How product attribute needs vary by digital health maturity level and influence rates of scale

Phase 1 Detailed Analysis

July 2020
Executive Summary

- Digital Square conducted research to understand how digital health product requirements may vary across different digital health maturity levels
  - 10 Global Goods and 11 proprietary product developers were interviewed to understand what product attributes their respective products had and why these attributes were important for different digital health maturity contexts
  - Product developers worked across various WHO digital health system categories

- We found that it is difficult to develop products that meet the needs across all digital health maturity level

<table>
<thead>
<tr>
<th>Key product attributes important for lower digital health maturity levels (1-3)</th>
<th>Key product attributes important for higher digital health maturity levels (4-5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Offline functionality</td>
<td>Software as a service (SaaS)</td>
</tr>
<tr>
<td>Data compression</td>
<td>Western regulatory requirements (e.g., HIPPA)</td>
</tr>
<tr>
<td>Mobile interface including SMS capabilities</td>
<td>Artificial intelligence (AI) are important in select circumstances</td>
</tr>
</tbody>
</table>

- High cost to sell and sporadic funding were cited as reasons on why developers working predominantly in high digital health maturity markets did not invest in research and development to adapt product attributes

- Developers working in predominantly low digital health maturity markets found it challenging to scale given donor driven, disease-siloed and project-based nature of the funding
Agenda

- **Objective and methodology**
- Product classification
- Product presence across market maturity levels
- Customer segmentation and market penetration
- Relevant product attributes, by market maturity level
21 digital health products were assessed to determine how product features vary across different market maturity segments

**Objective**

- Assess how product attributes vary across digital market maturity segments

**Methodology**

- Phone interviews conducted with 10 Global Good and 11 Non-Global Good solution providers (minimum of 10 each) between May and July 2020
- **Solution selection criteria:** Inclusion of a mix of WHO solution classifications, Global Good and Non-Global Good providers, different business models, and diversified presence across digital health maturity market levels.

**Global Good**

- Bahmni, DHIS2, Dimagi CommCare, iHRIS, ODK, OpenHIM, OpenIMIS, OpenLMIS, OpenSRP, Reveal (10)

**Proprietary**

- Focus: low DH maturity
  - BroadReach, Mezzanine, Mobenzi, SystemOne, Zenysis (5)

- Focus: global
  - Ada, Magpi, Mapbox, RLDatix, Salesforce, Twilio (6)
Surveyed providers were asked questions related to the product’s market presence, market share and attributes

Key questions:
• What digital health market maturity segment(s) do you work in?
• Who are your key customers (and/or end-users)?
• How much of your customer segment do you reach?
• What additional market segments, if any, do you want to pursue in the future?
• What product features does your product have (of the 14 defined product attributes)?
  • Of the ones not selected, why are these not included?
  • Of the ones that are selected, why did you choose to include these?
For each product, 14 attribute categories were evaluated

<table>
<thead>
<tr>
<th>No.</th>
<th>Product Attribute</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>HIPAA/GDPR compliant</td>
<td>Product adheres to the requirements of HIPAA/GDPR.</td>
</tr>
<tr>
<td>2</td>
<td>Artificial intelligence (AI) / machine learning (ML)</td>
<td>Product takes advantage of machine learning or other artificial intelligence.</td>
</tr>
<tr>
<td>3</td>
<td>De-duplication</td>
<td>Product eliminates duplicate copies of data, thereby optimizing storage.</td>
</tr>
<tr>
<td>4</td>
<td>User interface (UI) / User experience (UX)</td>
<td>Company has dedicated resources to user experience and user interface in product design.</td>
</tr>
<tr>
<td>5</td>
<td>High record capacity</td>
<td>Product can store high numbers of records.</td>
</tr>
<tr>
<td>6</td>
<td>SaaS</td>
<td>Product is currently available as a software as a service (SaaS) offering to users.</td>
</tr>
<tr>
<td>7</td>
<td>Cloud-based access</td>
<td>Product is cloud-ready, i.e. users can access it via networks and the internet.</td>
</tr>
<tr>
<td>8</td>
<td>Open source</td>
<td>Product source code is available for the public to view or edit and is available under an open source license.</td>
</tr>
<tr>
<td>9</td>
<td>Automation</td>
<td>Product automatically sequences from one task and/or field to the next.</td>
</tr>
<tr>
<td>10</td>
<td>Offline functionality</td>
<td>Product can be used without an internet connection.</td>
</tr>
<tr>
<td>11</td>
<td>Small data packets</td>
<td>Product can compress data into smaller file sizes, thus enhancing speed and storage capacity.</td>
</tr>
<tr>
<td>12</td>
<td>SMS</td>
<td>Product uses SMS as a means of interaction with the user.</td>
</tr>
<tr>
<td>13</td>
<td>Mobile interface</td>
<td>Product has a mobile interface for users to interact with.</td>
</tr>
<tr>
<td>14</td>
<td>Health insurance workflows</td>
<td>Product incorporates health insurance functionality (e.g. customer service, claims processing, etc.).</td>
</tr>
</tbody>
</table>
Agenda

- Objective and methodology
- **Product classification**
  - Product presence across market maturity levels
  - Customer segmentation and market penetration
  - Relevant product attributes, by market maturity level
WHO classified digital health interventions to help diverse communities working in digital health – including government stakeholders, clinicians, implementers, researchers, donors and other stakeholders – to have a standardized vocabulary.

The system category classification represent the information and communication technology applications designed to deliver WHO interventions.

A wide range of system categories were assessed in this work.

World Health Organization's Classification of Digital Health Interventions v1.0 system categories
10 Global Good product providers were surveyed, spanning a variety of system categories

<table>
<thead>
<tr>
<th>No</th>
<th>Company / Organization</th>
<th>Product Name</th>
<th>WHO System Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>IntelliSOFT Kenya</td>
<td>Bahmni</td>
<td>Electronic medical records (M)</td>
</tr>
<tr>
<td>2</td>
<td>DHIS2</td>
<td>DHIS2 (District Health Information System 2)</td>
<td>Health management information system (N)</td>
</tr>
<tr>
<td>3</td>
<td>Dimagi</td>
<td>CommCare</td>
<td>Community-based information system (F)</td>
</tr>
<tr>
<td>4</td>
<td>IntraHealth</td>
<td>iHRIS</td>
<td>Human resource information system (O)</td>
</tr>
<tr>
<td>5</td>
<td>University of Washington</td>
<td>ODK (Open Data Kit)</td>
<td>Community-based information system (F)</td>
</tr>
<tr>
<td>6</td>
<td>Jembi</td>
<td>OpenHIM</td>
<td>Data interchange and interoperability and accessibility (G)</td>
</tr>
<tr>
<td>7</td>
<td>GIZ</td>
<td>openIMIS</td>
<td>Health finance and insurance information management system (M)</td>
</tr>
<tr>
<td>8</td>
<td>Village Reach</td>
<td>OpenLMIS</td>
<td>Logistics management information system (T)</td>
</tr>
<tr>
<td>9</td>
<td>Ona</td>
<td>OpenSRP</td>
<td>Electronic medical records (M)</td>
</tr>
<tr>
<td>10</td>
<td>Akros</td>
<td>Reveal</td>
<td>Public health and disease surveillance (V)</td>
</tr>
</tbody>
</table>
11 Proprietary product providers were surveyed, spanning a variety of system categories

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<th>Product Name</th>
<th>WHO System Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>BroadReach</td>
<td>Vantage</td>
<td>Health management information system (N)</td>
</tr>
<tr>
<td>2</td>
<td>Mezzanine</td>
<td>Stock Visibility Solution</td>
<td>Logistics management information system (T)</td>
</tr>
<tr>
<td>3</td>
<td>Mobenzi</td>
<td>Mobenzi</td>
<td>Community-based information system (F)</td>
</tr>
<tr>
<td>4</td>
<td>SystemOne</td>
<td>GxAlert/Aspect</td>
<td>Laboratory and diagnostics information systems (R)</td>
</tr>
<tr>
<td>5</td>
<td>Zenysis</td>
<td>Zenysis</td>
<td>Health management information system (N)</td>
</tr>
</tbody>
</table>

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<th>No</th>
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<th>Product Name</th>
<th>WHO System Category¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Ada</td>
<td>Ada</td>
<td>Client communication system (D)</td>
</tr>
<tr>
<td>2</td>
<td>Magpi</td>
<td>Magpi</td>
<td>Community-based information system (F)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Health management information system (N)</td>
</tr>
<tr>
<td>3</td>
<td>Mapbox</td>
<td>Mapbox</td>
<td>Health management information system (N)</td>
</tr>
<tr>
<td>4</td>
<td>RLDatix</td>
<td>RL Suite</td>
<td>Public health and disease surveillance system (V)</td>
</tr>
<tr>
<td>5</td>
<td>Salesforce</td>
<td>Salesforce</td>
<td>Customer relationship management (<em>not in WHO</em>)</td>
</tr>
<tr>
<td>6</td>
<td>Twilio</td>
<td>Twilio (various)</td>
<td>Client communication system (D)</td>
</tr>
</tbody>
</table>
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- Objective and methodology
- Product classification
- **Product presence across market maturity levels**
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- Relevant product attributes, by market maturity level
Available data revealed that organizations are prioritizing specific digital health maturity levels

Data caveats:
- Country coverage is indicative based on interview feedback but does not include full country presence across all countries
- Several global proprietary organizations mentioned operating in more than 140 countries and did not provide comprehensive country details
- Global proprietary data underrepresents the true coverage rates
Global goods have the highest coverage in the lowest maturity levels, but some interest was expressed in expanding.

Rationale for operating in low-maturity markets
- Several conveyed that the markets they operate in are donor driven
- Integration with more sophisticated systems was thought to be challenging for some
- Intention for the products is to be in low maturity levels

Rationale for operating in higher maturity levels
- Interest expressed in helping to move countries to higher digital health maturity levels
- Not all countries are uniform and there are opportunities everywhere
Proprietary developers operate in similar market maturity levels as Global Goods offering more choice for customers

**Rationale for operating in low-maturity markets**
- Products are created explicitly for low-and-middle-income (LMIC) markets
- Mission focused on underserved populations
- Donor provides “use case” for operations
- Some expressed difficulty entering higher maturity markets given their relatively small number of employees and funds to compete with higher maturity market players

**Rationale for operating in higher maturity levels**
- Ability to integrate into fragmented information systems
- We are generating predictive analytics that could be useful in high resource markets
Global organizations focus more heavily on high digital health maturity levels, but many have experience in lower digital health maturity contexts.

Proportion of countries with at least one digital health product

- Global Goods (n=9)
- Proprietary (Low DH Maturity) (n=4)
- Proprietary (Global) (n=5)

Rationale for operating in low-maturity markets:
- More interest from lower digital health maturity levels given the COVID context
- Non-profits are a key client
- Several indicated that they work in more than 100 countries

Rationale for operating in higher maturity levels:
- Developers acknowledged that higher digital health maturity levels are their focus
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Products surveyed operate B2B or B2G business models, with national governments, donors and multi-national NGOs acting as main customers.

- 20 out of 21 of the digital health products surveyed operate with B2B or B2G business model.
  - Only one proprietary organization targets patients directly.
- Reflecting this B2B/B2G focus, customers are mainly national governments, donors or global NGOs.
  - This is driven from all Global Good and 45% of proprietary products surveyed operating mostly in lower digital maturity markets, where the direct buyer is usually a donor or non-profit implementing partner, who provides services for the government.
- Proprietary organizations with a global footprint are more likely to serve private health providers or non-health sector clients than the other developer segments.
End-users are often different than customers and include frontline healthcare workers

Across the Global Good and proprietary products surveyed, multiple end-users were identified throughout the health system value chain.

There is increasing focus on solutions that target and support frontline end-users to make daily on-the-job decisions, while direct-to-patient remains neglected. Areas of increased focus include patient risk assessments, case triaging and workload management.
Product market penetration was generally estimated to be low in low DH maturity markets, with high growth potential and limited competition

Scale is observed as difficult to achieve for digital health products in B2B/B2G models, unless deployed by a national government with centralized governance and sustainable financing

Most companies estimated their product’s market share as low (5 to 30% of their main customer segment) and limited to certain disease programs or geographic regions in a country

- Over 10 types of digital systems\(^1\) were surveyed, with wide variances in the applicable definition of ‘market’
- Most providers found it challenging to estimate their market share, especially those operating in lower digital maturity markets
  - This could reflect a lack of robust market intelligence in lower digital market maturity levels, but also indicates expansive room for growth, with no company indicating a highly competitive share in their respective market
- Demand for attributes specific to lower digital health maturity levels are likely inadequate to incentivize global proprietary players to create differentiated solutions
- Disconnect between buyers (whose requirements drive product design) and needs of end-users may inhibit organizations ability to reach high market share

\(^1\)Based on the World Health Organization’s Classification of Digital Health Interventions v1.0 system categories
However, lower digital maturity markets display fragmented funding ecosystems that prevent scale, except when deployed by national governments.

Scale is observed as difficult to achieve for digital health products in B2B/B2G models, unless deployed by a national government with centralized governance and sustainable financing.

Key determinants of digital health market penetration are observed as the funding ecosystem, client type, health system structure and appropriate product design:

- **Funding ecosystem**: Low or unclear market penetration of products operating in lower digital maturity markets is reflective of the donor driven, disease-siloed and project-based nature of the funding ecosystem. This results in a fragmented solution landscape that runs on one to five-year service contracts.

- **Client type**: When the national government is the primary customer, market penetration is high, applicable in both lower digital maturity markets (through donor support) or or higher digital maturity markets (through domestic government funding). This was observed in two Global Good solutions in levels 2-3 and one proprietary solution in level 5, with >90% of public sector market penetration in countries they were deployed.

- **Health system structure**: Products deployed in decentralized health systems, such as Nigeria, India and the US, are less likely to have high national market penetration.

- **Appropriate Product**: Product requirements differ for different market maturity levels and attributes that are specific to lower market maturity levels are not prioritized by global market leaders with robust marketing and selling capabilities.
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Common product attribute trends were identified across the digital health maturity market levels

<table>
<thead>
<tr>
<th>Relevancy of product attributes, by digital health market maturity level$^1$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level 1 (Least mature)</td>
</tr>
<tr>
<td>Offline functionality</td>
</tr>
<tr>
<td>Open source</td>
</tr>
<tr>
<td>Data compression</td>
</tr>
<tr>
<td>SMS</td>
</tr>
<tr>
<td>De-duplication</td>
</tr>
<tr>
<td>Automation</td>
</tr>
<tr>
<td>High record capacity</td>
</tr>
<tr>
<td>UI/ UX</td>
</tr>
<tr>
<td>Cloud-based (access)</td>
</tr>
<tr>
<td>Mobile interface</td>
</tr>
<tr>
<td>Compliant to local regulation</td>
</tr>
<tr>
<td>Compliant to HIPAA/GDPR regulation</td>
</tr>
<tr>
<td>Artificial intelligence / machine learning</td>
</tr>
<tr>
<td>SaaS</td>
</tr>
</tbody>
</table>

$^1$Health insurance workflows have been excluded due to data relating to product functionality more than feature attributes.

Methodology: Chart represents 10 or more mentions that attribute fit and/or is important to the digital market maturity level and/or demonstrated the highest scores in the indicated market maturity levels.
Proportion developer segment organizations with each product attribute

- Open source: 100%
- Record capacity: 100%
- UX/UI: 100%
- Cloud-based: 100%
- Automated: 100%
- Offline: 90%
- Mobile interface: 80%
- Data compression: 80%
- SMS: 80%
- De-duplication: 60%
- HIPAA/ GDPR: 20%
- AI/ML: 30%
- SaaS model: 30%

1 Health insurance workflows have been excluded due to data relating to product functionality more than feature attributes.
Proportion developer segment organizations with each product attribute

- **Open source**: 20% | 100%
- **Record capacity**: 100% | 100%
- **UX/UI**: 100% | 100%
- **Cloud-based**: 80% | 100%
- **Automated**: 80% | 100%
- **Offline**: 90% | 80%
- **Mobile interface**: 80% | 80%
- **Data compression**: 80% | 80%
- **SMS**: 80% | 80%
- **De-duplication**: 60% | 80%
- **HIPAA/ GDPR**: 20% | 40%
- **AI/ML**: 30% | 40%
- **SaaS model**: 30% | 80%

1. Health insurance workflows have been excluded due to data relating to product functionality more than feature attributes.
Proportion developer segment organizations with each product attribute

- **Open source**: 20% Global Goods, 17% Proprietary (Low DH), 67% Proprietary (Global)
- **Record capacity**: 100% Global Goods, 100% Proprietary (Low DH), 100% Proprietary (Global)
- **UX/UI**: 80% Global Goods, 83% Proprietary (Low DH), 90% Proprietary (Global)
- **Cloud-based**: 80% Global Goods, 83% Proprietary (Low DH), 100% Proprietary (Global)
- **Automated**: 80% Global Goods, 83% Proprietary (Low DH), 100% Proprietary (Global)
- **Offline**: 50% Global Goods, 80% Proprietary (Low DH), 90% Proprietary (Global)
- **Mobile interface**: 100% Global Goods, 100% Proprietary (Low DH), 100% Proprietary (Global)
- **Data compression**: 80% Global Goods, 80% Proprietary (Low DH), 100% Proprietary (Global)
- **SMS**: 50% Global Goods, 80% Proprietary (Low DH), 80% Proprietary (Global)
- **De-duplication**: 60% Global Goods, 60% Proprietary (Low DH), 80% Proprietary (Global)
- **HIPAA/ GDPR**: 20% Global Goods, 33% Proprietary (Low DH), 40% Proprietary (Global)
- **AI/ML**: 30% Global Goods, 40% Proprietary (Low DH), 67% Proprietary (Global)
- **SaaS model**: 30% Global Goods, 50% Proprietary (Low DH), 80% Proprietary (Global)

1. Health insurance workflows have been excluded due to data relating to product functionality more than feature attributes.
User-centric design and high record capacity are considered important universally, while offline functionality, cloud-access and a mobile interface are key to success in lower digital maturity markets

In lower digital maturity levels...
- **Open source** solutions are predominantly Global Good products and found in lower digital maturity levels.
- **Offline functionality, cloud-access and data compression** were called out as essential attributes for use in lower digital maturity levels.
- Where regulation was noted, **local regulatory compliance** was found to be sufficient.

In higher digital maturity levels...
- **SaaS models** were found to be most common for customers in higher digital maturity levels but there is some interest in exploring this model at level maturity levels.
- More products were found to be **HIPAA and/or GDPR-compliant**.
- **SMS, data compression** and being **open-source** was not considered as important.

Overall...
- Investments in **user-centric design** and **high record capacity** were universal across respondents, though level of resources varied.
- **Mobile interfaces** vary in sophistication and do not imply **SMS** interactions. Basic mobile-friendly interfaces are more relevant in lower digital maturity levels.
- **Use of AI/ML** is currently low across all products surveyed, but there was more presence in high digital health maturity markets.
- **Insurance capability** was the least quoted product attribute, relevant only to insurance-related or back-end data aggregation products.
Configurability and interoperability were also highlighted as critical product attributes in lower digital maturity markets

- The importance of **product configurability** was emphasized, to easily expand function or modules, enable ‘drag and drop’ solution building and save costs.

  “If one of goals is to expand, configurability is important for this – whether it is malaria or vaccination. It is important that it is adaptable to save costs.”

  “[Governments] have such little capacity. [They need] configurable, drag and drop, combined with UI/UX”

- **Interoperability** was highlighted by providers of backbone data infrastructure platforms as an important enabler for scale.

  “What sets us apart is connectivity – is the network and connects the devices. Not just software, but also the connectivity.”

  “…having the the know how on interoperability is important”
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