

Getting Human Resource Information Systems Right: A Case Presentation of Uganda

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Case Report

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Abstract

Background

Human resources information systems (HRIS) are a key tool for collecting and analyzing health workforce data at the country level and the specific focus of milestones 4.1 and 4.2 of the Global Strategy on Human Resources for Health (HRH). Yet documentation on the capabilities of HRIS in low- and middle-income countries (LMICs) is limited. Vital Wave, with IntraHealth International and Cooper/Smith, conducted a targeted scan of the HRIS landscape in 20 countries and “deep-dive” assessments in Burkina Faso, Mozambique, and Uganda. Here we present the case of Uganda’s workforce information ecosystem.

Case Presentation

Since 2006, Uganda has seen investment in HRIS from different donors, overseen by the Ministry of Health (MOH) and accompanied by the rollout of IntraHealth’s open-source iHRIS software. Despite this history of investment, mapping of the country’s multiple information systems revealed uneven adoption and engagement nationally and sub-nationally, with high levels of data fragmentation due to lack of interoperability and data-sharing practices. We also mapped the administrative processes and data flows for three priority use cases: recruitment and deployment, salary payments, and performance management. What emerges is a complex, decentralized information ecosystem driven by years of donor investment, but one that still sees uneven ownership and data use across the health system. Challenges include:

- Limited interoperability between systems, specifically payroll, iHRIS, and the district health information system (DHIS2)
- Complex HRH planning and management policy context, with variable implementation of numerous policies and no single reference to guide investments and implementation
- Limited visibility into the private and community health workforce.

Conclusions

Uganda’s progress in developing its HRH information ecosystem underscores the importance of continuously aligning system capabilities, incentives, and motivations to an ever-evolving country context. However, as evidenced in Uganda and our broader assessment findings, robustness of the information ecosystem itself is insufficient to making substantive strides toward the Global Strategy’s milestones 4.1 and 4.2—governance oversight and ownership are critical to success. With a better understanding of what good looks like in terms of HRIS functionality in LMICs and ensuring interventions are addressing the causal issues, there can be many pathways to making systems work.

Background

Amidst the COVID-19 pandemic and the WHO’s Year of the Health and Care Worker, the importance of the health workforce has never been more apparent. Health workers are critical to achieving health and development objectives, as well as shaping global readiness for future pandemics. However, many country governments are unable to see the “big picture” of who plays a critical role in service delivery due to lack of accurate and reliable health workforce data. This reality hampers efforts to mobilize all available human resources—public, private, not-for-profit—efficiently for pandemic response and limits longer-term planning and management by countries seeking to achieve Sustainable Development Goal 3 (SDG 3) and universal health coverage (UHC).

Human resources information systems (HRIS) are a key tool for collecting and analyzing health workforce data at the country level [1]—and the specific focus of milestones 4.1 and 4.2 of the Global Strategy on Human Resources for Health (HRH): Workforce 2030 (Table 1) [2]. Such data are essential for monitoring and accountability of national and regional strategies in health workforce development. When aligned with National Health Workforce Accounts (NHWA), a system by which countries use a standardized, data-informed approach to guide the development and modification of national HRH policies (WHA Resolution 69.19), HRIS enable the collection, analysis, visualization, and use of HRH data. Yet despite advances made over the last 20 years, spurred by the 2006 World Health Report [3] and other seminal HRH reports at the global level [4, 5, 6], documentation on the existence and capabilities of HRIS in low- and middle-income countries (LMICs) is limited. To address this limitation, Vital Wave brought together a consortium from April 2020 to May 2021 that included IntraHealth International and Cooper/Smith to conduct a targeted scan of the HRIS landscape in 20 countries and three deep-dive assessments in Burkina Faso, Mozambique, and Uganda [7], with support from the Bill & Melinda Gates Foundation.

Table 1

Global Strategy on HRH: Workforce 2030, Objective 4. Strengthen data on human resources for health for monitoring and accountability of national and regional strategies and the Global Strategy.

<p>Milestone 4.1: by 2020, all countries will have made progress to establish registries to track health workforce stock, education, distribution, flows, demand, capacity, and remuneration</p>
<p>Milestone 4.2: by 2020, all countries will have made progress on sharing HRH data through NHWA and submitting core indicators to WHO annually</p>

A review of the literature alongside analysis of data from both the yearlong multi-country review across 20 countries and the three deep-dive countries provided a set of critical success factors that describe “what good looks like” for HRIS in the health sector. To build and maintain strong systems and to institutionalize data use for management and decision-making, governance, and leadership are essential [8]. In addition, it is important to take a “whole-of-government” approach, to be able to see past programmatic silos with a view across diverse stakeholders, from site to national level [9]. HRH is a domain that involves various ministries and departments at multiple administrative levels, including

Ministry of Finance (for payroll), Ministry of Public Service (for actual employment), Ministry of Education (for pre-service education), Ministry of Labor (for industrial relations), and Ministry of Health (MOH) (for core management). Clear roles, responsibilities, and associated capabilities are key for sustained HRIS engagement. In addition, a long-term horizon helps build a system over time, including fostering a culture of data use [10]. All these elements of a successful HRIS are illustrated in Figure 1 and reinforce the 2009-2010 HRH Reference Group (HIRG) Suggested Benchmarks of a Well-Functioning HRH Information System [11]. They include important technical elements that must be supported by good human and organizational foundations, specifically strong governance and ownership, the right incentive structures, and systems designed to match country contexts.

With this framework in mind and drawing on data from the assessment, this paper presents the case of Uganda's health sector and workforce information ecosystem, as an example of a variation in country experience in working toward objective 4 of the Global Strategy to strengthen data on HRH. This case illustrates a scenario common to many LMICs where advances in digital capabilities, often externally driven, appear to have outpaced local governance and leadership capabilities needed to inform and oversee the overall ecosystem, its architecture and maintenance, and institutionalization of data use for decision-making. It describes the methodology undertaken to identify key bottlenecks and bright spots, or what works and what does not, through detailed mapping of administrative processes and data flows. It concludes with a discussion of the Uganda-specific findings according to each element of a successful HRIS, and considerations for local stakeholders and the global community in addressing the underlying causal issues for common bottlenecks and strengthening HRIS to better design, plan, and manage the health workforce.

Case Presentation

Methodology

The initial focus of the assessment was a scoping across 20 countries to identify “what” exists, informed as much as possible by NHWA-recommended indicators, as well as the contextual factors shaping the health workforce information ecosystem. Secondary research combined with targeted in-country interviews contributed to the multi-country review findings. Subsequently, this information was used to select three countries—Burkina Faso, Mozambique, and Uganda—that represented a variety of country scenarios for more in-depth understanding or “deep dives.”

Uganda, an East African, Anglophone country, was selected to show how HRIS were functioning in the context of a decentralized public health system with an increasingly important private sector and where there has been significant donor-driven investment in improving HRH data availability and use. The deep-dive assessment methodology and analysis focused on “how” the health workforce information ecosystem worked and prioritized a systems-wide (macro) perspective alongside the perspectives of the different actors within the system (micro or individual perspective). In Uganda, the assessment team conducted 20 key informant interviews at different administrative levels and across the public and private

sectors from January to March 2021. These qualitative data, supplemented with a targeted document review, informed process mapping exercises of key actors, policies, information systems, and data flows. Results were validated through meetings with the Ministry of Health to ensure data accuracy prior to dissemination.

Current state of health workforce information ecosystem in Uganda

Since 2006, Uganda has seen many years of investment in HRIS. This support has come from several different donors (USAID, the European Union, WHO, and UNICEF), overseen by the Uganda MOH, and accompanied by the introduction and rollout of IntraHealth's open-source HRIS software—iHRIS—specifically, iHRIS Manage and iHRIS Qualify (see timeline in Figure 2). In 2019, the country undertook implementation of NHWA, training two focal points and completing a proof of concept to extract data from iHRIS, the Integrated Personnel and Payroll System (IPPS), and the Uganda Bureau of Statistics to complete annual reporting on 21 of the 78 total indicators.

Mapping of the information ecosystem indicated 16 different information sources pertaining to HRH in Uganda, hosted or maintained across seven ministries and departments, along with analysis of service coverage conducted using the Workload Indicators of Staffing Need (WISN) methodology (Figure 3). The primary sources of HRH data include:

- iHRIS Qualify, which supports the health professional councils' information systems (established in 2006)
- iHRIS Manage, the HRIS (established in 2007), including a registry that compiles the HRIS information across all districts.
- The IPPS, introduced in 2007 and used by the Ministry of Public Service to manage payroll, which currently contains 43,530 workers.

Recent activities by the government to improve its ability to better plan, manage, and track the public-sector health workforce include the MOH's efforts to expand iHRIS Manage functionality by adding more modules (attendance, performance appraisal, file tracking, leave, accommodation, and also iHRIS Train for pre-service education data). The country is now in the process of introducing a new Human Capital Management System (HCMS) that will include performance management functions and replace IPPS, covering the entire public sector workforce. This process has been underway since 2018, and respondents estimated it was 80% complete.

Despite this history of investment, the country's current engagement with NHWA, and ongoing efforts to improve HRH planning and management, mapping of the multiple information systems revealed uneven adoption and engagement across subnational units and at the national level. Indeed, high levels of data fragmentation due to a lack of interoperability and data-sharing practices across the systems mapped were observed by key informants. This fragmentation may reflect the donor-driven nature of the systems

developed and an inadequate focus on building the necessary local ownership, or leadership and governance capacity, for system maintenance and sustainability at both subnational and national levels.

Using data flow mapping to identify key bottlenecks and “bright spots”

In addition to information systems mapping, the assessment team also mapped the administrative processes and data flows for three priority use cases: recruitment and deployment, salary payments, and performance management. Each use case identified where interoperable databases existed, which systems were electronic versus paper-based, the actors involved in these decisions, and the associated bottlenecks or pain points at different levels of the health system. This approach allowed for much valued and in-depth analysis of specific issues, but also where and how they manifested and at which levels of the health system. Figure 4 provides a summary of HRH knowledge and bottlenecks in Uganda, drawing on the results of the detailed process and data flow mapping available in the full report. Descriptions of the systems, bottlenecks, and bright spots identified for each of the priority use cases follow.

Recruitment and deployment

iHRIS puts Uganda in a strong place for HRH recruitment and deployment of public-sector health workers. However, engagement with the system is uneven across different districts depending on the strength of subnational leadership and Human Resources (HR) governance and budget allocation. Not having visibility into community health worker (CHW) or private sector health workforce constrains the government’s ability to make effective referral and workforce development or deployment plans with a “big picture” perspective. Use of the CHW Registry, established in 2008 and in place in 35 out of 135 districts, is limited and hampers users’ ability to track and manage these frontline workers at the national level. Unique to Uganda across the deep-dive countries, professional councils are consulted by service commissions during recruitment of health workers to check that applicants are in good standing. Councils consult comprehensive electronic registries for this (using iHRIS Qualify). While iHRIS provides some efficiencies for recruitment, a legal requirement to maintain paper registers alongside electronic systems is time consuming.

Salary payments and reconciliation

Despite there being an HRIS in place, key respondents regarded IPPS (payroll data) as the most important source of HRH information, with many steps involved in ensuring its integrity. This data flow creates a valued and most often used data set for HRH decision-making, but it is not comprehensive, as only Ministry of Public Service-contracted workers are paid through IPPS. Challenges specific to this data flow included limited visibility into non-gratuity contract workers and project hires, since administrative functions like pay change reports require streamlining, and reported salary delays for health workers.

Individual performance management and attendance tracking

Performance appraisal is based on an annual plan but is out of sync with other systems-planning processes. While there are opportunities to strengthen the performance management process, the fact that it is based on annual plans for all health workers is a bright spot for Uganda in systematization of these data. In addition, plans for digitizing this process through HCMS for the entire public-sector workforce are promising. Health worker attendance tracking is biometrically enabled through mobile phone applications or manually tracked through attendance registries, with health worker absenteeism resulting in reductions to salary payments in some facilities. It is likely that the performance management data and associated processes will improve if the data have more perceived use in decision-making.

Looking across the priority use cases in Uganda, what emerges is a complex, decentralized information ecosystem driven by years of donor investment, but one that still sees uneven ownership and data use across the health system. System design has generally been driven by top leadership and has not necessarily kept up with user needs at subnational or facility levels, despite the decentralized structure of the public health sector. The specific challenges that were identified are as follows:

- **Limited interoperability between systems:** Despite the multiple systems in place, there is limited interoperability between them (specifically the payroll system, IPPS, and key health workforce information systems—iHRIS, DHIS2). This lack of information exchange or data sharing across systems leads to duplication of efforts and priority need to retain trained staff who can conduct manual analysis to, for example, calculate staff workload. Furthermore, the multiple systems in place require different login passwords and result in system fatigue, which acts as a barrier to data use. However, Uganda’s investment in establishing master facility and staff lists, and the CHW Registry, provide essential architecture for improvements to interoperability across the ecosystem.
- **Complex HRH planning and management policy context:** Several policies have been developed related to HRH planning and management, including the use of HRIS to guide these efforts, but according to key informants there is variable implementation. In Uganda there are a high number of ministries involved in the health sector. For example, at recruitment, four ministries (MOH, Ministry of Local Government, Ministry of Public Service, and Ministry of Finance, Planning and Economic Development) come together to approve new hires. The large number of different, relevant policies in place means there is no single reference document that could guide investments and implementation. This re-emphasizes the importance of a “whole-of-government” approach.
- **Limited visibility into the private and community health workforce:** Looking across the multiple information systems and the capabilities they provide, visibility into the private sector and the CHWs are major gaps. In Uganda, medical and nursing professional councils have a comprehensive listing or registries of both public and private sector health workers that is routinely consulted at recruitment to ensure the health worker is in good standing with the council. There are some isolated instances of cross-sectoral data sharing. Some public-salaried health workers are seconded into faith-based, non-governmental organizations (NGOs), or trust hospitals, and iHRIS records their details. Private sector facilities also register with and report to local government, but the assessment did not learn of these data being used for HRH decision-making. Interoperability across systems, however, is lacking,

resulting in duplicated efforts and siloed HRH data. With regards to visibility into the community health workforce, the CHW Registry has not been kept up to date and is only used in 35 out of 135 districts. There is a newly established Department of Community Health that presents an opportunity to expand this further, but the assessment found a general lack of awareness of the CHW Registry within the department and its leadership.

Discussion

The bottlenecks and bright spots identified using the methodology in Uganda provide an opportunity to learn from and build upon local struggles and successes in countries that want to expand and scale their existing digital investments. Uganda's case also underscores the importance of concurrent investment in leadership and governance structures for data use, system maintenance, and sustainability. In this section we describe the key elements of a well-functioning or successful HRIS through the Uganda deep-dive findings and propose areas for intervention by different stakeholder types using this framework.

An established source of truth for health workers in all sectors and cadres

As a health worker registry, iHRIS Manage is intended to provide a single source of truth for the entire health workforce. However, a lack of interoperability with the payroll system meant that in Uganda there have been parallel sources of information with both payroll and iHRIS being used for HRH decision-making. The new HCMS, intended for use across the public sector, will ideally bring these data sources together into a single system. It remains to be seen what kind of visibility the private sector workforce and CHWs will have in this new system.

Visibility into the private sector and informal health workforce is a gap in most LMICs. For the private sector, there needs to be better engagement between public and private sectors to enable enumeration of all currently employed health workers. Barriers to private health sector engagement may include wariness about onerous oversight, concerns about taxation, and the informal or semi-formal nature of many private sector providers. A clear "win-win" case needs to be established for enumeration of the private sector health workforce, so they can be better factored into government health worker deployment decisions, so for example, public sector health workers can be deployed to places where there is no doctor at all. In Uganda, registries maintained by the professional medical and nursing councils facilitate a more comprehensive picture of the health workforce across the public, private, and not-for-profit and faith-based sectors for those practitioners who must be licensed. For CHWs, the lack of definitive enumeration relates to the informality of the cadre. Professionalization of CHW cadres (including formal job descriptions or scopes of practice, a regularized pay structure, standardized or accredited training) would help provide some structure to community health workers, even if they are not integrated into the public health system, and in turn facilitate better enumeration.

A unique ID that can be used to facilitate interoperability

A unique ID can bring together all the different information systems (council data, payroll, health workforce registries) to ensure a comprehensive picture of the workforce. Uganda has a National Identity Card, but it has not achieved full population or workforce coverage at this time. When this system achieves scale, it will assist greatly with data sharing across systems. In some contexts, a payroll ID or government employee ID goes some distance toward playing this role, but only for public sector employees. In South Africa, the professional license number of doctors and nurses from the council registration plays this role and helps regulate against fraudulent health workers.

Functionality that meets user needs for routine management and administrative tasks, especially at the subnational level

In Uganda, iHRIS was customized to meet the needs of decision-makers at various administrative levels. Nevertheless, the level of engagement with the system has varied over time across districts. Reasons for varied levels of engagement include a lack of ongoing training; challenges in data capture and entry; and varied levels of capacity and motivation as staff involved in iHRIS are reassigned, resign, or retire. A design to better meet the administrative and decision-making needs of those at subnational levels may foster improved adoption and engagement with the system. Support from decision-makers at the national level in all aspects of the system, from relevant policy making, budgeting, and staffing, to specify a few, also needs to be fostered and maintained for the sake of sustainability.

Data access that enables decision-making but protects privacy and security needs

HRIS have a strong role to play in increasing accountability and transparency around deployment. At the same time, these data are considered highly sensitive as they include the personal details (particularly salary) of health workers. In Uganda, it was reported that some users had trouble accessing iHRIS data, which curtailed engagement and use. These users include stakeholders within the MOH and external agencies such as faith-based hospitals (which for example, might like to see where the public sector health worker shortages are so they can contribute to filling the gaps). Clear data-sharing policies between agencies and to the public may support better data sharing, access, and use—while also respecting privacy.

Data sharing and integration across different HRH data sources including payroll, HRIS, and facility registries

Uganda is unique in that its main professional councils manage their databases of licensed and registered practitioners using iHRIS Qualify. Use of this software enables routine queries of a health worker's registration status, including education and other qualifications, so that when a health worker is hired, his or her professional standing with the council can be quickly assessed and assured. The new

HRIS in South Africa is designed to do the same. However, an enduring barrier to data quality and data use has been the lack of interoperability with payroll.

Governance and ownership

Many efforts in HRIS development over the last 20 years have been externally driven, with uneven country ownership. Donors have been keen to understand the distribution of health workers to help direct their investments. Local drivers of HRIS development include legislative and policy commitments to UHC, equity, and transparency. In Uganda, governance and ownership of iHRIS varied throughout the health system. However, now, the government is developing its own public sector HR system (HCMS), which will enable greater data sharing between these systems and actors. In Kenya, the National MOH introduced a policy for minimal staffing levels for HRIS at the country level to ensure data collection, quality and use. This policy has been enacted in many counties with strong evidence of sustainable HRIS data use.

Actor incentive structures

An HRIS provides a level of transparency and accountability that some stakeholders may not embrace. Before an HRIS is introduced, commitments to accountability and transparency need to be socialized and incentivized throughout the health system. Improvements are likely to have knock-on effects throughout the data value chain to improve performance. For example, if attendance and performance are used for decision-making, more care and investment will be taken in improving both data quality and actual performance. Transparency around deployment decision-making is likely to increase motivation and engagement, and again help improve performance.

System design matched to country context

Many country contexts are not conducive to digital solutions. Poor connectivity, uneven and unreliable electrification, and low levels of data and digital literacy are all factors that need to be taken into consideration in system design. Ensuring that information systems have offline capabilities, simple interfaces, and drop-down menus for data capture—all are factors that will enable system function in contexts of low digital readiness and uneven data literacy. Capacity-building efforts need to be ongoing and to focus on strategic data use as well as data capture. Efforts, secured by government funding, need to include both classroom and on-the-job elements for the sake of sustainability.

Conclusion

When looking to strengthen existing HRIS, and ultimately improve HRH data in pursuit of the Global Strategy's objective 4, it is insufficient to only examine and address the bottlenecks or pain points in administrative processes and data flows. To identify more enduring solutions and take steps toward having all the essential elements of a successful HRIS in place, it is important to examine the underlying factors that cause the bottlenecks to exist in the first place. Informed by the deep-dive assessment findings from Uganda, as well as in Burkina Faso and Mozambique and the 20-country scan, the

assessment distilled four causal issues, summarized in Figure 8, to guide the global community in intervening.

Getting HRIS right provides ministries of health and other stakeholders with an important tool for the improved design, planning, and management of the health workforce. Well-functioning systems enable countries to demonstrate clear progress in achieving national and regional HRH strategies, giving health workers the visibility and support required to do their work to the best of their abilities, and ultimately contribute toward effective pandemic response, equity in access to care, and UHC. Digital solutions are a necessary component in the suite of recommendations to strengthen these systems. Uganda's progress in developing its HRH information ecosystem as described in the case presentation underscores the importance of continuously aligning system capabilities, incentives, and motivations to an ever-evolving country context. However, as evidenced in the Uganda case and the broader assessment findings, robustness of the information ecosystem itself is insufficient to making substantive strides toward the Global Strategy's milestones 4.1 and 4.2—governance oversight and ownership are critical to success. Many countries, especially in LMIC contexts, lack an accurate sense of the composition, location, and performance of their health workforce. With a better understanding of what good looks like in terms of HRIS functionality in LMICs and ensuring interventions are addressing the causal issues, there can be many pathways to success and making systems work, to ensure health for all.

Abbreviations

CHW	Community health worker
DHIS2	District Health Information Software 2
HCMS	Human Capital Management System
HIRG	HRH Reference Group
HR	Human resources
HRH	Human resources for health
HRIS	Human resources information system (or systems)
IPPS	Integrated Personnel and Payroll System
LMIC	Low- and middle-income country
MOH	Ministry of Health
NHWA	National Health Workforce Accounts
SDG	Sustainable Development Goal
UHC	Universal health coverage
UNICEF	United Nations Children's Fund
USAID	United States Agency for International Development
WISN	Workload Indicators of Staffing Need

Declarations

Ethics approval and consent to participate

Not applicable

Consent for publication

Not applicable

Availability of data and materials

The datasets generated and/or analyzed for the case study are not publicly available due to limitations on health workforce data use by the Ministry of Health in Uganda but are available from the corresponding author on reasonable request.

Competing interests

The authors declare that they have no competing interests.

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Authors' contributions

AC was responsible for the initial structure and overall draft of this manuscript. AS, MA, LG, and SH were responsible for detailed drafts of specific sections, generation of the figures used in the manuscript, and subsequent draft revisions. VO was the country lead in Uganda, overseeing data collection and analysis for the deep dive assessment. ASi and SO provided data inputs from the WHO and the Uganda NHWA, respectively. AB was responsible for draft revisions and aligning this manuscript with journal requirements. All authors read and approved the final manuscript.

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References

1. World Health Organization. WHO country assessment tool on the uses and sources for human resources for health (HRH) data. 2012. [https://www.who.int/publications/i/item/who-country-assessment-tool-on-the-uses-and-sources-for-human-resources-for-health-\(hrh\)-data](https://www.who.int/publications/i/item/who-country-assessment-tool-on-the-uses-and-sources-for-human-resources-for-health-(hrh)-data). Accessed 14 December 2021.
2. World Health Organization. Global Strategy on Human Resources for Health: Workforce 2030. 2016. <https://apps.who.int/iris/bitstream/handle/10665/250368/9789241511131-eng.pdf>. Accessed 14 December 2021.
3. World Health Organization. World Health Report: Working Together for Health detailing global health workforce crisis. 2006. https://www.who.int/whr/2006/whr06_en.pdf. Accessed 14 December 2021.
4. World Health Organization. WHO Global Code of Practice on the International Recruitment of Health Personnel. 2010. https://www.who.int/hrh/migration/code/WHO_global_code_of_practice_EN.pdf. Accessed 14 December 2021.
5. World Health Organization. A Universal Truth: No Health Without a Workforce Report at Third Global Forum on Human Resources for Health. 2013. https://www.who.int/workforcealliance/knowledge/resources/GHWA-a_universal_truth_report.pdf?ua=1. Accessed December 14, 2021.
6. World Health Organization. Global Strategy on Human Resources for Health: Workforce 2030. 2016. <https://apps.who.int/iris/bitstream/handle/10665/250368/9789241511131-eng.pdf>. Accessed 14 December 2021.

7. Vital Wave. Human Resources for Health: Workforce Analytics for Design and Planning Report. 2021. https://vitalwave.com/wp-content/uploads/2021/06/HRH-Assessment_Final-Report-2021.pdf. Accessed 14 December 2021.
8. Khan, H., Hussainy, S.K., Khan, K. and Khan, A. The applications, advantages and challenges in the implementation of HRIS in Pakistani perspective. 2017. VINE Journal of Information and Knowledge Management Systems, Vol. 47 No. 1, pp. 137-150. <https://doi.org/10.1108/VJIKMS-01-2016-0005>
9. Cázarez-Grageda K. The whole of government approach: Initial lessons concerning national coordinating structures for the 2030 Agenda and how review can improve their operation. 2019. Bonn: Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ). <https://www.partners-for-review.de/wp-content/uploads/2019/09/Whole-of-Government-P4R-Discussion-paper-2019.pdf>. Accessed 14 December 2021.
10. Buchan, James & Dussault, Gilles. Developing the health workforce for universal health coverage. 2020. Bulletin of the World Health Organization. 98. 109-116. 10.2471/BLT.19.234138.
11. World Health Organization. Report of the First Meeting of the Health Workforce Information Reference Group. 2010. https://apps.who.int/iris/bitstream/handle/10665/70332/WHO_HSS_HRH_HIG_2010.1_eng.pdf?sequence=1&isAllowed=y. Accessed 14 December 2021.

Figures

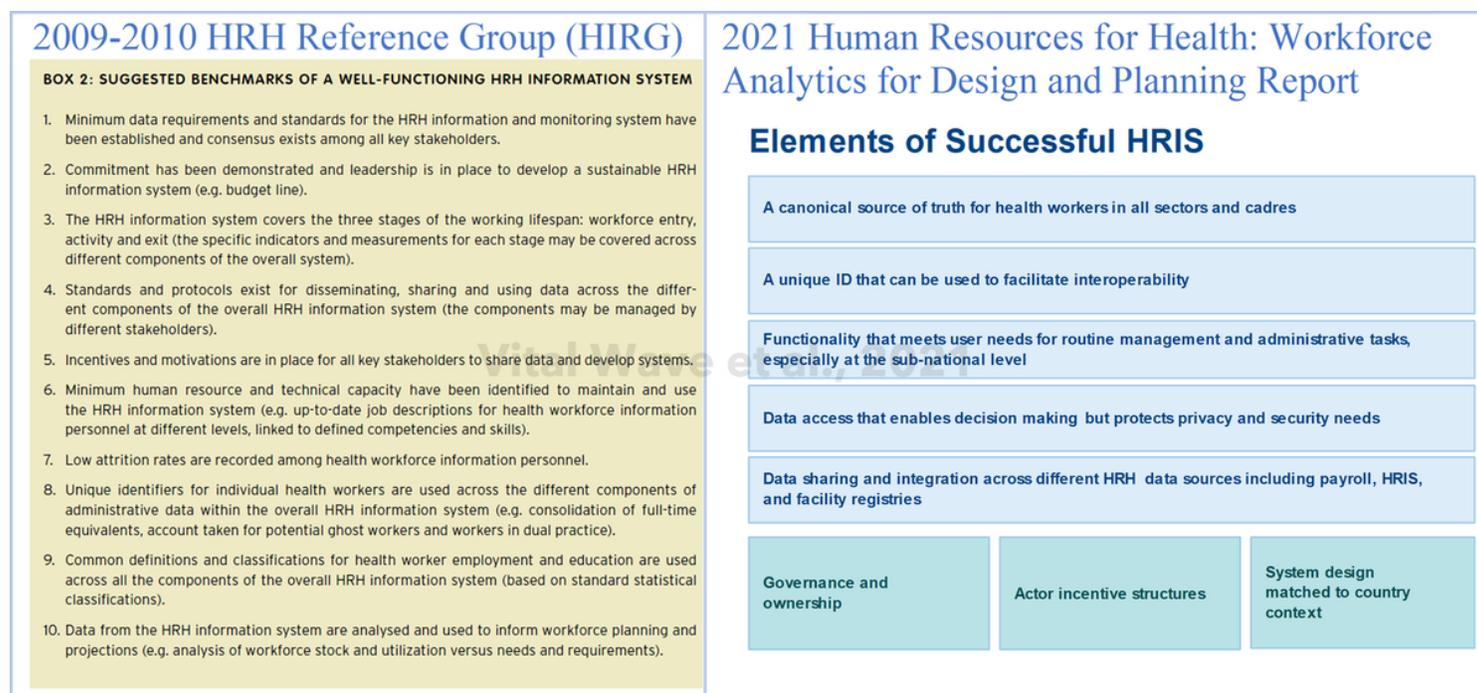


Figure 1

Elements of a Successful HRIS

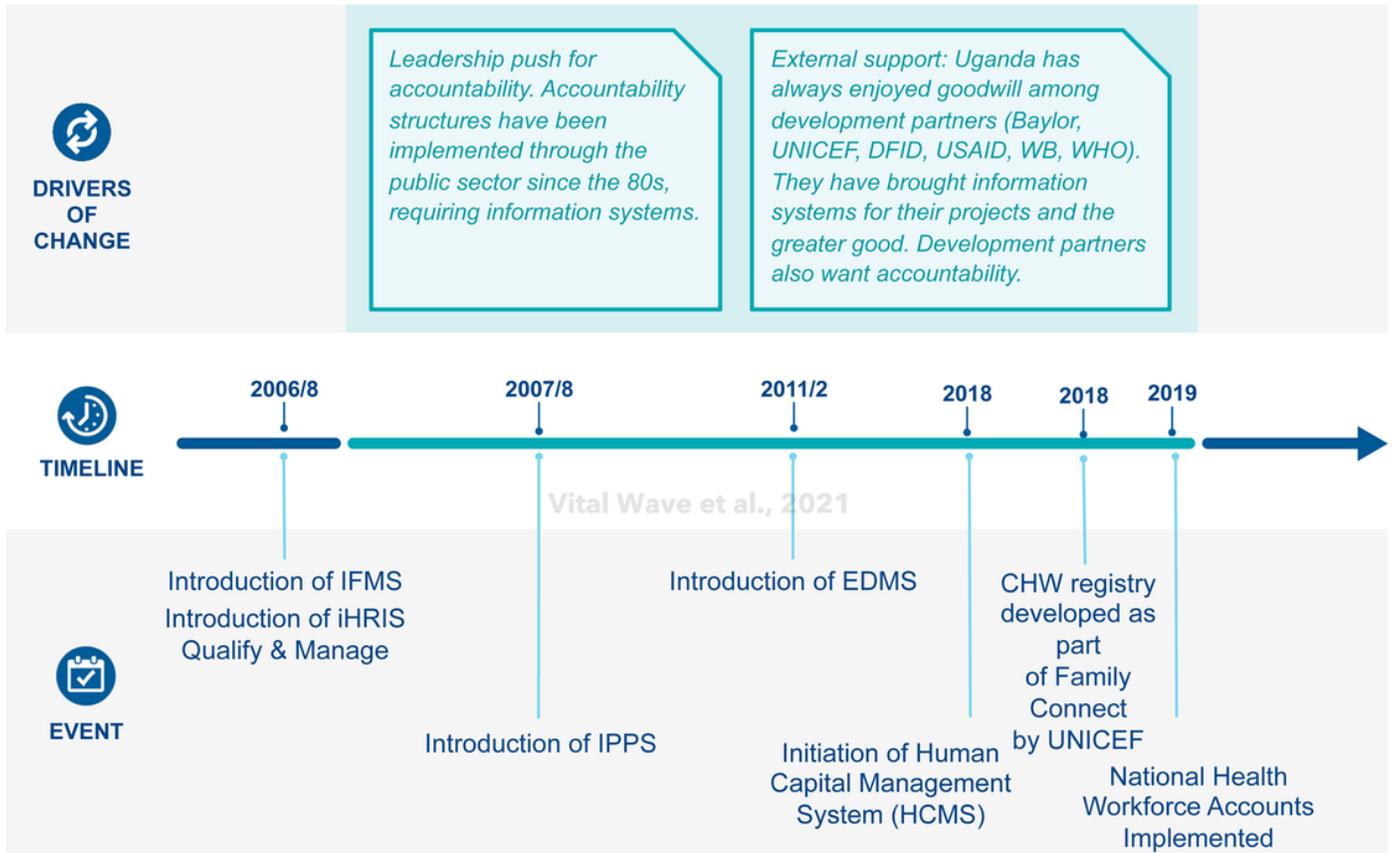


Figure 2

Uganda: Timeline of System Development

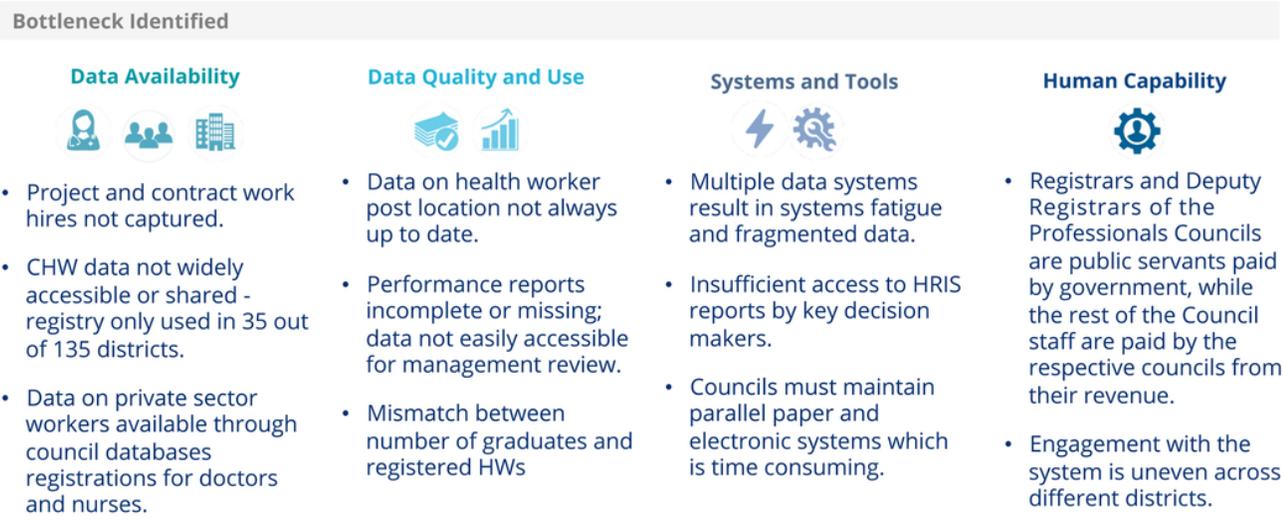


Figure 3

Uganda: Systems Overview

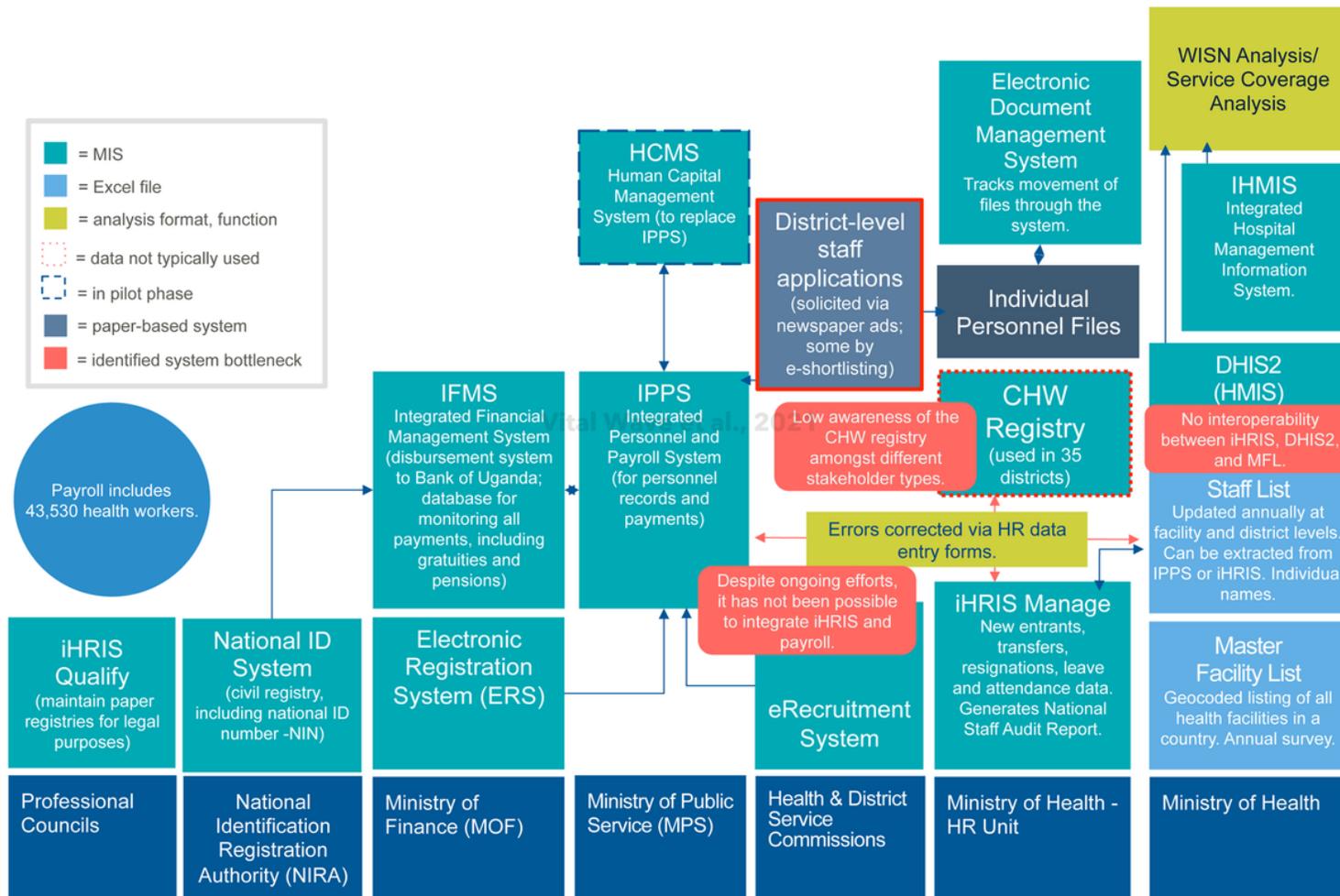


Figure 4

Summary of HRH Knowledge and Bottlenecks in Uganda

Uganda: Recruitment and Deployment

Decentralized system with majority of bottlenecks at the district level related to data use and availability of health worker data

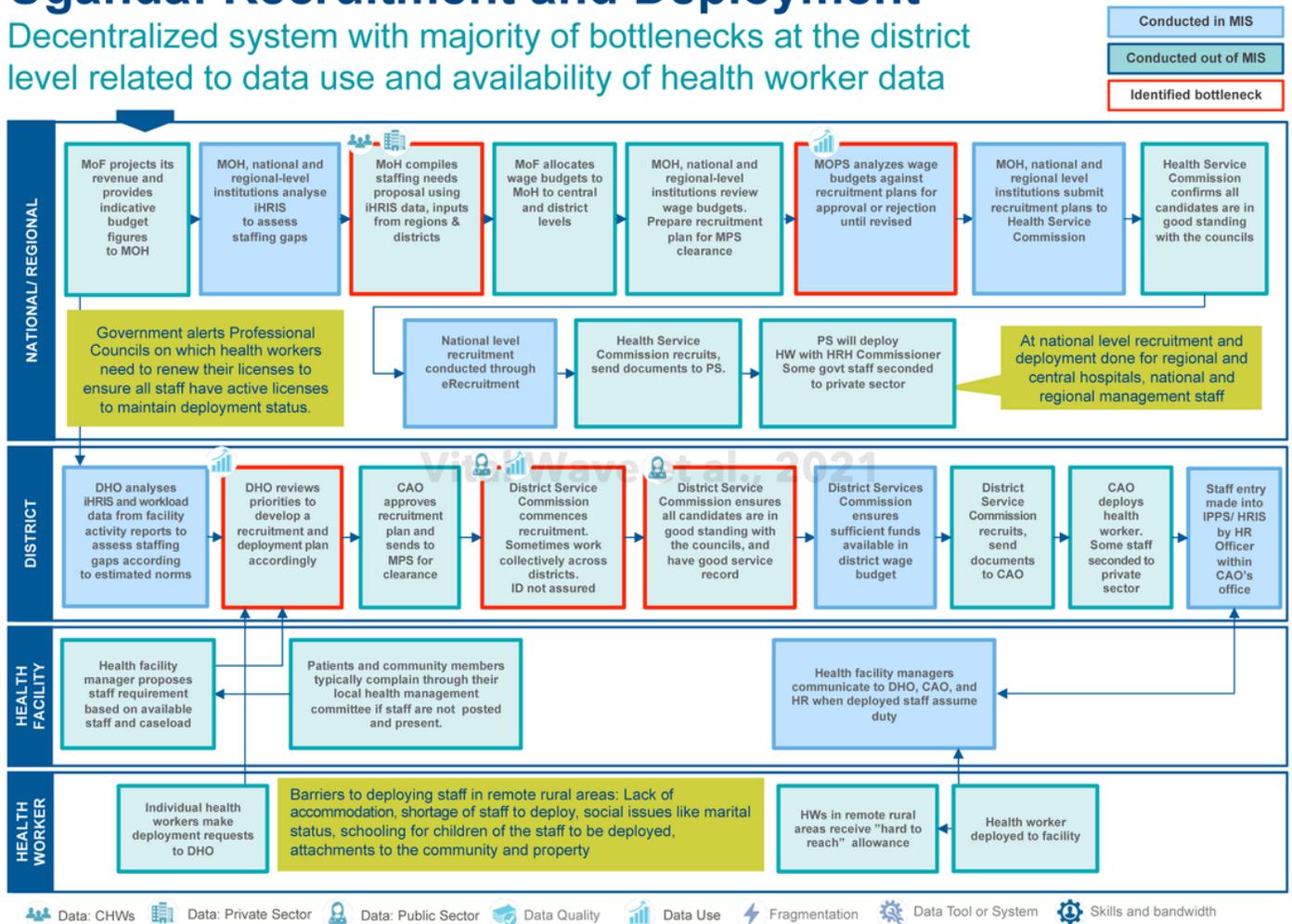


Figure 5

Uganda Recruitment and Deployment Data Flow

Uganda: Salary Payments

Many steps in ensuring integrity of payroll but attendance data not always reliable

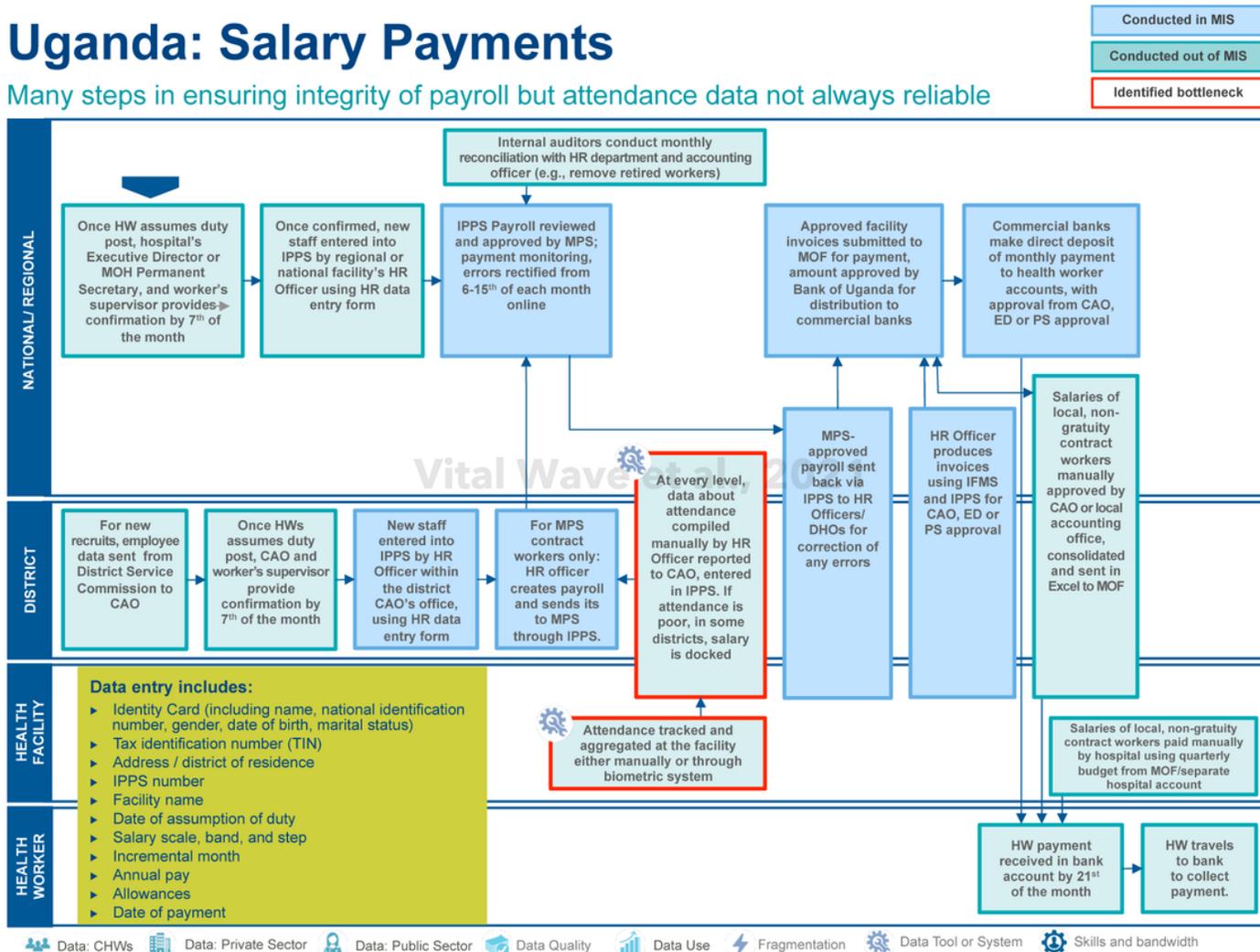


Figure 6

Uganda Salary Payments Data Flow

Uganda: Individual Performance Management

A paper-based appraisal system, attendance incorporated into iHRIS Manage

Conducted in MIS
 Conducted out of MIS
 Identified bottleneck

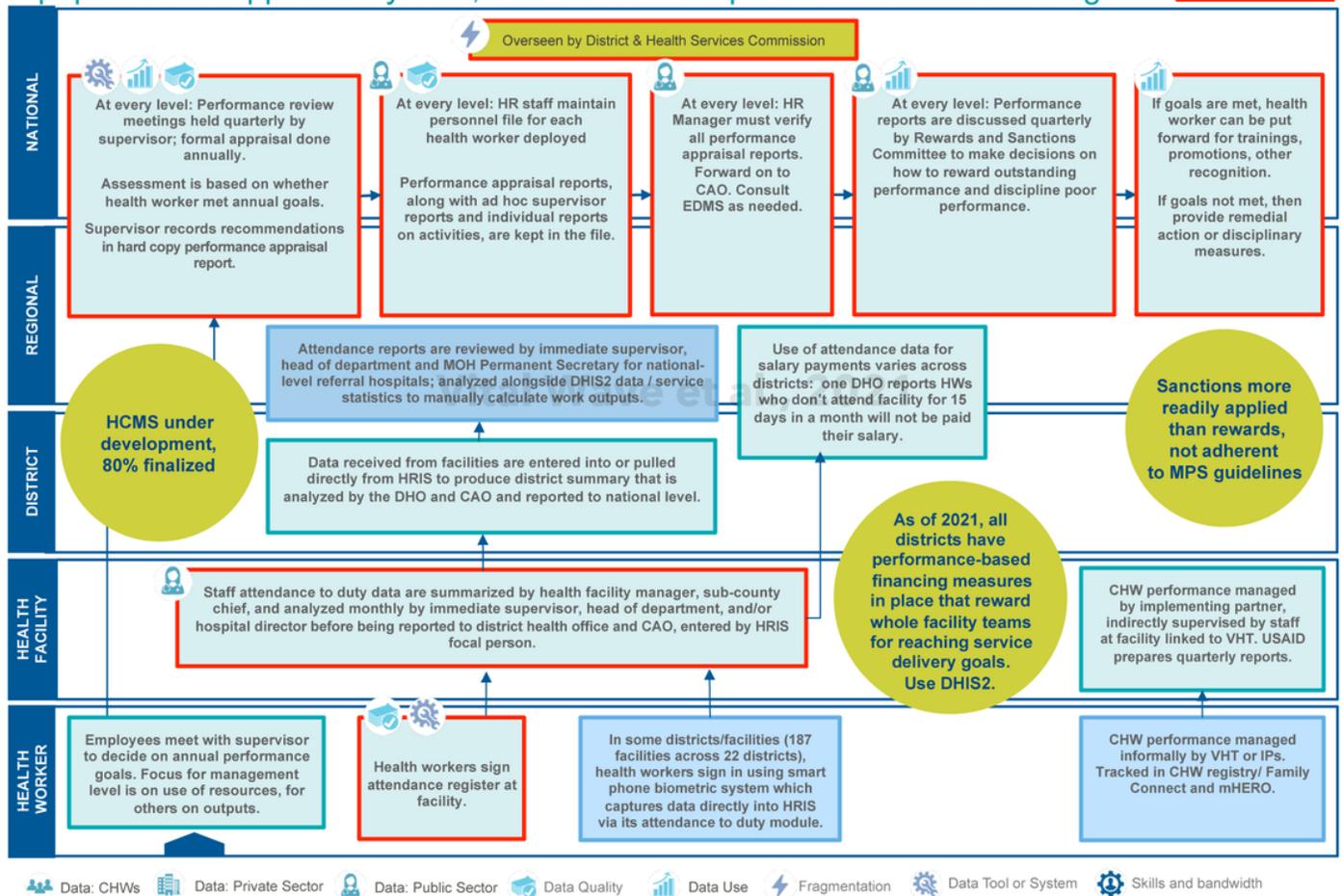


Figure 7

Uganda Individual Performance Management Data Flow

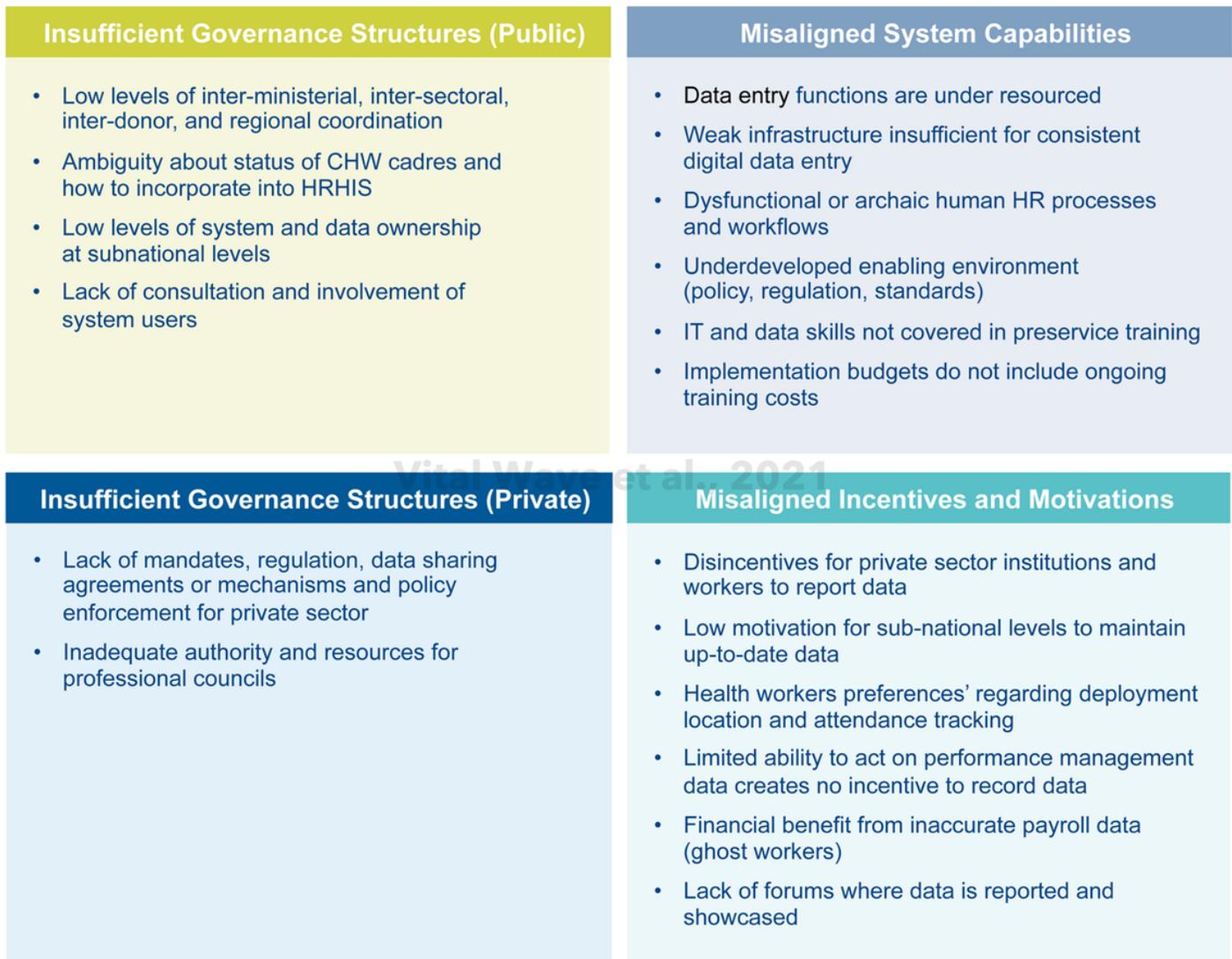


Figure 8

Summary of Causal Issues for Identified Bottlenecks