



iHRIS PDD Evaluation

*A Holistic Assessment Using The
Principles of Digital Development*

Analysis Report
Prepared for

IntraHealth International

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EXECUTIVE SUMMARY

It seems so simple...

On the one hand, we have the Principles for Digital Development - the well-established standards intended to help practitioners succeed in applying digital technologies to development programs. And on the other hand, we have major software systems that are providing help and support to international development projects. While the Principles are living guidelines supported by a community and endorsed by organizations around the world, they have never been used (to our knowledge) to evaluate a software product - in this case iHRIS, a major health software suite.

This innovative study uses the Principles to evaluate iHRIS in an open and constructive way to inform future development of the suite in alignment with those Principles.

Scope of Work: IntraHealth, with funding from the Digital Square Project/PATH under the Bill and Melinda Gates Foundation, contracted with NPOKI, LLC, a consulting group specializing in information management systems used in the nonprofit environment, to evaluate the iHRIS Suite against the Principles for Digital Development (PDD) as part of their ongoing effort to ensure that their work continues to demonstrate the intention of the Principles. NPOKI has worked previously with the iHRIS Suite and has hosted several webinars and industry gatherings featuring iHRIS. NPOKI also did the foundational knowledge work in 2007-2010 that led to the global health sector's adoption of standard indicator dictionaries (SDMX-HD) and the development of a successful, open-source M&E system (DHIS).

The Principles for Digital Development: The Principles for Digital Development are nine living guidelines that are designed to help integrate best practices into technology-enabled programs. They include guidance for every phase of a project life cycle, and they are part of an ongoing effort among development practitioners to share knowledge and support continuous learning. The PDD were created in a community-driven effort, in consultation with the Bill and Melinda Gates Foundation, the Swedish International Development Agency (SIDA), the UN's Children's Fund (UNICEF), UN Development Program (UNDP), the World Bank, the U.S. Agency for International Development (USAID), and the World Health Organization (WHO). Currently, the PDD are maintained by the Digital Impact Alliance (DIAL).

There are nine Principles. They include:

1. *Design with the User*
2. *Understand the Existing Ecosystem*
3. *Design for Scale*
4. *Build for Sustainability*

5. *Be Data Driven*
6. *Use Open Standards, Open Data, Open Source, and Open Innovation*
7. *Reuse and Improve*
8. *Address Privacy & Security*
9. *Be Collaborative*

iHRIS: In 2005, country leaders reached out to USAID’s global Capacity Project and requested simple, easy-to-use software and systems to help them capture and maintain high-quality information for health workforce planning, management, and training. The stakeholders worked with the project to develop requirements and use cases, and in 2007, released the open source iHRIS health workforce information software. The initial iHRIS software has grown into the iHRIS Suite of health workforce information solutions. The iHRIS Suite is available free-of-charge under an open source license, enabling local developers to modify the code to suit local needs. The PDD are landmark guidelines for developing and deploying digital health solutions. As an early endorser of the PDD, IntraHealth continually endeavors to incorporate the PDD best practices in their work.

Methodology: To meet the objectives of the scope of work, NPOKI employed an approach called an **Information Audit** to evaluate information management systems like iHRIS against both organizational requirements and industry standards. The information audit is a 45 minute/one-hour interview between a stakeholder (or, in some cases, a group of stakeholders with a similar role) and a consultant interview team, usually two people from the NPOKI team.

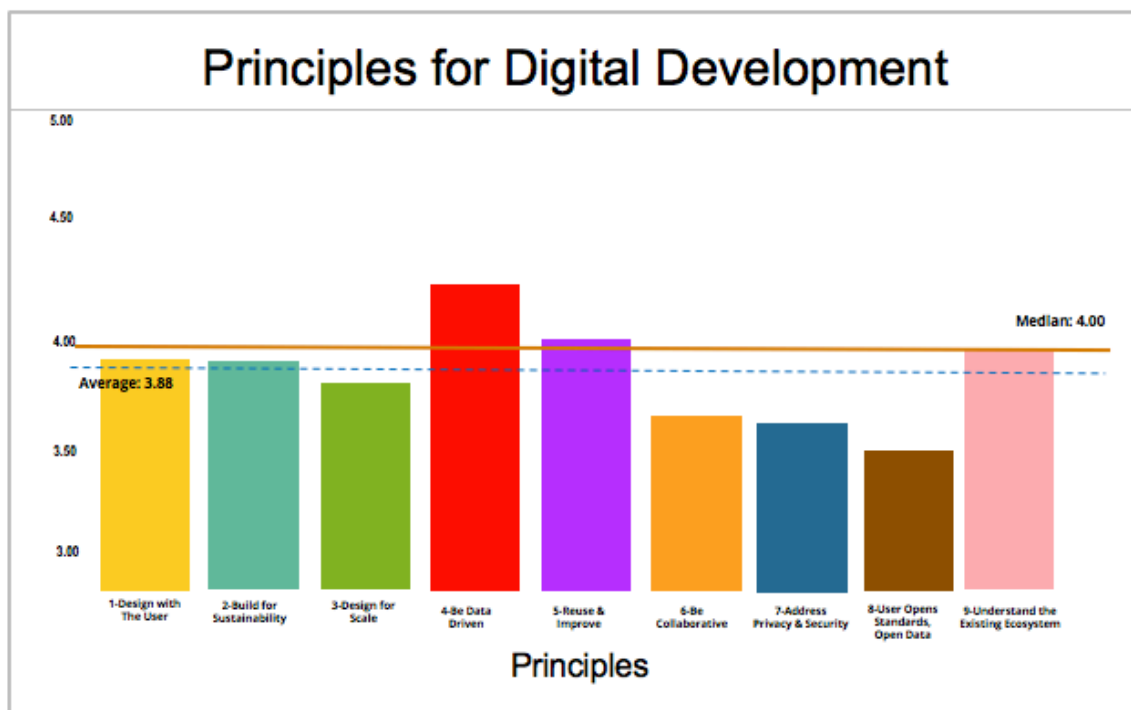
Stakeholders were recommended by the iHRIS team and were divided into three groups:

- Group 1: End Users, Administrators, Trainers (12 Respondents) – End Users represent those individuals that were part of the original roll-out of the iHRIS Suite, as well as those who are currently users. Administrators include those who had responsibility for the selection of iHRIS as the HR system of choice. Trainers represent both members of the IntraHealth iHRIS training team, and field-based experts who were called to introduce/upgrade skills regarding iHRIS implementation. Group 1 survey questions were developed specifically to address the experience of this group.
- Group 2: Development Team (Present & Past) (5 Respondents) – iHRIS has been developed by a dedicated group of developers for over a decade. It is an ongoing effort to take the lessons learned by the software development community and incorporate those into the iHRIS Suite. Group 2 survey questions were developed specifically for iHRIS developers who had had hand’s on experience in the development of the Suite.
- Group 3: Industry Experts (5 Respondents) – There are multiple iHRIS supporters who reflect the best practices of the software development community. While this group was not included in the survey questions for Group 1 and Group 2,

their comments have been reflected in the findings/recommendations for the study.







The process included capturing information about the stakeholder's background and their work and history with the iHRIS Suite. The interview team then walked the stakeholder through a series of questions developed from its framework for auditing an application against the PDD. Each question is a statement – to which the user responded with his/her level of agreement.




The answers were scored using a Likert scale, the most widely used approach to evaluating responses in survey research, on a scale of 1 to 5 with 1 = strongly disagree, and 5 = strongly agree. There was also a choice for 'Don't Know/Doesn't Apply'.



In addition to the quantitative responses, the team also collected comments and insights into the reason for a respondent's answer. This qualitative data was important to the team's understanding of the thought process and the considerations of the respondents.

Findings: As you can see from the chart above, in general, the iHRIS Suite aligned well with all nine PDD, as per the Likert Scale, which scores respondents on a 1.0 to 5.0 scale, with 5.0 as the highest score. The average score for iHRIS compliance across all of the principles was 3.88, with the highest being 4.28 (Principle 4 – *Be Data Driven*) and the lowest score being 3.51 (Principle 8 – *Use Open Standards, Open Data, Open Source, and Open Innovation*). Here are some details about the findings for each Principle:

<p>Principle #1 – Design with the User</p> <p>Average Score = 3.97 </p>	<p>iHRIS aligns well with this first principle with most respondents noting regular, systematic user feedback is considered and that users know how to engage developers. Formal performance indicators and an organized testing system were found lacking. A roadmap reflecting user-influenced indicators, video training, and recruiting beta-test users will help increase this score.</p>
<p>Principle #2 – Build for Sustainability</p> <p>Average Score = 3.95 </p>	<p>iHRIS aligns with this second principle with some inconsistency. Its modular design, rapid iteration and baseline assessments are highly appreciated by respondents. Low scores were noted for the long-term risk and sustainability strategy, and for the lack of comprehensive, iterative user testing. Articulating a clear future state for iHRIS including a path to financial sustainability will help this score stabilize and improve.</p>
<p>Principle #3 – Design for Scale</p> <p>Average Score = 3.83 </p>	<p>iHRIS aligns moderately well with this third principle. Incentives and clear plans for partner collaboration, and the well-defined modular approach to scaling iHRIS were noted. A perceived lack of transparency about how implementation costs scale with a program, and a lack of metrics and feedback mechanisms during the process of scaling are downsides. Publishing scaling use cases from the user community would likely move this score up.</p>
<p>Principle #4 – Be Data Driven</p> <p>Average Score = 4.28 </p>	<p>Data is the engine of iHRIS, and this is reflected in the highest average score in this study. Operating with a data standard, clarity into data storage and use, and responsible, hygienic data management are noted among the best in class. More tools for data de-duping, validation and a published path to compliance with newer data privacy standards will keep this score moving in the right direction.</p>
<p>Principle #5 – Reuse and Improve</p> <p>Average Score = 4.05 </p>	<p>iHRIS is very well aligned with this principle, with respondents noting its strengths in engaging global, expert resources while ensuring local, field-based experts shape the application's user interface. The need for prototyping, simulation, sandbox and test tools for users and clear compliance with open source standards was expressed. Investment in harvesting a vibrant iHRIS user community may be the best way to move the dial on alignment with this principle.</p>
<p>Principle #6 - Be Collaborative</p> <p>Average Score = 3.69 </p>	<p>iHRIS is aligned with this principle with some work remaining in planning for scale. Community experts at the global and field levels are engaged, projects are modular, and the licensing model is clear and open; all fostering collaboration. A published collaboration methodology and scheduled community connections enabling rapid feedback and iteration would be effective next steps to increase this score.</p>

<p>Principle #7 – Address Privacy & Security</p> <p>Average Score = 3.65</p> 	<p>Showing inconsistent alignment in our survey, data security and privacy need to be enumerated and addressed explicitly in the iHRIS roadmap. Bright spots include clear personnel roles, access control lists and sensitive data categorization. Reflecting the fraught data privacy and compliance climate in 2019, a data security manual with incident response, risk matrix and secure data repository will help boost this important score.</p>
<p>Principle #8 – Use Open Standards, Open Data, Open Source, and Open Innovation</p> <p>Average Score = 3.51</p> 	<p>With a split between the two surveyed groups iHRIS received the lowest average score on this principle. Clear definitions of what “open” translates to for standards, data, source and innovation in iHRIS, and plans for collaboration are noted. A perceived lack of comprehensive documentation on the limits of sharing, evaluation and data leverage kept this score low. But high scores were achieved in two categories: iHRIS meeting the definition of “open” and in planning for open source. A community governance group tasked with benchmarking “openness” would help this score.</p>
<p>Principle #9 – Understand the Existing Ecosystem</p> <p>Average Score = 3.98</p> 	<p>Clarity about its ecosystem and the current standard of data ethics is critical for any application’s success and iHRIS aligns well to this principle. Interoperability, transparency of feasibility and clear quantitative analyses work well to situate iHRIS within its ecosystem. Detailed user feedback, outcome narratives, and a better promotion strategy will help move the dial on this score and get iHRIS into more projects, communities and organizations.</p>

While it may be argued that each of the Principles has equal weight, the *Be Data Driven* Principle has perhaps the most importance. iHRIS’ compliance with that Principle - from its original development to the present - is both notable and indicative of the focus of the IntraHealth developers as the shepherds of the process. All of our groups identified the *Be Data Driven Principle* as the one that the iHRIS Suite most exemplified. Unsurprisingly, it received the highest score.

iHRIS received the lowest score on the Principle *Use Open Standards, Open Data, Open Source, and Open Innovation*. This was a bit surprising since many of our industry experts considered iHRIS to be a good example of an applications use of open source and open standards. A perceived lack of comprehensive documentation on the limits of sharing, evaluation and data leverage along with a need for clearer of what “open” translates to for standards, data, source and innovation in iHRIS, and plans for collaboration kept this score low.

Our full report includes both detailed comments from the respondents as well as scores and findings for each survey question of the nine principles.

Recommendations: Measuring the iHRIS Suite against the Principles for Digital Development is a helpful way to understand the current strengths and weaknesses of the iHRIS development, testing, implementation, and support, both historically and

currently. But this report does not provide a full picture. As some of our industry experts have said, the real test of an application comes from the value it provides to its clients, and the uniqueness of its functionality against other applications.

We divide our recommendations into six categories, including Functionality, Training, Communities of Practice, Documentation, Sustainability, and Evaluation. While some of the recommendations can be tied directly to the PDD, many were derived from our discussions with respondents while taking the survey.

Functionality

Create an API, specifically for connecting iHRIS to popular health management solutions like OpenMRS, OpenEMR, and DHIS2. Fundraise specifically for the API.

Many of these respondents worked with other health applications as well, and the need to create custom links between iHRIS and applications like DHIS2 or OpenMRS was a real challenge. There may be more willingness to include the iHRIS Suite if there is a stable, documented API that allows for direct and seamless integration with other solutions. *(Understand the Existing Ecosystem)*

Clarify the mechanisms for feedback, document them well, and include them in any training.

While the iHRIS Suite provides mechanisms for feedback through its Community of Practice, we were surprised to learn that many respondents were not aware of the various ways that they could provide feedback and that they could even request new features. We think that this is simply a matter of better documentation, training, and promotion. *(Design with the User)*

Expand iHRIS to support other workforces, e.g. pharmacy workers, social workers, education staff, etc.

We learned that many potential clients arrive at the iHRIS web site looking for a tool or suite of tools to better manage a workforce in a low resource environment. What they discover is that iHRIS deals with only the health workforce. Potential partnerships with other organizations who focus on education, social development, pharmaceutical support, etc. might be a way to find the funding and resources to expand the current functionality of iHRIS to support other workforces. *(Design for Scale, Be Collaborative)*

Training

Create iHRIS Academies, similar to DHIS2 Academies, to offer focused, ongoing training.

The frustration around access to ongoing sustainable iHRIS training was a common theme. Those who had implemented the iHRIS Suite without direct support from IntraHealth were most frustrated, especially if a language other than English was involved. Two respondents referenced iHRIS Academies and compared them with the DHIS2 Academy model. There was a sentiment among respondents that iHRIS would benefit by replicating the DHIS2 model. *(Build for Sustainability)*

Communities of Practice

Provide greater support of and promotion for the iHRIS Global Support Community (the Slack and Google Groups). This should be done by a resource dedicated to the role, not by the developers.

A strong community of practice is one of the methods for promoting iHRIS and for strengthening the relationship with the existing community. As a resource, the iHRIS Global Support Community is a solid and useful resource and should have dedicated moderation by a person skilled in managing conversations and encouraging participation by lurkers (not by a developer who is busy putting out fires) with regular access to the development team. An effort should be made to stimulate conversations and information sharing across other projects, especially health projects in the developing world. *(Be Collaborative)*.

Documentation

Update the iHRIS Toolkit. This resource was identified by many users as a vital part of a successful implementation.

The iHRIS Toolkit was described as being full of good information and templates around implementation, including strategies for support, scaling, and sustainability. Some respondents felt that the toolkit required some updating. Some felt that it should be a part of a robust training program. Input from users about how to upgrade the iHRIS Toolkit would be a great discussion on the Slack and Google Groups Community of Practice. *(Be Data Driven)*

Sustainability

Diversify both funding and ownership of iHRIS. In particular, look for a field-based partner to share the responsibilities of iHRIS development, support, and training. This goal is critical to the future success of iHRIS.

Sustainability of iHRIS was identified as a significant issue. As IntraHealth looks for more funding for iHRIS development, it needs to refine and implement its

strategy for sustainability. There was also strong support for the iHRIS Foundation. Governance was seen as an important part of the future of iHRIS, and the Foundation was seen as an excellent way to address this requirement. *(Build for Sustainability)*

Evaluation

Use the metrics provided by the Community Health Analytics Open Source Software (CHAOSS) to evaluate the iHRIS Suite. These metrics are expected to be finished in the near future. This activity will help IntraHealth in presenting iHRIS to donors.

While the PDD addresses the environment in which software projects are created and deployed, specific metrics around the quality of the software solution, the needs of the community, the accuracy of the data generated, and the overall success of the project need to be employed as part of an overall monitoring and evaluation strategy. We believe that the CHAOSS metrics might be a good resource and is certainly worth of investigation once they achieve maturity. *(Be Data Driven, Reuse and Improve, Be Collaborative)*

iHRIS was perceived as providing great value to the health community. Its users extolled its flexibility and features and acknowledged its loyal community and the niche it fulfills. It is clearly a success story for IntraHealth and a model for other NGOs considering moving into the open source application development space.

PART ONE

1. INTRODUCTION/BACKGROUND

The iHRIS Suite is a package of software applications built on a flexible framework that can be adapted to meet a wide variety of needs for managing health workforce information. The original challenge for iHRIS was the creation of a cost-effective way to capture information for health workforce planning, management, and training. The concept was to create solutions using the best practices of software development to maximize local ownership, capacity building, innovation, and partnership.

iHRIS was developed/coordinated by IntraHealth through the strategic support of the Capacity Project (2004-2009), USAID's global flagship project for Human Resources for Health. That development continued through USAID's follow-on project, CapacityPlus (2009-2015). Currently, iHRIS is utilized in 24 countries. Per IntraHealth, a country is considered as "using iHRIS" once there are countable records in the system.

The iHRIS Suite can be adapted to meet a wide variety of needs for managing health workforce information. It is comprised of four human resources applications:

- [iHRIS Manage](#) supports Ministry of Health and other service delivery organizations to track, manage, deploy, and map their health workforce
- [iHRIS Qualify](#) enables professional councils and associations to maintain a database of registered and licensed health professionals to support increased quality of care
- [iHRIS Train](#) is a new iHRIS application to track and manage health worker training activities, including preservice education and in-service continuing education
- [MEPI Connect](#) is a free, computerized, open source tool that helps the leaders of educational institutions track their graduates to assess the effectiveness of strategies to retain graduates at posts in underserved areas and more.

IntraHealth also offer two workforce planning tools: [iHRIS Plan](#) and [iHRIS Retain](#).

iHRIS has been translated by volunteers into more than 14 languages, including French, Spanish, Portuguese, Arabic, and Swahili.

2. THEORY OF CHANGE

The Problem

Many countries in Africa, Asia, and Latin America are fragile and often conflict-affected, often with health system challenges, including dysfunctional or non-existent public health systems. Comprehensive tools to track, manage, and plan the health workforce may not exist, may not be implemented in a sustainable and scalable way, and/or may not be adequately resourced with properly trained staff. They lack a comprehensive Health Resources Information System (HRIS) appropriate for their environment.

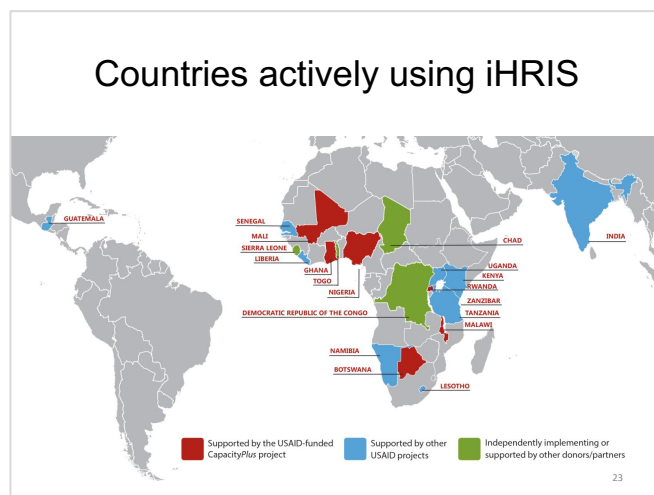
Health workers are the backbone of any health management information system (HMIS) and are essential to the achievement of Universal Health Coverage. Yet most developing country health systems have little or no data on their health workforce numbers, skills, or locations, and therefore have little ability to understand and address health workforce challenges.

Sometimes, workforce data is captured in a country's basic HMIS, but the information contained in it is often aggregate with little detail. Sometimes the data is spread across a large number of paper files throughout different organizations, making the information difficult, if not impossible, to analyze. Imagine a spreadsheet that lists the number of doctors or nurses or midwives in a given district, but little else. This information might help a country look at deployment issues or inequities but provides none of the granular information essential to supporting the health workforce.

Producers and consumers of health workforce management information cover a range of roles and responsibilities within a country. They include, of course, the Ministry of Health and other policy bodies at the national level. They support public sector health service delivery as well as the national health policies and plans.

Other producers or consumers of the information are the health workers themselves in facilities and communities throughout the country. In between, there may be different levels of local government.

If a country does have an HRIS, it is usually a simple payroll system designed to ensure public sector workers get paid. These payroll systems often have large gaps. For example, they usually don't include health specific information, such as cadre or health competencies. They



commonly don't include the duty station – i.e. the community or facility in which health workers are working. They would instead favor the 'duty station' where health workers get paid – perhaps the district health office. Finally, the public sector payroll system almost never includes non-public sector employees.

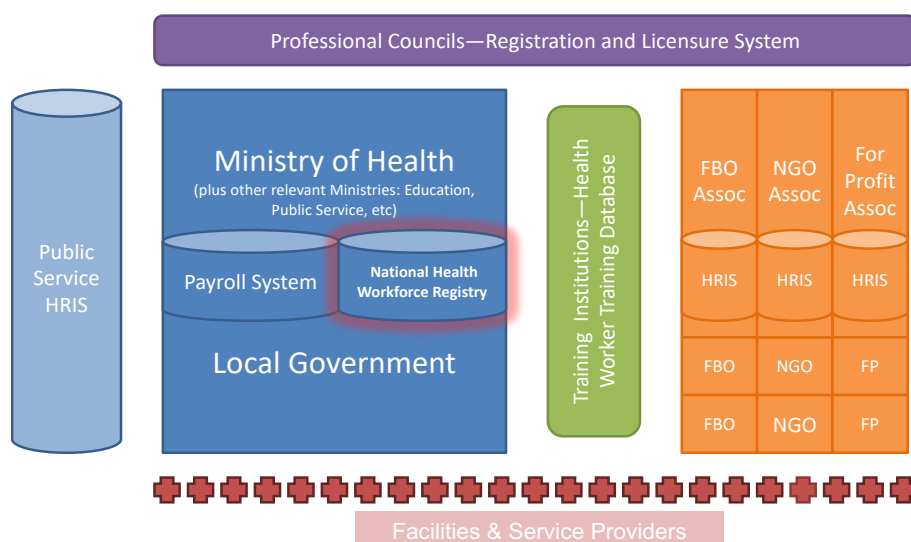
Sometimes workforce data is captured by various non-public sector organizations themselves. Usually grouped into faith-based organizations (FBOs), non-governmental organizations (NGOs) and for-profit providers and organizations, these groups will have their own payroll systems at a minimum. Another solution might be an umbrella organization or association that provides health workforce management services to all their member organizations.

There are two other important sources of data for a national health workforce registry. One of these is training institutions, that can provide data on the incoming pipeline of health workers from pre-service education, as well as improvements to competencies through in-service education.

Finally, one of the most powerful source of health workforce information is the professional council. These regulatory bodies seek to register and license all health professionals of a particular cadre – medical boards for doctors, nursing councils for nurses and midwives, and so on. They are powerful for two reasons – first they capture all health workers regardless of the sector in which they are working, and second, they gather data directly from the health workers themselves, not through any complex and error-prone management structure.

Here is a chart showing the various producers and consumers of health workforce data:

Health Workforce Information System (HRIS)



The ideal situation for policy, planning and support to different consumers of workforce data would be to develop a National Health Workforce Registry to capture a minimum data set on all health workers in a country. This would involve a great deal of work to establish data sharing agreements and effective interoperability.

The Solution

As part of the Capacity Project, a USAID funded five-year cooperative agreement to implement quality health programming in developing countries, IntraHealth was challenged with creating a cost effective, sustainable way to capture information for health workforce planning, management, and training.

Starting in 2004, the Capacity Project worked with pioneering stakeholders in Rwanda and Uganda to define health workforce information challenges and possible solutions. While the focus of these workshops was on appropriate interventions to improve workforce management and health outcomes, one of the outcomes was a clear need to develop a tool to capture data for health workforce planning, management, and training. Eventually iHRIS would become what it is today - a series of modules that include:

- A human resources management system for ministries of health and other service delivery organizations
- A health licensure and certification database for professional health councils
- A database for managing health worker training information
- A workforce planning and modeling solution
- A tool for costing health worker retention strategies

At the time, an open source approach was chosen primarily on cost considerations. Proprietary corporate human resources information systems were expensive to purchase and charged large annual licensing fees before any consulting costs for local adaptation were considered. An open source solution based on Ubuntu Linux was deemed more appropriate for the low resource environment where an HRIS would be deployed.

A secondary benefit of an open source solution is the community that would develop to support users. Through mailing lists, forums, wikis, and other collaboration tools, a robust community of users and developers could emerge to support the suite, provide additional functionality, and make suggestions for new features.

The software that emerged from these initial efforts has grown into the iHRIS Suite, a collection of health workforce information modules. The iHRIS Suite is available free-of-charge under an open-source type of license, enabling local developers to modify the code to suit local needs. The software is available under the GPLv3 license and is free to download. (<http://www.gnu.org/licenses/gpl.html>)

3. EVALUATION METHODOLOGY

Principles for Digital Development

As the use of technology - from mobile phones and tablets to computers and drones - increases globally, so does its use in international development. More and more, technology is being integrated into service delivery across sectors such as education, health, agriculture, finance, and humanitarian assistance. The goal of the Principles for Digital Development is to use the hard-won knowledge of the community for improving both projects and their impact.

The Principles for Digital Development (PDD) are an attempt to unify previous principles, such as the UNICEF Innovation Principles (2009), the mHealth group Greentree Principles (2010) and the UK Digital Service Design Principles (2012); and create a community of practice for those who work in digital development. The Digital Service Design Principles became the basis for first draft of Principles for Digital Development (2014). They were widely embraced by the international development community and further developed with significant support from The Bill and Melinda Gates Foundation, the Swedish International Development Agency (SIDA), the UN's Children's Fund (UNICEF), UN Development Program (UNDP), the World Bank, the U.S. Agency for International Development (USAID), and the World Health Organization (WHO). (<https://digitalprinciples.org/about/>) IntraHealth was an early endorser of the Principles along with CRS, FHI360, Grameen, JSI, PATH, Pathfinder, RTI, TechChange, WHO, and the World Bank, among others. Principles to Practice was published in 2016, and the PDD Forum was launched in 2017.



While technology has the potential to increase efficiency, cost effectiveness, and impact across these sectors, there are still major barriers to ensure that its impact is fully realized. The PDD are a set of living guidelines intended to help practitioners succeed in applying technology to development programs. They are now hosted by the Digital Impact Alliance (DIAL). A quick review of the Principles is as follows:



Design with the User: User-centered design starts with getting to know the people you are designing for through conversation, observation and co-creation.



Understand the Existing Ecosystem: Well-designed initiatives and digital tools consider the particular structures and needs that exist in each country, region and community.



Design for Scale: Achieving scale requires adoption beyond an initiatives pilot population and often necessitates securing funding or partners that take the initiative to new communities or regions.



Build for Sustainability: Building sustainable programs, platforms and digital tools is essential to maintain user and stakeholder support, as well as to maximize long-term impact.



Be Data Driven: When an initiative is data driven, quality information is available to the right people when they need it, and they are using those data to take action.



Use Open Standards, Open Data, Open Source, and Open Innovation: An open approach to digital development can help to increase collaboration in the digital development community and avoid duplicating work that has already been done.



Reuse and Improve: Reusing and improving is about taking the work of the global development community further than any organization or program can do alone.



Address Privacy & Security: Addressing privacy and security in digital development involves careful consideration of which data are collected and how data are acquired, used, stored and shared.



Be Collaborative: Being collaborative means sharing information, insights, strategies and resources across projects, organizations and sectors, leading to increased efficiency and impact.

These nine principles form a useful set of evaluation criteria.

Using the Principles

The Principles were intended to provide guidelines to best practices for software development and to encourage NGOS to use those guidelines in a proactive way. It was envisioned that organizations who develop software would “endorse” the Principles. That means that an organization, at the highest levels, would agree to put the PDD into practice through its policies, processes, and activities. It would be a formal and public acknowledgement that an organization is committed to designing technology-enabled tools that can reach more people, achieve greater impact, and produce stronger and more sustainable outcomes by actively living out the Principles.

Secondary beneficiaries of the Principles include those who use software in country and donors who fund software development. The Principles set a guideline for how systems should be developed and deployed with the goal to help those in country for whom the systems are designed. For donors, the Principles provide criteria to evaluate a potential grantee’s ability to effectively pursue these activities in a way that benefits the entire community. Siloed, poorly designed and managed software development efforts ultimately help no one. Ensuring that NGOs understand and embrace the basic Principles is an indication of strong intent and potential success.

Data Collection

To meet the objectives of the scope of work for this assignment, we employed an approach called an **Information Audit**. The Audit is used to evaluate information management systems like iHRIS against both organizational requirements and industry standards. Through this holistic process of staff and client interviews and system evaluation, we examined:

- The specific environment in which the system is used
- The system users, including evaluation of skills and access to training and mentoring
- The user interface design and its applicability in low resource areas
- The system structure as measured against standards like open standards, open data, open source technologies and open innovation
- The system’s re/use of existing, proven technologies and processes
- The ability of a system or process to get information to users in a seamless and reliable way
- The adherence to appropriate privacy and security protocols
- The sustainability of the solution or resource beyond its current use
- The scalability of the solution or resource

- The commitment to the larger nonprofit community, especially in helping other organizations avoid “reinventing the wheel”

NPOKI used this information audit approach for several reasons. In this case, the instrument used to gather data would be a survey - a list of statements to which the respondent agrees/disagrees using a scale of 1 to 5, with an additional choice for “I don’t know/does not apply to me”, and with a field for “comments”. It would have been very easy to send this survey out to the various stakeholders, hoping for a substantial return of completed surveys, and likewise hoping that the comments would add color to what is basically a quantitative study.

But monitoring and evaluation best practices tell us several things:

- Surveys that you distribute internally (i.e. to staff) generally have a better response rate than those distributed to external audiences (i.e. clients). Internal surveys will generally receive a **30-40%** response rate (or more) on average, compared to an average **10-15%** response rate for external surveys. If your sample group is small, your results in general will be poor.
- The more questions you ask, the fewer respondents who start a survey will complete the full survey.
- Respondents may start off enthusiastically with a survey, but that enthusiasm can wane as they move through all the statements. They may not answer a question, choose the “don’t know/does not apply” option, or skip adding comments.
- Sometimes respondents misunderstand what a statement means and can therefore score it wrong.
- A survey does not offer the respondent the opportunity for a back-and-forth conversation with the survey maker.

For all of these reasons, we chose to go with the longer and more intensive process of an information audit, where two auditors work with a respondent as s/he goes over the statements. The auditors record the responses. The auditors also encourage respondents to add color comments by engaging them in conversation and can clarify any confusion around the statements.

The information audit is a one-hour interview between a stakeholder (or, in some cases, a group of stakeholders with a similar role) and a consultant interview team, usually two people. Stakeholders were divided into three groups:

- Group 1: End Users, Administrators, Trainers
- Group 2: Development Team (Present & Past)
- Group 3: Industry Experts

The process included capturing information about the stakeholder's background, work, and history with the iHRIS Suite. The interview team then walked the stakeholder through a series of questions developed from its framework for auditing an application against the PDD. Each question is a statement – to which the user responded with his/her level of agreement.

Group 3 - the Industry Experts - were individuals identified by the software developer (IntraHealth) and by the community of users of iHRIS and other health-related applications like OpenEMR and DHIS2. The experts did not participate in the survey process, but were interviewed on several topics, including their knowledge of iHRIS, their thoughts around the PDD, their examples of best practices and lessons learned in developing software for similar communities, and their suggestions for other methods for evaluating software. Included in Group 3 were two staff members from DIAL, the organization that currently supports the PDD.

The answers were scored using a Likert scale, the most widely used approach to evaluating responses in survey research, on a scale of 1 to 5, with 1 = strongly disagree, and 5 = strongly agree. There was also a choice for 'Don't Know/Doesn't Apply'.

In addition to the quantitative responses, the team also collected comments and insights into the reason for a respondent's answer. This qualitative data was important to the team's understanding of the thought process and considerations of the respondents.

4. WORK PLAN

We performed the following sequence of activities to achieve the deliverables for the assignment:

- **Review Documents**
 - Conducted a desk review of existing iHRIS documents and publications.
 - Gained sufficient familiarity with background materials and history, using initial project proposals, subsequent funding proposals, reporting documents, blog posts, etc.
- **Create Inception Report**
 - Created a report capturing how iHRIS was built, iterated, and used from start to the current day.
 - Described the theory of change upon which iHRIS was created.
 - Included the expected research activities and requirements, and deliverable due dates for the next phase of the engagement.
- **Develop a Digital Principles Assessment Framework**

- Evaluated the currently available frameworks for assessment using the PDD, including the ones developed by SIMLab and TechChange
- Created a new framework for filtering the iHRIS Suite against the PDD using the data from the research report. The frameworks developed by SIMLab and TechChange did not provide a good fit for an application that already had several years of development and implementation history.
- **Interview Staff, Clients & Experts**
 - Performed 23 one-hour interviews , including senior management, staff, clients, both at IntraHealth HQ and in the Field, who own/create/use/disseminate iHRIS information as part of their routine tasks.
 - Captured how iHRIS is used and how it adds value.
 - Interviewed Industry Experts to gain better insight into both the PDD and the best practices of software development.
- **Organize Information Audit Data**
 - Examined, distilled, and organized the findings into a draft research report using the data collected during the information audit.
 - Added further document review, surveys, and other relevant informational resources that enhanced the research.
 - Included a description of the Principles for Digital Development.

5. Considerations

During the Information Audit process, we spoke with several people who were leaders in the software application development field, including Kate Wilson and Michael Downey from the Digital Impact Alliance and Allen Gunn from Aspiration. They provided insights into the process of evaluating a software application against a framework like the PDD. They also provided some general considerations about any software development project created/developed/maintained under an NGO project or program. We present these considerations as a filter to our findings:

- A. *Can any set of standards (like the PDD) be used as a scorecard to evaluate a software application?*

The challenge is that a report card on the success of any software application is based on a list of categories that are more qualitative than quantitative and highly subjective. These categories include:

- Usability
- Security
- Code quality

- Value of delivery

The PDD addresses usability and security but does not provide a way of evaluating the success of these categories, but rather provides the standards that one should use. The PDD does not address code quality at all. The software application market is littered with examples of poor code or applications built upon the wrong platform. Value of delivery (no harm done, lives improved or saved) is also an important category for evaluation.

Another consideration is examining the usage dimension:

1. For what use type
2. For what use case

The developer also needs to ask: Who will be using the application and in what environment? What are their skills set and their access to appropriate training? What is the problem they are trying to solve? Does the application adequately meet those needs?

The PDD does not address environment, user skills, or quality of the solution.

B. Can the PDD be used by donors as way of evaluating whether a software development project has merit and should be funded?

Using the PDD as a way of affirming a software development project is difficult. Even with the best of intentions, an NGO may not be the right type of organization to build a software application. However, if an organization does not use the principles, it should not be a candidate for receiving donor funding. In that case, the PDD are excellent principles for saying “no”.

C. Do the PDD ask the right questions?

All of the principles are positively framed statements, describing the best scenario for developing software. They were characterized by the industry experts we interviewed as being “glass half full” principles. Any questions derived from the PDD maintain that positive focus. Even when measured using a Likert Scale, the tendency is toward a Positive Bias that agrees with the statement. For example:

iHRIS **provides clear ways** for me to submit feedback regarding my experience using the system.

iHRIS **does not provide clear ways** for me to submit feedback regarding my experience using the system.

Because these statements are essentially the same, with one worded in a positive way and one in a negative way, an iHRIS user asked these questions using a Likert scale should respond with the same answer, i.e. 'Strongly Agree' for the first statement, or 'Strongly Disagree' for the second statement. However, researchers have identified a phenomenon known as **Acquiescence Bias** where a respondent to a survey has a tendency to agree with all the questions in a survey. This bias in responding may represent a form of dishonest reporting because the participant automatically endorses any statements, even if it results in contradictory responses.

Other forms of response bias include:

- **Demand characteristics** - a type of response bias where participants alter their response or behavior simply because they are part of an experiment. This arises because participants are actively engaged in the experiment, and may try to figure out the purpose, or adopt certain behaviors they believe belong in an experimental setting.
- **Extreme responding** - a form of response bias that drives respondents to only select the most extreme options or answers available. For example, in a survey utilizing a Likert scale, the participant only answers questions with "strongly agree" or "strongly disagree".
- **Question order bias** - a type of response bias where a respondent may react differently to questions based on the order in which questions appear in a survey or interview. There are many ways that survey items that appear earlier in a survey can affect responses to later questions.
- **Social desirability bias** - a type of response bias that influences a participant to deny undesirable traits and ascribe to themselves traits that are socially desirable. In essence, it is a bias that drives an individual to answer in a way that makes them look more favorable to the experimenter.

We realize in our survey questions, based on the PDD, that using a small sample group might open itself to several possible biases, and that a survey based on all positive statements might produce an Acquiescence Bias.

D. Is there any area not addressed by the PDD that should be included?

One area of importance to NGOs developing open source applications is **Governance**. Software code carries with it the potential for security, legal, and operational risks. If not handled properly, these risks can result in delayed release dates and extended go-to-market timelines. It can also require additional time, money, and resources in remediation efforts. It may also result in faulty usability and an unwanted customer experience for end users.

Software governance comes into play firstly as a conceptual idea. The idea being that an NGO developing open source software applications acknowledges the extent of its

reliance on open source and agrees that there are too many risks involved in not knowing what components go into their code.

The next move is from a conceptual governance policy to a practical one: (1) the understanding that a software inventory needs to be managed, and (2) the NGO needs to maintain policies by which it tracks, approves, controls and maintains the components used in its software. The practical manifestation of a governance policy encompasses a detection and approval process, an organizational chain of command to deal with software usage, and a decision regarding the automation of these processes.

PART TWO

6. Findings

In this report, we provide both summary and detailed information from the results of our Information Audit. The surveys for Groups 1 & 2 were created using Google Forms. Group 3 was not included in the survey process because interviewees in that group had not worked directly with the iHRIS Suite. Those interviews provided a qualitative background of the work iHRIS is doing in the field and how it is perceived in that context. They afforded us with a more informed background with which to review the work of iHRIS in relationship to the Principles.

Some of the graphics provided in this report were native to Google Forms using their Summary View feature (See Appendix B). To provide additional analysis capability and other graphical views, we opted to use Tableau, a popular tool used by the data visualization and M&E communities, to analyze datasets and create interactive dashboards. We created a Tableau dataset by exporting the Google Forms results to Google Sheets and then importing the Google Sheets data into Tableau. In addition to this report, we have also submitted the Tableau dataset (*iHRISDashboard19.01.17.twbx*) which contains all of the quantitative and qualitative information gathered. This file can be accessed using Tableau or the free Tableau Reader.

The following pages capture the results of our Information Audit. In the **Findings – Detail** section, each page refers to one of the 9 Principles for Digital Development. At the top of the page we present the Principle, a brief description, and our calculated overall average score. The remainder of the page contains the exact statement as presented to both Group 1 or Group 2, along with the average score for each statement. Group 1 included 12 respondents, while Group 2 included 5 respondents. There were 5 respondents in Group 3 who were not part of the survey as the statements were directed at users and developers. All respondents were selected by the iHRIS team. Because our sampling was relatively small, we opted for average scores over median scores. Median scores are more appropriate for larger samplings. At the bottom of each page, we have included comments that we documented during the Information Audit.

In the **Findings – Summary** section, each chart provides a brief appraisal of how iHRIS aligns with that Principle. It is interesting to note that the average score for iHRIS compliance across all of the Principles is 3.88, with the highest being 4.28 (Principle 4 – Be Data Driven) and the lowest score being 3.51 (Principle 8 – Use Open Standards, Open Data, Open Source, and Open Innovation).

While it may be argued that each of the Principles has equal weight, the *Be Data Driven* Principle has perhaps the most importance. iHRIS' compliance with that Principle - from its original development to the present - is both notable and indicative of the focus of

the IntraHealth developers as the shepherds of the process. All of our groups identified the *Be Data Driven Principle* as the one that the iHRIS Suite most exemplified. Unsurprisingly, it received the highest score.

iHRIS received the lowest score on the Principle *Use Open Standards, Open Data, Open Source, and Open Innovation*. This was a bit surprising since many of our industry experts considered iHRIS to be a good example of an application's use of open source and open standards. There is often confusion around the use of the term 'open' and it can be considered a failing of the Principles that there is a lack of clarity as to the meaning of the terms or the phrases. A good example is the term 'open innovation'. In some areas this means innovation that is done not behind a corporate firewall in an isolated laboratory, but in an environment where everyone in the organization can see and participate. In other areas, open innovation means using external sources of innovation such as customers and rival organizations. The idea that innovation is 'closed' seems to belie the definition of the word innovation.

The low score was also based on a perceived lack of comprehensive documentation on the limits of sharing, evaluation, and data leverage. Along with a need for clearer definition of what "open" translates to, these two elements kept this score low.

Findings – Detail



Principle #1 – Design with the User

User-centered design starts with getting to know the people you are designing for through conversation, observation and co-creation.

Average Score = 3.97

	Questions	Category	iHRIS
Group 1	D1) iHRIS seems to be well thought-out and allows me to perform my job effectively.	<i>Landscape Assessment</i>	4.08
	D2) iHRIS provides clear ways for me to submit feedback regarding my experience using the system.	<i>User Feedback & Analysis</i>	3.67
	D3) iHRIS testing process seemed well organized and efficient.	<i>User Testing Engagement</i>	3.83
	D4) iHRIS training I have received provide the information I needed to begin using the system effectively	<i>User Training & Dissemination</i>	4.09
	D5) I feel I have a good understanding of how this can help me engage with the people I work with moving forward.	<i>Late-stage Engagement</i>	4.50
Group 2	D1) iHRIS has complete design documentation describing in detail plans for testing, deployment, and maintenance at all project stages	<i>Design/Vision Statement</i>	3.60
	D2) Regular, systematic feedback was obtained from users and was considered and/or implemented as appropriate.	<i>Iterative Deployment</i>	4.80
	D3) iHRIS has a clear user feedback monitoring strategy tied to well-defined indicators.	<i>Evaluative Indicators</i>	2.40

Comments

Group One

D1) iHRIS design is simple and easy to use
D1) Migrating from legacy system brings in bad data. Cleaning data is difficult
D1) Users must be supervised/motivated for data to be accurate
D1) Does not handle management of workforce resources - salaries, payments, etc.
D2) Google group is helpful
D2) There is a feedback button, but may not be obvious, not effective
D3) Original testing was not organized
D3) Implementation toolkit served us well
D3) Newer iterations were informed from past iterations

D4) Need packaged videos for training
D4) Need training of trainers
D4) Need iHRIS Academy, like DHIS2 Academy
D4) Sometimes retraining is necessary
D5) iHRIS developers have provided excellent support
Group Two
D1) Includes roadmap, functionality, but may not be sufficient
D1) Documentation review is needed
D1) Toolkit addresses testing, deployment, maintenance
D2) Projects funded by IH have strong user feedback
D2) User requirements drove development
D3) Feedback, but not “well-defined” indicators



Principle #2 – Build for Sustainability

Building sustainable programs, platforms and digital tools is essential to maintain user and stakeholder support, as well as to maximize long-term impact.

Average Score = 3.95

	Questions	Category	iHRIS
Group 1	B1) iHRIS is well-adapted to the requirements of my environment and location	<i>Established Partnerships</i>	4.00
	B2) iHRIS provides needed depth-of-expertise into the needs and complexities of my processes	<i>Critical Collaboration</i>	4.00
	B3) iHRIS accommodates the unique or custom needs of my social environment.	<i>Local Engagement</i>	4.17
Group 2	B1) iHRIS documents the Principles of Sustainability and how they apply.	<i>Definition & Theory of Change</i>	4.00
	B2) iHRIS documents development, and shares that with stakeholders at all lifecycle phases.	<i>Collaborative Partnerships</i>	4.20
	B3) iHRIS documents a clear financing strategy that includes risk assessment and per-stakeholder specifics.	<i>Financial Specifications</i>	3.60
	B4) iHRIS documents late-stage project scenarios, and includes stakeholder ownership and accountability	<i>Project Sunsetting</i>	4.00
	B5) iHRIS documents all scale scenarios as obtained from stakeholders. Costs and risks are outlined in detail.	<i>Cost of Scale</i>	3.80
	B6) iHRIS documents a comprehensive, iterative user testing plan, noting the key impacts from each user group.	<i>Early Testing</i>	3.00
	B7) iHRIS employs a modular deployment strategy which emphasizes the ability to rapidly incorporate feedback.	<i>Rapid Resource Response</i>	4.80
	B8) iHRIS provides a complete baseline assessment against which to measure improvements.	<i>Baseline Data & Relevance</i>	4.20
	B9) iHRIS outlines complete per-user financial monitoring strategies including long-term risks and sustainability.	<i>Financial Monitoring</i>	3.00

Comments

Group One

B1) iHRIS developed to work with limited bandwidth
 B1) iHRIS Mangle = 3, iHRIS Plan = 2, iHRIS Train = 4
 B1) Arabic is difficult to translate
 B1) Easily customizable to meet most requirements
 B2) Developers understood the needs of users
 B2) Strong support for customization
 B2) Too few with expertise
 B3) iHRIS is very flexible and adaptable
 B3) Significant change can fork the software
 B3) Need Offline iHRIS, better batch upload

Group Two

B1) Original development tied to IH project goals.
 B1) iHRIS now adheres to sustainability principles

B2) Good at documenting for most (but not all) lifecycle phases, with stakeholder input
 B3) Done this on individual projects, but no overall strategy
 B3) Financing strategy in toolkit needs to be strengthened
 3) Budgeting templates in toolkit
 B4) Concerned about support for ongoing implementations when there is no funding
 BB5) Country-level deployment and scaling requirements documented
 B5) Not all scale scenarios are documented in detail

B6) There IS currently a comprehensive user testing process
 B6) There was NOT a comprehensive user testing plan at the beginning, need to do more
 B7) Five modules, but need to focus on flagship iHRIS Manage
 B8) Provided at global level, but not complete
 B8) provided in the toolkit
 B8) Some implementations do this, helps to improve iHRIS
 B9) Walked clients through real costs compared to licenses for costware
 B9) No, we do not provide any financial monitoring strategies



Principle #3 – Design for Scale

Achieving scale requires adoption beyond an initiatives pilot population and often necessitates securing funding or partners that take the initiative to new communities or regions.

Average Score = 3.83

	Questions	Category	iHRIS
Group 1	S1) iHRIS is designed to grow with my organization.	<i>Assessment & Feedback</i>	4.17
	S2) iHRIS provides unique functionality compared with other open source software applications.	<i>Ecosystem Considerations</i>	4.50
	S3) The per-user costs for using iHRIS for an organization are clearly defined.	<i>Per-User Cost Evaluation</i>	2.67
Group 2	S1) iHRIS defines scale from multiple perspectives outlining challenges and risks.	<i>Definition of Scale</i>	4.20
	S2) iHRIS outlines detailed costs and risks associated with long-term scaling.	<i>Financial Investment</i>	3.60
	S3) iHRIS lays out explanation and plans for how partner collaboration will improve scale.	<i>Collaborative Guidance</i>	4.60
	S4) iHRIS defines a modular approach to scaling, mitigating financial, logistical risks.	<i>Modular Approach</i>	4.20
	S5) iHRIS documents a measurement methodology to facilitate feedback and measurement during scaling.	<i>Measurement</i>	3.00
	S6) iHRIS contains an assessment of communities/partners working in the market space, and explains how to promote iHRIS.	<i>Capacity Analysis</i>	3.80
	S7) iHRIS documents a strategy for mitigating risk due to lack of resources during scaling.	<i>Mitigation & Resources</i>	3.40

Comments

Group One

S1) iHRIS does scale, but not easily
 S1) Scales, but needs mobile data entry app
 S2) iHRIS is adaptive and provides more/better options
 S2) No other open source tool provides health workforce
 S2) iHRIS is clearly the leader
 S2) Orange Data Mining has similar functionality
 S2) Need API to easily connect
 S3) Documented equipment costs, but not per-user costs
 S3) Future cloud version of iHRIS may offer per-user costs resources

Group Two

S1) Scale considered from MOH perspective
 S1) We provide documentation on scaling challenges
 S2) Detailed costs and risks documentation in toolkit can be improved
 S2) Small organizations specifically need more help regarding scaling
 S3) When we rollout, we leverage partnerships
 S4) We roll out modules individually, depending on a client's needs
 S4) Consider small pilot or small country vs. a large scale country
 S5) Feedback button in software, documented in toolkit
 S6) iHRIS team engages others in the market space
 S6) Strong push for community involvement
 S7) PATH has provided a global guidebook about scale
 S7) Real risk was when USAID project ended



Principle #4 –Be Data Driven

When an initiative is data driven, quality information is available to the right people when they need it, and they are using those data to take action.

Average Score = 4.28

	Questions	Category	iHRIS
Group 1	V1) The quality of the data in iHRIS is reliable and accurate.	Data Quality	3.75
	V2) Confidential data within iHRIS is handled appropriately and securely (DOB, salary, etc.)	Data Privacy Procedures	3.80
	V3) The data fields in iHRIS are appropriate and enforce accurate entry.	Responsible Data Management	4.42
	V4) The data iHRIS captures is relevant to the analysis needed to manage personnel.	Data Driven Outcomes	4.75
Group 2	V1) iHRIS outlines a prioritized data management plan that describes the data you expect to acquire or generate, and how you will manage, analyze, and store that data, and how you will use that data.	Defining Data Standards	4.60
	V2) iHRIS considers localized data use and technical literacy when defining the assessment framework.	Data Assessments	4.60
	V3) iHRIS outlines a prioritized breakdown of data storage options including benefits and risks.	Data Storage	4.40

Comments

Group One

V1) Data is as good as the human who enters the information
V1) iHRIS has pattern matching and range checking
V1) Accuracy can be a training issue
V1) Latest version has individualized reports
V2) User rights must be carefully set up, should be default
V2) Data is secure, backed up, approved, and encrypted
V2) GDPR is the guideline for all IH systems, iHRIS included
V3) Difficult to mimic paper forms
V3) Graphic data is a challenge
V3) Data collection tool needs redesign
V3) Sub forms make it difficult to update multiple records

V4) iHRIS allows reports for information across districts, including mapping
V4) Need for historical data, pivot tables for managers

Group Two

V2) Not a lot of M&E engagement re: assessment framework
V2) We always assess technical expertise of user
V3) Tried to convince MOH to use cloud.
V3) Data does not leave country without an MOH agreement, per IH policy
V3) We insist upon a good backup strategy, because of power issues



Principle #5 – Reuse and Improve

Reusing and improving is about taking the work of the global development community further than any organization or program can do alone.

Average Score = 4.05

	Questions	Category	iHRIS
Group 1	R1) IntraHealth has communicated via training or web site, how it uses open open source software and interoperates.	<i>Open Standards</i>	3.73
	R2) IntraHealth has communicated via training or web site, how it works with partners to meet the needs of the community	<i>Partner Identification</i>	3.78
	R3) IntraHealth has provided a way to request enhancements/new features to the software.	<i>Clear Documentation</i>	4.08
Group 2	R1) iHRIS engages specific technologies, resources, and experts that will clearly enhance the application.	<i>Resource Identification</i>	5.00
	R2) iHRIS considers or engages local experts in the community to understand user needs.	<i>Local Needs Assessment</i>	5.00
	R3) iHRIS utilizes prototyping tools (simulation application, test performance.	<i>User Prototyping</i>	3.40
	R4) iHRIS outlines the time for project staff to engage with user/stakeholder communities.	<i>Resource & Time Allocation</i>	4.20
	R5) iHRIS engages collaborative efforts to improve the overall application design.	<i>Relevant Collaboration</i>	4.40
	R6) iHRIS outlines a plan to engage subject matter experts in each step of the development process.	<i>Iterative Collaboration</i>	3.60

Comments

Group One

R1) Fantastic job communicating through OpenHIE, but struggle with other open source systems. Not much discussion re: DHIS2
 R1) Conducted in interoperability academies
 R1) API a must
 R2) "We do not do things to people or for people, but with people, and by people after training."
 R2) IH is a leader in working with partners and attending industry meetings
 R2) Web site, training manual, and implementation tool kit needs improvement
 R2) More/sustainable funding will ensure better resources
 R3) iHRIS adds features based on client demand

R3) Community forum provides method for feature discussion
 R3) Online forms, email, on-the-ground, user group
 R3) Response time can be slow

Group Two

R1) Good in-country expertise
 R2) Every implementation includes local experts
 R3) Yes, using various tools
 R4) IH projects succeed in deployment and change management
 R5) We use collaborative methods when developing and testing



Principle #6 Be Collaborative

Being collaborative means sharing information, insights, strategies and resources across projects, organizations and sectors, leading to increased efficiency and impact.

Average Score = 3.69

	Questions	Category	iHRIS
Group 1	C1) The license for iHRIS is clearly documented so that developers and users understand the rules of use.	<i>Licensing & Distribution</i>	4.27
	C2) iHRIS provides documentation regarding implementation of industry best practices.	<i>Community Connections</i>	3.56
	C3) iHRIS provides information regarding collaboration with civil/municipal government.	<i>End User Involvement</i>	3.63
	C4) iHRIS provides information regarding engagement with open source community.	<i>Open Source Participation</i>	3.73
	C5) iHRIS provides clear mechanisms for disseminating feedback regarding software, whether positive or negative.	<i>Community Feedback</i>	3.50
Group 2	C1) iHRIS outlines a plan to engage community in each step of the development process.	<i>Expert Identification</i>	4.60
	C2) iHRIS used an internal collaboration process during the planning /design phases.	<i>Internal Feedback Processes</i>	4.60
	C3) iHRIS outlines a plan for project modularity that includes collaboration and community engagement.	<i>Modularity</i>	4.60
	C4) iHRIS defines clear channels of stakeholder and local technology group collaboration.	<i>Local Engagement</i>	4.00
	C5) iHRIS defines a collaboration methodology that facilitates rapid feedback from identified groups.	<i>Collaboration Practices</i>	3.00

Comments

Group One

C1) Use Creative Commons License – fundamental
 C2) Implementation Toolkit is good, both interactive and downloadable as pdf
 C2) Not many references to industry best practices
 C2) Must explain that iHRIS is health specific, not a general HR system
 C3) Collaboration discussed in Toolkit
 C3) iHRIS Google groups are ways of engaging with others
 C3) If IH implements project, collaboration is strong
 C4) Open source community discussions happen, but are not documented

C4) Strong engagement with OpenHIE
 C4) We need a Community Manager to promote discussion
 C5) iHRIS does not provide easy feedback mechanisms within the software
 C5) Many channels for communication: web site, Google groups, Slack, listserv, others

Group Two

C1) We actively engage local experts in development
 C5) IH encouraged feedback from technical groups
 C5) Collaboration across civil society can be difficult



Principle #7 –Address Privacy & Security

Addressing privacy and security in digital development involves careful consideration of which data are collected and how data are acquired, used, stored and shared.

Average Score = 3.65

	Questions	Category	iHRIS
Group 1	A1) iHRIS provides information regarding how the system deals with potential threats and vulnerabilities.	<i>Data Risk Assessment</i>	2.54
	A2) iHRIS takes into consideration how data and related indicators are managed and regulated in my local environment.	<i>Context Assessment</i>	3.00
	A3) iHRIS implements an effective user permissions system that controls which users have access to which data.	<i>Data Access</i>	4.58
	A4) iHRIS provides functionality and documentation for securely archiving data.	<i>Data Sunsetting</i>	3.27
	A5) iHRIS documentation provides a clear data security strategy that includes mitigation response in the event data is compromised.	<i>Security Considerations</i>	2.12
Group 2	A1) iHRIS carefully and completely identifies and categorizes sensitive data elements and associated protocols	<i>Essential Data Identification</i>	4.40
	A2) iHRIS outlines a plan for engaging communities in securing project data, taking into account technical literacy.	<i>Data Management Plan</i>	4.40
	A3) iHRIS assigns clear responsibilities for team members during events such as training and response planning.	<i>Personnel Responsibilities</i>	4.60

Comments

Group One

A1) Linux provides a stable, attack-free platform
 A1) Could be improved. An early security breach was not managed well
 A1) Not documented at all. Need better process
 A1) VPN/Firewall may be needed for extra security
 A2) Risks in lack of support from IH
 A2) The indicators are clear, but management and risk are not addressed
 A3) User rights needs more development, default not always the best option

A4) No built-in archiving functionality that I am aware of
 A4) There is archiving on a server platform
 A5) Not aware of any data security documentation

Group Two

A1) Technical literacy is a real challenge in the field
 A1) Critical requirement, with GDPR as a good standard
 A2) We train local users



Principle #8 – Use Open Standards, Open Data, Open Source, and Open Innovation

An open approach to digital development can help to increase collaboration in the digital development community and avoid duplicating work that has already been done.

Average Score = 3.51

	Questions	Category	iHRIS
Group 1	O1) iHRIS document provides information regarding the limitations or potential restrictions around the open standards or data repositories used.	<i>Open Source Evaluation</i>	2.75
	O2) iHRIS documentation provides information on interoperability with open source standards.	<i>Interoperability</i>	3.36
	O3) iHRIS documentation provides information regarding data sharing and data leverage.	<i>Data Sharing & Engagement</i>	3.10
Group 2	O1) iHRIS clearly defines "open" within the project context, including four core aspects: standards, data, source, and innovation.	<i>Definition of Open</i>	4.80
	O2) iHRIS discusses how each digital attribute would make use of an open model - via collaboration, licensing, or data sharing.	<i>Planning for Open Source</i>	4.60

Comments

Group One

O1) iHRIS references many open source technologies
 O1) Users ask for information about open standards
 O2) A lot of information on interoperability is published
 O2) IH are a founding member of OpenHIE
 O2) Very little information about development technology i.e. MySQL, PHP, Linux
 O2) Users ask for information about open source standards
 O3) No documentation on interaction with the open source community is provided
 O3) WHO may share information with iHRIS

Group Two

O1) Data is sensitive, but we develop against standards
 O1) The four core aspects are key to project success
 O2) Discussed in toolkit



Principle #9 –Understand the Existing Ecosystem

Addressing privacy and security in digital development involves careful consideration of which data are collected and how data are acquired, used, stored and shared.

Average Score = 3.98

	Questions	Category	iHRIS
Group 1	U1) iHRIS provides information regarding organizations/experts that were instrumental in the development of the system.	<i>Landscape Assessment</i>	4.17
	U2) The iHRIS site provides information regarding monitoring and evaluation of the effectiveness of the system and how feedback is used.	<i>Account for All Outcomes</i>	3.18
Group 2	U1) To improve assessment, quantitative measures are developed to evaluate iHRIS.	<i>Context Analysis</i>	4.20
	U2) iHRIS discusses technical feasibility assessment (delivery of a product or service) including opportunities and challenges.	<i>Technical Feasibility</i>	4.40
	U3) iHRIS priorities engagement with local communities and programs with relevant experience.	<i>Integration & Interoperability</i>	4.60
	U4) iHRIS outlines a promotion strategy for all modules with relevant projects, communities, and organizations.	<i>Promotion & Access</i>	4.00

Comments

Group One

U1) IH is the only source of expertise, no list of external experts
 U1) Regional iHRIS support teams in Africa
 U1) iHRIS community provides excellent interaction with developers
 U1) iHRIS is a network of networks, where community provides assistance
 U2) Feedback from external evaluations, but not from system
 U2) Quarterly/Annual reports sent to USAID

Group Two

U1) Capacity developed formal quantitative measures
 U1) Lots of qualitative data, but less quantitative data
 U1) Strong M&E defined for many implementations
 U2) Most challenges and opportunities were considered
 U4) Mainly promotes with the original client
 U4) We need to strengthen our promotion strategy

Findings – Summary



Principle #1 – Design with the User

User-centered design starts with getting to know the people you are designing for through conversation, observation and co-creation.

Average Score = 3.97

iHRIS **aligns well** with this first principle with most respondents noting regular, systematic user feedback is considered and that users know how to engage developers. Formal performance indicators and an organized testing system were found lacking. A roadmap reflecting user-influenced indicators, video training, and recruiting beta-test users will help increase this score.



Principle #2 – Build for Sustainability

Building sustainable programs, platforms and digital tools is essential to maintain user and stakeholder support, as well as to maximize long-term impact.

Average Score = 3.95

iHRIS aligns with this second principle with **some inconsistency**. Its modular design, rapid iteration and baseline assessments are highly appreciated by respondents. Low scores were noted for the long-term risk and sustainability strategy, and for the lack of comprehensive, iterative user testing. Articulating a clear future state for iHRIS including a path to financial sustainability will help this score stabilize and improve.



Principle #3 – Design for Scale

Achieving scale requires adoption beyond an initiatives pilot population and often necessitates securing funding or partners that take the initiative to new communities or regions.


Average Score = 3.83

iHRIS **aligns moderately well** with this third principle. Incentives and clear plans for partner collaboration, and the well-defined modular approach to scaling iHRIS were noted. A perceived lack of transparency about how implementation costs scale with a program, and a lack of metrics and feedback mechanisms during the process of scaling are downsides. Publishing scaling use cases from the user community would likely move this score up.



Principle #4 – Be Data Driven

When an initiative is data driven, quality information is available to the right people when they need it, and they are using those data to take action.

Average Score = 4.28 

Data is the engine of iHRIS, and this is reflected in the **highest average score** in this study. Operating with a data standard, clarity into data storage and use, and responsible, hygienic data management are noted among the best in class. More tools for data de-duping, validation and a published path to compliance with newer data privacy standards will keep this score moving in the right direction.



Principle #5 – Reuse and Improve

Reusing and improving is about taking the work of the global development community further than any organization or program can do alone.

Average Score = 4.05 

iHRIS is **very well aligned** with this principle, with respondents noting its strengths in engaging global, expert resources while ensuring local, field-based experts shape the application's user interface. The need for prototyping, simulation, sandbox and test tools for users and clear compliance with open source standards was expressed. Investment in harvesting a vibrant iHRIS user community may be the best way to move the dial on alignment with this principle.



Principle #6 - Be Collaborative

Being collaborative means sharing information, insights, strategies & resources across projects, organizations & sectors, leading to increased efficiency and impact.

Average Score = 3.69 

iHRIS is **aligned** with this principle with some work remaining in planning for scale. Community experts at the global and field levels are engaged, projects are modular, and the licensing model is clear and open; all fostering collaboration. A published collaboration methodology and scheduled community connections enabling rapid feedback and iteration would be effective next steps to increase this score.



Principle #7 – Address Privacy & Security

Addressing privacy and security in digital development involves careful consideration of which data are collected and how data are acquired, used, stored and shared.

Average Score = 3.65 

Showing **inconsistent alignment** in our survey, data security and privacy need to be enumerated and addressed explicitly in the iHRIS roadmap. Bright spots include clear personnel roles, access control lists and sensitive data categorization. Reflecting the fraught data privacy and compliance climate in 2019, a data security manual with incident response, risk matrix and secure data repository will help boost this important score.



Principle #8 – Use Open Standards, Open Data, Open Source, and Open Innovation

An open approach to digital development can help to increase collaboration in the digital development community and avoid duplicating work that has already been done.

Average Score = 3.51 

With a split between the two surveyed groups iHRIS received the **lowest average** score on this principle. Clear definitions of what “open” translates to for standards, data, source and innovation in iHRIS, and plans for collaboration are noted. A perceived lack of comprehensive documentation on the limits of sharing, evaluation and data leverage kept this score low. But **high scores were achieved in two categories**: iHRIS meeting the definition of “open” and in planning for open source. A community governance group tasked with benchmarking “openness” would help this score.



Principle #9 – Understand the Existing Ecosystem

Addressing privacy and security in digital development involves careful consideration of which data are collected and how data are acquired, used, stored and shared.

Average Score = 3.98 

Clarity about its ecosystem and the current standard of data ethics is critical for any application’s success and iHRIS **aligns well** to this principle. Interoperability, transparency of feasibility and clear quantitative analyses work well to situate iHRIS within its ecosystem. Detailed user feedback, outcome narratives, and a better promotion strategy will help move the dial on this score and get iHRIS into more projects, communities and organizations.

For this assignment, we began to look at any existing framework based on the PDD, including ones developed by SIMLab and TechChange. Of particular interest to us was the [Principles For Digital Development Maturity Matrix](#) as designed by TechChange, a US social enterprise which provides courses on the use of technology in addressing social and global challenges. TechChange approach was to divide a software project into the four elements of its project life cycle: Analyze & Plan, Design & Develop, Deploy & Implement, and Monitor & Evaluate. For each cycle, TechChange would assign the appropriate categories as identified in each Principle. Based on each category, they would create five separate statements capturing the range of possibilities for that category, from the most negative to the most positive. Let's look at how they handled the "Design With The User" Principle for two categories:

Analyze & Plan	1	2	3	4	5
Landscape Assessment	The proposal or project's landscape assessment is not contextual and such a process was not even done correctly. There are clear communities that the proposal or project should be considering that are not detailed in it.	The proposal or project's landscape assessment does not account for specific geographic contexts, previous projects that are similar, and does not include relevant members of the digital development community.	The proposal or project does not have a full landscape assessment and has mediocre methods identified for facilitating user feedback in the design process.	The proposal or project has conducted a full landscape assessment and identified user testing groups and active digital development communities.	The proposal or project calls for a full landscape assessment, research, and active collaboration with communities and organizations operating in the field working on the proposal or project's issues.
User Feedback & Analysis	The proposal or project does not address how the project will continually incorporate user feedback and this is a clear lack of understanding of the project's targeted user base.	The proposal or project does not have a clear idea of its target audience and does not include a viable strategy for long-term or inclusive feedback mechanisms for its user base.	The proposal or project identifies rudimentary and unspecific feedback mechanisms for engaging with its users throughout the project.	The proposal or project notes the value and need to get real-time or rapid feedback from its target user audience, but it needs to consider how to keep getting such feedback throughout the entirety of the project and not only at the beginning of the project.	The proposal or project has identified clear mechanisms for receiving rapid-response user feedback throughout every stage of the project.

In this sample, a respondent would read the five statements describing “Landscape Assessment” and pick the one that best matches up with their assessment of their current software project. The score for that category would range from 1 to 5. The respondent would continue on to the statements for “User Feedback & Analysis”, reading each statement, and picking the one that best described their assessment. And so on.

As we evaluated this approach, there was much we liked about it. Our major concern was what in our view was the tedious process of reading through all the statements before choosing a score. The respondent would quickly tire of this process and either abandon the survey or skip through as fast as possible without giving the attention required for meaningful answers.

We tried using this same approach, but with an auditor reading the category and statements to the respondent. This helped in a few ways. We were able to get the respondent to stick with the survey longer, although weariness still was a major factor. One of the benefits of this approach was that we could answer respondent’s questions about the statements and also elicit comments as to why they answered in a certain way. This “color commentary” was very helpful.

Another challenge with the TechChange approach was that most respondents could not respond to all the statements. Their role in the development and deployment of the software may have excluded them from knowledge about the entire project. To overcome this, you would need to take a group of respondents who were involved in the design, testing, implementation, documentation, training, administering, helpdesk, etc. and have them respond as a group. Unfortunately, group dynamics would skew the scoring. No one wants to admit in front of their supervisor that any part of the software development and deployment process was not handled in the best way possible.

The way that we chose to handle this was to divide users into groups, based on the role they played in the software development and deployment cycle, and to parse out the statements that were most appropriate for each of the user groups.

Ultimately, we felt that none of the frameworks provided a good fit for an application that already had several years of development and implementation history, and so we developed our own framework. But our approach was not without some challenges.

Even with creating user Groups, some respondents could not answer all the questions. For example, someone who identifies as a “developer” may or may not have information about budgeting, and so could not respond to statements about the budget. But in the PDD, the Principle clearly talks about a developer having enough resources (people, money, time) to successfully finish the development of the software project. Another respondent who identified as a developer was able to respond to the

budget statements easily. To avoid this situation, we added the choice “Don’t Know/Does Not Apply” to our survey.

The challenge that we continue to face is that many of the statements as presented in the PDD offer more than one criterion. For example, for the PDD “Be Data Driven”, consider the following statement: *V3) The data fields provided on the forms in iHRIS are appropriate in terms of length and type of data, and the iHRIS system enforces accurate data entry.* This statement asks two things of the respondent:

- Are the data fields appropriate in terms of length and type of data?
- Does the iHRIS system enforce accurate data entry?

The respondent is forced to rate the statement from 1 to 5, but in reality, s/he may see the first part of the statement as a 4 and the second part of the statement as a 2. Several of the respondents commented on this during the audit. While our approach would add more statements to the survey - some slightly redundant - in the future, we would break up these multi-part statements into individual statements.

We also avoided weighting any of the Principles or any of the statements that support the Principle. While other evaluators might put more weight on one Principle over another, we chose to maintain a neutral position and assumed that all the Principles were of equal importance.

7. Recommendations

Measuring the iHRIS Suite against the Principles for Digital Development is a helpful way to understand the current strengths and weaknesses of the iHRIS development, testing, implementation, and support, both historically and currently. But it is far from providing a full picture. As some of the industry experts with whom we spoke have said, the real test of an application comes from the value it provides to its clients, and the uniqueness of its functionality against other applications. Another consideration is sustainability. Concerns about sustainability, especially should IntraHealth not have the resources to further develop and support the application, were voiced by several of the people we audited.

We must also acknowledge the strong support for the iHRIS Foundation. Governance was seen as an important part of the future of iHRIS, and the Foundation is seen as an excellent way to address this requirement.

We have included in this report some general recommendations (in no particular order) as voiced by the respondents during our audit.

General Recommendations

We divide our recommendations into six categories, including Functionality, Training, Communities of Practice, Documentation, Sustainability, and Evaluation. While some of the recommendations can be tied directly to the PDD, many were derived from our discussions with respondents. We found the interaction with respondents during the survey as a form of user feedback, and we also found that the information audit approach was a successful way to solicit that feedback. In all cases, the recommendations were derived from more than one respondent.

Functionality

Create an API, specifically for connecting iHRIS to popular health management solutions like OpenMRS, OpenEMR, and DHIS2. Fundraise specifically for the API.

Many of the actual users of iHRIS discussed the unique feature set of the iHRIS Suite and the fact that it provided data not readily available anywhere else. However, many of these respondents worked with other health applications as well, and the need to create custom links between iHRIS and applications like DHIS2 or OpenMRS was a real challenge. There may be more willingness to include the iHRIS Suite if there is a stable, documented API that allows for direct and seamless integration with other solutions. *(Understand the Existing Ecosystem)*

Clarify the mechanisms for feedback, document them well, and include them in any training.

While the iHRIS Suite provides mechanisms for feedback through its Community of Practice, we were surprised to learn that many respondents were not aware of the various ways that they could provide feedback and that they could even request new features. We think that this is simply a matter of better documentation, training, and promotion. With each interaction with the iHRIS community, all of the various ways that feedback can be submitted should be discussed, and users should be encouraged to take advantage of these communications channels. It should also be an important part of any training. *(Design with the User)*

Expand iHRIS to support other workforces, e.g. pharmacy workers, social workers, education staff, etc.

An interesting takeaway from our audit came from both the survey respondents and from the industry experts. What we learned was that many potential clients arrive at the iHRIS website looking for a tool or suite of tools to better manage a workforce in a low resource environment in Asia, Africa, or Latin America. The

problem they face is familiar: *‘comprehensive tools to track, manage, and plan a workforce may not exist, may not be implemented in a sustainable and scalable way, and/or may not be adequately resourced with properly trained staff. They lack a comprehensive Workforce Resources Information System (WRIS) appropriate for their environment.’*

What they discover is that iHRIS deals with only the health workforce. The prospective clients’ problems are similar, but the sector is different. And so, they look elsewhere.

While not in the scope of work of iHRIS’s current sponsor, IntraHealth, potential partnerships with other organizations who focus on education, social development, pharmaceutical support, etc., might be a way to find the funding and resources to expand the current functionality of iHRIS to support other workforces. (*Design for Scale, Be Collaborative*)

Training

Create iHRIS Academies, similar to DHIS2 Academies, to offer focused, ongoing training.

The frustration around access to ongoing sustainable iHRIS training was a common theme. Those respondents who worked directly with IntraHealth reported a positive implementation process, but ongoing training as the project scaled and training of new staff was described as being problematic. Those who had implemented the iHRIS Suite without direct support from IntraHealth were most frustrated, especially if a language other than English was involved. Two respondents referenced iHRIS Academies and compared them with the DHIS2 Academies. They recommended that iHRIS follow model of the DHIS2 Academy to enhance training opportunities. (*Build for Sustainability*)

Communities of Practice

Provide greater support of and promotion for the iHRIS Global Support Community (the Google Group). This should be done by a resource dedicated to the role, not by the developers.

As the *Design for Scale* indicates, the ability to reach new communities and find new partners is essential. A strong community of practice is one of the methods for promoting iHRIS and for strengthening the relationship with the existing community. As a solution, the iHRIS Global Support Community is a solid and useful resource and should have dedicated moderation (not by a developer) with regular access to the development team. But collaboration and community go beyond the iHRIS users, and an effort should be made to encourage

conversations and information sharing across other projects, especially health projects in the developing world. (*Be Collaborative*).

Documentation

Update the iHRIS Toolkit. This resource was identified by many users as a vital part of a successful implementation.

Another resource mentioned by respondents was the [iHRIS Toolkit](#). It was described as being full of good information and templates around implementation, including strategies for support, scaling, and sustainability. The case studies were particularly helpful. Some respondents felt that the toolkit required some updating. Some felt that it should be a part of a robust training program. Some suggested short videos walking users through implementation as a way to add value. Input from users about how to upgrade the iHRIS Toolkit would be a great discussion on the Slack and Google Groups Community of Practice. (*Be Data Driven*)

Sustainability

Diversify both funding and ownership of iHRIS. In particular, look for a field-based partner to share the responsibilities of iHRIS development, support, and training. This goal is critical to the future success of iHRIS.

Sustainability continues to be an issue for the iHRIS team. Concerns around sustainability may lead some potential users of iHRIS to consider other options. It certainly engenders some concern among the current user base. As defined by the Principle *Build for Sustainability*, building sustainable programs, platforms and digital tools is essential to maintain user and stakeholder support, as well as to maximize long-term impact. We have dedicated a section to address sustainability. (See ***Models of Sustainability*** below).

Evaluation

Use the metrics provided by the Community Health Analytics Open Source Software (CHAOSS) to evaluate the iHRIS Suite. These metrics are expected to be finished in the near future. This activity will help IntraHealth in presenting iHRIS to donors.

An important element to ensuring that a project is on track is to develop appropriate metrics by which progress can be measured. While the PDD addresses the environment in which software projects are created and deployed, specific metrics around the quality of the software solution, the needs of the community, the accuracy of the data generated, and the overall success of the project need to be employed as part of an overall monitoring and evaluation

strategy. Having a baseline defined, from where to measure progress is an important part of that monitoring and evaluation strategy. We believe that the CHAOSS metrics might be a good resource and are certainly worth investigation once they achieve maturity. Reaching out to this community would provide for an interesting discussion as well. (*Be Data Driven, Reuse and Improve, Be Collaborative*) (See **CHAOSS - a potential benchmark for iHRIS** below).

Models of Sustainability

Sustainability of iHRIS remains a critical issue. As IntraHealth looks for more funding for iHRIS development, it needs to provide an insight into its strategy for sustainability. In 2012, NPQI submitted an iHRIS Sustainability Report with many recommendations remaining valid today. That report should be reexamined for its applicability to fundraising efforts.

We suggest looking at a sustainability model like OpenMRS, OpenEMR, DHIS2, and other software service applications in the public health space have adopted. As an instance, these applications have successfully married their academic roots with a field-focused practitioner's feature set, while providing tangible reporting and transparency benefits to NGO HQ/donors/MoH and an ecosystem for social enterprise software companies to deploy and support the system. There is a strong case for reaching out to existing organizations and to the academic community for further partnerships.

For example, DHIS2, with its primary home at the University of Oslo, has access to a stream of developers and a stable, financed, academic infrastructure to support testing. DHIS2 partners with HISP (Health Information Systems Program), a global network of people, entities, and organizations that design, implement and sustain Health Information Systems. As a network, HISP globally follows a participatory approach to support local management of healthcare delivery and information flows. Through this partnership, DHIS2 has been able to support DHIS2 Academies for training and to provide a group of experienced, field-based consultants who can support users. DHIS2 also has an exceptionally engaged community of practice. It provides implementing NGOs with a peer network of trainers, DHIS2 governance with an excellent feedback loop, software social enterprises with a platform ecosystem to develop, and the global health community with that most valuable impact assessment tool – data.

CHAOSS - a potential benchmark for iHRIS

During the Information Audit, we were introduced to an organization called [CHAOSS](#) (Community Health Analytics Open Source Software). CHAOSS is a Linux Foundation project focused on creating analytics and metrics to help define community health. Work in the CHAOSS Project community is organized in two committees and four workgroups:

Committees

The Metrics Committee works on establishing implementation-agnostic metrics for measuring community activity, contributions, and health.

The Software Committee works on producing integrated, open source software for analyzing software development, and definition of standards and models used in that software in specific use cases.

Workgroups

The goal of the workgroups is to refine the metrics and to work with software implementations. The workgroups are built around the four categories of metrics that CHAOSS has identified. The workgroups are:

- Diversity and Inclusion
- Growth Maturity and Decline
- Risk
- Value

Specifically, CHAOSS has created implementation-agnostic metrics for assessing open source communities' health and sustainability. These metrics measure community activity, contributions, and health; and optionally produce standardized metric exchange formats, detailed use cases, models, and recommendations to analyze specific issues in the open source software world. These metrics address the gap – the issues not covered by the PDD – and are certainly worthy of consideration for possible future evaluation of iHRIS.

8. Summary

One of the interesting takeaways in our attempt to use the Principles for Digital Development as a way to evaluate the iHRIS Suite was in the actual methodology we used:

- Translating the PDD into quantitative statements;
- Dividing respondents into groups around their self-identified roles;
- Collecting data against these statements using our information audit approach.

While we identified some elements that we would change in the future, including reducing statements to containing only one definable variable, we were very pleased with the ability to interact with the respondents and to be able to capture qualitative data. These “color comments” greatly enhanced our ability to report on the reasons why respondents answered in the way they did, and to capture information not included in the survey, but important to the iHRIS developers and community. In general, the survey would have more value with a larger survey group, and with some considerations

around weighting some principles more heavily than other principles. We offer our methodology freely under a Creative Commons License to others who may want to use or modify it for their own use.

We conclude with a quote from our original 2012 sustainability report:

iHRIS has created a solid foundation of measurable impact and goodwill since its original implementation.... Its growth will involve working with talented current staff and partners, as well as new partners and ideas, to serve its well-established constituency of health workers and administrators. By embracing both the challenges and the opportunities laid out, and taking the key considerations into account, IntraHealth can move iHRIS confidently into a new space ...a class-leading human resource management system for ministries of health, and international and local NGOs.

iHRIS today is perceived as providing great value to the health community. Its users extol its flexibility and features, while donors acknowledge its loyal community and the niche it fulfills. Developed and implemented on a solid foundation of software community values, like the Principles for Digital Development, iHRIS remains a success story for IntraHealth and the global health community.

9. ATTACHMENT A - Interviews

- Group 1: End Users, Administrators, Trainers, Donors
- Group 2: Development Team (Present & Past)
- Group 3: Industry Experts

A. Group 1: End Users, Administrators, Trainers, Donors

NAME	TITLE
Rebecca Kohler	Chief Strategy Officer
Ally Shaban	Regional Developer/Tanzania & Global Team
Pamela McQuide	iHRIS Early Implementer/Namibia COP
Robert Nguni	iHRIS Implementation/Kenya
Agnes Wadda	PRO/IT Manager/Uganda Nurses & Midwifery Examination Board, Ministry of Education
Keolebogile Maedo Kerekang	Ministry of Health/DHAPC/Botswana
Kayode Odusote	WAHO, former IntraHealth consultant, interim Board of Directors, iHRIS Foundation (Nigeria)
Juma Lungo	iHRIS implementor independent of IntraHealth/University of Dar Es Salaam Professor
Phedra Elayeb	Community Member iHRIS implementor independent of IntraHealth Congo Brazzaville
Dana Acciavatti	Team Member, Digital Health
Amanda Ben Dor	Technical Program Director, Co-Chair Global Digital Health Network, PATH
Dave Potenziani	Team Member, Digital Health (Capacity Plus)

B. Group 2: Development Team (Past and Present)

NAME	TITLE
Wayan Vota	Director, Digital Health
Luke Duncan	iHRIS Developer
Dykki Settle	Previous Director of Digital Health at inception of iHRIS, Now at PATH
Carl Leitner	Previous Developer for iHRIS, now at PATH
Norbert Mijumbi	Regional Developer/Uganda & Global Team

C. Group 3: Industry Experts

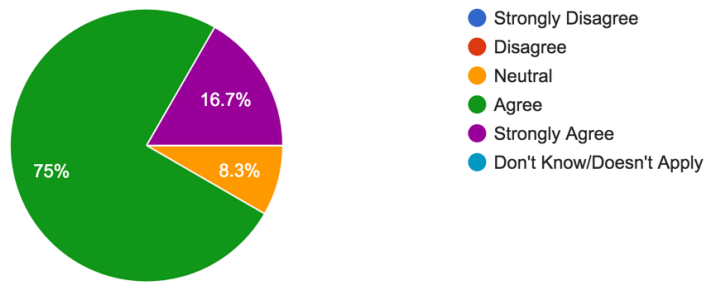
NAME	TITLE
Kate Wilson	CEO, Digital Impact Alliance
Allen Gunn	Executive Director, Aspiration
Sean Blaschke	UNICEF/Comoros
Michael Downey	Director of Community, Open Source Center, DIAL Familiar with iHRIS
Christopher Neu	TechChange

10. ATTACHMENT B – Survey Results by Principle

PRINCIPLE #1 – Design with the User Group 1

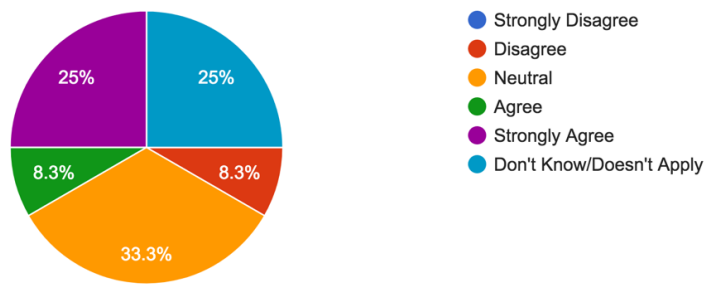
D1) iHRIS seems to be well thought-out and allows me to perform my job effectively.

12 responses



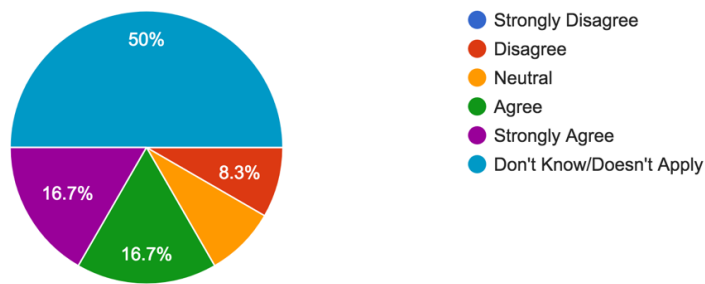
D2) iHRIS provides clear ways for me to submit feedback regarding my experience using the system.

12 responses



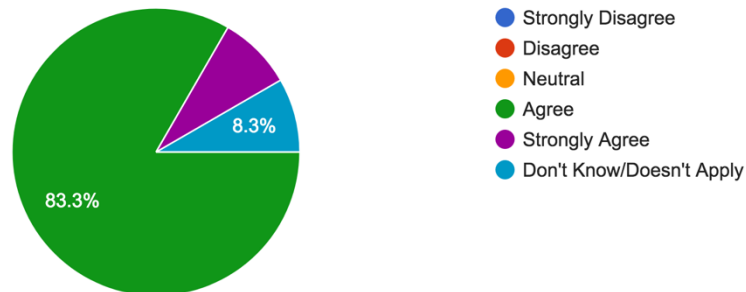
D3) (If you were involved in early testing of pre-release versions of the system): the iHRIS testing process seemed well organized and efficient.

12 responses



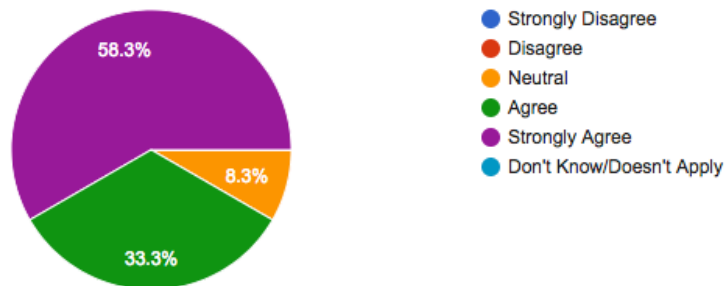
D4) iHRIS training or workshops I have received/attended provide the information I needed to begin using the system effectively

12 responses



D5) Because of my communications with IntraHealth, I feel I have a good understanding of how this software can help me engage with the people I work with moving forward.

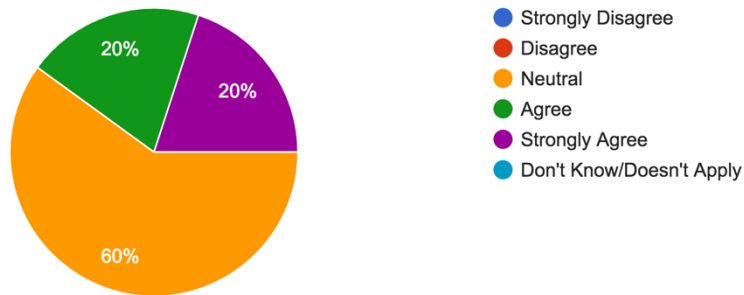
12 responses



PRINCIPLE #1 – Design with the User Group 2

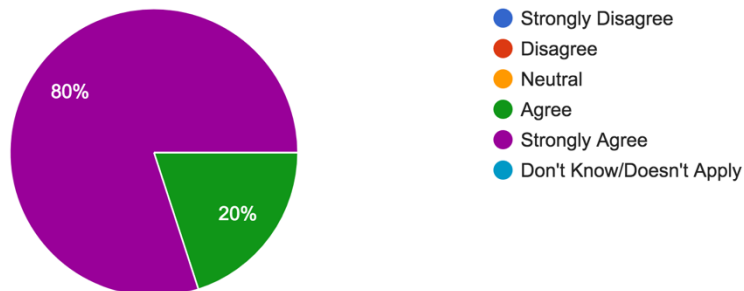
D1) iHRIS has complete design documentation describing in detail plans for testing, deployment, and maintenance at all project stages.

5 responses



D2) During the development of iHRIS, regular, systematic feedback was obtained from users and was considered and/or implemented as appropriate.

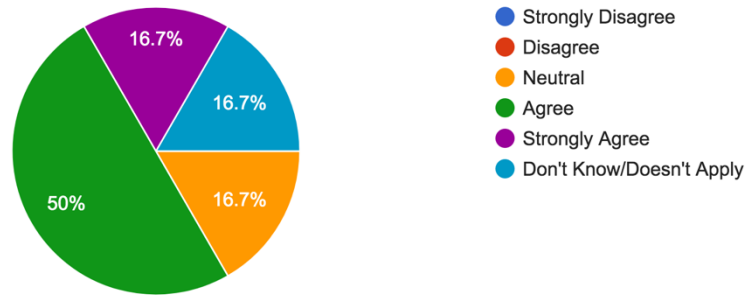
5 responses



PRINCIPLE #2 – Build for Sustainability Group 1

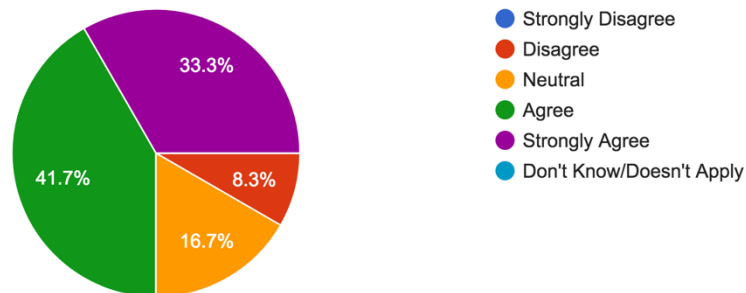
B1) iHRIS is well-adapted to the requirements of my environment and location.

12 responses



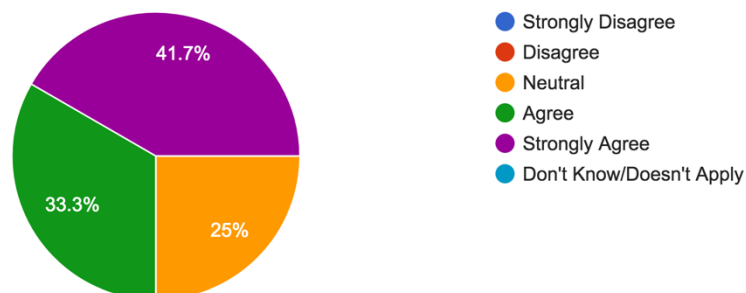
B2) iHRIS provides needed depth-of-expertise into the particular needs and complexities of my processes and situations.

12 responses



B3) iHRIS accommodates the unique or custom needs of my local environment.

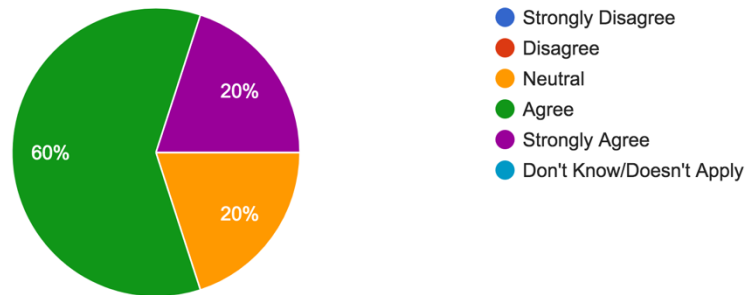
12 responses



PRINCIPLE #2 – Build for Sustainability Group 2

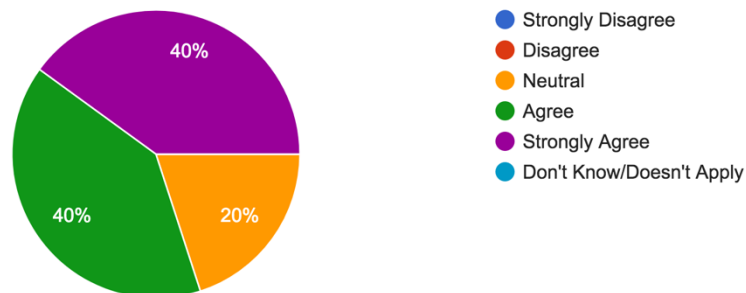
B1) iHRIS documents the Principles of Sustainability, and how they apply to the project.

5 responses



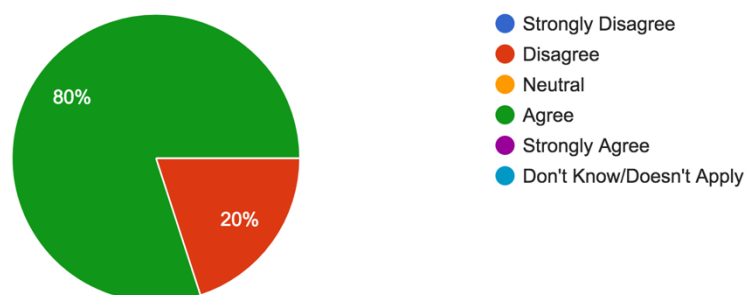
B2) iHRIS documents development, and shares that with stakeholders at all lifecycle phases.

5 responses



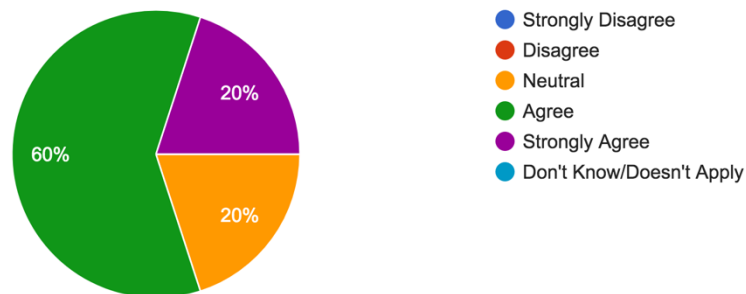
B3) iHRIS documents a clear financing strategy that includes risk assessment and per-stakeholder specifics.

5 responses



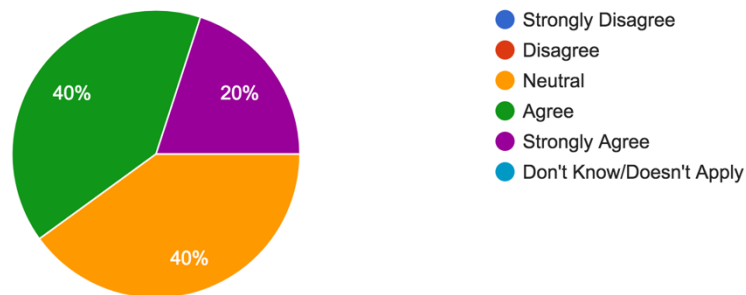
B4) iHRIS documents late-stage project continuation scenarios, and includes stakeholder ownership and accountability.

5 responses



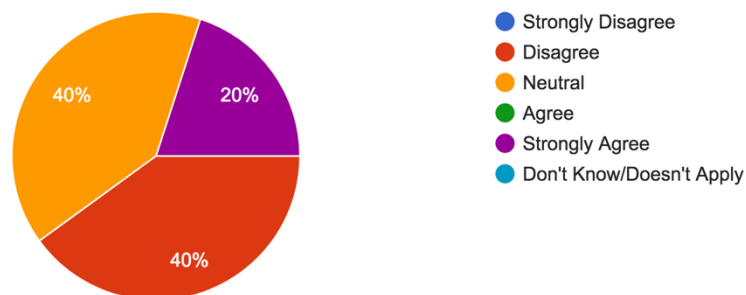
B5) iHRIS documents all scale scenarios as obtained from stakeholders. Costs and risks are outlined in detail.

5 responses



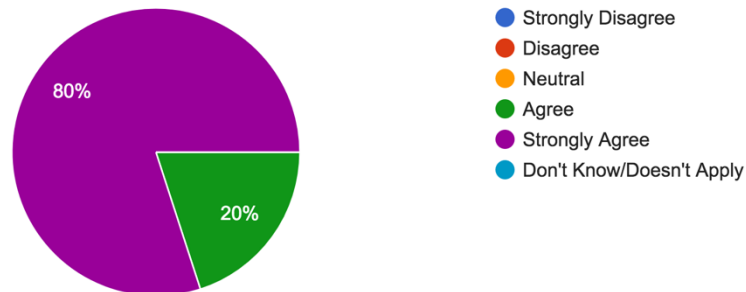
B6) iHRIS documents a comprehensive, iterative user testing plan, noting the key impacts from each user group.

5 responses



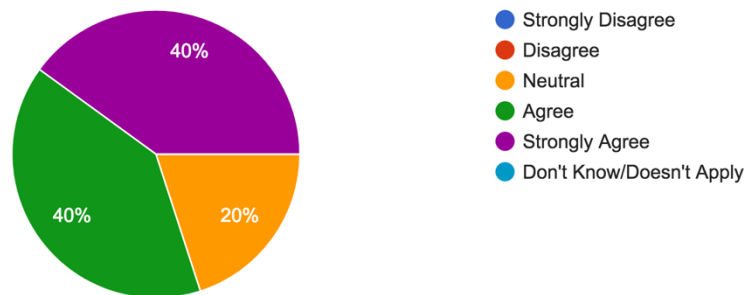
B7) iHRIS employs a modular or step-by-step deployment strategy which emphasizes the ability to rapidly incorporate feedback.

5 responses



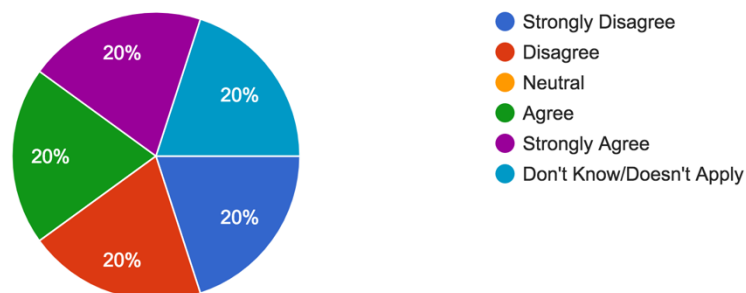
B8) iHRIS provides a complete baseline assessment against which to measure improvements as the project progresses.

5 responses



B9) iHRIS outlines complete per-user financial monitoring strategies including long-term risks and sustainability.

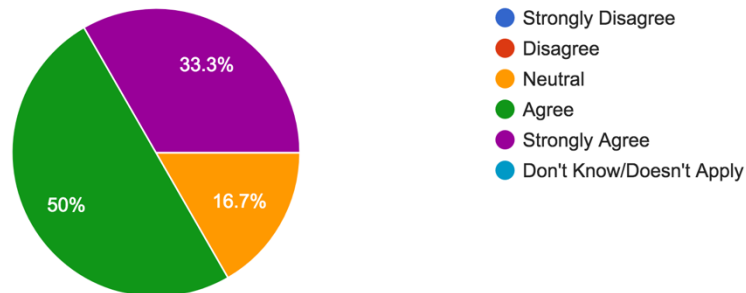
5 responses



PRINCIPLE #3 – Design for Scale Group 1

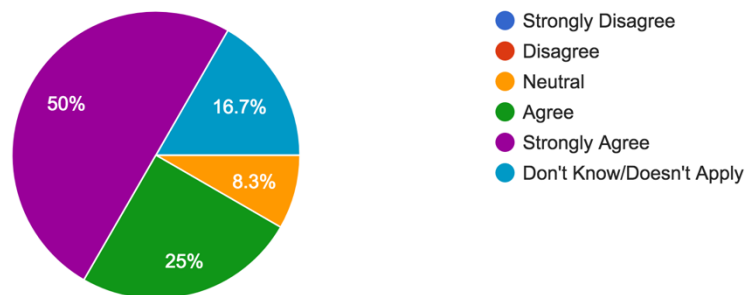
S1) iHRIS is designed to grow with my organization.

12 responses



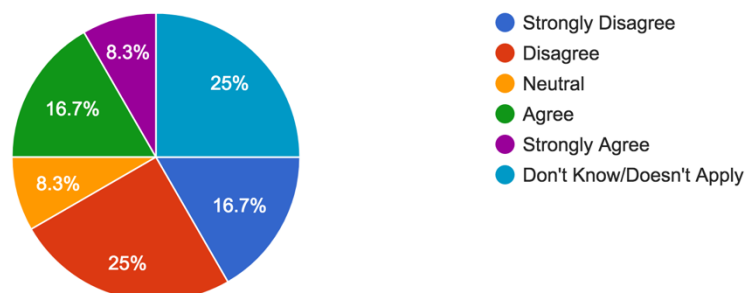
S2) iHRIS provides unique functionality compared with other open source software applications.

12 responses



S3) The per-user costs for using iHRIS for an organization are clearly defined by the IntraHealth.

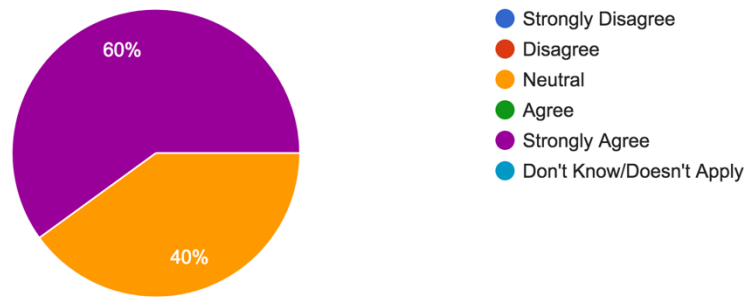
12 responses



PRINCIPLE #3 – Design for Scale Group 2

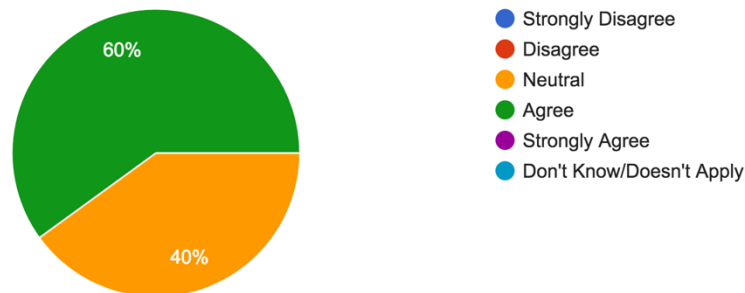
S1) iHRIS defines scale from multiple perspectives (end-user, implementer, trainer, sponsor), outlining associated challenges and risks.

5 responses



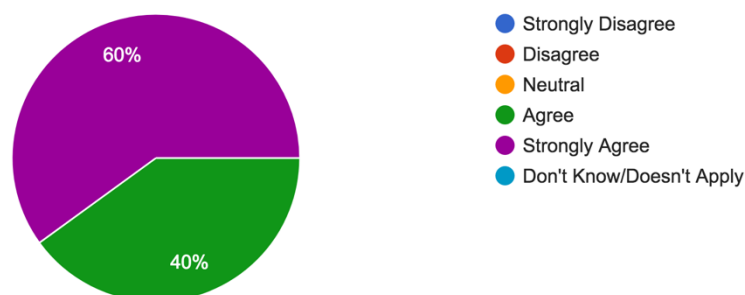
S2) iHRIS outlines detailed costs and risks associated with long-term scaling.

5 responses



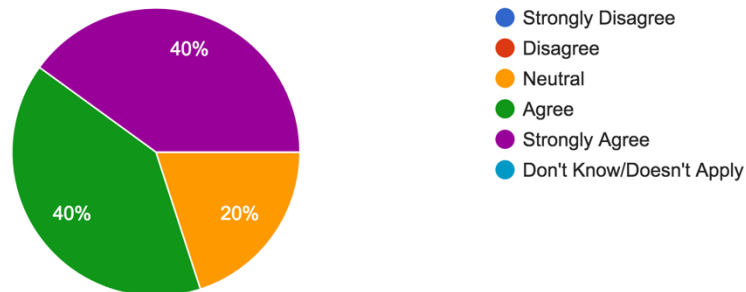
S3) iHRIS lays out an explanation and plan for how partner collaboration will improve scale.

5 responses



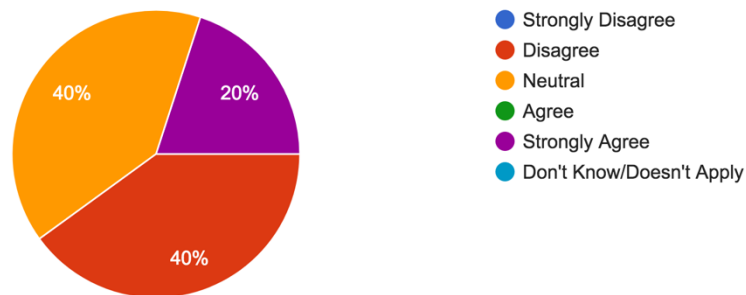
S4) iHRIS defines a modular or step-by-step approach to scaling that mitigates financial and logistical risks.

5 responses



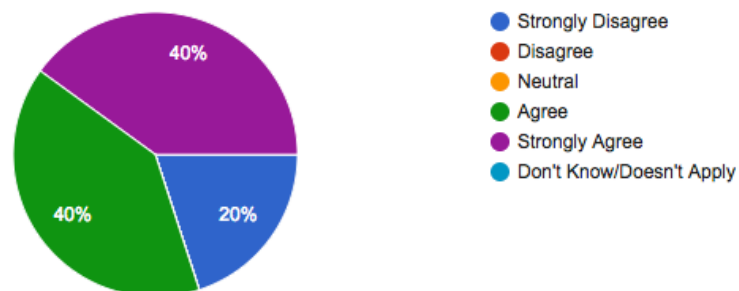
S5) iHRIS documents a measurement methodology to facilitate feedback and measurement during scaling.

5 responses



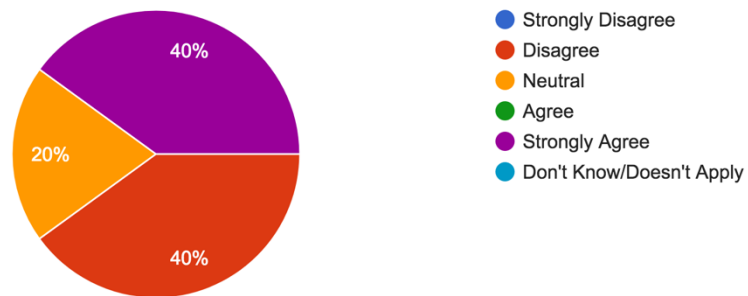
S6) iHRIS contains an assessment of communities and partners already working in the market space, and explains how to promote iHRIS to these communities and partners.

5 responses



S7) iHRIS documents a strategy for mitigating risk due to lack of resources during scaling.

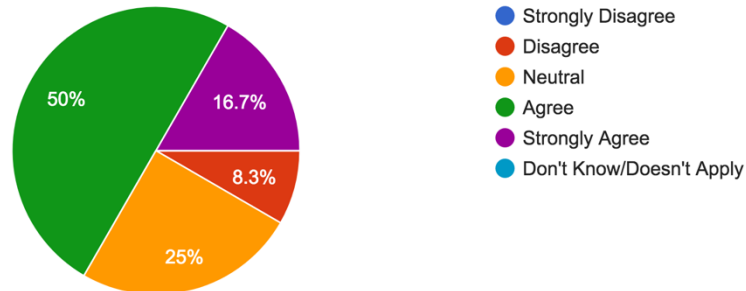
5 responses



PRINCIPLE #4 –Be Data Driven Group 1

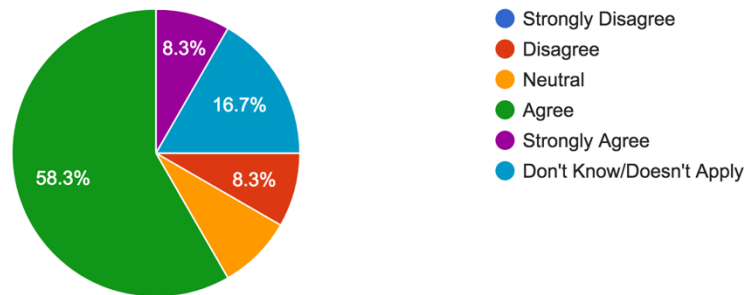
V1) The quality of the data in iHRIS is reliable and accurate.

12 responses



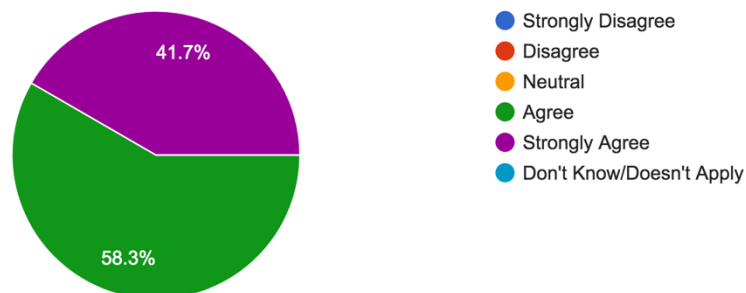
V2) Confidential data within iHRIS is handled appropriately and securely (DOB, salary, etc.)

12 responses



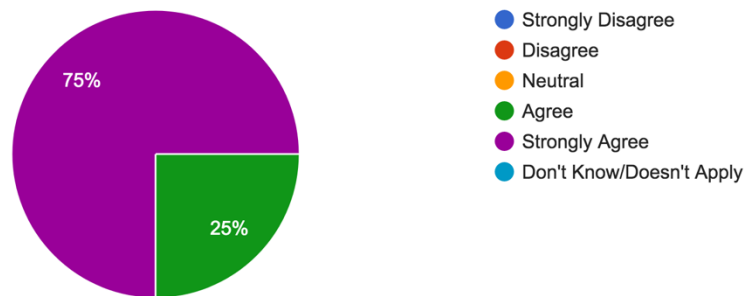
V3) The data fields provided on the forms in iHRIS are appropriate in terms of length and type of data, and the iHRIS system enforces accurate data entry.

12 responses



V4) The data iHRIS captures is relevant and meaningful to the analysis needed by an organization to manage its personnel.

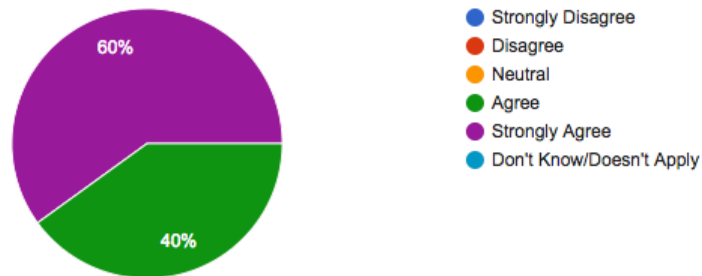
12 responses



PRINCIPLE #4 –Be Data Driven Group 2

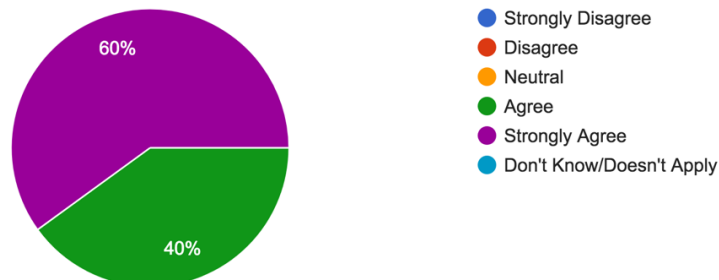
V1) iHRIS outlines a prioritized data management plan - a written document that describes the data you expect to acquire or generate, and how you will manage, analyze, and store that data, and how you will use that data.

5 responses



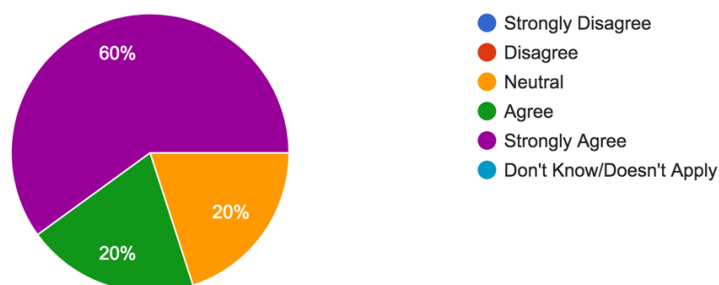
V2) iHRIS considers localized data use and technical literacy when defining the assessment framework.

5 responses



V3) iHRIS outlines a prioritized breakdown of data storage options (where data is stored) including benefits and risks.

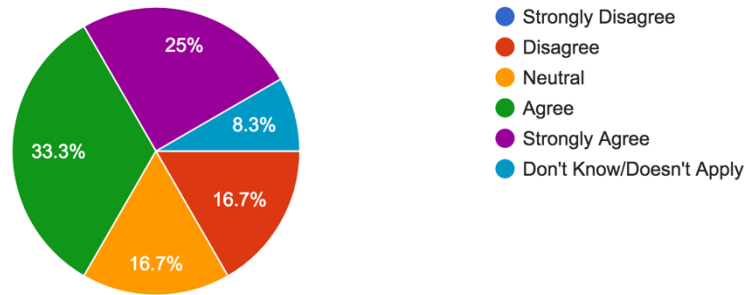
5 responses



PRINCIPLE #5 – Reuse and Improve Group 1

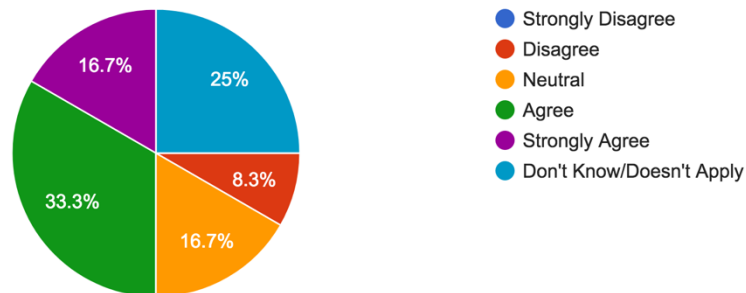
R1) IntraHealth has communicated via training or web site, how it uses open source software and interoperates with other open source systems.

12 responses



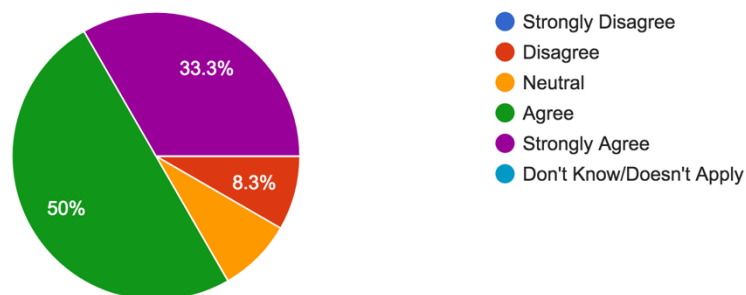
R2) IntraHealth has communicated via training or web site, how it works with partners to meet the needs of the community.

12 responses



R3) IntraHealth has provided and communicated a way to request enhancements or new features to the software.

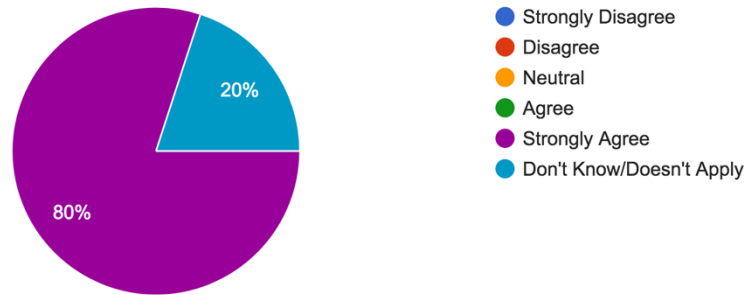
12 responses



PRINCIPLE #5 – Reuse and Improve Group 2

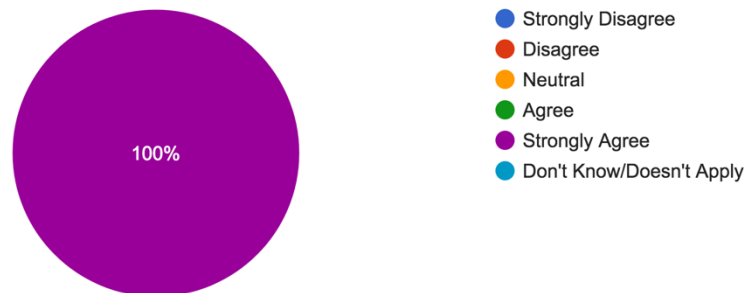
R1) iHRIS engages specific technologies, resources, and experts that will clearly enhance the application.

5 responses



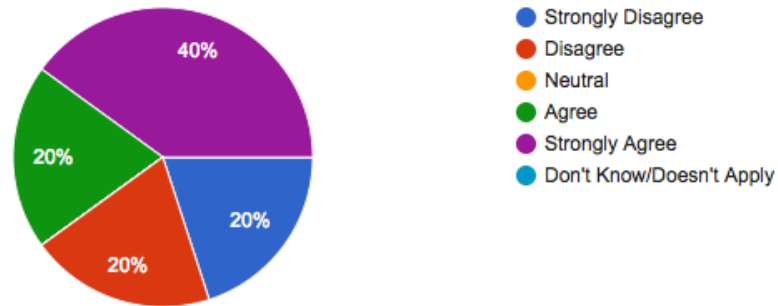
R2) iHRIS actively considers or engages local experts within the community to further understand user needs.

5 responses



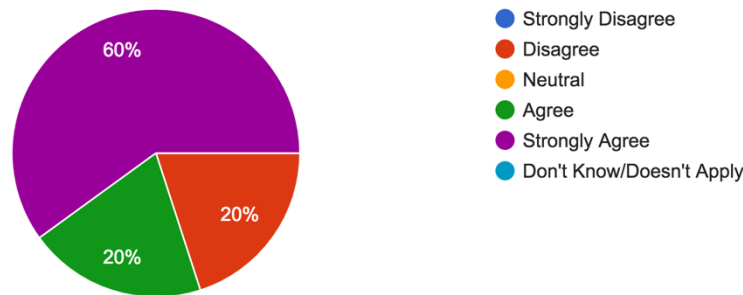
R3) iHRIS utilizes prototyping tools (tools that allow designers to simulate application flow, test performance, and experience how the application will work).

5 responses



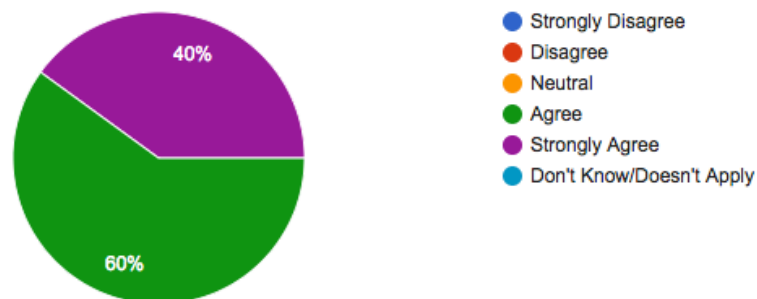
R4) iHRIS outlines the time required for project staff to engage with user and stakeholder communities.

5 responses



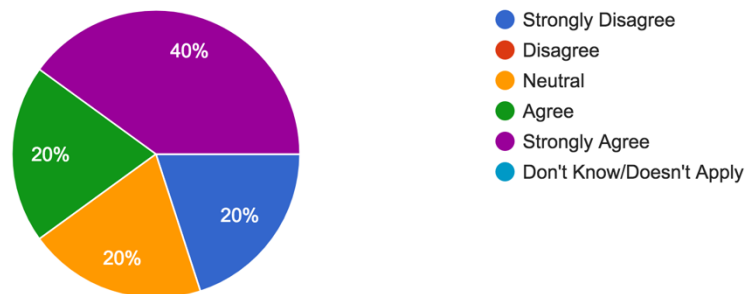
R5) iHRIS engages collaborative efforts like landscape assessments, expert-facing interview, and other methods to improve the overall application design.

5 responses



R6) iHRIS outlines a plan to engage subject matter experts in each step of the development process.

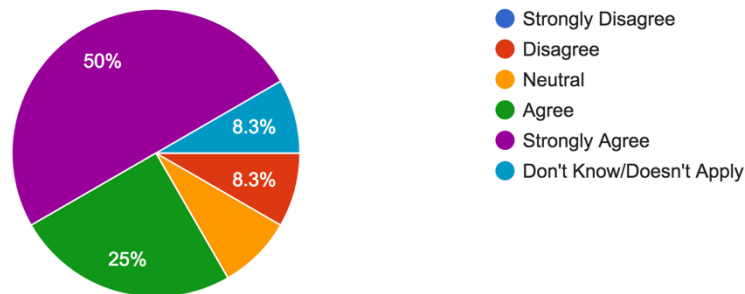
5 responses



PRINCIPLE #6 - Be Collaborative Group 1

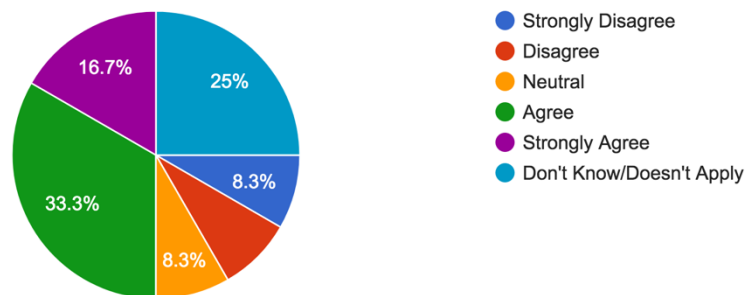
C1) The license for iHRIS is clearly documented so that developers and users understand the rules of use (i.e. creative commons license).

12 responses



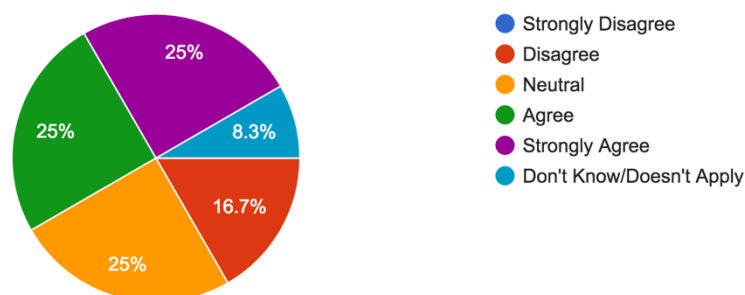
C2) iHRIS provides methods and/or documentation regarding implementation of relevant industry best practices and related tools.

12 responses



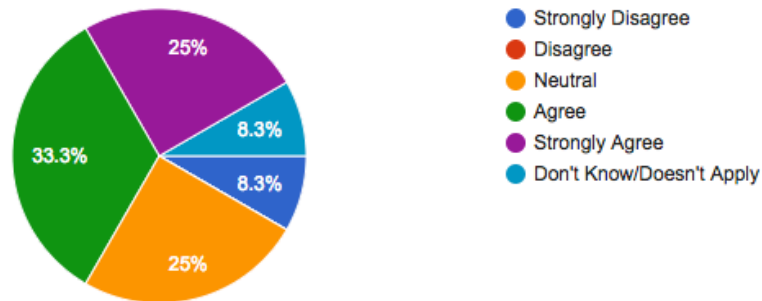
C3) iHRIS provides information regarding collaboration and feedback from relevant civil, municipal, and government organizations.

12 responses



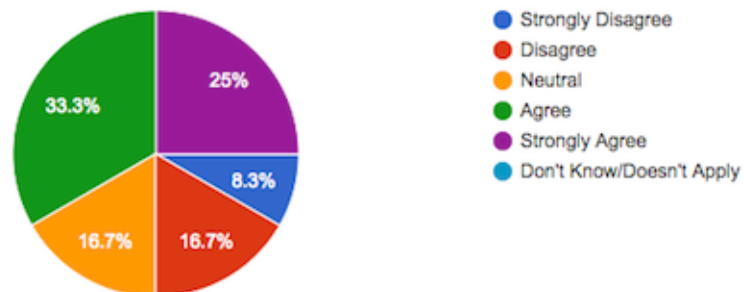
C4) iHRIS provides information regarding engagement with the open source community and other relevant local and international communities to improve the reach and functionality of the software.

12 responses



C5) iHRIS provides clear mechanisms for providing and disseminating feedback regarding the software, whether that feedback is positive or negative.

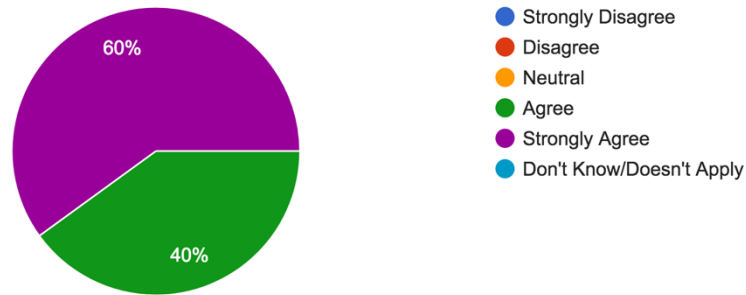
12 responses



PRINCIPLE #6 - Be Collaborative Group 2

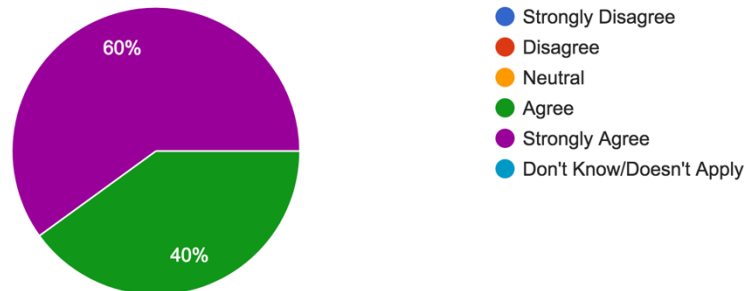
C1)iHRIS outlines a plan to engage community experts in each step of the development process.

5 responses



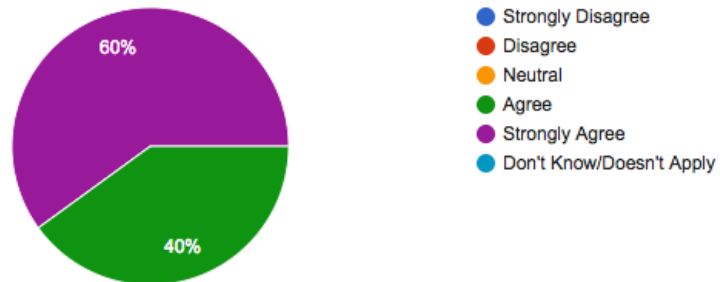
C2) iHRIS uses an internal collaboration process during the planning and design phases which includes events or workshops to encourage feedback.

5 responses



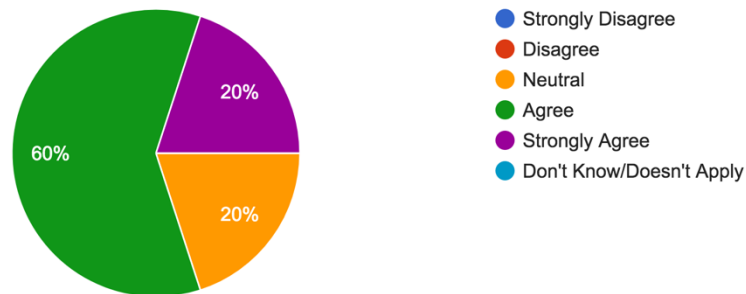
C3) iHRIS outlines a plan for project modularity (breaking a project into individual steps or modules) that includes collaboration and community engagement.

5 responses



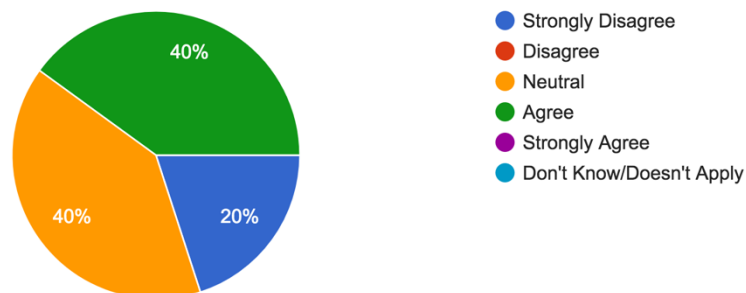
C4) iHRIS defines clear channels of stakeholder and local technology group collaboration.

5 responses



C5) iHRIS defines a collaboration methodology that facilitates rapid feedback from identified technical groups across civil society.

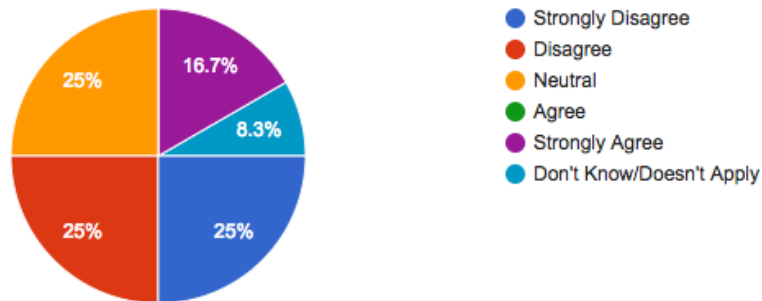
5 responses



PRINCIPLE #7 – Address Privacy & Security Group 1

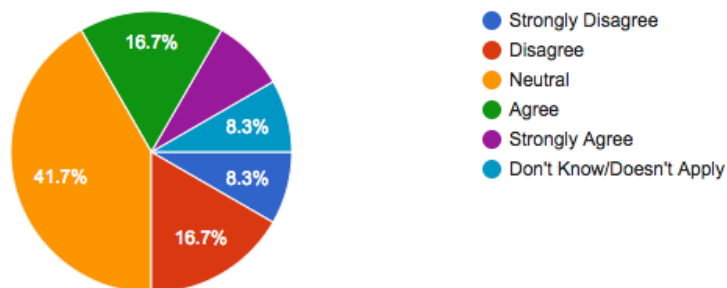
A1) iHRIS provides information regarding how the system deals with potential threats and vulnerabilities. Any known compromises are communicated clearly with mitigation information.

12 responses



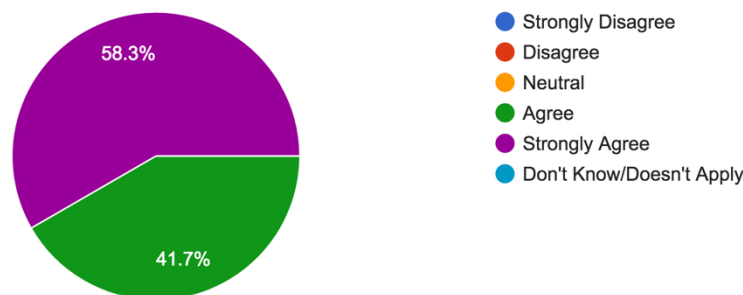
A2) iHRIS takes into consideration how data and related indicators are managed and regulated in my local environment. Challenges and risks are also communicated.

12 responses



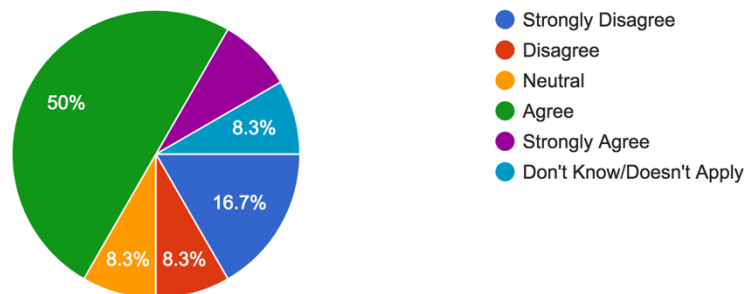
A3) iHRIS implements an effective user permissions system that controls which users have access to which data.

12 responses



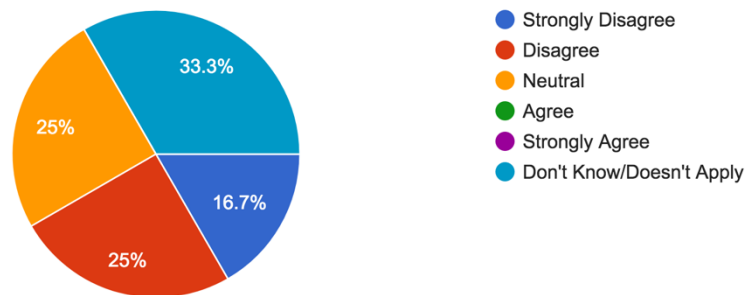
A4) iHRIS provides functionality and documentation for securely archiving data.

12 responses



A5) iHRIS documentation provides a clear data security strategy that includes mitigation response in the event should data be compromised.

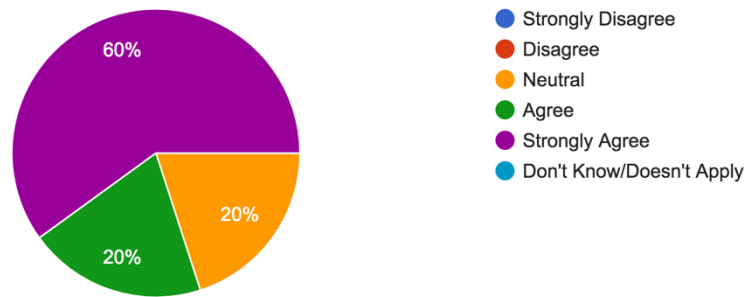
12 responses



PRINCIPLE #7 – Address Privacy & Security Group 2

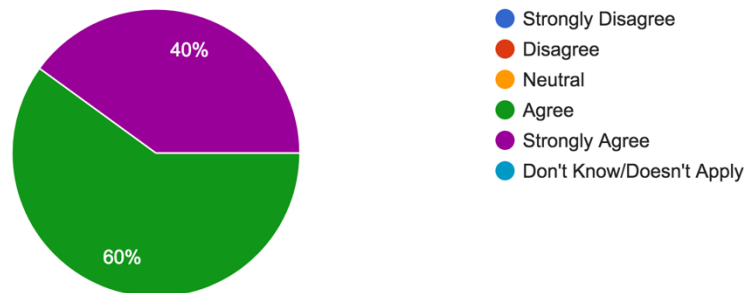
A1) iHRIS carefully and completely identifies and categorizes sensitive data elements and associated handling protocols.

5 responses



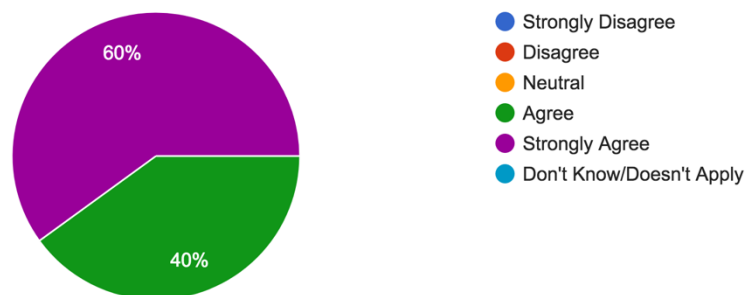
A2) iHRIS outlines a plan for engaging local communities in securing project data, taking into account technical literacy.

5 responses



A3) iHRIS assigns clear responsibilities for team members during events such as training, workshops, and response planning.

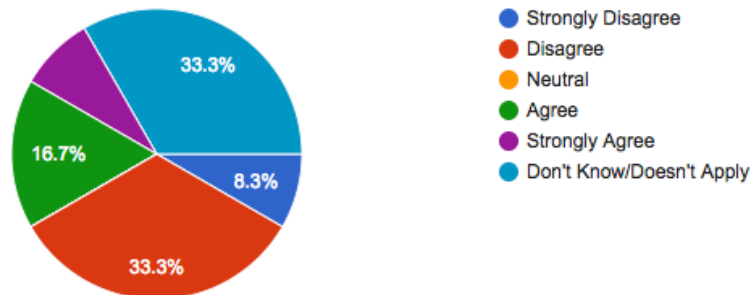
5 responses



PRINCIPLE #8 – Use Open Standards Group 1

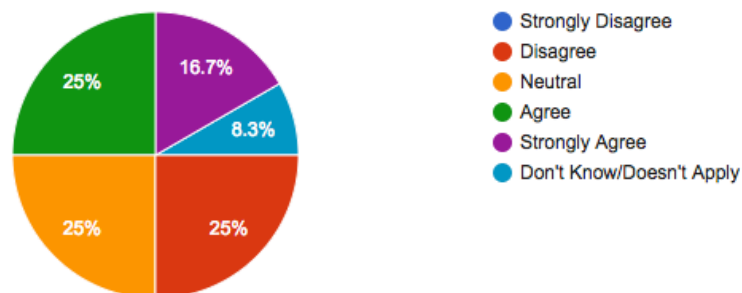
O1) iHRIS documentation or training provides information regarding the limitations or potential restrictions around the open standards or the data repositories that are used by the system.

12 responses



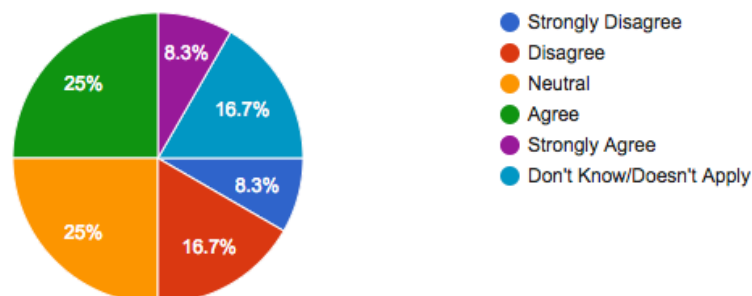
O2) iHRIS documentation or training provides information on interoperability with open source standards and how such usage improves the software.

12 responses



O3) iHRIS documentation or training provides information regarding data sharing between various open data communities and how that data can be leveraged to improve productivity.

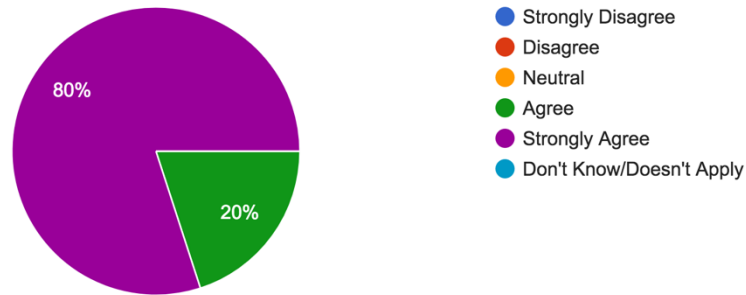
12 responses



PRINCIPLE #8 – Use Open Standards Group 2

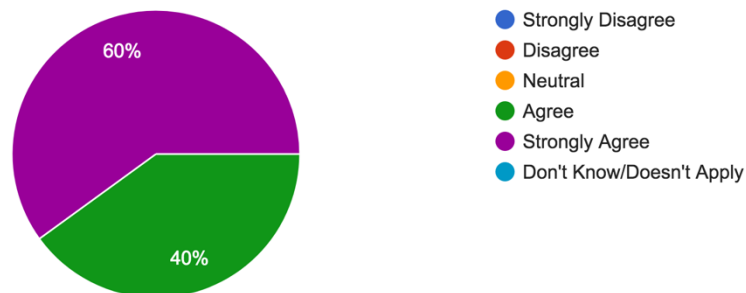
O1) iHRIS clearly defines "open" within the project context, including the four core aspects: standards, data, source, and innovation.

5 responses



O2) iHRIS discusses how each digital attribute would potentially make use of an open model - via collaboration, licensing, or data sharing.

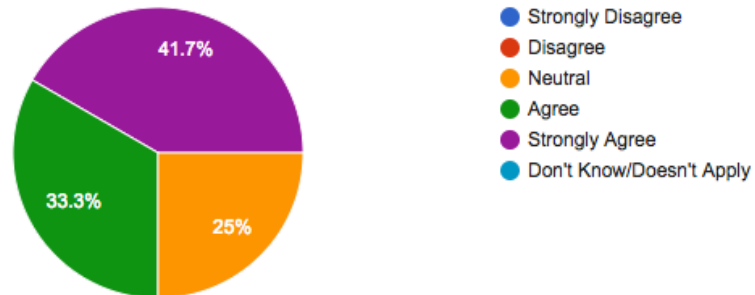
5 responses



PRINCIPLE #9 – Understand the Existing Ecosystem Group 1

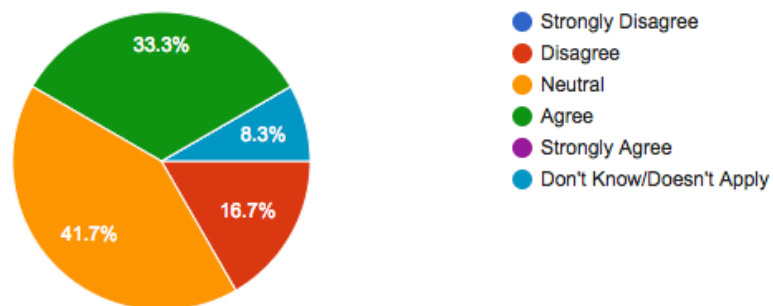
U1) iHRIS provides information regarding organizations and experts that were/are instrumental in the development of the system and how that improves the overall product.

12 responses



U2) The iHRIS site provides information regarding monitoring and evaluation of the effectiveness of the system and how feedback and lessons-learned are re-incorporated back into the product.

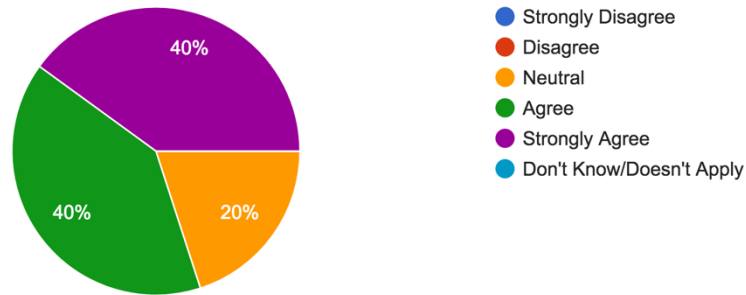
12 responses



PRINCIPLE #9 – Understand the Existing Ecosystem Group 2

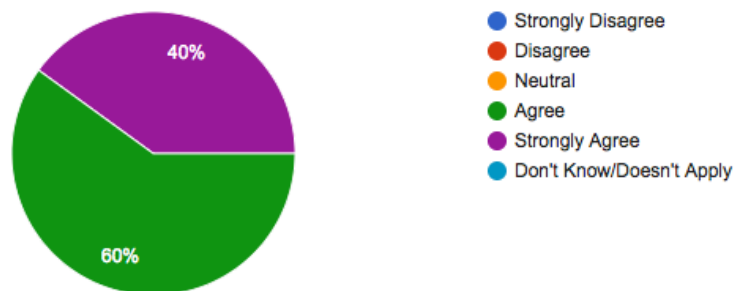
U1) In order to improve assessment, quantitative measures are developed to evaluate iHRIS.

5 responses



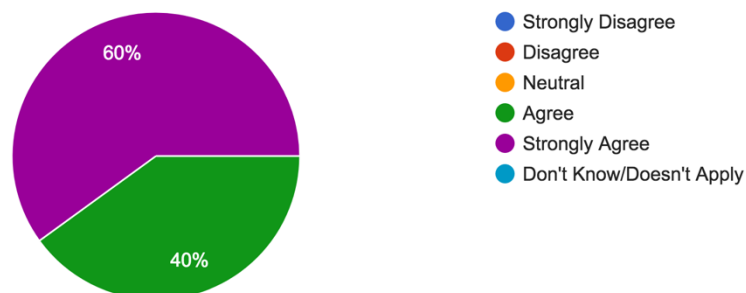
U2) iHRIS discusses technical feasibility assessment (how you intend to deliver a product or service to your client) including opportunities and challenges.

5 responses



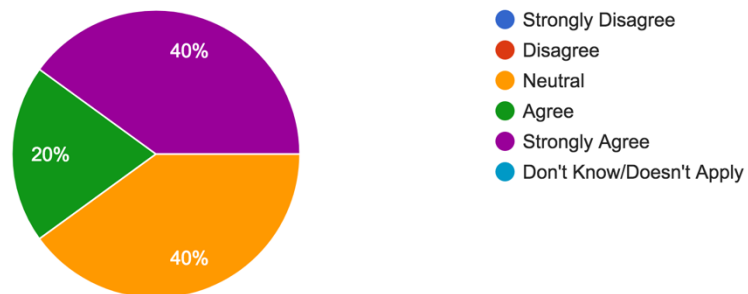
U3) In addition to a technical integration strategy, iHRIS prioritizes engagement with local communities and programs with relevant experience.

5 responses



U4) iHRIS outlines a promotion strategy for all modules with relevant communities, projects, and organizations.

5 responses



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