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Realising the potential of technology in education

Government of Sierra Leone Education Data Hub: A User Research Report

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Reviewer Björn Haßler

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Executive summary

Sierra Leone's [Education Data Hub](#)¹ was launched in September 2019, by the [Directorate of Science, Technology and Innovation \(DSTI\)](#)² through a partnership with the [Ministry of Basic and Senior Secondary Education \(MBSSE\)](#).³

From May to June 2020, the [EdTech Hub](#)⁴ partnered with the MBSSE and DSTI to conduct user research to inform the next phase of the Education Data Hub. The user research aimed to answer two main questions:

1. How is the Education Data Hub currently used by different stakeholders for making decisions and solving problems?
2. How can the Education Data Hub be improved to maximise the use of data to support student learning and accountability?

The research team interviewed 19 participants, from civil society (including teachers and parents), the civil service, NGOs (Non-Governmental Organisations) and IGOs (Intergovernmental Organisations) and uncovered the following key insights.

1. Presently the Data Hub is mainly used to inform:
 - On-the-ground projects at the planning stage, including funding applications (e.g., target specific areas / schools based on below-average exam pass rates; estimate how many students can be reached through a project; identify and get in touch with local actors);
 - Academic or professional research (think tanks, IGOs);
 - Business strategy (firms in the education sector).
2. Some interviewees had not heard of the Data Hub before being contacted for this research, despite fitting the profile of users. Others were aware of the Data Hub but had not used it, for instance, because they had not found a use case, or they found it easier to request the raw data from the MBSSE.
3. Existing users, as well as non-users, were very positive about the Data Hub. They repeatedly stated how difficult it was to find official education data from governments and how appreciative they were of the Hub.
4. The top features and content requests by users and potential users are downloadable raw data, and background information on the data itself and the education system in Sierra Leone. Some wanted more granularity. User feedback also indicated a need to improve how the data is visualised.
5. A lack of maintenance and support, unreliable data, political manipulation of the data and an unclear product vision were participants' greatest fears. They also

¹For information about the Education Data Hub, see:

<https://educationdatahub.dsti.gov.sl/education>

²For further information on the Directorate, see: <https://www.dsti.gov.sl/>

³ For further information on the Ministry, see: <https://mbsse.gov.sl/>

⁴ For further information on the EdTech Hub, see: <https://edtechhub.org/>

predicted that keeping the Data Hub simple and relevant for different user groups would be long-term challenges.

- 6.** There is a clearly stated request to make the Data Hub more mobile-friendly to better serve the general public within Sierra Leone.

The report ends with a set of product development and strategy recommendations for the DSTI to consider:

- A.** Immediate upgrades to the Data Hub: No-regret, near-term improvements that will help the Data Hub to better meet user needs.
- B.** Define the future of the Data Hub: the DSTI should work with partners to define the mission and goals of the Data Hub, clarify scope, and ensure it has the team, skills and budget to support continuous improvement, with clear ownership.
- C.** Focus on expanding awareness of the Data Hub and increasing traffic and usage
Once the most pressing improvements to the Data Hub have been made, and its future has been secured, focus on driving usage through clearer naming of the service, and optimising it for search engines.
- D.** Develop a roadmap to support future delivery: Some product management approaches to support delivery in the longer term.

1. Introduction

The [Education Data Hub](#) is an online platform developed in 2019, by Sierra Leone's Directorate of Science, Technology and Innovation (DSTI) in partnership with the Ministry of Basic and Senior Secondary Education (MBSSE). The objective of the Education Data Hub is to improve the quality of education and ensure all students in Sierra Leone are learning, by making education data easily accessible for use in planning, accountability and monitoring, resource allocation, and spending decisions. The Data Hub also gives citizens access to the information they need to hold educators and the government accountable.

The Education Data Hub currently connects the Annual School Census and the National Examination Results. It serves as a tool to support research, planning, policy and practice decisions, and the evaluation of interventions across schools.

In May 2020, the [EdTech Hub](#)⁵ partnered with MBSSE and DSTI to conduct user research for the Education Data Hub, working with the digital transformation consultancy [Public Digital](#)⁶. Prior to updating the Data Hub with 2019 data, and expanding its functionality, the MBSSE and DSTI and digital visualisation partner [Beyond Words Studios \(BWS\)](#)⁷ sought to better understand how Education Data Hub users currently are accessing and using Hub data and what more is needed to improve their ability to find and use this data in decision making. Key questions framing the research conducted by Public Digital include:

- How is the Education Data Hub used in making decisions and solving problems by different stakeholders?
- How can the Education Data Hub be improved to maximise the use of data in support of student learning and accountability?

This report is the output of this user research and is structured as follows:

- Methodology: how research participants were identified and recruited, limitations and user groups.
- Research findings: insights from the user research, plus the ideas and strategic questions they generate.
- Beyond the user research findings: what we found from Amazon Web Services (AWS) analytics, and what we expected to find in the user research that we did not.
- Recommended next steps: product development and strategy recommendations, based on both the user research findings and the research team's own experience.
- Appendix: Notes from a usability test and lessons for future user research.

⁵ For information about the EdTech Hub, see: <https://edtechhub.org/>

⁶ For information about Public Digital, see: <https://public.digital/>

⁷ For information about Beyond Words Studios, see: <https://beyondwordsstudio.com/>

2. Methodology

This is a summary of the detailed [methodology section](#) in the appendix.

Based on initial research and conversations with the MBSSE and DSTI team members, we identified and focused our recruitment on three main groups of users:

1. Civil society, including: parents of children of or nearing school age; private organisations in the education sector; academics; school principals / headmasters and mistresses
2. Civil servants, including: Individuals in charge of assessing the quality of the education delivered (e.g., school inspectorate representatives), as well as those in charge of school infrastructure (buildings and facilities), and those in charge of global education policies and their evaluation.
3. NGOs and IGOs: organisations of all sizes, including a large intergovernmental organisation (UNICEF), a medium-sized organisation with offices in multiple countries, and a small Sierra Leonean NGO.

We conducted 19 interviews between 11 and 24 June 2020. The interviews were conducted remotely, using Zoom and WhatsApp. On average, the interviews took 40 minutes. All insights about the use of the Data Hub in this report come from the user research interviews.

3. Research findings

This section on research findings describes the insights that we gathered from our interviews, including who uses the Data Hub, how it is used, perceptions about the Data Hub, and how it could evolve in the future.

3.1. Who uses the Data Hub today?

The six interviewees who disclosed that they have currently or recently used the Data Hub were:

- From two small international NGOs
- Working for an education provider in Sierra Leone
- Working for an education software provider in Sierra Leone
- A PhD student at an American university
- A civil servant in the Teacher Services Commission

We learnt that the Data Hub is not yet well known. Seven out of nineteen people we interviewed had either not heard of it or had not used it, as shown in the table below. Among the twelve people who had heard of the Data Hub before, half had never used it.

In the absence of sufficient, reliable, web analytics or traffic data, however, we cannot determine if the sample of users that we interviewed is representative of all current Data Hub visitors.

Due to our small sample size, we have grouped both current, recent and past users of the Data Hub together (Table x). Of the 12 interviewees who know about the Data Hub, six have not yet had an opportunity to use it.

Table 1. The relationship between interviewees and the Data Hub

People with no knowledge of the Hub	7		
People who know about the Hub	12	People with current, recent or past use of the Hub	6
		People who have not used the Hub	6

3.2. How interviewees currently relate to the Data Hub

This section describes how current users interact with the Data Hub.

3.2.1. How the interviewees learned about the Data Hub

Participants mentioned learning about the Data Hub in various ways, including through a connection at the DSTI or MBSSE and discovering it while looking for other information on the MBSSE website. Several people mentioned hearing about it from communications shared by Minister Sengeh, either on WhatsApp groups or radio shows.

However, awareness is not always understanding, and the term 'Hub' seemed to confuse a few people who thought it was a networking platform or a physical location.

3.2.2. Why the interviewees use the Data Hub

Among the people who are currently using it, the reasons cited for using the Hub were:

- To inform on-the-ground projects at the planning stage, including funding applications (e.g., target specific areas / schools based on below-average exam pass rates; estimate how many students can be reached through a project; identify and get in touch with local actors).
- To forward information to third parties who don't know where to ask or look for, e.g., enrollment data.
- To inform academic research.
- For private organisations in the education sector:
 - to estimate market size (e.g., based on the number and the typology of schools) and inform business strategy;
 - to build a pipeline of commercial leads, for example retrieving the contact details of school principals.
- To forecast future needs, for example: *"what schools will need improvements in 3 years to be able to welcome all the children"*

Users from NGOs and IGOs stated that they always complemented the information they accessed from the Data Hub with:

- raw data, obtained through a request to DSTI or MBSSE;
- additional data collected through surveys, partners or on-the-ground research they were conducting: *"The hub brings the picture to mind but for my work, I then use raw data to get to the details"*

World Bank datasets, USAID's Demographic Health Survey (DHS), AfroBarometer, UNESCO Institute for Statistics and OECD were cited many times as complementary sources.

3.2.3. Why the Hub is not being used even when interviewees are aware of it

Of the 12 interviewees who had heard about the Data Hub before we engaged with them, 6 had not used it for the following reasons:

- They did not have access to a computer.
- They had no identified use case for the Data Hub over the time period they had known about the Data Hub.
- They preferred using raw data from the MBSSE, which made their analysis simpler and easier.

One participant explicitly noted that they could only access the internet on a mobile phone and therefore couldn't access the Data Hub.

Other participants who knew about the Hub but were not users, included:

- A consultant with an organisation that specialises in cleaning data for future uploads onto the Data Hub. They are involved in assessing, providing and / or cleaning data for various organisations like the MBSSE or DSTI, and have experience in seeing how their work is then featured on websites like the Education Data Hub.
- Consultants who are in-between government contracts, with no current need for accessing the Data Hub, but likely to find it useful in a future project.

Figure 1. Insight and strategic questions 1

Insight:

Civil servants often seek raw data that they can manipulate for their own analysis.

Strategic questions:

- Should the Data Hub aim to replace other internal storage locations of education data, and become the unique point of access for the latest education data?
- Should the Data Hub establish itself as a first point of access for high-level data insights. What problem would that help to solve (which team is being currently asked these questions, what would they do if they spent less time answering them)?
- Is it reasonable to expect civil servants to go online for their internal
- data needs, instead of getting it on physical supports (e.g., USB, CD) that don't require access to the internet?

It is important to keep in mind that the Data Hub doesn't include dynamic data feeds that could trigger return visits, nor is it regularly updated. Most users seem to have specific immediate needs that don't encourage regular or repeat visits, particularly when they can access the raw data.

Figure 2. Insight and strategic questions 2

Insight:

The Data Hub in its current state doesn't encourage regular visits

Strategic questions:

- What would be the value of regular visits that don't correspond to an immediate or specific need?
- Who would benefit from that value?
- What would be the cost of creating and maintaining content that would entice such visits?

3.3. What Data Hub users are asking for

This section describes the information that users are looking for when they come to the Data Hub.

3.3.1. Downloadable raw data

All users asked for the ability to download the raw data, for conducting further analysis with their own data analytics software solution or to compare it to other data. They appreciate the graphs which give them a first-pass sense-check of the data in a user-friendly way.

3.3.2. Background information on the data and system

Participants, regardless of their current use of the Data Hub, also asked for more information about how the data was collected, processed and analysed, in particular when it came to the graphs displayed on the Data Hub:

“more transparency, how are you getting this data? How are you confirming this data? Is it government data, government data informed by GPE [Global Partnership for Education]? If you got it, can I also get that data? [I need] help describing the coding, where they were retrieved, process, methodology, some summaries”

“I need to know where the data came from and how the graph was constructed”

“you need to know exactly what the chart means”

The provision of explanations was also seen as an opportunity to learn:

“I'd love to develop skills in that area [data analysis], so it would help me”

Many interviewees were unfamiliar with Sierra Leone's education system. They expressed an interest in having more information about the education system, such as a definition of “approved schools”, or equivalences for the national exams.

3.4. User perceptions of the graphs

Several interviewees described the graphs as sophisticated, sometimes unclear, and likely too complex for untrained people or those with limited comprehension and data analysis skills.

“The World Bank website or USAID's DHS allow you to create quite simple graphs, I use those functions quite a bit - if I want to know trends in school enrollment across countries, I can do that.”

While users value features that enable them to quickly visualise data as illustrated in the participant quoted above, they also asked for more information about the methodology used to create the graphs and some of the terminology.

Interviewees with a background in economics – from academia and NGOs, offered that some of the graphs could be misinterpreted as suggesting causality where there is only correlation.

Figure 3. Insight and strategic questions 3

Insight:

The existing graphs are appreciated by users but were described as overly complicated and a likely barrier to lay users.

Strategic questions:

- What is the best way to visually present data for the various audiences of the Data Hub?
- How can the needs and abilities of highly educated and mathematically savvy users be balanced with users who have less capacity to manipulate data, and understand sophisticated graphs and charts?
- How can the key data points that are provided as “ready baked” graphs include more informative narrative on their importance and value?

3.5. User expectations and feedback on the Data Hub

Users shared that they expect the Data Hub to:

- Deliver insights into the Sierra Leonean education system so that they can plan projects and policies (increase efficiency for users).
- Provide an entry point for government information about the education system, and signpost to further information. For example, this could be through links to relevant pages or policy documents on the MBSSE’s website.

Overall, user experiences with the Data Hub as captured in the direct quotes below, were very positive.

“I love to see the list of all the schools, before COVID I wanted to do participatory studies at the school, was able to [identify schools] – that was the gem of the Data Hub”

“I like this initiative. It's going to be very useful for [IGO] programme and policy people”

“it's great to look at snapshot profiles of schools”

“The whole thing is interesting, it's extremely well laid out, great info, gives us a realistic picture of how many students we'd be working with if we get funding, I was very impressed.”

“It was very useful to look at the performance of schools”

“It gives me good ideas. It becomes a one-stop shop, I can look [up] so many things about a school “

When asked specifically “What's working really well for you on the Data Hub right now, and what should not be changed?” user responses were:

“Everything has proven essential”.

“The search function, really cool, works with minimal internal skills.”

“The visualisation engine, I think it's very powerful and allows to make sense of very large data sets “

Currently, very little official data on education in Sierra Leone can be readily accessed online. User sentiments are that “anything is better than nothing” and that the Data Hub is a modern and efficient way to deliver information.

3.6. User reflections on how the Data Hub could evolve

We probed users with the following two questions to gain insight into their perceptions of the positive and negative ways in which the Data Hub could evolve in the future.

3.6.1. “What would make the Data Hub the most useful source of Sierra Leonean education data, as far as you're concerned?”

The consultants and university academics we interviewed were quick to point out that the ability to download data would be their most preferred immediate improvement.

The next most frequent request was for more data with more granularity. Gender, dropout, and teacher data were raised several times, along with broader employment, health and societal data, in particular, to engage more with civil society by providing strong evidence of the efficacy of getting an education.

“In developing countries, education is an economic means, does this education get me a job?”

Figure 4. Insights and strategic questions 4.

Insight:

There is a huge appetite among users for validated, official data. Some users could see the Data Hub becoming a future source of all data and information on education, health, population trends, employment, finances, and more.

Strategic questions:

- Where does the remit of the Data Hub end?
- How would it hand over the transition to other data sources (for example to the Ministry of Labour and Social Security, the Ministry of Health and Sanitation and other governmental agencies)?
- How would it avoid being 'taken over' by data from other entities over which it has little control?
- Could — and should — the Data Hub be set up as a service that could be replicated for other policy areas outside of Education?

Users also shared the view that it would be helpful to have a way to ask questions, flag data inconsistencies (for example, a participant searched for their school but the spelling was wrong on the Data Hub and they had to find it through filtering) and missing data, or to signal performance issues (for example, a participant asked why the Data Hub is often down in the middle of the night).

Many users shared that they currently use back channels to find someone to ask about data or the Data Hub, and sometimes failed to find the support they needed.

Some users outside of Sierra Leone also shared that they didn't know who the DSTI were and were unfamiliar with the relationship between the DSTI and MBSSE.

Lastly, current users of the Data Hub indicated that they would like to be informed of data updates and any other changes to the Hub.

3.6.2. "What could be the worst thing the Data Hub could evolve into, as far as you're concerned?"

Our interviewees were honest in reflecting on what they feared could happen to the Data Hub, based on previous experiences with similar endeavours. A sample of responses to this question is highlighted below.

Table 2. Sample responses on the 'worst thing the Data Hub could evolve into

<i>"A political space."</i> <i>"Government propaganda, data that's not a reflection of reality."</i>	Political weaponising
<i>"It doesn't get updated. Licenses are not paid. What kills these initiatives is the lack of continuity / update. And if licence fees are not paid! Budget [it] in the annual update."</i> <i>"A one-hit wonder."</i>	Lack of maintenance and support
<i>"Trying to be all things to everyone and not do any adequately Something so highly technical only a few people can use it or make reference of it."</i>	Off-the-mark product vision
<i>"Showing misleading data or inaccurate data."</i> <i>"Showing inaccurate data."</i> <i>"Having data that's out of date."</i> <i>"Remove data."</i>	Unreliable data

Additional sentiments from users about the future growth and evolution of the Data Hub⁸ include:

Table 3. Sample responses on the future growth and evolution of the Data Hub

<i>If the Data Hub is usable for parents, who then can look up schools, then the better schools will be oversubscribed. Enrollment for high-performing schools could become problematic.</i>	Fear of unexpected impacts on school enrollment
<i>As the Data Hub hosts more data, in particular longitudinal data, the information architecture and site functionalities will need to remain both simple and precise in order to avoid overwhelming users and complicating their efforts.</i>	A focus on simplicity and relevance to key user groups will become more important
<i>Various lenses for the data may need to be added, for example, a student-centric lens in addition to the current school-centric one. A teacher-centric lens was also mentioned by an interviewee while several mentioned requiring a gender-centric view (would cross-reference for students, schools and teachers).</i>	
<i>As the Data Hub gets updated with new data regularly or frequently, users may begin requesting APIs providing dynamic feeds as a simple, reliable way for them to access the latest data. This should be included in the consideration for the platform side of the Data Hub.</i>	New features may be needed

3.7. Should the entire Data Hub be mobile friendly?

The use of mobile phones to access the internet is growing in Sierra Leone. However, as of June 2020, it is not yet in line with usage in developed countries. [World Bank⁹](#) 2018 data estimates 88.5% of people have a mobile phone (not necessarily a smartphone), and according to [2017 UNICEF data¹⁰](#), only 13.8% of households have access to the internet by any device from home. Meanwhile, USAID DHS data from 2016¹¹ estimates mobile phone penetration as still low in rural areas, where 52% of households own a

⁸ These have been paraphrased and are not word-for-word quotes.

⁹ Source:

https://databank.worldbank.org/views/reports/reportwidget.aspx?Report_Name=CountryProfile&Id=b450fd57&tbar=y&dd=y&inf=n&zm=n

¹⁰ Source:

https://www.statistics.sl/images/StatisticsSL/Documents/sierra_leone_mics6_2017_report.pdf

¹¹ Source: Sierra Leone Malaria Indicator Survey 2016 Final Report [MIS25]:

<https://dhsprogram.com/pubs/pdf/MIS25/MIS25.pdf>

mobile phone versus 90% of urban households. [Data from 2013](#)¹² showed penetration at 41.1% of rural and 84.7% of urban households, showing that progress has been slow.

Only one NGO / IGO representative indicated using a mobile device because they did not have access to a computer connected to the internet to look at the data that would help them with programme decisions. All other interviewees could use a computer with internet access. However, the single mobile phone user that we encountered is likely to be representative of many more. Further research is required to better understand the on-the-ground needs of local NGO and IGO representatives.

From the user interviews, including one with a parent, a case can be made for making at least a section of the Data Hub specifically parent-facing and mobile-friendly, for example by building a 'Find a school' mobile-first service. This would complement the existing USSD services already available to parents.

We do not recommend making the entire site mobile-responsive, and accessible via mobile phones, as it was not a stated recommendation from most users — NGOs, IGOs and academics — who prefer to download and analyse data using a computer. Making the entire site responsive could threaten the existence of sophisticated graphs and filters which they value. We recommend creating a stand-alone, sister mobile service which could help drive usage from parents and other users in Sierra Leone who may be interested in specific school performance and characteristics, although this is not an obvious need as parents are able to access this type of information through other informal sources.

Going forward, a mobile-first service could include:

- Mobile-optimised: small screens, big fingers;
- Low page weight including low-fidelity school imagery: usage doesn't eat up the users' data allowance, and service that runs well over low bandwidth;
- Copy that is written for low literacy and low numeracy (the exact target level would need additional definition);
- No graphs (since graphs often do not display well on small screens, and could be communicated through words instead);
- Quick and simple navigation to a school: few top filters, secondary advanced search;
- Selected data sets with simple explanations of how they show what is going on (dual purpose of education on the situation and on how to read a graph);
- Additionally, it could help to answer use cases such as:
 - Which school near me is best for my child and me? (Academic performance, ownership, religious orientation, ratio of teachers to students, state of the school)
 - How does 'my' school compare to other schools? (Locally / regionally / nationally)

¹² Source: Sierra Leone Demographic and Health Survey 2013 [FR297]: <https://dhsprogram.com/pubs/pdf/FR297/FR297.pdf>

- How is my old school doing?
 - I want to save a school through a 3rd-party bookmarking service (pages need good, unique URLs)
- This could probably be a web-app for lower costs, to be defined with an engineering team;
- The value proposition to be tested could be 'As a parent or as a former student, I want school data at the tip of my fingers to check my school and show it off';
- Currently, parents use school open days and word of mouth to select a school, then get performance information about the school their child(ren) enrolled in from the CAR (Continuous Assessment Recordkeeper) teacher;
 - Consider linking the Data Hub to official information on enrolment (see for example [how Australia does it](#)¹³.)

The existing desktop version would supplement the mobile content, with a richer data set and complex functionalities for the benefit of researchers, NGOs and consultants who have fewer or no internet data and device size constraints. The data sets accessed on a desktop should contain:

- High fidelity school imagery (this was highly rated by many participants);
- Graphs;
- Ability to filter to groups of schools;
- Ability to download parts of the data, not just all or only school by school.

¹³ For more information on how Australia does this, see: <https://www.education.wa.edu.au/enrolling-in-school>

Figure 5. Insight and strategic questions 5

Insight:

To serve parents and Sierra Leone based users with simple queries (How's this school doing? What's the best school in that area?), the Data Hub needs to deliver some of its content in a mobile-first manner. To serve its other audiences, it needs to deliver its sophisticated features and new ones, such as downloads, in a desktop-first format

Strategic questions:

- Is it reasonable to consider delivering part of the data via a dedicated mobile app or website centred around school and geographical area data, while maintaining all of the data accessible on a desktop-first version in order to continue providing the much appreciated 'at a glance' graphs, in particular.
- What are the edge cases at the boundary between mobile and desktop usage?
- Are computer and internet penetration likely to drastically change over the next year, making the case for a mobile-first version less relevant?

4. Beyond the user research findings

We were provided with data from Cloudfront, which is the content delivery network for the Data Hub, for web traffic to the Data Hub between 5 April and 3 June 2020.

This data shows content requests by visitors to the site and comes from server requests, rather than embedded trackers on the front-end. This is therefore not an extensive set of analytics data captured on the pages themselves. For example, ideally, analytics data shows number of clicks, page dwell times, [bounce rates](#)¹⁴, and journeys across pages.

What this data reliably tells us is that 90% of users of the Data Hub in that period are located outside of Sierra Leone, the vast majority in the USA.

After excluding the 30% of traffic from bots, remaining traffic is as below. Please note that these are not unique visits.

Figure 6. Distribution of visits to the Data Hub between 5 April and 3 June 2020

58% of non-bot visits are from desktops



30% of non-bot visits are from mobiles

Remaining visits are from tablets and unidentified platforms.

4.1. What we expected to uncover and didn't find

At the outset of this research activity, we identified a series of beliefs and starting hypotheses in partnership with the MBSSE and DSTI that gave initial direction to the research. We agreed that we would not focus on validating these hypotheses specifically, but rather use them as a starting point for our discussions and refine our understanding based on the insights we gather.

Through these discussions we learned that two of our starting hypotheses were not validated.

- 1. Use case A: Policymaking and policy efficacy assessment.** Usage of the Data Hub by policy assessors is hampered by the fact that it displays 2018 data. We expect this use case to become valid once the Data Hub is more up-to-date.

¹⁴ For more information on bounce rates, see:

<https://support.google.com/analytics/answer/1009409?hl=en#:~:text=A%20bounce%20is%20a%20single%2Dpage%20session%20on%20your%20site.&text=Bounce%20rate%20is%20single%2Dpage.request%20to%20the%20Analytics%20server.>

- 2. Use case B: School enrollment decision making.** One respondent mentioned knowing “some parents who looked at the Data Hub to choose a school” but we were not able to interview those parents directly. Furthermore, between the challenges associated with accessing the Data Hub via a mobile device, its 2018 data, and a firmly established process of parents sending children to the schools they attended, and finding out about quality schools through word of mouth, we believe the Data Hub isn’t yet a viable primary source of enrollment decision data for most parents across the country.

Figure 7. Insight and strategic questions 6

Insight:

We have anecdotal evidence that civil servants use internal or back channels to access education data, and feel the Data Hub is not targeted to them.

Strategic questions:

- Is one of the aims of the Data Hub to serve the data needs of civil servants, replacing existing internal channels and becoming the ‘single source of truth’?
- Is it realistic to expect this change would be welcome and embraced by requesters and users of education data in civil service?

Further to these starting hypotheses, as the research progressed, we expected to hear more about how the data could be used for advocacy purposes and have not found this to be the case among our participants. Current usage is mainly for programme planning and funding proposals.

Based on our initial conversations with stakeholders at the MBSSE and DSTI, we also expected to learn that school staff (principals, board members and teachers) were using the Data Hub to check the status of their school and surrounding schools. The inaccessibility of the Data Hub on a mobile device seems to be one of the main reasons for its low to non-existent usage among this group of target users. Further study is required to better understand the needs of these groups of users.

Finally, we did not uncover or validate any access needs.

5. Recommended next steps

This section sets out four types of recommendations, roughly listed in priority order:

- 1. Immediate upgrades to the Data Hub:** These are no-regret, near-term improvements that will help the Data Hub to better meet user needs.
- 2. Define the future of the Data Hub:** We would recommend the DSTI works with partners to define the mission and goals of the Data Hub, clarify the scope and ensure it has the team, skills and budget to support continuous improvement, with clear ownership.
- 3. Focus on expanding awareness of the Data Hub** and increasing traffic and usage: Once the most pressing improvements to the Data Hub have been made, and its future has been secured, we recommend a focus on driving usage through clearer naming of the service, and optimising it for search engines.
- 4. Develop a roadmap to support future delivery:** To help plan for the medium to long term, we have recommended some product management approaches.

Please note that while recommendations are primarily based on the user research findings outlined in this report, they also draw on the user research team's experience of delivering digital products and services and international good practice.

5.1. Recommendation 1: Immediate upgrades to the Data Hub

We recommend that the DSTI makes the following improvements to the Data Hub in the near term. The precise prioritisation and timelines for these upgrades should be decided by the DSTI and BWS, informed by the budget, team and time available, as well as policy priorities.

- 1.1.** Add information about the DSTI, the source of the data displayed and the analysis behind data and graphs. An 'About us' page and relevant links from and to other governmental websites would help to build authenticity and authority
- 1.2.** Add the 2019 data, functionalities to look at the data longitudinally and a glossary (see how [New South Wales Education Data Hub¹⁵](https://data.cese.nsw.gov.au/data/dataset/glossary/resource/a01b3645-5e4f-4c53-a475-33b4f2648884?view_id=3d7c768b-e44b-4451-bc52-41f48d2ef4b4) does it). We recommend making the glossary a dynamic body of content, linked from the MBSSE master sources so that it reflects the latest definitions and doesn't require reviews and updates

¹⁵ For further information on the New South Wales Education Data Hub, see: https://data.cese.nsw.gov.au/data/dataset/glossary/resource/a01b3645-5e4f-4c53-a475-33b4f2648884?view_id=3d7c768b-e44b-4451-bc52-41f48d2ef4b4

1.3. Add functionality to download raw data.

- Minimum: Single download of all data
- Good: 'Minimum' as well as data notes on collection and cleaning
- Best: 'Good' as well as filters to select what data to download and in what format (as data and / or as JPG or PNG images)
- Review the user interface of the School search (see issues encountered in the usability test in appendix)
- Ensure the front-end is optimised for search engines as the current site only appears in limited queries on search engines. This would help increase organic traffic and make the Data Hub less dependent on word of mouth and the DSTI's own marketing efforts and advocacy by a few representatives.
- Embed analytics into the pages' code and set up a dashboard to track and monitor the activity
- Make the Data Hub AA/AAA WCAG2.0 compliant and deliver a highly accessible public service experience for all users
- Provide guidance on how to use the data with usage or licensing policy (an example might be the [Greater London Authority's London DataStore](#)¹⁶)
- Add a feedback mechanism so users can contact the team behind the Data Hub):
 - Minimum: An email address (must be monitored)
 - Good: A contact form (must be monitored)
 - Best: 'Is this page useful' feedback and 'is there anything wrong with this page', compare any page on [the UK Government website](#)¹⁷. All submissions could go into a Jira or Trello board for tracking, either will require monitoring
- Provide a simple way to subscribe for information on updates on the entire Data Hub / To a specific school / To a specific geographical area (Chiefdom/City/Region, to be defined)

Figure 8. Example feedback banner from GOV.UK



¹⁶ For an example on how to use data with usage or licensing policy, see:

<https://data.london.gov.uk/about/terms-and-conditions/>

¹⁷ Visit the UK government website at: <https://www.gov.uk/>

Other product changes to consider

We also identified three product changes to consider in the longer term. These are less urgent and require more exploration, than those listed above.

- Explore how to satisfy, if at all, the respondent's request for more data and more granularity in the data.
 - The Data Hub could also allow the upload of data as a way to increase its value and role to all users, particularly academics, NGOs and consultancies that regularly produce their own data sets and reports and aim for wide distribution and usage. We recommend applying Postel's Law: Be strict in what you put out and be lenient in what you receive. For example, the difference in authorship would need to be both clear and obvious.
- Consider how to visually present data for the various audiences of the Data Hub
 - How can the needs and abilities of an audience comfortable with data (such as analysts and academics) be balanced with the needs of non-specialist audiences?
 - How can the key data points that are provided as 'ready baked' graphs make their importance and value clearer to users?
 - How customised or customisable should graphs be?
 - Can graphs be downloaded? As a data set, as an image?
- Consider delivering part of the data via a dedicated mobile-first website: for example, school and geographical area data.
 - What are the edge cases at the boundary between mobile and desktop usage? Are computer and internet penetration likely to drastically change over the next year, making the case for a mobile-first version less relevant?

5.2. Recommendation 2: Define the future of the Data Hub

- 2.1** Secure long-term funding to make sure the Data Hub is sustainable:
 - Secure funding for the service that enables the DSTI to keep the Data Hub up-to-date, and make continuous improvements, free from political appropriation.
- 2.2** Define the mission, goals and audience of the Data Hub:

- What are the mission and goals of the Data Hub? Who is the Data Hub for? How should the various user groups be served, and with what priority?
- Example mission statement:
The Education Data Hub collates, hosts and distributes digitally Sierra Leone-centric education data in raw and analysed formats, to enable all users to efficiently retrieve official data and information.
- Example set of goals:
 - To be the first and unique point of call for all Sierra Leone education data requests
 - To be the most reliable, efficient and effective online source of official Sierra Leone education data
 - To be a recognised leader in education data distribution initiatives in government

2.3 Work with other parts of Government to clarify the edges of the Data Hub. Platforms like the Data Hub are markedly more modern-looking and easy-to-use than other websites from the same organisation (or parent organisation). A classic pitfall for such platforms is that they are viewed as excellent digital packhorses for all 'sort of the same' content from various other entities, content that is actually unrelated to the mission and purpose of the host site and also not budgeted for.

- The stronger and clearer the strategic purpose of the Data Hub will be, the easier it will be to not stray too far from the intended scope and preserve and deliver the Data Hub's original value proposition.
- Clarify how the Data Hub hands over the transition to other data sources, if at all (for example to the Ministry of Labour and Social Security, the Ministry of Health and Sanitation and other governmental agencies)?
- How will it avoid being taken over by data from other entities that it has little ownership over?
- How can the Data Hub be set up as a service that can be replicated to distribute similar sets of data?
- Should the Data Hub also become a single source of truth for civil servants?
- Clarify ownership of the Data Hub, and ensure there are the people and skills in place to support continuous improvement

2.4 Assign a product owner for the Data Hub, who would be in charge of both the delivery and the quality of the service.

- The product owner should have access to regular time from a full-stack developer and a designer with user research skills, at minimum, in order to be able to independently roll out fixes, improvements and updates.

- Ideally, a multidisciplinary digital team within the DSTI would maintain and continuously improve the Data Hub as part of a portfolio of digital products and services.

5.3. Recommendation 3: Focus on expanding awareness of the Data Hub and increasing traffic and usage

Higher awareness, traffic and usage is likely to support the case for future funding. Therefore, consider focusing on these areas before investing more time in planning and making product improvements.

3.1 Consider renaming the Data Hub, to make its purpose clearer to users, and making a distinction between the service provided and the platform providing it.

- As a service, the Data Hub enables free access to nationwide education data. As a platform, it hosts and distributes that data. Consider naming each part differently. For example, London's open data website is called [London Datastore](https://data.london.gov.uk/)¹⁸. An example of a specific data service on the London Datastore is the [London Air Quality Map](https://data.london.gov.uk/air-quality/)¹⁹. For a definition of what a service is in government, look at the [UK Government Digital Service blog](https://gds.blog.gov.uk/2015/10/07/government-as-a-platform-for-the-rest-of-us/)²⁰. For a definition of a platform, here's how Felicity Singleton, Programme Director at the Government Digital Service in the UK described them in 2015:

*"Platforms give us a digital infrastructure to build services on an ecosystem of components that's not closed and locked away inside a proprietary stack of technology and processes, but based on standards and open to all. The entire public sector can use it. So can third parties."*²¹

3.2 Experiment with ways to drive awareness and use of the Data Hub.

- Make URLs understandable through a human-first taxonomy (for example, rather than <https://educationdatahub.dsti.gov.sl/education/schools/>, adopt a structure such as [https://educationdatahub.dsti.gov.sl/SchoolsDirectory/Bombali/Makeni/Makeni City/Abbako_Tech_Vock_Junior Secondary School](https://educationdatahub.dsti.gov.sl/SchoolsDirectory/Bombali/Makeni/Makeni_City/Abbako_Tech_Vock_Junior_Secondary_School/))

¹⁸ See: <https://data.london.gov.uk/>

¹⁹ See: <https://data.london.gov.uk/air-quality/>

²⁰ For more information:

<https://gds.blog.gov.uk/2018/04/04/what-do-we-mean-when-we-talk-about-services/>

²¹ Read more

at: <https://gds.blog.gov.uk/2015/10/07/government-as-a-platform-for-the-rest-of-us/>

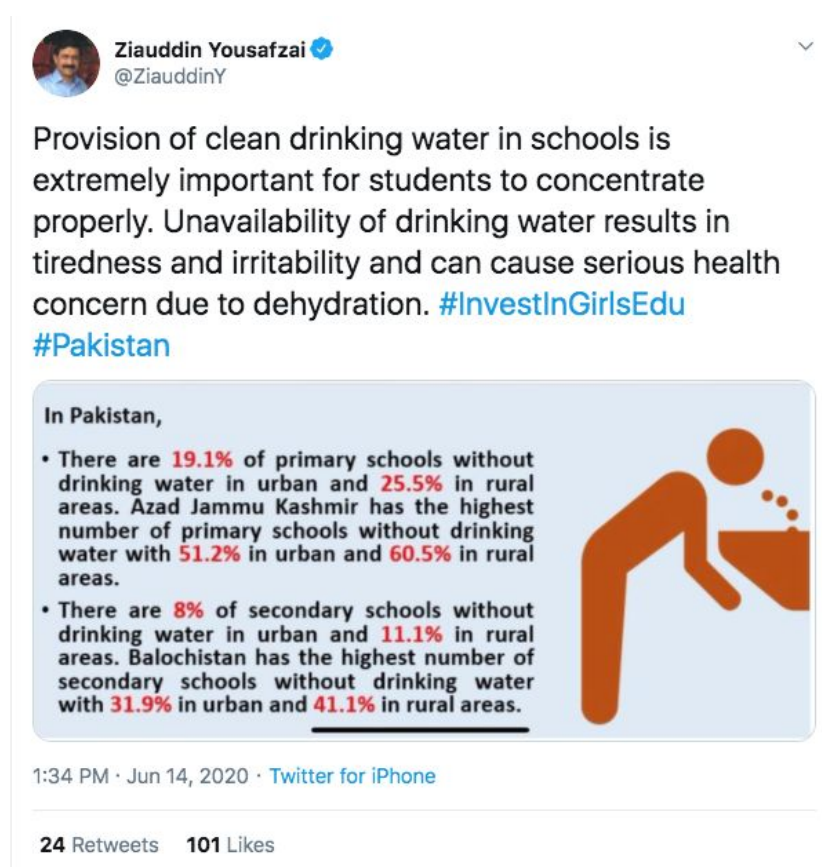
- Make URLs easy to copy and share, for example through the use of a branded URL shortener (for example, the above-mentioned school could also have the short URL edudatahub.sl/219101301).
- Share stories about how Data Hub data are being used to inform decision making.
- Consider internal and third-party data-use cases to showcase how users created value from the Data Hub (see for example how Brazilian start-up [Brazil QEdu](https://www.qedu.org.br)²² does it)

Notes

Here are some more ideas based on what we have seen work elsewhere. The DSTI will need to experiment and test what is most effective in this particular context.

- Ask trusted government websites and digital services to link to the Data Hub, where relevant.
- Include the URL on communications to target user groups, e.g., in SMS messages or letters sent to parents and headteachers.
- Consider blogging about product improvements and user research to signal transparency, improve visibility and engage your most active users.
- Trial an email newsletter summarising major updates or upgrades.
- Encourage third-party advocacy by providing social-media-friendly snapshots of data that are easy to share to raise awareness, as Ziauddin Yousafzai, father of Malala, does for Pakistan's schools:

²² See: <https://www.qedu.org.br/sobre/depoimentos>, note that the site is in Brazilian Portuguese

Figure 9. Snapshot from Twitter feed of Ziauddin Yousafzai, father of Malala Yousafzai²³

- Note that Mr Yousafzai received multiple inquiries about the source of such data in his Twitter feed. We recommend creating a snapshot template that clearly links back to the hub with a logo and a (possibly shortened) URL.

5.4. Recommendation 4: Develop a roadmap to support future delivery

Our fourth set of recommendations concern the development of a roadmap to support future delivery. This recommendation has the following aspects:

- 4.1.** Determine what success (the vision) looks like for the Data Hub, and how the team will know it's on track for that success.
- 4.2.** Define metrics that let the team know whether the service is performing within expected parameters (commonly known as KPIs, Key Performance Indicators). A typical KPI is website uptime, the time that a website or web service is available to the users over a given period. Knowing that some downtime is expected, most providers try to meet a goal of 99% uptime or higher.
- 4.3.** Define objectives and key results (OKRs) that let the team know if they're on track for success and when they have succeeded.

²³ Source: Twitter

Notes

A good OKR is directional: “By the end of the quarter, we’ll have reached the summit of Mount Everest”. For the Hub, an example OKR could be “By the end of 2020, we’ll have made all available data downloadable in customisable sets”.

Build, then maintain, a product roadmap based on the vision, mission and objectives:

- A product roadmap is a high-level, strategic document that maps out general stages of a product’s development. The main purpose of a product roadmap is to tie a product’s vision in with its parent organisation’s objectives.
- A product roadmap is created as a result of strategic planning. It documents both the executive strategy and overall goals of a product. should outline how you intend to improve the Data Hub now, next and later (for some further reading on product roadmaps we recommend [mindtheproduct](#)²⁴)

The most useful roadmaps are pragmatic and define outcomes and sequencing rather than milestones and dates. It should be regularly updated as time passes, assumptions are tested, and work is done. The product team should plan to conduct regular usability and accessibility testing to evaluate if the Data Hub is fit for purpose, and identify desirable updates and changes.

²⁴ For further information, see:

<https://www.mindtheproduct.com/product-roadmaps-in-five-easy-pieces/>

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7. Appendix

7.1. Methodology

In this section, we outline our rationale for our chosen research method and give further details about our methodology, including how we identified participants, the number of sessions conducted and details on user groups and recruitment. We end with considerations about what we learned.

7.1.1. Selection of the research method

Since the launch of the Education Data Hub in September 2019, the DSTI has been monitoring traffic and usage of data through the enquiries it receives, (via phone calls, emails and tweets) and the analysis of technical data traffic reports from server-level traffic (Cloud front).

To gain the best insights into usage needs, habits and patterns, we conducted remote semi-structured interviews, using a set of uniform questions that were asked of all interviewees. The interviews were supplemented with additional questions as needed for further clarification or to request more details.

As research went on, we learned that many interviewees had little to no experience using the Hub, and in some instances no knowledge of it. Our research questions were modified accordingly, and not all questions were asked of everyone.

7.1.2. Identifying research participants from available traffic data

We looked at data traffic reports for the period 5 April–3 June 2020 to glean insights about the types of participants who would be best positioned to engage with us on the user research.

These reports give some information about traffic through the CloudFront server but contain no information about the activity on the website itself. An analogy would be that server traffic counts how often a door into a room is opened but does not say who it was or what precisely was done in that room. In the digital world this information would be provided by client-side trackers (cookies), elements in the page code that provide information on everything done by a visitor on a webpage, and tell us whether visits are by different or unique users.

Through cross-referencing the enquiries that the DSTI receives and the traffic data, we were able to build an initial picture of who was visiting the site but with few actionable details and insights. We learned that the traffic was largely coming from outside of Sierra Leone (10% Sierra Leone, 90% abroad) so we decided to overweight potential national users in our sample, in order to better understand their needs and use cases.

The server analytics document a total of 277 visits from external referrers for a 60-day sample period, which includes Google, Facebook, URL shortener t.co and other sources referencing the hub such as otrasvoceseneducacion.org²⁵ and [worldscientific.com](https://www.worldscientific.com/)²⁶, however gave no information on whether multiple visits were from the same machine ('unique visits').

7.1.3. Number of research sessions conducted and representativeness

The initial scope of work for the user research was based on 15 interviews, as a snapshot of insights. This goal was to provide early insights in time for the next release of the Hub rather than focusing on identifying a representative sample of users.

In the absence of unique visitor numbers, we decided to randomly sample individuals or teams from the following groups:

- known visitors, who had been in contact with either the DSTI or MBSSE about the Hub;

²⁵ For further information, see: <http://otrasvoceseneducacion.org/>, note that the site is in Spanish.

²⁶ For further information, see: <https://www.worldscientific.com/>

- likely visitors, who might need to access the data on the Hub because of their specific roles or functions within the civil service and IGOs, and some NGOs;
- 'could-be' visitors among civil society who might need the data on the Hub for their work or family.

We increased our sample size to 19 interviews to improve the representativeness of our respondents, a need we identified early in the research process, and to accommodate the strong response to our outreach efforts.

However, with the current lack of precise visitor traffic, we cannot evaluate if our sample is representative of the overall population of visitors.

7.1.4. Details of the sessions conducted

We conducted 19 unique individual and team interviews between 11 and 24 June 2020. The interviews were conducted remotely using Zoom and WhatsApp. On average, the interviews took approximately 40 minutes.

As recruitment is a common challenge in user research, we are grateful for the assistance from the DSTI and the EdTech Hub in identifying suitable participants (i.e., diverse representatives from the user groups mentioned below).

All interviews were led by senior user researcher Sophie Freiermuth and by principal consultant Claire Bedoui from Public Digital.

Project stakeholders Abeba Taddese from the EdTech Hub and PJ Cole from DSTI attended one interview each.

7.1.5. User groups

Prior to beginning our interviews and based on initial research and conversations with the MBSSE and DSTI team members, we assumed the Data Hub had three main groups of users — civil society, civil servants, and NGOs and IGOs — that were likely not evenly representative. Following a discussion with the project steering group halfway through recruitment efforts, we decided to prioritise users from civil society over civil servants. The MBSSE stakeholders were keen to know how the Data Hub could be useful to Sierra Leone's citizens, as 'end-users' of education policies and reforms.

The primary purpose of the three-part classification mentioned above was the recruitment of diverse current Data Hub users. It is not intended to establish or imply fixed user categories and is expected to change as the use of the Data Hub and frequency evolve over time.

Civil society

The civil society group is composed of:

- Parents of children of or nearing school age
- Private organisations in the education sector such as
 - consultancies who work either with NGOs, intergovernmental organisations or government agencies,

- businesses that provide products and solutions rather than delivering education services.
- Academics
- School principals / headmasters and mistresses

Civil servants

The civil servants group includes individuals in charge of assessing the quality of the education delivered (e.g., school inspectorate representatives), as well as those in charge of school infrastructure (buildings and facilities), and those in charge of global education policies and their evaluation.

This group also includes two respondents who work as independent consultants, primarily or exclusively for the government, as their data needs are directly related to their job in government.

Non-governmental and intergovernmental organisations

In this group, we clustered organisations of all sizes, from a large multilateral organisation (UNICEF) to a medium-size organisation with offices in developed countries, to a small and new Sierra Leonean NGO.

7.2. Recruitment: targets and final tally

The tables below show our initial main categories and final sub-categories. To complete our 19 interviews, we conducted outreach to 28 individuals and organisations. Among the interviewees, 13 were based in Sierra Leone. The six others were based in the United States, the United Kingdom and Jordan.

Table 4. Initial categories used for recruitment

	Recruitment target	Final recruitment
Civil servants (incl. contractors)	5	6
Civil society	5	8
NGOs and IGOs	5	5

Table 5. Final sub-categories used for recruitment

User group	Sub-category	Final categorisation
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Civil servants (incl. contractors)	[none]	6
Civil society	Academics	4
	Private organisations in the education sector	3
	Parents	1
NGOs and IGOs	NGOs	4
	IGOs	1

7.2.1. What we learned when trying to find participants for the user research

The high demand for education data from reputable sources made recruitment of NGO / IGO, education sector suppliers and academics in higher learning very easy.

Civil servants were the hardest group to recruit from. We suspect this was due, in some part, to their getting the raw data directly from various people or teams at the MBSSE, and do not necessarily need or value an externally hosted website.

7.2.2. Are our participants truly representative of all Data Hub users?

In the absence of precise tracking data from analytics and this being the first research of its kind on the Data Hub, we cannot establish a confidence interval and validate that we engaged a representative sample set of users.

From the patterns in the data, however, we are satisfied that we reached a broad and diverse sample of people, whose profiles, interests and uses varied markedly.

7.3. Notes from a usability test

During one interview, a participant went to the Data Hub and shared their screen with us on the call. We observed them freely using the Schools Directory and conducted an ad-hoc, unscripted usability test.

Table 6. Notes from a usability test: Use Case — Find my old school

Notes from the session	UX recommendations
<i>User: a Sierra Leonean citizen, member of a medium-sized NGO in Sierra Leone</i>	
They struggled to find the 'Filter Schools' button, needed to be pointed at it	Review the position of the button and its label in relation to the rest of the content
Search failed as their desired school has a typo in the data	Search engine should offer 'did you mean' as well as predictive search
The search bar was their preferred way of exploring the data, despite not providing them with the desired results	If search engine cannot be updated and filters are the best way to search, consider making the search bar less prominent
Struggles repeatedly to understand that once a filter has been selected, a second filter displays and needs to be activated	Review the UI of filtering. Consider replacing dropdowns by radio buttons or checkboxes. Some of the filter options are very long, might need to be reviewed
Eventually filters down to their School. They spend a lot of time looking at the photos	Consider allowing a lightbox or zoom functionality to showcase the photos.

Table 7. User experience of Schools Director: Use Case

What did they think of this experience of using the Schools Directory?

"I'm looking at the school picture. It's making me sad, what can we do as students of the school? There's an Old Boys society but it's not very active!"

When a user is engrossed in the content rather than hung-up on navigation or functionalities, despite having worked very hard to get to that content, it's a very positive sign that the content delivers value.

8. Other issues raised by interviewees

Parents expect the MBSSE to provide information on the grading system, “what do [sic] a student need to score before he / she’s awarded an A or Excellent?”

Government-owned schools, from primary to mid-secondary have been devolved to the Freetown city council. They are supposed to have supervisory responsibilities but there are real challenges with implementation of the devolution. For example, the decision to close schools was taken without engaging with the city council. ‘Leh wi Lan’ wasn’t communicated to the council. Until the mandate to the city council is clarified, and the relationship between city council and schools is unequivocally defined, the council has little use for the Data Hub.

The school principals and civil servants we interviewed mentioned their difficulty in attracting and retaining qualified, competent and engaged teachers. They expected the Data Hub to include data that would help them.

9. Lessons for future user research

We strongly recommend this exercise is repeated when the 2019 data is uploaded and hope this report will be used as a baseline for comparison purposes.

It was easy to interview users who were not based in Sierra Leone as internet connections were reliable. In contrast, the interviews we conducted with users in Sierra Leone were challenged by low bandwidth, which on occasion required us to switch from using Zoom to WhatsApp. Unlike the Zoom calls, the calls on WhatsApp were not recorded, which made excellent note-taking critical.

We recommend conducting continued contextual enquiries and ethnographic observations of target users in their activity with data, in order to better refine the interface and content. Some of these studies should be longitudinal.

We also recommend further continuous usability and accessibility testing that is preferably conducted in-person, in order to inform design decisions that will deliver a version that is accessible to 'the man on the street', as poetically described by one of our interviewees.