GLOBAL DIGITAL HEALTH INDEX

NOVEMBER WORKSHOP REPORT

Use Cases • Index Category & Indicators • Digital Health Maturity Models

November 28-30, 2016
Monk Valley Resort, Cape Town, South Africa

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### Acronyms

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Full Form</th>
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<tr>
<td>DIG</td>
<td>Dalberg’s Design Impact Group</td>
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<td>EHR</td>
<td>Electronic Health Records</td>
</tr>
<tr>
<td>EMRAM</td>
<td>Electronic Medical Record Adoption Model</td>
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<tr>
<td>EMR</td>
<td>Electronic Medical Records</td>
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<tr>
<td>GDI</td>
<td>Global Development Incubator</td>
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<td>GDHI</td>
<td>Global Digital Health Index and Maturity Model</td>
</tr>
<tr>
<td>Index</td>
<td>Global Digital Health Index and Maturity Model</td>
</tr>
<tr>
<td>GOe</td>
<td>Global Observatory for eHealth</td>
</tr>
<tr>
<td>GDP</td>
<td>Gross Domestic Product</td>
</tr>
<tr>
<td>HMIS</td>
<td>Health Management Information Systems</td>
</tr>
<tr>
<td>HIMSS</td>
<td>Healthcare Information and Management Systems Society</td>
</tr>
<tr>
<td>HH</td>
<td>Households</td>
</tr>
<tr>
<td>ICT</td>
<td>Information and Communication Technology</td>
</tr>
<tr>
<td>ITU</td>
<td>International Telecommunication Union</td>
</tr>
<tr>
<td>JHU</td>
<td>John Hopkins University</td>
</tr>
<tr>
<td>LMIC</td>
<td>Low and Middle Income Country</td>
</tr>
<tr>
<td>MVP</td>
<td>Minimum Viable Product</td>
</tr>
<tr>
<td>MOH</td>
<td>Ministry of Health</td>
</tr>
<tr>
<td>SMS</td>
<td>Short Message Service</td>
</tr>
<tr>
<td>SDGs</td>
<td>Sustainable Development Goals</td>
</tr>
<tr>
<td>TB</td>
<td>Tuberculosis</td>
</tr>
<tr>
<td>UHC</td>
<td>Universal Health Care</td>
</tr>
<tr>
<td>WHO</td>
<td>World Health Organization</td>
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With more mobile phones than people on the planet, there is an unprecedented opportunity for technology to help save lives, as demonstrated by the eventual use of data in the Ebola response in West Africa. Integrating the use of proven digital health strategies, supportive policies, financing, and capacity are essential to advancing global health. With the launch of the Sustainable Development Goals (SDGs), there is also an opportunity to set baselines and track the impact of digital health on improving health outcomes and strengthening health systems at a country and global level.

In 2016, HealthEnabled, and its partners, embarked on facilitating the development of a Global Digital Health Index and Maturity Model that can serve as a platform for countries to document, benchmark, and track their maturity in adopting digital health across a series of defined metrics. HealthEnabled and the Global Development Incubator (GDI) have led this process from conceptualization to assessment of existing indices as well as to the review of potential frameworks and data sources to populate such as resource. They have partnered with Dalberg’s Design Impact Group (DIG) to help facilitate the overall design of the Index including key use cases for the Index and ThoughtWorks to support the development of the Index itself, including the web-based dashboard and data visualizations. Johnson & Johnson generously provided the initial seed funding for Phase 1 of the Index development process. With their support, the team created a best in class pitch deck to socialize the Index concept and mobilize resources, conducted a preliminary mapping of data and digital health frameworks, and engaged key informants to prioritize use cases.

To advance work on the Index, with generous support from Philips, a workshop was held in Cape Town, South Africa from November 28-30, 2016 with key experts in the field to further refine the design of the Index. The overall aim and objectives of the workshop were to gather expert input on:

1) Use cases for the Index
2) Indicators to track digital adoption and maturity alongside health outcome measurements
3) Country scoring and digital health maturity models

The workshop convened 23 stakeholders representing 9 countries, including India, Mali Nigeria, South Africa, China, and Denmark.

The overall workshop was well-received and actively engaged each participant through tailored large and small group exercises. Key findings from the workshop included refinements to priorities within the two main use cases of Government and Private Sector Users. Government Representatives articulated finding value in data that can be exportable and useful for reporting, analyzing the digital health status of other countries for benchmarking purposes, and using the Index for donor advocacy and to inform and prioritize country budget allocation. Private Sector Representatives expressed interest in using the Index to provide a snapshot of the market, allowing for targeted strategic planning, and obtaining a competitive landscape overview through greater visibility into the country situation.
Using the WHO/ITU eHealth Strategy Toolkit to frame out categories, key indicators were prioritized from a list of 155 indicators for each of the use cases. This provided a complete list of high priority indicators. Next, two groups reviewed each indicator and discussed the validity of keeping the indicator within Version 1.0 of the Index. Coming out of the workshop is a list of 55 indicators (for health, digital health, and technology context) to test in the next phase of development.

Within groups and during many of the full group discussions the question of data availability, quality and future collection was a reoccurring theme. During the final day of the workshop a group formed to discuss data collection requirements and procedures. As the next steps of the Index are developing, the ability to capture and validate data accuracy will be a key backbone to the final data set prioritized for the Index Version 1.0.

Participants specified many features for each type of use case, many of which overlapped, showing general agreement among the four groups. Using the data gathered during this session, DIG designed new dashboard mockups for the Index after the workshop. These mock-ups can be found in the Annex to this report.

Overall the group preferred for the Index to be framed more as a maturity model rather than an Index or score that compares countries. Participants felt that sub-national maturity models should also be considered to help MOH use the information in a real-time actionable way. As a next step, experts will need to be convened to determine what the various levels of maturity mean and have the potential for “scores” of maturity within each category that can be aggregated for an overall maturity score. In the meantime, there was great anticipated value in making available data accessible and available through the tool, while a longer process to develop a maturity will be undertaken.

As a follow up to the workshop, HealthEnabled and its partners will work with Johns Hopkins Bloomberg School of Public Health and the Ministry of Health of India to test out the draft list of indicators in the context of India in early 2017 to validate indicators, data sources, and start to develop a data collection tool for testing and validating. Additionally, HealthEnabled and its partners are actively working on garnering more funding and partners to use this opportunity to create a multi-stakeholder partnership to continue to refine the models and Index. The plan is to develop a first iteration of the Index and test in a few countries by mid-2017 with the anticipated launch of the Minimum Viable Product (MVP) by the World Health Assembly in late May 2017, where the Government of India has tabled the first resolution on mHealth calling for greater investment and support in the use of ICT to improve health outcomes globally.
The Global Digital Health Index (Index) and Maturity Model is an interactive digital resource that aims to track, monitor, and evaluate the effective use of digital technology for health globally. The Index will act as a monitoring and evaluation platform that assesses country progress in digital health and identifies each participating country’s greatest opportunities, needs and gaps. It will help benchmark and determine how resources and investments in digital health are ultimately strengthening the broader health system and encourage better behavior among policy makers, donors, and implementers in the digital health field.

With early support from Johnson & Johnson, HealthEnabled and the Global Development Incubator (GDI) have successfully built strong momentum towards the creation of the Index and Maturity Model. Now with the generous support of Philips, the second phase of the Index continues. Philips has been a long-time champion and advocate of digital health and is leading complementary efforts to the Index, which includes the Future Health Index which is aimed at understanding how digital tools and connected care can chart a new and more aspirational path towards improved health and wellbeing. Both the Future Health Index and the Global Digital Health Index are complimentary and can serve to provide resources and learnings for both streams of work.

Overall, there are three main phases for this project as seen in the graphic below:

Figure 1: Main Phases

During Phase 1, the Index was conceptualized and a best in class pitch deck was developed in early 2016 to socialize the Index concept and build momentum towards its development. Through the first phase, initial background research was conducted on digital health frameworks, data availability and interviews with key informants were conducted to determine priority use cases for the Index. This phase of work culminated in an internal workshop in August, 2016 which laid the foundation for the November 2016 stakeholder workshop in Cape Town.
Cape Town External Stakeholder Workshop Overview

In Phase 2 of the Index design process, the team sought out to convene a two-day workshop with key country MOH leadership; digital health, data science, and industry experts; and other key stakeholders to finalize 1) Index use cases; 2) Index indicators and categories; 3) Index visualization.

- **Index Use Cases:** During phase 1, an illustrative list of use cases for the Index was developed. Interviews were conducted with key stakeholders to gain their insights into potential users. The internal workshop that was conducted during phase 1 explored this in further detail. During this workshop, experts were asked to provide final input on the selected users and use cases of the index.

- **Index Indicators and Categories:** During phase 1, a comprehensive desk review of potential health and digital health indicators was conducted and stakeholders were interviewed on what they thought were the most relevant frameworks and indicators for the Index. An outcome from the first phase was a total of 200 indicators, made up of 40 categories within ICT, health and digital health (134 were digital health indicators). During this November workshop, participants were asked to give their expert input on the list of digital health specific indicators from the first workshop that had data available which was 121 indicators. Participants were asked to give expert input to create a final list of digital health indicators for the next phase of work. 55 digital health indicators were prioritized by workshop participants.

- **Develop Updated Concept Designs and Visualization:** In the first phase of the Index work, various Index dashboard mock-ups were created. During this workshop, participants were tasked with developing concept designs of the Index based off the use case and indicator work. DIG has developed conceptual wire frames of this visualization which will inform the development of the high-level technical design document that ThoughtWorks will prepare. See Annex for the wireframes.

- **Develop High Level Functional Requirements Document:** After the expert workshop, DIG and ThoughtWorks have worked together to flesh out a full specification document that will outline the process for developing the dashboard and lay out key features and specifications of the Index that will inform the final development of the platform. While DIG will provide high level design advice, ThoughtWorks will be involved in scoping the level of effort and technical developments required to build the platform and its specifications, particularly in support of the various use cases.
Introductions and Expectations

The workshop began on the morning of November 28th, 2016 with 22 participants attending from Denmark to India and Mali to China and Nigeria to the United Kingdom and the United States. The workshop attendees ranged came from diverse public, private and academic backgrounds with many having extensive research, health, ICT, and design skill sets. The full participant list can be found in Appendix A to this document.

HealthEnabled opened the workshop providing background of the Global Digital Health Index and details on the workshop content and goals. The organization’s vision for the Index and possible environments and scenarios in which the Index could be used was presented. Workshop participants were encouraged to provide real input into this stage of the Index design. Overall, the Index aims to support the standardization and use of more targeted data from countries to assess and track progress within a country as well as make comparisons across countries. While the index will include indicators for both digital health adoption, health indicators will also be included but not used within a scoring approach.

Visioning Exercise

After the introduction, participants were asked to reflect on what their vision for the Index would be and how they personally would use such a tool. Participants broke out into four groups to discuss the topic. Key takeaways from the visioning exercise included:

- Advocacy platform for governments and donors, including identifying areas of support needed to inform future funding opportunities that are also tied to concrete health outcomes
- A framework, methods, and resources in place for standardizing data collection and informing future investments in digital health
- Engagement with the private sector for partnership as well as investment
- Cross-country learning and information sharing

Throughout the workshop, complementary initiatives and experts were invited to present their experiences and resources to inform participant engagement in the design process.

Philips Future Health Index Presentation

Philips gave a presentation on the experiences they had designing and implementing the Future Health Index, which was launched in 2016. The Future Health Index is a perceptional and attitudinal survey, where clinicians and patients self-report their opinions on readiness to accept digital health, access to care, and technologies used to support health care in the country. In 2016 they did the survey in 13 countries and used a scoring approach to compare countries. They developed a weighted score for individual categories that was aggregated to present one total score. This approach was problematic in several countries and one country asked for the data not to be reported publicly.
Philips continues to evolve FHI to better meet stakeholder needs, which encourages greater participation and overall adoption. For 2017, the team is exploring additional data sources to validate the index creation such as

- Healthcare spend as a % of GDP
- IT spending on connected care

As a result, Philips is changing the survey and scoring approach for the 2017 survey to include setting benchmarks instead of comparing countries. They are also interested in including additional metrics and data sources that will relate to access, integration, and adoption of digital health technologies to compare outcomes to the perception and attitudinal data. The aggregation approach to one total score was modified upon stakeholder feedback, as there was sensitivity towards hard number rankings. So much sensitivity, that the lowest scoring nation, opted not to participate in 2017.

**HIMSS Maturity Models**

HIMSS Analytics has developed several digital health maturity models that have been implemented globally for the last 10 years. One of the maturity models they developed is the EMRAM model, which is designed to help hospitals grow in maturity of adopting electronic medical record systems.

The EMRAM model uses a 7-stage process to measure maturity and produce a final score placing a hospital in a particular stage. While the EMRAM model has 230 data points for all 7 levels, only 30-40 core indicators are used to calculate the score. The only hospital scores that are published publicly are those that fall in the 6 or 7th stage so that others can learn from high performing hospitals.
USE CASES FOR THE INDEX

Workshop participants were expected to contribute to the specific roles of different actors that might be key users of the Index. Participants were given worksheets to define how the Index might serve their roles and goals. Specifically, participants focused on two main roles:

1. Ministry/Government official with a role in health and/or ICT, and
2. Private sector employee in the health or technology field

Four groups were created with the purpose of working through one of the two personas identified. Participants were asked to brainstorm for 20 minutes about how the Index might be valuable to that specific personas work. Participants used worksheets to document their brainstorming session. Following this activity, the groups then voted on which were the top four use cases that would cut across all four main personas.

Prioritized Use Cases

Each group was asked to take on one persona and describe what they would use the Index for and some key features that might be considered of value to their roles. The groups came up with four main use cases for the Index across all four personas. Within each, they were tasked with

1. **Benchmark a country on a spectrum of adoption of digital technologies for health and help countries to track progress and maturity over time**
   a. Show areas where a country is struggling to reach universal health coverage (UHC) and identify where digital tools can be leveraged using standard metrics and information validated by external sources
   b. Provide a set of standardized indicators and metrics to help define adoption and digital health maturity at country and sub-national levels
   c. Use it as a tool for governments to help set the vision, gain buy-in, generate awareness, and support the development national strategies for the use of digital health tools
   d. Support governments, partners, and donors to promote country and sub-national coordination and communication
   e. Build the capacity of Ministries of Health to better understand the level of effort, resourcing and commitments a country or region can make financially for a variety of digital tools addressing health outcomes
   f. House key documents and information related to digital health interventions in the county (national strategies, key experts, implementation partners, digital health deployments, etc).

2. **Advocate for resources to be allocated for digital health at a country and international level to promote donor, public, and private sector investments**
   a. Help countries and private sector partners identify who are key and core funders of digital health to target
   b. Opportunity to use the Index to inform and prioritize country and sub-national budget allocations, as well as form partnerships with key stakeholders in the government and private sector
3. **Create an avenue to find countries performing well or with key lessons learned to facilitate cross country learning**
   a. Help countries find other countries similar in nature that have successes or lessons learned to promote knowledge sharing and cross-country technical assistance on specific issues such as national HMIS or EMRs
   b. Promote “leap frogging” for countries to learn from others successes and failures
   c. Locate key contact information for MOH and other key experts in countries

4. **Support private sector entrepreneurs and investors to strategically prioritize new market entry and strategies**
   a. Utilize data to compare markets/companies/technologies on the ground to understand the competitive landscape, policies and resources available for investment, develop risk mitigation strategies, and prioritize new market entry
   b. Support private sector partners to form relationships with the key Ministry of Health experts, strategies, and approaches to ensure alignment and implementation of best practices in a rapidly changing field
   c. View information on several countries and create cross-country and market strategies that leverage human capital that can be integrated into new and existing markets

**Desired Features**

- Live updates will be important; the digital index shouldn’t wait a year as information needs to be actionable given the rapid growth of the digital space
- Visibility of data will help countries be more accountable
- System integration between the Index with other national information systems to promote real time and automated data sharing can help improve the efficiency and use of existing data sources.
- Having the World Health Organization or other major international body supporting the Index will give credibility and encourage reporting and use of the Index
- The Index can become an opportunity to create more data and stronger data to inform market sizes for future investment
- The data needs to be exportable to be used in reports in excel and/or graph form

**Key Take Away**

**Government Representatives** find value in data that can be exportable and useful for reporting, analyzing the digital health status of other countries for benchmarking purposes, and using the Index for donor advocacy and to inform and prioritize country budget allocation.

**Private Sector Representatives** find value in using the Index to provide a snapshot of the market, allowing for targeted strategic planning, and offers a competitive landscape overview with data.
DEVELOPING INDEX CATEGORY AND INDICATORS

The workshop facilitators provided details on the background and process used to select categories and indicators for the Index. The categories of indicators presented were the categories from WHO/ITU eHealth Strategy Toolkit. Participants were tasked with choosing categories and indicators that were most important for each of the four use cases that were prioritized. Workshop participants were provided a list of available indicators with data represented by the 2015 WHO GOe Survey and other sources previously researched. While there is a universe of indicators of interest, there are not data sources currently available for all. The facilitators reiterated to participants that the first version of the Index could initially use indicators and data sources that are already available, but still develop the prioritized list (for indicators without data sources) to inform the future development of a standardized survey or new data collection source to be used in future versions of the Index. Groups were encouraged to offer additional indicators that should be considered for the Index if they were not already included in the list provided to them.

The seven categories from the World Health Organization (WHO) and International Telecommunication Union’s (ITU) 2012 National eHealth Strategy Toolkit (seen in the figure below) were used as the main categories to frame the indicators. Participants had a list of 121 total digital health indicators that they could choose from for their specific use case. After the groups compiled their list of priority indicators the workshop facilitators compiled this list and removed duplicate indicators that the groups selected.

In addition to the digital health indicators that would be used to make up the Index and potential score, the groups were also asked to identify five top health indicators that would be most useful to support their particular use case.

Figure 2: eHealth Components

Prioritized Indicators

Out of 121 digital health focused indicators presented to the group, participants identified the 55 top priority indicators that could be included in the Index. Out of these 55 chosen indicators, 23 could be mapped back to existing data sources, primarily to the WHO GOe survey. The final indicators, by category, that have existing data that can be used in the Index are found in the table below.

Table 1: MVP 1 Index Indicators with Data Sources

<table>
<thead>
<tr>
<th>CATEGORY</th>
<th>INDICATORS</th>
</tr>
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<tbody>
<tr>
<td>Leadership &amp; Governance</td>
<td>None</td>
</tr>
<tr>
<td>Strategy &amp; Investment</td>
<td>None</td>
</tr>
<tr>
<td>Legislation, Policy &amp; Compliance</td>
<td>1. Unique identifier</td>
</tr>
<tr>
<td>Workforce</td>
<td>2. Is digital health part of curriculum for all health professionals?</td>
</tr>
<tr>
<td>Standards &amp; Interoperability</td>
<td>-</td>
</tr>
<tr>
<td>Infrastructure</td>
<td>3. Percentage of health facilities with electricity</td>
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<tr>
<td></td>
<td>4. Mobile network coverage (2g, 3g, 4g)</td>
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<tr>
<td></td>
<td>5. Include all ICT access and ICT use indicators</td>
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<tr>
<td></td>
<td>6. ITU ICT development index score</td>
</tr>
<tr>
<td></td>
<td>7. Cost of SMS / internet services / data</td>
</tr>
<tr>
<td></td>
<td>8. Mobile penetration rate (vs. use)</td>
</tr>
<tr>
<td></td>
<td>9. Smartphone penetration rate (vs. use)</td>
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<tr>
<td></td>
<td>10. Percentage of HH with internet access</td>
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<tr>
<td>Services &amp; Applications</td>
<td>11. Percentage of healthcare facilities with EHR (EMRAM)</td>
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<tr>
<td></td>
<td>12. Use of digital for health communication and promotion (demand generation)</td>
</tr>
<tr>
<td></td>
<td>13. Human resources for health information systems</td>
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<tr>
<td></td>
<td>14. Supply chain management information systems</td>
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<tr>
<td></td>
<td>15. Emergency medical services</td>
</tr>
<tr>
<td></td>
<td>16. Presence of telehealth programs and their maturity</td>
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<td></td>
<td>17. Remote patient monitoring program - program maturity</td>
</tr>
<tr>
<td></td>
<td>18. Presences of telehealth programs and their maturity</td>
</tr>
<tr>
<td></td>
<td>19. Digital maturity of services by type (telehealth, EHRs, social media)</td>
</tr>
<tr>
<td></td>
<td>20. mHealth programs for disease surveillance</td>
</tr>
<tr>
<td></td>
<td>21. National electronic health records system</td>
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<tr>
<td></td>
<td>22. Average EMRAM score</td>
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<tr>
<td></td>
<td>23. Mechanism to get client feedback</td>
</tr>
</tbody>
</table>
Each group was also asked to identify the top five health indicators that they believe would be the most useful for their particular use case. The indicators were summarized and duplicates removed to produce the final list of top health indicators that could be used, not as a score metric, but rather as background and context for the Index. The top indicators selected by the groups were:

1. Health workforce per population
2. Total Healthcare expenditure
3. Health Expenditure as a % of GDP
4. Non-Communicable Diseases Burden
5. Infectious Disease Burden
6. Under 5 Mortality Rate
7. Birth Rate
8. Maternal Mortality
9. Life Expectancy
10. UHC Indicators
11. Happiness Index Score

Desired Features

- There were varying views on if the Digital Health Index should pull in other Index scores into the model. Generally, participants believed that other Index scores should not be used to actually weight the Index score, but could be presented in the dashboard for context.
- Using Gapminder data to display the health and other development statistics might be of value to explore
- Having a built-in graphing or simple analysis tool can help improve use of the data and the Index
- Caution should be taken with regard to missing data from known and available data sources; e.g. 31% of the GOe surveys had missing data. A strong quality assurance process and mechanism should be put in place.
- A data collection tool will need to be designed and validated in several countries. A suggestion of convening experts in countries to review and validate will be essential.

Key Takeaway

**Outcome Indicators:** Each group identified key indicators that were most valuable to their use case which provided a complete list of high priority indicators that came out of the workshop. Next, two groups reviewed each indicator and discussed the validity of keeping the indicator for a version 1 of the Index. Coming out of the workshop we have a list of 55 indicators (for health, digital health, and country context) to test for the next phase of development.

**Data Quality and Collection Discussion:** Within groups and during many of the full group discussions the question of data availability, quality and future collection was a reoccurring theme. During the final day of the workshop a group formed to discuss data collection requirements and procedures. As the next steps of the Index are developing, ensuring data quality will be a key factor to ensure accuracy of impact.
For each of the four use cases, participants were asked to draw out what their ideal Index dashboard landing webpage would look like. Participants brainstormed about the types of indicators, graphs, features and other relevant aspects of the dashboard that would be helpful for their use case. Following the workshop, the Design Impact Group used the data from the workshop to create new mock ups of possible dashboards and features. These mockups can be found in the Appendix to this report.

At the start of the session ThoughtWorks gave a presentation about the principles of effective data display and use to help frame the workshop exercise. Participants were divided into four groups and were tasked with designing an Index landing page that would be relevant for their particular use case needs. Drawing from the data and indicator discussion each group designed their ideal and practical Index dashboard with desired graphs and features such as filtering by time or country etc. This activity allowed each group to highlight the most valued visualizations and needs, including the opportunity to offer creative ideas on key features the Index could provide.

All groups had a country landing page on the visualization they created. They key features of the country page included:

- Maturity levels and key gaps highlighted
- Context indicators and static country map and districts readily available for comparison
- Enable countries to set “targets” or milestones for their own maturity showing what has been met or not
- For countries with comparable health indicators and/or health system structure have a list pop up with their levels of maturity for quick comparison

Future version features could include:

- Listing digital health projects implemented and at what scale by country or link to WHO Digital Health Atlas
- Allow for more detailed data entry and statistical analysis tools
- Facilitate live and more real-time data and ability to update your survey results on a more frequent basis than annually
- Filter by time and view outliers
- A list of pre-programmed and detailed reports that can be downloaded in a variety of formats (.csv, .xls, .json, .pdf, .jpeg etc) Possible reports could include:
  - Maturity along all WHO/ITU Framework domains
  - Country compared to their WHO or LMIC etc. region
  - Overall maturity over time
  - Progress report (data on indicator) by each WHO/ITU Framework domain of what was accomplished and what is outstanding

The Index can serve as a resource to enable countries to track maturity levels and highlight key gaps.
Visualization Guidance

- Participants recommended to keep dashboards simple and easily actionable with real-time data if and when possible
- A full download of the raw data set was identified as a priority for version one of the Index
- Having multiple languages in the Index will be essential and Spanish and French as a bare minimum should be included in version one

Key Takeaway

Participants specified many features for each type of use case, many of which overlapped, showing general agreement among the four groups. Using the data gathered during this session, DIG designed new dashboard mockups for the Index after the workshop. These mock-ups can be found in the Annex to this report
Overall the group preferred for the Index to be framed more as a maturity model rather than an Index or score that compares countries. Other key points raised included:

- Sub-national maturity should also be considered to help MOH to use the information in a real-time actionable way
- Engage a sub-group of experts to guide and inform what the various levels of maturity mean and have the potential for “scores” of maturity within each category that can be aggregated for an overall maturity score
- Establish a mechanism to provide resources to help countries move along their own maturity based on their national priorities. Listing eHealth focal persons, eHealth strategies and other documents can be helpful resources.
- Provide a list of digital health projects and the level of scale will be important but will be very difficult to get in a standardized manner given these types of repositories are normally not in place in many countries. Link effort to WHO Digital Health Atlas.
- The maturity of a country’s digital health adoption will vary widely from a high-income country to a low-income country. Additionally, countries with different financial status will have different priorities. Therefore, country level maturity models should be flexible enough for countries to select their own priorities and not be measured as a standard against each other.
- In order for a maturity model to be helpful for countries, the data will need to be more “real-time” and not updated once a year given the digital health space changes so rapidly.
- Is there a “dream” model that would cut across low, middle, and high income countries?
- It was suggested to start with a draft model and test this in a few different countries to further refine and validate it in 2017.
- Pushing scores publicly can come with challenges and potential for reducing interest in the Index at a country level.
- Doing a detailed gap analysis by country using the data from the Index would be a valuable resource for countries. However, the resources required to do this can be laborious so thought should be placed on how to efficiently do this in the future. Having national and sub-national gap analysis could be very valuable for countries.
- A global heat map based on maturity of digital health integration was a popular feature. Selecting specific indicators to analyze individual countries and compare data by category and indicators will be helpful.
- Value was found for countries with similar digital health integration to have the option to compare among their peers at the indicator level.
HealthEnabled and its partners will work with Johns Hopkins Bloomberg School of Public Health to test out the draft list of indicators in the context of India in early 2017 to validate indicators, data sources, and start to develop a data collection tool for testing and validating. Based on this workshop ThoughtWorks and DIG have developed an overall approach for how to design and build the MVP within the first six months of 2017. To support this momentum, HealthEnabled and its partners are actively working to create a multi-stakeholder partnership to continue to develop and sustain the Global Digital Health Index and Maturity Model effort. The plan is to develop a first iteration of the Index and test in a few countries by mid-2017.
APPENDIX A: PARTICIPANT LIST

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Government of India

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Ketchum Measurement

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Christoph Stork
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John Rayner
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HIMSS Analytics - HIMSS Europe - HIMSS UK

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Corporate Contributions: Digital Health and HIV
Johnson & Johnson

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**APPENDIX B:**
**STAKEHOLDER WORKSHOP SUMMARY**

**Participants (22 total):**
- 4 MoH (Denmark, India, Mali, Nigeria)
- 3 private sector health
- 2 software professionals

**Overall Goal**
To gather input and achieve consensus on the priority use cases, indicators, and features for the first version of the Global Digital Health Index (GDHI)—an online, interactive resource for countries to track the effective use of digital health.

**Background**
HealthEnabled and Global Development Incubator (GDI), aided by the Design Impact Group (DIG) and ThoughtWorks, led research and workshops to finalize a set of data points, requested features, key users, and possible use cases for the tool. For this workshop, Ministry of Health (MoH) and private sector users were prioritized from the broader user set.

**Key Daily Outputs**

<table>
<thead>
<tr>
<th>DAY</th>
<th>Output Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>DAY 1</td>
<td>Gained consensus over priority use cases for the Index</td>
</tr>
<tr>
<td></td>
<td>Defined data indicators and priority features for Index version 1</td>
</tr>
<tr>
<td>DAY 3</td>
<td>Finalized scope of version 1 and secured buy in from all participants</td>
</tr>
</tbody>
</table>

**Day Structure**
- Outlined the workshop goals
- Introduced GDHI scoping work conducted to date by HealthEnabled, Global Development Incubator (GDI), Dalberg Design Impact Group (DIG), and ThoughtWorks
- Assigned 4 small groups with mixed participant backgrounds
- Focused on private sector and ministry of health users; developed personas to get participants into user’s mindset and context
- Brainstormed use cases for each persona
- Prioritized and detailed use cases
- Discussed detailed use cases; prioritized 4 for day 2 amongst large group

**Tools Used**
- Personas: stylized descriptions of primary users representing target segments, each with idealized needs, motivations, and behaviors
- Use case: a use case describes how the GDHI might help the primary users achieve a goal in the context of their own challenges and situation

**Key Outputs**
- Detailed persona sheets for MoHand private sector users for use as a tool in future design
- 4 prioritized use cases (3 MoH, 1 private sector) focused on new market entry, cross-country learning, identifying digital health gaps, and resource advocacy
DAY 2

Day Structure

- Presented potential data indicators and categorization culled by GDI pre-workshop
- In small groups, mapped data to each step of the 4 priority use cases from day 1 from existing list. Ideated around new potential indicators.
- Prioritized indicators by “need to have” versus “nice to have”, accounting for existing data quality and ease of future collection
- Translated use cases + data into initial wireframes for GDHI. Developed feature set for version 1 of GDHI
- Categorized all features
- Presented across groups, removed overlap, and prioritized all data and features

Tools Used

- Use case workflow: outline of each step of the use case, to allow for pinpointing challenges and opportunities
- Dashboard visualization: participants sketched features as graphs on a “web browser” to establish a visual hierarchy

Key Outputs

- Distinct visualizations for each use case, including all essential indicators and features
- Prioritized list of features, user stories, and indicators for all key use cases

DAY 3

Day Structure

- Recapped final list of priority indicators and features
- Discussed possible future iterations of GDHI (i.e. version 2+), with additional features including scoring frameworks and maturity models
- Split into 3 working groups, each focused on one of the following goals:
  - Refining feature list and visualization
  - Defining all data indicators
  - Proposing data collection process for priority but currently uncollected indicators
- Gathered feedback and agreed on next steps

Tools Used

- Version 1, 2, 3+ Timelines: feature and data roadmaps to better distinguish highest priority items for the first version

Key Outputs

- Secured buy-in on version 1 and commitment from each participant on ways to help the GDHI progress through development, testing, and scaling stages
- Final list of high-level user stories (pulled from feature list) necessary for software developers
- Proposed data collection process
- Identified priority data indicators
APPENDIX C: DATA OUTCOMES

EXECUTIVE SUMMARY

The following report, ‘The Global Digital Health Index Data Outcomes’ is an annex of a larger report titled “The Global Digital Health Index December Report.” This annex reviews the process and outcomes of data prioritization for the first version of the Index. The Global Digital Health Index (Index) is an interactive digital resource that tracks, monitors and evaluates, and scores the effective use of digital technology for health across the WHO Member States. The Index will act as a monitoring and evaluation platform that assesses country progress in digital health and identifies each participating country’s greatest opportunities, needs and gaps. It will help determine how resources and investments in digital health are ultimately strengthening the broader health system and encourage better behavior among policy makers, donors, and implementers in the digital health field.

HealthEnabled and the Global Development Incubator have led the data preparation and decision process work with their design partner, Dalberg’s Design Impact Group (DIG) and technical advisor ThoughtWorks. Previous work on the development of the Index has been supported by Johnson & Johnson. The work accomplished to date has been the mapping of the Global Observatory for eHealth survey results, identification of specific indicators related to digital health maturity, interviews with key informants to inform the development of use cases and a 1-day meeting with DIG and ThoughtWorks to design the December workshop.

Thanks to Philips’ leadership in investing in digital health, this latest grant work, from a data perspective, has resulted in the development of categories and preliminary indicators corresponding to key use cases for the index.

Report Contents:

- Summary of previous work—Index Phase 1 mapping of relevant indicators versus data available.
- WHO’s Global Observatory for eHealth Survey and early visualization drafts
- November 28th’s design workshop and data-related outcomes
- Next steps and decisions
**SUMMARY OF PREVIOUS WORK**

**Initial approach to data mapping**

The Global Development Incubator’s (GDI), early attempts at mapping the necessary content for a Global Digital Health Index (Index) was first approached by conducting a landscape review of global data available through multilateral organizations. The World Bank Open Data source was an initial first step in discerning what data sets are available, including details around the download availability, formatting, frequency and consistency of reporting. This expanded to other key sources such as the UN Statistical Database, UNDP Human Development Index and USAID’s DHS Program. Upon reviewing various global data set sources, followed by the review of relevant digital health frameworks, it became clear that the digital health frameworks such as the WHO/ITU Digital Health Strategy Toolkit offered a clearer guidance on categories and indicators that would be relevant for the Global Digital Health Index.

**Data Preparation Work**

The data mapping process for the Index began with the review of existing frameworks, or tools, developed by experts to help practitioners and countries assess the strength or maturity of the enabling environment relevant to Digital Health. These frameworks were designed to provide strategic information and guidance on effective practices and standards in digital health, health or Information & Communication Technology (ICT). Over 12 frameworks were reviewed relating to key topics in digital health, including; ICT Infrastructure, Health System Strengthening, eHealth Strategy, mHealth and Universal Health Care. The eHealth Survey by the Global Observatory for eHealth (GOe) at the World Health Organization is the core data available for the Global Digital Health Index. The World Health Organization and International Telecommunications Union’s National eHealth Strategy toolkit was a core framework that guided the recommended categories for the Index.

---

**Figure 3: Early Data Mapping work for the Index**
WHO’S GLOBAL OBSERVATORY FOR EHEALTH SURVEY AND EARLY VISUALIZATIONS

GOe Survey

The WHO’s Global Observatory for eHealth (GOe) has conducted 4 global surveys to date on eHealth to determine a series of benchmarks at national, regional, and global levels in the adoption of the necessary foundation actions to support the growth of eHealth. The aim of the surveys is to provide governments with data that can be used as benchmarks for their own development as well as a way to compare their own progress with that of other WHO member states. The first survey was conducted in 2005, then 2009, 2013, and most recently 2015. The surveys were not standardized from year to year as they took a thematic approach to measure eHealth in support of universal health coverage (2015), ehealth and innovation in women’s and children’s health (2013), strengthening of eHealth policies and promotion of growth in eHealth capacity (2009) and the baseline survey assessment (2005). Results from each year of the survey were available on the WHO GOe website in the form of country profiles, which allowed for individual .PDF country profile downloads. With one exception, for the 2005 survey all raw data from the survey is available for download.

Figure 4: WHO GOe Survey Outcomes as shown in Country Profile PDFs

The GOe survey data is a critical source of information for the Global Digital Health Index as it is one of the only significant global datasets that specifically focuses on digital health. The GOe survey data was the primary available data source that was used during the workshop. Our research showed that there were only smaller efforts covering fewer countries, such as the Future Health Index or some instances of data that covered subsets of digital health, such as the HIMSS Electronic Medication Record Adoption Model (EMRAM) score.
Early visualizations

ThoughtWorks, a software company that aims to revolutionize the IT industry and create positive social change has partnered with HealthEnabled to provide the technical development of the Global Digital Health Index. Leading up to the Cape Town workshop, ThoughtWorks supported the Global Development Incubator’s (GDI) data mapping process by conducting a review of the available WHO GOe survey data and offered solutions for accessing the survey data from the .PDF documents to be used in a workable form. Since the data from the 2015, 2013, 2009 GOe surveys was not available for download in .xlsx or .csv format, ThoughtWorks proposed a data scrapping exercise for the 2015 survey data.

The result from ThoughtWorks data scrapping activity allowed for a comprehensive list of 2015 GOe survey indicators, as well it provided for the ability to review and analyze the data results, completeness and classification of all indicators. See figure 5 below for data scrapping results.

Figure 5: ThoughtWorks Data Scrapping of 2015 GOe Survey Data

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Next, the GDI team applied a draft scoring system to each indicator to use as input for Tableau, a data visualization software. The scoring system was as follows:

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<tr>
<th>Answer Style</th>
<th>Answer Translation for Tableau Use</th>
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</thead>
<tbody>
<tr>
<td>A Yes/No Answer</td>
<td>Yes = 1, No = 0</td>
</tr>
<tr>
<td>Answer was given as a percentage</td>
<td>%</td>
</tr>
<tr>
<td>Data Answer was National, Regional, Intermediate, Local</td>
<td>National &amp; Regional = 1, Intermediate = 0.75, Local = 0.5</td>
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<td>Data Answer was Established, Pilot, Informal</td>
<td>Established = 1, Pilot &amp; Informal = 0.05</td>
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</table>
GDI then input the 2015 WHO GOe Survey Data into Tableau to offer a visualization of the survey Data. See figure 6 below for an example of that visualization.

**Figure 6: 2015 GOe Data Visualized in Tableau**

---

**NOVEMBER 28TH WORKSHOP**

**Workshop Summary**

The overall goal of the workshop was to gather input and achieve consensus on the priority use cases, indicators, and features for the first version of the Global Digital Health Index (GDHI).

- **Day 1**: Outputs resulted in a consensus on priority use cases of the Index
- **Day 2**: Resulted in defining data indicators and priority features for the first version of the Index
- **Day 3**: Finalized the scope of version 1 and secured buy in from workshop participants

**Day 2 of the Workshop - Data**

To begin the second day of the workshop, the workshop facilitators presented an overview of the Day 1 outcomes, which were a consensus on priority use cases for the index. Following this overview, Global Development Incubator presented their background work on Data. The goal for the day was to identify and decide on relevant indicators to use in the Index. To accomplish this identification, workshop participants were provided a list of available indicators with data represented by the 2015 WHO GOe Survey. This would give the Index team a clear snapshot of indicators that were deemed relevant from the workshop participant’s perspective. This determined set of indicators could then be considered to be used the first version of the Index. See the below diagram, the pink circle representing the
input from workshop participants, the blue circle representing the available 2015 GOe data set, and the overlap area represents the desired outcome for the first version of the Index.

Figure 7: Overlap of Recommended Indicators with Available Data

During the second day of the workshop, the groups were provided with a comprehensive list of the 2015 GOe survey indicators. These indicators were grouped into the following 7 categories/components:


These 7 categories/components derive from the World Health Organization (WHO) – International Telecommunication Union’s (ITU) 2012 National eHealth Strategy Toolkit.

Figure 8: eHealth Components/Categories

During the first day of the workshop, participants broke out into 4 groups and developed probable use cases from the Index with a focus on government personal and private sector personal. For the second day of the workshop, participants were tasked with mapping the provided 2015 WHO GoE indicator list to their group use cases. The purpose of providing the 2015 WHO GoE indicator list was for participants to have a guide of indicators to use—but they were not limited to only mapping the provided indicator list to the use cases. Groups were encouraged to offer additional indicators that should be considered for the Index.

Once each group mapped and recommended indicators to their use cases, the Index workshop facilitation team compiled all indicators from each group. The complete list from all groups can be found in the table below. Please note, when applicable, duplicates were removed.

<table>
<thead>
<tr>
<th>CATEGORY</th>
<th>INDICATORS WITHIN CATEGORY</th>
<th>IS DATA AVAILABLE?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leadership &amp; Governance</td>
<td>• Does the country have a separate, specific department for digital health</td>
<td>No</td>
</tr>
<tr>
<td>Strategy &amp; Investment</td>
<td>• National digital health strategy in place (note: Strategy, Policy etc)</td>
<td>NO</td>
</tr>
<tr>
<td></td>
<td>• Source of funding for digital health framework</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Percentage of health budget spent / expenditure toward digital health (changed “allocation” to “spent”)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Is technology-driven care reimbursable or covered by insurance</td>
<td></td>
</tr>
<tr>
<td>Legislation, policy &amp; compliance</td>
<td>• Legal Framework for Data Security</td>
<td>1 of 7</td>
</tr>
<tr>
<td></td>
<td>• Legal Framework for Privacy and Confidentiality</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Legal Framework for Interoperability</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Legal Framework for Data Ownership</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Unique identifier</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Regulatory framework for apps / devices / health IT</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Legal framework for private sector providers for digital health (which might include SLAS / service level agreement)</td>
<td></td>
</tr>
<tr>
<td>Workforce</td>
<td>• Overall coverage: Do you have infrastructure to provide training to every health worker on digital health</td>
<td>1 of 3</td>
</tr>
<tr>
<td></td>
<td>• Workforce development indication --&gt; level of training (maturity): specialized courses in digital health (e.g., MSc in digital health)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Is digital health part of curriculum for all health professionals?</td>
<td></td>
</tr>
<tr>
<td>Standards &amp; Operability</td>
<td>• Are your health systems interoperable?</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>• Do you have a health information exchange?</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Do you have live data? (realtime)</td>
<td></td>
</tr>
<tr>
<td>CATEGORY</td>
<td>INDICATORS WITHIN CATEGORY</td>
<td>IS DATA AVAILABLE?</td>
</tr>
<tr>
<td>------------------</td>
<td>--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>-------------------</td>
</tr>
</tbody>
</table>
| Infrastructure   | • Percentage of health facilities with electricity  
• Percentage of health facilities with internet  
• Percentage of health facilities with mobile network coverage  
• Mobile network coverage (2g, 3g, 4g)  
• Include all ICT access and ICT use indicators  
• ITU ICT development index score  
• Cost of SMS / internet services / data services  
• Partnership agreement with mobile providers  
• Mobile penetration rate (vs. use)  
• Smartphone penetration rate (vs. use)  
• Percentage of HH with internet access | 8 of 11 |
| Services & Applications | • Coverage of digital civil registration and vital statistics (as a % of population)  
• Presence of tele-medicines programs and their maturity  
• Percentage coverage of electronic national health information system (as a % of government structures)  
• Percentage of healthcare facilities with EHR  
• Number of nationally scaled digital health information systems  
• Use of digital for health communication and promotion (demand generation)  
• Human resources for health information systems  
• Supply chain management information systems  
• Emergency medical services  
• Presence of tele-health programs and their maturity  
• Remote patient monitoring program - program maturity  
• Presences of tele-health programs and their maturity  
• Digital maturity of services by type (tele-health, EHRs, social media)  
• National system having mechanism for inventory of eHealth projects  
• mhealth programs for disease surveillance  
• National electronic health records system  
• Number of pilot digital health projects by type (private vs public pilots)  
• Average EMRAM score  
• Percentage of facilities having compliant (with national standards) medical records  
• Project durability (project name, duration, location, people reached)  
• Use of provision channels  
• Mechanism to get client feedback | 13 of 22 |

Total: 55
Total: 23
NEXT STEPS & DECISIONS

The outcome from the November 28th workshop in regard to data for the Index is listed in the above table. This outcome satisfies the data work that was a goal of this grant work. In total the workshop has resulted in the identification of 55 indicators across 7 categories/components that would be the highest priority for the Index. Of these 55 indicators 23 could be mapped back to available GOe survey data or other available data sources.

Since more than half of the desired Index indicators lack a current data source, the next steps of the Index design will be on data requirement decisions:

- Will version 1 of the Index only use the identified indicators that have available data
- What, if any, additional indicators will be used that were not identified in this workshop
- Consideration of data collection for missing data points to identified indicators
The Global Digital Health Index (Index) is an online, interactive resource for countries to track the effective use of digital health.

The following conceptual wireframes are intended to summarize the visualization and feature work done at the Global Digital Health Index Workshop, which took place in Cape Town from Nov 28-30, 2016. The workshop brought together a diverse set of participants from national governments, private sector health and technology companies, and various public health organizations. It leveraged a human-centered design approach to generate and refine an approach for version 1 of the Index.

The wireframes are in a draft stage, and more work will need to be done to finalize them from a usability perspective prior to converting them into high-fidelity mockups that can be leveraged for software development.

**HOME PAGE**

*Home Page Clarifications:*

1. **Country Search:**
   - Search by country name. Hitting enter / return goes directly to the country page.

2. **Map:** Defaults to showing all countries independently colored on a scale according to overall maturity level.
   - When a user hover over countries with his/her mouse, the country detail section on the right of the map updates to show details on that country.

3. **Country Details:** Defaults to show user’s country (by detecting current IP address).
   - Open question around which key details to show.
COUNTRY PAGE

Country Page Clarifications:

1. Digital Health Maturity Breakdown:
   Each bar shows maturity, and then a small summary explains the key determinants to achieve that phase.

2. Country Background:
   Includes space for high priority non-health indicators, non-digital health health indicators, a map and key country contacts/organizations.

3. Benchmarking + Raw Data:
   View the raw data which aggregates to determine the maturity for each category. This section also includes a benchmarking feature to, by default, compare each indicator to the average metric of all other countries with the same maturity in that category.

4. Analyst Summary + RSS:
   Displays a longer summary about the country and live stories related to digital health in that country.