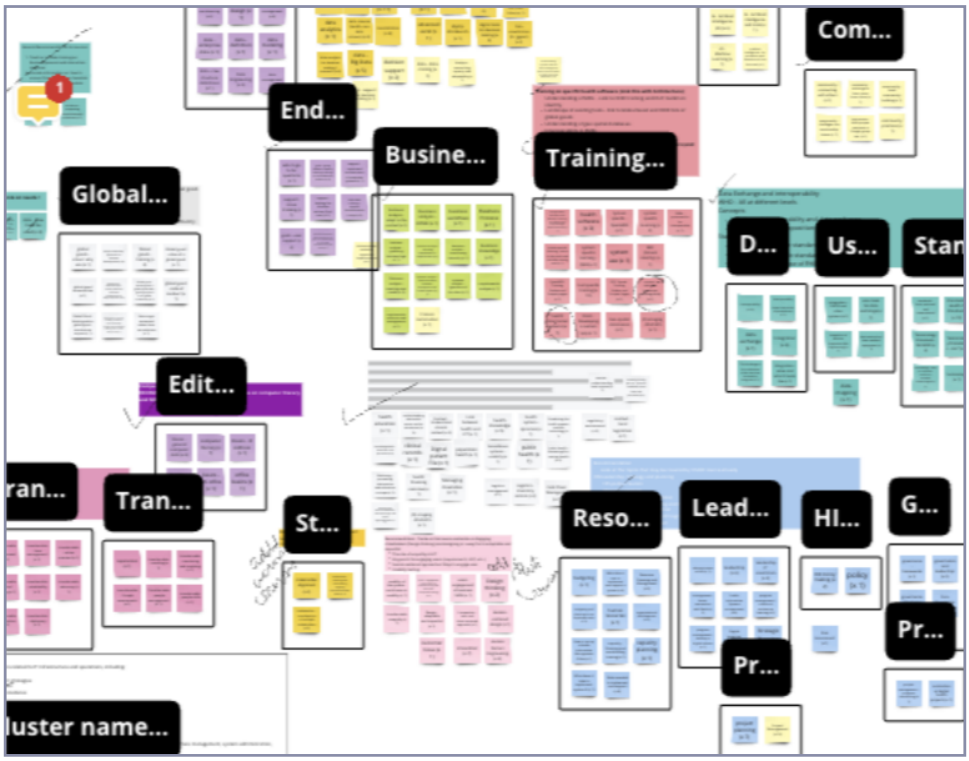


Figure 2.2 Screenshot of data groups in Miro

3.2 Learning Pathway Creation Process

To move from the affinity mapping of topics to learning objectives, the Regenstrief team conducted two workshops to get input on the creation objectives based upon the topics that were identified. The two identical workshops were designed to get input on creating learning objectives. The format of "after the module, the learner should be able to [action verb] + [knowledge or skill]" was used to guide the creation of draft learning objectives. Workshop invitees included DIPC partners, persons who responded to the survey and noted a desire to engage further or share further information, and HIS capacity strengthening SMEs (see Appendix E.).

After getting input from the community, the Regenstrief team took the workshop results and the themes from the qualitative research and framed them within the outline of the emerging WHO Draft Digital Health Competency Framework (DHCF). While most topics were more in-depth than the framework, the framework was used to help categorize the learning objectives that were synthesized from the desired topics. This was then circulated to the DIPC partners and other stakeholders for further input and comment.

3.3 Persona Creation Process

Personas were developed using survey and interview data to represent goals, job frustrations, training needs, and more with respect to a single job role. People who directly support health information systems were prioritized for the development of these personas. For each persona, qualitative data were reviewed that were stated by or about that particular role, including personal characteristics and their expressions of training needs, health system challenges, barriers to learning, country and organization affiliation, etc. This information was synthesized into the personas with fictional names, images, and biographies.

04. FINDINGS AND RESULTS

4.1 Learner Insights

When combining the survey and the Peru face-to-face session, there were a total of 131 respondents to the surveys from 28 countries. Descriptive statistics of the participants can be seen in Table 1.0 below. The respondents were more commonly male, and the survey was almost equally completed in English and Spanish. There were responses from multiple levels in the HIS ecosystem: policy makers/decision makers; HIS planners, researchers, and developers; health practitioners and providers. By self-report, respondents tended to provide direct HIS support, with additional response from leadership and indirect HIS supporters.

	COUNT (%)		COUNT (%)
GENDER	**131**	**SURVEY LANGUAGE**	**131**
Male	81 (62%)	English	67 (51%)
Female	46 (35%)	Spanish	64 (49%)
No Answer	4 (3%)	No Answer	0 (0%)
LEVEL OF SUPPORT FOR HIS	**99**	**TEAM ENVIRONMENT**	**38**
Direct Support	49 (49%)	Works in a large team	17 (45%)
Indirect Support	21 (21%)	Works in a small team	16 (42%)
Provide leadership	28 (28%)	Works independently	5 (13%)
None of these	1 (1%)	**WORK ENVIRONMENT**	**38**
		Clients or external-facing work	4 (10%)
		Equally internal and external	22 (58%)
		Internal-facing work	12 (32%)

Table 1.0

Additionally, 11 interviews were conducted with creators or stewards of global goods, such as DHIS2, OpenMRS, and OpenHIM. Topics and insights from these interviews were combined with feedback from survey participants for tagging and affinity mapping.

Insights about learners from participants were summarized into several learner personas, primarily focused on roles that support health information systems. These personas were designed to represent the goals, behaviors, frustrations, challenges, and perspectives of these roles. The following personas were created and can be viewed in detail in the Appendix:

- Digital Health Advisor
- Systems Analyst
- Developer
- Systems Administrator
- Project Manager
- Trainer / Support Analyst / Help Desk
- Health Care Provider / Clinical Informaticist

4.2 Challenges and Barriers to Learning

Survey respondents listed a broad range of challenges and barriers to learning. Within their organizations, issues were identified at all levels. At the staffing level, access to and awareness of training resources were limited, and respondents articulated a perceived lack of support for training from management leadership. Staff engagement with training and learning was further impacted by staffing turnover, low motivation from a lack of recognition and compensation. Within leadership and management there was a lack of understanding by managers, with changes in priorities and scope creep complicating staff work. Logistical issues, particularly insufficient finances for sustainability and staff development, and limited stakeholder engagement were also noted to impact staff opportunities for learning.

Multiple challenges within their broader societies were listed by survey respondents. Gaps in physical infrastructure impacted their ability to effectively train and engage in personal development as factors like: internet connectivity, road access and quality, and accessible transportation. For digital infrastructure, there were limitations in interoperability and difficulty adapting to evolving technology. Survey respondents also expressed frustrations with the lack of digital training resources, and the tools to access and apply best practices. Social challenges such as gender, language barriers, and patient perspectives were also highlighted, however there was insufficient information to understand their deeper meaning.

Staff training and development were constrained by an insufficient supply of computing equipment and digital tools, and relevant course content. Limited access to courses is further complicated by available courses lacking health contexts, and minimal attention to building technical capacity and innovation. Accessible courses were regarded as too long and theory focused, with a need for applicable and relevant knowledge from multiple sources. The lack of IT literacy, digital literacy, and inadequate in-house expertise expressed by survey respondents highlight potential training needs.

4.3 Training Needs

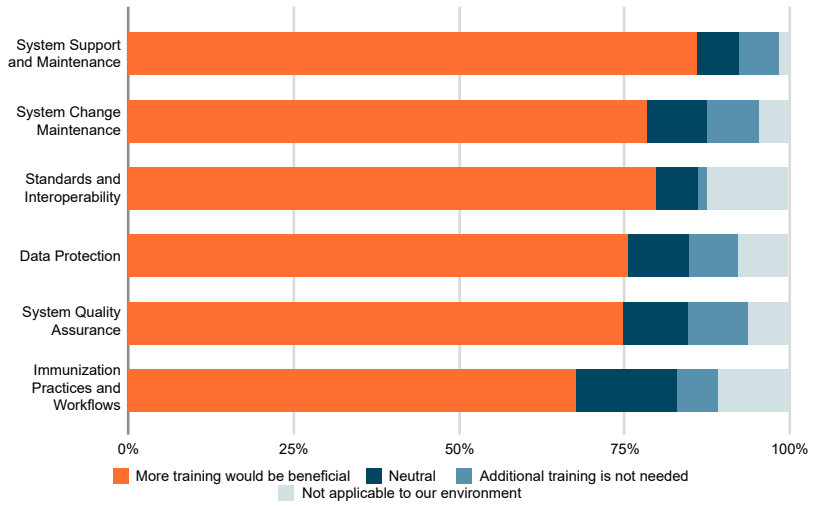
In addition to respondents, direct requests and input about training needs, frustrations, barriers, and learning challenges helped to inform the identification of potential learning topics, which range from a general audience through HIS Leadership and Strategy. Within the administrative and developer levels, there appeared to be a training need for: HIT security; system engineering; AI, data collection, use, and analysis; specific global goods, computer literacy; and related skills. Training needs at the managerial and leadership levels included eHealth architecture, end-user training and support, strategy and planning, data exchange and interoperability, business analysis, project management, understanding clinical context, and other topics. The full set of learning topics can be found in Table 2.0 below with additional detail provided in the learning pathways which includes details on the learners and the learning objectives for each of these identified topics is detailed in the Appendix.

CATEGORY	LEARNING TOPIC
HIS Leadership and Strategy	• Architecture • Data Exchange and Interoperability • HIS Leadership, Strategy and Planning
System support and management	• Training on specific software • Understanding the Clinical Context • End-user support and training • Systems Development Life cycle and Change Management • Software Quality Assurance and Testing • Architecture • Data Exchange and Interoperability • Business analysis • IT Infrastructure and Operations • Project Management
Global goods and community	• Working with a community • Working with a global good
Technology	• Artificial Intelligence • HIT Security • FHIR • Systems Engineering
Data Analysis and Data Use	• Analytics, data science and biostatistics • Database design and modeling • Data use • Data Collection and Review
General	• Computer Literacy • Transferable Skills • System User Security Basics

Table 2.0 Learning Topics

In addition to the qualitative questions on training needs, respondents were asked to give input on whether or not more training is required in particular areas. The results of these questions can be found in Figure 3.0 below. In general, most survey participants felt that more training is necessary, with the highest proportion reporting additional training needs for system support and maintenance, system change management, and standards and interoperability.

Figure 3.0 Learning Topics



05. NEXT STEPS

Based upon the findings, the first recommendation is that the team use the identified topical needs to prioritize the creation of training materials. The first priority for creating learning materials is to create materials for one or more topics relating to providing HIT system support. Personas will be used to remind the team of the types of needs and challenges that the learners are facing.

The second recommendation is to form an HIS learning community that is focused in best practices for sustaining HIT investments. The Regenstrief team will work with the community to address a subset of these topics with peer-to-peer presentations and asynchronous discussions. Initially, the target audience for the learning community will be planners, researchers, and developers, due to this groups' proximity to both on-the-ground work and management. The learning community will provide further feedback on the analyzed data, and support a collaborative process to develop a roadmap for training.

06. REFERENCES

- IRB: #18859 Building Capacity to Support Vaccine Logistics and Pandemic Preparedness in Low-income and Middle-income Countries [Internet]. Indiana University; 2023 Apr 14. Available from https://drive.google.com/file/d/1mc6SL5elOx3mn3AxVdAVxUMPHnqi1_Fv/view?usp=sharing

- Submitting a human subjects study for review [Internet]. Indiana University; 2018 Apr 14 [cited 2023 Sep 7]. Available from https://research.iu.edu/compliance/human-subjects/submissions/index.html

- American Society for Quality (ASQ). (n.d.). What is an affinity diagram? K-J method | ASQ. WHAT IS AN AFFINITY DIAGRAM? https://asq.org/quality-resources/affinity

07. APPENDIX

Appendix A. Survey Instrument

INDIANA UNIVERSITY STUDY INFORMATION SHEET FOR RESEARCH

[Insert Protocol Title]
[Insert IRB Protocol Number]
Regenstrief Global Health Informatics Survey

You are being asked to participate in a research study through this survey. Scientists do research to answer important questions that might help change or improve the way we do things in the future. This document will give you information about the study to help you decide whether you want to participate. Please read this form, and ask any questions you have, before agreeing to be in the study.

All research is voluntary. You can choose not to take part in this survey. If you decide to take the survey, you can change your mind later and leave the survey at any time. You will not be penalized or lose any benefits if you decide not to participate or choose to leave the survey later. Any personal identifying information provided in this survey will remain confidential.

The purpose of this study is to capture your thoughts and experience regarding training needed to build, deploy, maintain, and sustain health information systems supporting vaccinations and pandemic preparedness within your country(ies). The information from this survey will help inform the development of educational modules for those who are building and managing health information systems.

We are asking you if you want to be in this study because you have been identified as someone who engages in planning, directing, managing, designing or supporting a health technology solution. The study is being conducted by the Regenstrief Institute Global Health Informatics team. It is funded by The Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), the main German development agency.

If you agree to be in the study, please take the survey below. The survey is expected to take about 10-20 minutes of your time.

Before agreeing to participate, please consider the risks and potential benefits of taking part in this study.

Potential risks include:

- You may be uncomfortable while answering the survey questions. While completing the survey, you can skip any questions that make you uncomfortable or that you do not want to answer.
- There is a risk someone outside the study team could get access to your research information from this study. More information about how we will protect your information to reduce this risk is below.

Potential Benefits: We hope to learn things that will help our project teams create training materials that will be relevant to those who have positions designing and supporting health information systems.

You will not be paid for participating in this study. There is no cost to participate in the study.

We will protect your information and make every effort to keep your personal information confidential, but we cannot guarantee absolute confidentiality. No information which could identify you will be shared in publications about this study.

Your personal information may be shared outside the research study if required by law. We also may need to share your research records with other groups for quality assurance or data analysis. These groups include the Indiana University Institutional Review Board or its designees, and state or federal agencies who may need to access the research records (as allowed by law).

If you have questions about the study or encounter a problem with the research, contact the researcher, Jennifer Shivers at 1-317-797-1200 or riighi@regenstrief.org.

For questions about your rights as a research participant, to discuss problems, complaints, or concerns about a research study, or to obtain information or to offer input, please contact the IU Human Research Protection Program office at 800-696-2949 or at irb@iu.edu.

If you decide to participate in this study, you can change your mind and decide to leave the survey at any time in the future. If you decide to withdraw, you may leave the survey unsubmitted.

Notes on Survey Design: NEW PAGE

YOUR ROLE AND CONTEXT

Notes on Survey Design (This is intended to be a sliding scale if possible)

I directly support day-to-day system operation, change management and / or development of new features in a role such as trainers, business analyst, a software developer, help desk personnel, project manager or a systems engineer.		I provide guidance and assistance to the support team when there are health information technology issues they cannot resolve.		I provide leadership and/or occasionally engage in the project.	None of these (End survey).

1. Please indicate your level of involvement in planning, managing, designing, or deploying health information systems in low- and middle-income countries (LIMCs) by sliding the scale to the right or left. Please choose the level that best fits your current role.

2. (Free text, 1 line) What country(ies) do you work in?

3. (Free text, 1 - 2 lines) Please describe your job title and role.

4. (Free text, 1 line) What type of organization or setting do you work in? For example, do you work within a healthcare facility, a ministry of health, or some other type of organization?

5. (Free text, multi-line) Please describe your education and experience background. For example, do you have training or experience in health care, health information systems, computer science or a field related to health information?

6. (Select one) What is your gender? Select one:

   a. Male
   b. Female
   c. Other
   d. Prefer not to answer

Notes on Survey Design: NEW PAGE

Notes on Survey Design: If they answered question one in the green area (More directly contributing in day-to-day work)

YOUR NEEDS AND EXPERIENCE
Please share your thoughts and experience regarding training needs.

7. (Free text, multi-line) In your work, what do you think are your key goals and responsibilities? What pain points and frustrations do you experience in achieving these?

8. (Free text, multi-line) What baseline capacity (i.e. skills, education, etc.) is needed for someone in your role to succeed?

9. (Free text, multi-line) In what areas would you like to have more proficiency, if any?

10. (Free text, multi-line) What key tools and software (especially pandemic-related tools) are currently in use or will be used in the future in your organization or setting? In your opinion, are there gaps in training when it comes to supporting implementation and change management in any of these tools?

11. (Free text, multi-line) What barriers do you experience in regard to professional learning, capacity building and/or the successful fulfillment of your role? Are there any institutional, social or technical factors which make it difficult to execute your role or your ability to access further learning and training resources?

12. "Are there any relevant local needs or processes which should be considered to effectively execute your role? Does the local context present opportunities or challenges with learning, developing capacity or successfully working within HIS?"

13. (Likert Scale) In your work, are you primarily working independently, or do you work as part of a team that supports health information systems?

I do most or all of my work independently.		I work in a small group.		I work as part of a larger team None of these (End survey).

14. In your work, do you interact more with clients, or do you work more within people from your own organization?

I interact mostly with clients or external individuals.		I equally interact with clients and with people from my own organization.		I primarily interact with people from my own organization, including team members.

Notes on Survey Design: NEW PAGE

Notes on Survey Design: If they answered question one in the blue area (less directly contributing in day-to-day work)

YOUR THOUGHTS AND EXPERIENCE WITH TRAINING NEEDS
Think about the HIS support teams to whom you provide guidance, assistance, or leadership. Please share your thoughts and experience regarding their training needs.

6. (Free text, multi-line) In your opinion, what are the key goals and responsibilities of the HIS system support teams? What pain points and frustrations do they experience in achieving these goals?

7. (Free text, multi-line) What baseline capacity (i.e. skills, education, etc.) is needed for someone to succeed in supporting and managing the HIS systems?

8. (Free text, multi-line) In what areas would you like to see opportunities for more proficiency, if any? Does this differ based on the role? For example, for those persons supporting systems who specialize in Health Informatics or a technical field (e.g. Systems Analysts or Informatics Nurses) vs. do not (e.g. physicians and nurses).

9. (Free text, multi-line) What key tools and software (especially pandemic-related tools) are currently in use or will be used in the future among those that you work with? In your opinion, are there gaps in training when it comes to supporting implementation and change management in any of these tools?

10. (Free text, multi-line) In your opinion, are there barriers to professional learning, capacity building and/or the successful fulfillment of your role? Are there any institutional, social or technical factors which make it difficult for HIS support teams to access further training or learning resources?

------ (Page Break) ------ Nice if we do not have a back button here

DIPC3 Survey Instrument [Internet]. Regenstrief Institute Inc., Global Health Informatics Program; 2023 Mar 16 [updated 2023 Mar 16]. Available from https://docs.google.com/document/d/1GQs7Sc2uAd04jBh3Qqg_Kbd41lBUL4xN-bwR3D15kaA/edit?usp=sharing.

Appendix B. Global Good Interview Prompts

Interview Guide for Global Good Software Creators - March 2023

Introduction

This interview is a part of a project that is focused on building educational modules for those who are strengthening and managing health information systems. We are aiming to capture your thoughts and experience regarding training needed to build, deploy, maintain, and sustain health information systems supporting vaccinations and pandemic preparedness within your country(ies). The information we discuss today will help inform the development of educational modules for those who are strengthening and managing health information systems.

We aim to speak with persons who are creating, managing, planning, designing, or deploying software for health systems in low- and middle-income countries (LIMCs). Specifically, we would like to hear your experiences with gaps in training, particularly those that implement your software. These are open-ended questions, so please feel free to share whatever information you deem helpful.

Everything we discuss today is entirely voluntary. You are not required to share any information that you do not deem appropriate or necessary.

Questions

Note: **Bold** questions are to be the highest priority questions to ask in the case of time constraints.

LEARNERS

1. What is your job title, and what roles do you regularly see working with your software?

2. What types of organizations and settings do you support? Direct healthcare facilities, ministries of health, or some other type of organization?

3. **What professional background, skills, and education are common and/or important among the individuals that you commonly see working with your software?**

4. Thinking about in-the-weed personnel vs. decision-makers, who do you find yourself needing to provide more support for?

INDIVIDUAL CAPACITY

5. For those who deploy, support, scale, and manage the implementation of your software, what baseline capacity (i.e. skills, education, etc.) is needed for someone to succeed?

6. **For those who deploy, support, scale and manage the implementation of your software, in what areas would you like for them to have more proficiency, if any?**

INSTITUTIONAL CAPACITY

7. **Among implementers of your software, where in their HIS do you see limitations? Opportunities for capacity strengthening?**

8. What key tools and software (especially pandemic-related tools) are currently in use or will be used in the future among those that your software supports?

In your opinion, are there gaps in training when it comes to using any of these tools?

SOFTWARE SOLUTION CREATORS

9. **What have you already created to support implementations? What do you plan to create? Are there any existing materials that are not specific to your software that you can share more broadly e.g. testing best practices or basic computer literacy skills?**

10. Is there anything else you would like to share about training needs that would allow you or your partners to better sustain and support health information systems?

11. Based on our conversation today, are there any other individuals that we should follow up with? Can you provide their contact information (name and email address)?

12. Are there any helpful training courses or materials that you have used or are aware of?

13. Is there anyone else we should speak with?

Thank you for your participation!

Interview Guide for Global Good Software Creators (DHIS2, SORMAS) - DIPC3 [Internet]. Regenstrief Institute Inc., Global Health Informatics Program; 2023 Mar 21 [updated 2023 May 23]. Available from https://docs.google.com/document/d/1d0gx1fcOs1fiLse12eQ-ex5Nfom8lwqlw1Vmd7yxHsk/edit?usp=sharing

Appendix C. PAHO Discussion Prompts

The following is the google form used for the PAHO face-to-face feedback session held in Peru.

Hoja informativa de la Universidad de Indiana para investigación [Internet]. PAHO. 2023 June. Available from https://drive.google.com/file/d/1_NIergj4QXBircyy8sXFGq3gPJOgGLi7/view?usp=drive_link.

Appendix D. Personas

The following are the personas as they were at the time of writing this document. The personas are intended to be living documents and may be modified or reused within a local context.

Ana Estrada — Business / Systems Analyst

Group eHealth Monitoring and Evaluation

Country Guatemala

Affiliation Non-Governmental Organization

Disposition Solution-oriented

"I am ready to scale up our digital interventions, but I also need to work within MoH policies and directives"

Goals

In support of the Ministry of Health, my responsibilities include:

- Providing support for decision making based on the different health information systems in my country
- Design and manage technical solutions that help project teams perform their work more efficiently
- Ensure quality data comes into the system and back out to the users

Frustrations

- Fractured systems due to lack of standardization
- Lack of time to invest in training
- Inadequate tools to do my work effectively
- Working with end users that have limited digital skills

Bio

Ana works closely with the Ministry of Health to discover practical solutions and to design and implement healthcare systems that can assist her clients in their work. She is used to working under constrained resources and wishes for better tools for her work. Her experience is a mix of public health and information technology, although she would benefit from more formal training in both areas to understand best practices.

Job Environment

In-the-weeds — Decision-maker

Works alone — Works closely with team

Client-facing — Internal-facing

Skills

- HIT System Management
- Process Analysis, requirements gathering
- Data Management and Analysis

Training Needs

- Data Use, Management, & Analytics tools
- Change Management, Security, Health Standards, and System Design
- Quality Assurance, Human-centered Design
- Communication, Project Management

Systems Supported

- OpenMRS
- DHIS2

Common Tools

- Excel
- MySQL
- R / Python
- Draw.io

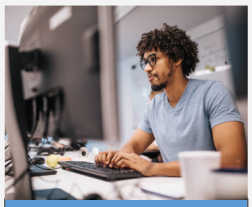
Atnafu Yosef — Developer, Systems Engineer

Group Health Information Technology

Country Ethiopia

Affiliation Non-Governmental Organization

Disposition Efficient



"I want to learn and help, but most staff are not computer gurus, so it requires effort to make it easier to understand."

Goals

In support of my government clients, my responsibilities include:

- Develop adaptable, impactful platforms that benefit end users and patients
- Ensure data is accurately captured, recorded, and secured
- Maintain high availability and quality of data for decision makers
- Keep systems running smoothly and efficiently

Frustrations

- There is training available, but it is during business hours, and it is not always practical and applied to my work.
- Personnel are constantly changing, so we have to keep re-orienting new staff.
- Lack of good equipment and licensed tools available.

Bio

Atnafu is a developer for a local NGO that supports the Ethiopian Ministry of Health. He has always been fascinated by technology and its potential to transform lives. He gains energy from collaborating with colleagues and thrives on finding solutions to complex programming challenges. He is proud to leverage his skills to strengthen public health infrastructure, one project at a time. However, he is often facing pressing deadlines, and he would like more time in his schedule to brush up on his skills.

Job Environment

In-the-weeds — Decision-maker

Works alone — Works closely with team

Client-facing — Internal-facing

Skills

- Computer Science + Information Technology
- Data Quality Analysis
- Networking and Systems Administration

Training Needs

- Software Development Lifecycle
- Working with latest and greatest technologies
- Management of Unified Systems
- Working with FHIR
- Standards and Interoperability
- Security and Confidentiality

Systems Supported

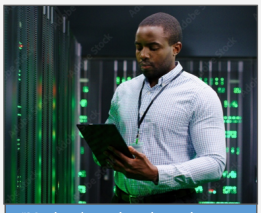
- DHIS2
- OpenMRS

Common Tools

- Redcap (Data Collection)
- Python
- Java
- Excel

Idris Sesay — Systems Administrator

Group Information Technology
Country Sierra Leone
Affiliation Local Health Facility
Disposition Resourceful



"My duty is to clear the path so you can deliver care. When the systems work smoothly, you can fully devote yourself to the patients."

Goals

In support of my hospital or clinic, my responsibilities include:

- Implement health information systems for health education, research, and clinical service quality improvement
- Ensure users understand systems and address challenges
- Maintain IT infrastructure to support healthcare delivery

Frustrations

- Power fluctuation, internet connection interruptions, and other infrastructural challenges
- User adoption is hindered by low basic IT literacy skills, resistance to change, low support from stakeholders, etc.
- Existing training is theoretical, not practical or hands-on

Bio

Idris serves as a systems administrator at a busy clinic that suffers from frequent power outages and spotty internet. Idris takes great pride in being a pillar of technical knowledge for the clinic, troubleshooting issues and maintaining the IT infrastructure that's so vital for delivering care. Even on frustrating days, he keeps his optimism and focuses on the meaning behind his work.

Job Environment

In-the-weeds — Decision-maker
Works alone — Works closely with team
Client-facing — Internal-facing

Skills

- Health Information System development, implementation, + administration
- Team-oriented and broader communication
- Shell and script programming

Training Needs

- Networking + integration of computing devices
- Change Management
- Health data standards and interoperability
- Health informatics and computing basics
- Data science, analysis, and visualization

Systems Supported

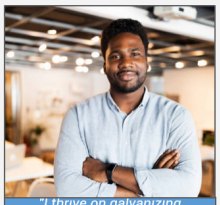
- CommCare
- DHIS2
- Logistics Mgmt. (LMIS)

Common Tools

- PowerShell
- Computerized Maintenance Management System (CMMS)

Thiago Moran — Project Manager, Administrator

Group Information Technology
Country Panama
Affiliation Ministry of Health
Disposition Collaborative



"I thrive on galvanizing people towards a shared purpose. Together we can achieve what no one could alone."

Goals

In support of Ministry-owned systems, my responsibilities include:

- Securing stakeholder alignment amidst a diverse group with sometimes competing priorities
- Creating awareness and maintaining ongoing interest and commitment amongst stakeholders
- Supporting integration across heterogeneous systems

Frustrations

- Users struggle to define what data to collect and how manage and interpret it.
- Budgetary concerns and excessive controls can inhibit the execution of innovative projects.
- National stakeholders have insufficient digital health capability

Bio

Thiago thrives on bringing people and technology together. As a project manager at Panama's Ministry of Health, he navigates a complex bureaucracy to drive adoption of innovative digital health solutions. He excels at securing alignment and commitment through his collaborative nature, strategic planning, and motivational skills.

Job Environment

In-the-weeds — Decision-maker
Works alone — Works closely with team
Client-facing — Internal-facing

Skills

- Stakeholder engagement and alignment
- Finance and resource management
- Experience managing digital health projects

Training Needs

- Digital related skills
- Value and use of standards and interoperability
- Effective use of project management tooling
- People skills, resource management, and communication
- Strategic planning, incl. use of monitoring frameworks and theories of change

Systems Supported

- mSupply Platform
- Local COVID Systems

Common Tools

- Microsoft Office Suite

Efua Boateng — Trainer, Support Analyst, Help Desk

Group Regional Health Directorate
Country Ghana
Affiliation Ministry of Health
Disposition Approachable

"Trainings should be designed and targeted at building the knowledge and skills to improve their work"

Goals

In support of regional health systems, my responsibilities include:

- Ensure health information systems are used correctly and efficiently
- Enable users to access the appropriate systems for their work
- Support the users who have questions, feature requests, etc.
- Ensure data is captured accurately by users

Frustrations

- Low motivation among users to learn or improve, possibly due to high workloads and low funding/resources
- Users are at varying skill levels with systems and technology in general
- The tools we support are inadequate, so it often does not meet user needs, even if we train them well.

Bio

Efua is an encouraging and patient trainer devoted to improving health systems in Ghana. She leverages her deep knowledge of clinical processes to provide empathetic guidance on utilizing data and technology. Efua creates a welcoming environment for questions and guides users up the technology mountain with strategic patience.

Job Environment

In-the-weeds — Decision-maker
Works alone — Works closely with team
Client-facing — Internal-facing

Skills

- Understanding of clinical care and public health processes
- Communications - reports, presentations, planning, coaching, training facilitation

Training Needs

- Help desk and user support best practices
- Technical basics - Hardware, RAM, CPU, etc.
- Data analysis and visualization
- Database design and management
- Health information system management
- Best practices for training, mentoring, quality assurance, etc.

Systems Supported

- SORMAS
- Data Collection Tools

Common Tools

- Microsoft Office
- Learning Platforms

Lucy Mussa — Immunization Officer, HIS Leader

Group COVID
Country Tanzania
Affiliation Ministry of Health
Disposition Holistic

"All tools can be considered 'key'; at the end of the day, the enabling environment of the organization (guidelines, leadership, process, etc.) determines the success of a tool."

Goals

As a COVID Immunization Officer, my main responsibilities include:

- Managing and scaling new applications and digital solutions
- Investing in digital solutions that can be scaled beyond COVID-19
- Understanding the health ecosystem and enterprise architecture

Frustrations

- Lack of context for national health systems
- Time constraints for focusing on digital health during a COVID-19 vaccine rollout
- Low digital literacy and/or language barriers with English
- Resistance to change from leadership and from users

Bio

Lucy serves as the lead COVID focal point at her country's Ministry of Health. She is experienced in administrative leadership, such as finances. She is leading the execution of an immunization strategy, which has been agreed upon by her and other stakeholders from the private and public sector. Lucy is often finding herself advocating for resources, including those to support the country's eHealth architecture, although she wishes she had more of an understanding of the value for technical systems and initiatives.

Job Environment

In-the-weeds — Decision-maker

Works alone — Works closely with team

Skills

- Management, Communication, Advocacy
- Strategic Planning, Financing, Leadership

Training Needs

- Digital health vocabulary and terminology
- Enterprise planning for digital health
- Applying principles of interoperability
- Global goods and digital health interventions
- Sustainability in digital health
- Organizational development
- Data-driven decision making

Systems Used in Country

dhis2 SORMAS FOUNDATION

Kwame Asante — Care Provider, Health Informaticist

Group Ghana Health Service
Country Ghana
Affiliation Local Facility
Disposition Compassionate

"True healthcare knows no borders or boundaries."

Goals

In support of my fellow health system users, my responsibilities include:

- Provide high quality healthcare to patients, particularly those in high risk populations
- Ensure clinical data represents the realities of healthcare
- Promote preventative care to patients using their preferred communication methods

Frustrations

- Infrastructure issues: Poor roads, poor internet access, inadequate vaccine logistics, etc.
- Technical illiteracy among patients, leaders, and fellow providers
- Lack of integration across health information systems

Bio

Kwame is a dedicated nurse and health advocate working in a rural clinic in Ghana. He is committed to providing the best possible care to his patients through a combination of clinical excellence, preventative education, and harnessing the power of technology. Though limited resources and infrastructure frustrate him at times, Kwame maintains a positive attitude and continually looks for innovative ways to connect patients to the healthcare they need.

Job Environment

In-the-weeds — Decision-maker

Works alone — Works closely with team

Client-facing — Internal-facing

Skills

- Understanding of clinical/healthcare process
- Promoting best practices in public health
- Patient education and information sharing
- Teamwork with other providers and staff

Training Needs

- Health Informatics
- Data-driven decision-making
- Peer-to-peer training and mentorship
- Basic Digital Literacy, data analysis, etc.
- Working with global goods and other tools

Systems Used

- DHIS2
- OpenMRS

DIPC Persona Working Space [Internet]. 2023 Aug 2 [updated 2023 Sep 5]. Available from: https://docs.google.com/presentation/d/1d7cTpLEIUbm4dfbo_mARsqlTQQIiCt2q6TtCJ23Y5kk/edit?usp=sharing.

Appendix E. Learning Pathways

As expected, the work of the GIZ DIPC project is more granular than the DHCF, yet the project findings are aligned to support the direction of the draft framework. The following tables represent the professional and technical topics that arose from the research done on desired training needs for those implementing, supporting and managing health information applications. The tables below are organized using the coloring from the DHCF framework above. The DIPC project findings start with the Health System and Digital Health Solution and this section is more comprehensively defined as this is a key focus for the DIPC project.

As a part of the DIPC project, different types of learner personas emerged. The results below signify learning objectives that are key to specific aspects of the work. There is recognition that individuals may perform multiple roles or different roles on different types of projects. An "X" is denoted in specific columns to indicate learning objectives that directly support the type of work of the noted individuals. Any of the other objectives may be deemed important to an individual learner.

Intended Use of the Pathways

The document is intended to be a living document that is updated and refined over time. This document is intended to be used in two different ways:

1. Use by those creating training materials to understand places where desired training is not yet available.

2. Ultimately, the vision would be that this document linked with content would enable use by learners in the digital health space to enable understanding of opportunities and needs for learning. Additional work is needed to link existing resources to this material in order to move toward a more comprehensive model that supports user needs.

To fully support use of this resource a next step is to align these learning needs with available materials. Additional usability will be gained by providing the information in a format that allows filtering and sorting by the type of work that is denoted.

Additional Resources:

DIPC Learning Pathways Workshop (de-identified) [Internet]. Regenstrief Institute Inc., Global Health Informatics Program [2023 Jul 27]. Available from: https://miro.com/app/board/uXjVMlGJn4A=/?share_link_id=999627269689

Appendix F. Draft Digital Health Competency Framework (DHCF)

The DHCF was used in this project to help categorize learning needs and resources. As the framework evolves, categorization and alignment of the materials can be reshaped as needed.

DHCF Background

On June 14 and June 28, 2023 i-DAIR hosted the 2nd and 3rd/ review of a draft digital health competency framework (DHCF) that The International Digital Health and AI Research Collaborative (I-DAIR) and a 170 person-strong global working group have been working on in #collaboration with WHO! We held our final meeting on July 26 to close out this phase of work. It will be picked up again when WHO convenes its Digital Health Competency Framework Expert Advisory Group.

The vision of the working group was to establish a globally accepted digital health competency framework that defines standards for professional competence in digital health, leading to strengthened digital health capacity, more adaptive and resilient health systems and healthier populations. The DHCF is rather unique in trying to cover a broad audience: (1) health policy and decision makers; (2) planners, implementers, researchers, developers; (3) health providers and practitioners; (4) patients, people populations. We call this a “foundational framework”. The hope is that this will help countries adapt or establish their own DHCF based on these core competencies to establish the standards for digital health capacity for their workforce.

For now the consortium has reviewed all eight domains: Ethics & Equity, Communications & Collaboration, Governance & Leadership, Health Systems & Digital Health Solutions, Data & Health Intelligence, Digital Health Literacy, Workforce Development & Training, and Research as depicted in a draft framework below.

Although the DHCF is a draft framework that is emerging, the framework was selected for use by the GIZ DIPC project because it is a comprehensive framework that can be used to help align capacity strengthening work across organizations and nations.

Draft Digital Health Competency Framework (DHCF)

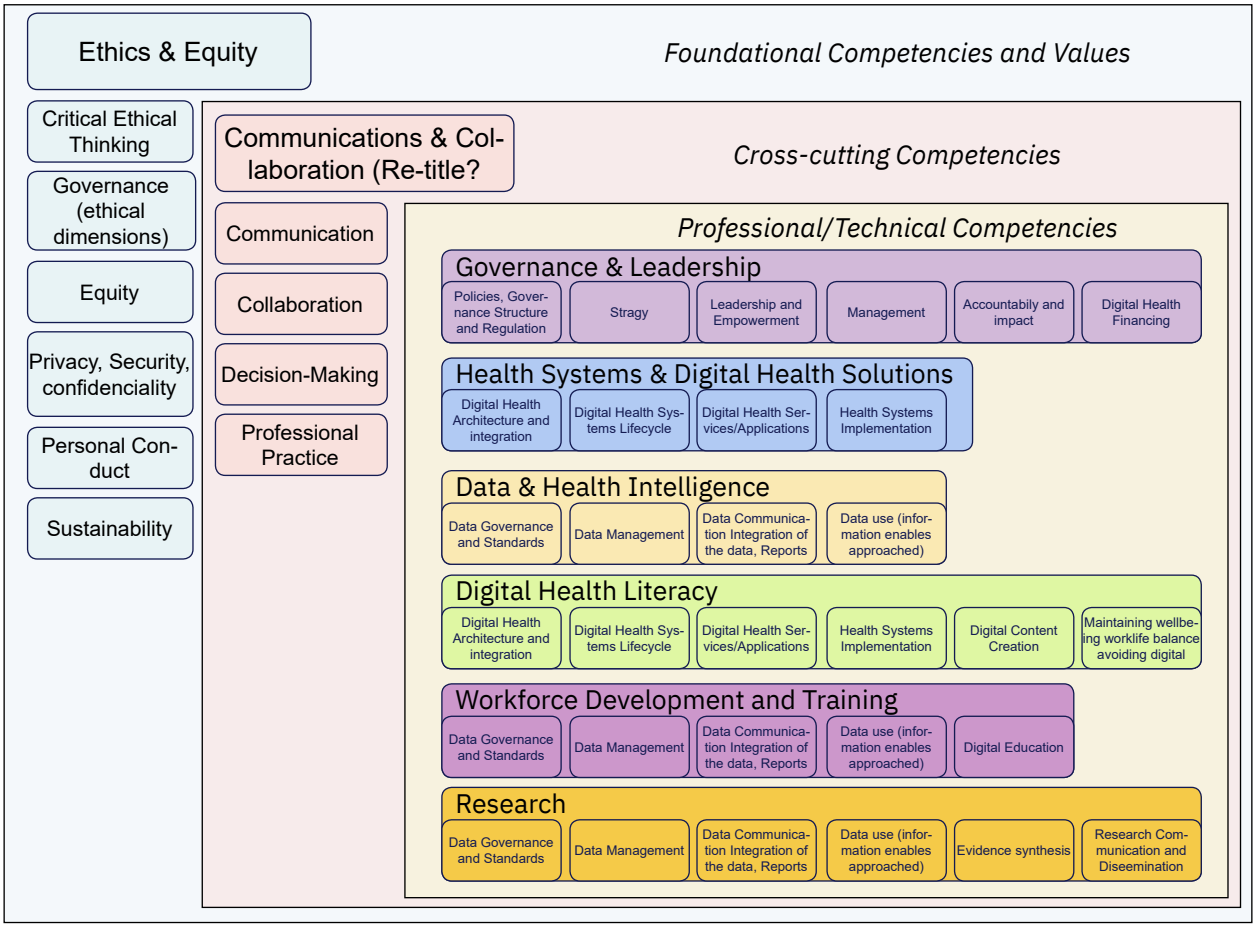


Diagram 1: Draft Digital Health Competency Framework (DHCF).


DIPC