# Table of Contents

1. Key Acronyms  
2. Overview of the mHealth 360 Analysis  
3. The state of mHealth in Malawi  
4. Timeline of mHealth in Malawi  
5. Geographic Distribution  
6. Project Maturity by Users  
7. National Community Health Strategy  
8. HSAs Using mHealth  
9. Health Informatics System Architecture  
10. Achieving Integrated Service Delivery at Scale  
11. Current mHealth Focus Areas  
12. Potential Areas for mHealth Expansion  
13. Service Domain Areas  
14. Functional Roles  
15. Malawi Essential Health Package (EHP)  
16. Types of Hardware  
17. Modes of Interaction  
18. Servers and Data Storage  
19. Types of Users  
20. Number of End Users  
21. Project Costing Across All Projects  
22. The Average Project Costs  
23. Average Device Costs  
24. Applications vs. SMS in mHealth  
25. Application vs. SMS Projects  
25.1. Cost of Application Projects vs. SMS Projects  
25.2. Applications vs. SMS Users  
26. Key Takeaways  
27. Appendix 1: Registered Projects
1. Key Acronyms

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Definition</th>
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<td>CHS</td>
<td>Community Health Services Section</td>
</tr>
<tr>
<td>CHT</td>
<td>Community Health Team</td>
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<td>CHW</td>
<td>Community Health Worker</td>
</tr>
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<td>Central Monitoring &amp; Evaluation Division</td>
</tr>
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<td>EHP</td>
<td>Essential Health Package</td>
</tr>
<tr>
<td>EPI</td>
<td>Expanded Program on Immunizations</td>
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<td>GPS</td>
<td>Global Positioning System</td>
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<td>HIS</td>
<td>Health Information System</td>
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<tr>
<td>HSA</td>
<td>Health Surveillance Assistant</td>
</tr>
<tr>
<td>HIV</td>
<td>Human Immunodeficiency Virus</td>
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<tr>
<td>IMCI</td>
<td>Integrated Management of Childhood Illnesses</td>
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<tr>
<td>M&amp;E</td>
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<td>MoHP</td>
<td>Ministry of Health &amp; Population</td>
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<td>NTDs</td>
<td>Neglected Tropical Diseases</td>
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<td>PDAs</td>
<td>Personal Digital Assistants</td>
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<td>SMS</td>
<td>Short Messaging Service (Texting)</td>
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<td>TB</td>
<td>Tuberculosis</td>
</tr>
<tr>
<td>USSD</td>
<td>Unstructured Supplementary Service Data</td>
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2. Overview of The mHealth 360 Analysis

As mobile technology has become ubiquitous, Malawi has seen several robust service delivery mobile applications for healthcare deployed with different levels of success. SMS and phone hotline projects have reached national scale and have been widely regarded as having both high impact and ease of use. Unfortunately, to date, no smartphone applications have been able to scale to a national audience and systems remain in silos both geographically, topically, and technically.

With limited resources, how do we determine which solutions should expand, where pilots can provide new insights into existing gaps, and how to create a national policy that allows for both innovation and scale? To aid the Kuunika: Data for Action project in developing and implementing mobile technology in Malawi, and to a larger extent, to aid the Ministry of Health and Population in the governance of mobile technology, we conducted an independent evaluation of mobile health technology systems currently being implemented in Malawi. This assessment provides a concrete way that Malawi can adapt high-level frameworks and tools into assessments that provide evidence for policies, standards, and strategies in mobile health.

As part of the Kuunika Project, the Central for Monitoring and Evaluation Division (CMED) and the Community Health Services Section (CHS) in the Ministry of Health and Population worked with Cooper/Smith to conduct a mobile health landscape analysis and technical feasibility study. This activity aligns with the project work plan and complements the current efforts of other Malawi programs. To date, few countries have conducted such an assessment. We hope this assessment will serve as a template for routine evaluations in Malawi and other countries interested in improving the alignment of mobile health investments and streamlining mobile health systems.

The mHealth 360 analysis consists of a 4-step approach:

1. **Survey of all mobile health projects in Malawi**
2. **In-depth analysis of a select group of platforms**
3. **End user experience feedback with a select group of platforms**
4. **Provide recommendations for policy and standards**

This report includes the results from mHealth 360 Analysis Step 1: survey of all mobile health projects in Malawi. This survey was undertaken as part of a national registration of all mHealth projects with results were synthesized by Cooper/Smith.
3. The State of mHealth in Malawi

3.1 National mHealth Registration

In 2017, the Secretary for Health and Population required that all Malawian mHealth projects complete a formal registration process. 31 mHealth projects officially registered. Information about the projects was extracted during registration. Additionally, a list of known mHealth projects was cross-referenced using existing databases.

mHealth is a component of electronic health (eHealth). It is the medical and public health practice supported by mobile devices, such as mobile phones, patient monitoring devices, personal digital assistants (PDAs), and other wireless devices.

- World Health Organization (WHO)
4. Timeline of mHealth in Malawi

mHealth projects in Malawi have existed since at least 2007, with an average of 2 new projects coming online each year. The average lifespan of a mHealth project is 5 years. 2016 was the most active year for new projects with 7 new projects coming online. As of March of 2018, there were 22 live mHealth projects.

Malawi continues to have an upward trend of mHealth projects.
5. Geographic Distribution

At least 5 mHealth projects have been implemented in each district in Malawi. There is an average of 8 projects per district. In addition, national/regional projects tend to span an average of 8 districts out of a total of 28. Most mHealth projects are concentrated in the Southern region. Blantyre & Zomba districts have 13 projects each (the greatest number).

mHealth is geographically widespread, reaching every district in Malawi.

6. Project Maturity by Users

When broken down into scale categories, the majority of mHealth projects in Malawi have less than 100 users or have 100-500 users, meaning they are either in the pilot phase or are scaling. Of those projects at a large scale, the majority are using voice or SMS services. No smartphone applications have been able to reach a large scale of users to date.

Number of Projects by Number of Users

- **Pilot**: 8 projects with less than 100 users
- **Scaling**: 10 projects with 100-500 users
- **National Scale**: 3 projects with 500-1,000 users
- **<100**: 2 projects with 2,000 users
- **100-500**: 1 project with 5,000 users
7. National Community Health Strategy

The Malawi National Community Health Strategy 2017-2022 states that Community Health Teams (CHTs) should increase the use of mHealth and has set the target that by 2022, 50% of CHTs will be using mHealth for integrated service delivery, data collection, and supervision.

Based on the registration survey results, we estimate that 1,823 Health Surveillance Assistants (HSAs) are currently using mHealth for community health service delivery. This number was calculated by including all registered projects that address the Malawi Essential Health Package for “Community Health” and have HSAs as the target end users. Excluded in the calculation are projects such as cStock - which is solely focused on nutrition, CCPF which does not specifically target HSAs, and ONSE which had not started implementation at the time of the registration.

Using the Community Health Strategy target of 15,000 HSAs employed by 2022 to fulfill the proper ratios, 12.15% of HSAs, or a quarter of the target goal, has been achieved. To achieve the target in full, we will need to see a 3 fold increase in mHealth uptake among HSAs.

8. HSAs Using mHealth

**Community Health Strategy Progress to Date**

- HSAs not using mHealth (87.85%)
- HSAs using mHealth (12.15%)

1,823

50%

By 2022, 50% of Community Health Teams (CHTs) will be using mHealth for integrated service delivery, data collection, and supervision.

Estimated number of Health Surveillance Assistants (HSAs) or Community Health Workers (CHWs) currently using mHealth for integrated service delivery, data collection, and supervision.

9. Health Informatics System Architecture

To reduce data collection burden on HSAs and CHWs, government programmes (e.g. civil registration and vital statistics, National ID, and others) and partners need to standardize and harmonize data collection methods. Integrated electronic data management solutions should be harmonized with the National eHealth Strategy and consider leveraging existing mHealth/digital tools.

-National Community Health Strategy 2017-2022
10. Achieving Integrated Service Delivery at Scale
To achieve integrated service delivery at scale, expansion of mHealth will be necessary in 3 areas:

- Scaling users both by increasing the number of Community Health Team members using mHealth tools and expanding geographically.
- Linking mHealth users with other levels of the health system to include supervisors and facilities. Linking mHealth tools to other platforms that are part of the National Health Information System.
- Expanding content to include coverage of service delivery areas that are not currently being covered and fully implement all services provided by Community Health Teams.

11. Current mHealth Focus Areas
The majority of Malawi’s mHealth projects are working in maternal and reproductive health, infant and child health, and community health.

- Maternal and Reproductive Health
- Infant and Child Health
- Community Health

12. Potential Areas for mHealth Expansion
Based on the burden of disease and national priorities, key areas for expansion include HIV and Tuberculosis (TB); chronic diseases; and vaccines, Expanded Program on Immunizations (EPI) or vaccine-preventable diseases.

- HIV and Tuberculosis (TB)
- Chronic Diseases
- Vaccines and Expanded Program on Immunizations (EPI)
13. Service Domain Areas
As part of national policies and guidelines, 5 service domain areas have been outlined. In the registration we asked partners which service domains they aligned with. While promotive, preventive, surveillance, and curative service domains were all covered by 22%-30% of projects, only 1 project reported aligning with rehabilitative services.

50% of projects registered aligned themselves with clinical services (16 projects). Most projects are in Reproductive Health, Integrated Management of Childhood Illness (IMCI), and Nutrition, with HIV, Neglected Tropical Diseases (NTDs) and Expanded Program on Immunization (EPI) lagging behind.

14. Functional Roles
50% of projects registered aligned themselves with clinical services (16 projects). Most projects are in Reproductive Health, Integrated Management of Childhood Illness (IMCI), and Nutrition, with HIV, Neglected Tropical Diseases (NTDs) and Expanded Program on Immunization (EPI) lagging behind.

50% OF PROJECTS ARE LINKED TO CLINICAL SERVICES

15. Malawi Essential Health Package (EHP)
Projects were allowed to choose multiple areas for the Malawi Essential Health Package (EHP) with which their project aligned. Community Health, Reproductive Maternal Neonatal and Child Health (RMNCH), and Integrated Management of Childhood Illness (IMCI) accounted for the majority of the projects.
16. Types of Hardware

Across all projects surveyed, the hardware used is moving away from basic phones and towards smart devices. Many projects used multiple types of devices. However, no projects recorded using Personal Digital Assistants (PDAs), and only one project recorded using wearable devices.

- **Basic Phones**: 24 projects (74%)
- **Tablets**: 14 projects (47%)
- **Smart Phones**: 8 projects (23%)

17. Modes of Interaction

Projects mostly interact with users via mobile applications or SMS as demonstrated below by the number of projects using each mode.

- **Application Projects**: 22 (55%)
- **SMS Projects**: 12 (30%)
- **Touch Screen Projects**: 11 (28%)
- **Web based Projects**: 5 (13%)
- **GPS Projects**: 3 (8%)
- **Voice Projects**: 2 (5%)
- **Email Projects**: 2 (5%)
- **USSD Projects**: 2 (5%)

18. Servers and Data Storage

Across all projects surveyed (31), most host their data on cloud servers (23 projects) and 8 host data locally. This is despite a GoM regulation that states all data must be stored locally.

- **Cloud Server**: 22 (70.97%)
- **Local Server**: 7 (22.58%)
- **Both**: 1 (3.23%)
- **Unknown**: 1 (3.23%)
Across all projects since 2007, there have been 15,231 users. 13,275 of those users are still active.

19. Type of Users
Health Surveillance Assistants (HSAs)/Community Health Workers (CHWs) are the largest group of mHealth users in Malawi. 23 out of 31 projects citing HSAs and CHWs as users. The second highest group, "other", included supervisors, district staff, and project-specific staff.

20. Number of End Users
Across all projects since 2007, there have been 15,231 users. 13,275 of those users are still active.
21. Project Costing Across All Projects

Budget data was not a required as part of registration. However, 12 out of the 31 projects provided detailed costing data across specific categories. This offers a glimpse into the general cost of mHealth implementation in Malawi.

$9,535,880

All time cost for the 12 projects that submitted costing data

12

REGISTERED PROJECTS

SUBMITTED COSTING INFORMATION

$794,657

Average cost per project across project lifetime (average 5 years)

$158,931

Average cost per project year

We used the average number of active users (n=459) and the average cost per project year taken from the 12 registered projects that submitted costing data ($158,931) to calculate the average cost per active user per year to be $346.26.

$346.26

Average cost per active user per year

22. The Average Project Costs

The average cost per category across the 12 projects shows that Software Development accounts for the largest portion of budgets ($115,076) at 15% of the average mHealth project total budget ($794,657).

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<th>Cost</th>
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<td>Software Development</td>
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<td>M&amp;E</td>
<td>$78,597</td>
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<td>Technical Support</td>
<td>$49,513</td>
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<td>All Devices</td>
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<td>Total Training per project</td>
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<td>Security/Operating</td>
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<td>Software License</td>
<td>$333</td>
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</table>

Software Development accounts for an average of 15% of total project budgets.
23. Average Device Costs
The average cost per device per user is $96 with an average of 6% of hardware being replaced each year due to hardware being lost, stolen, or damaged. This contradicts common misconceptions around the loss of mobile phones that are often cited as a reason not to undertake mHealth projects.

24. Applications vs. SMS in mHealth
Malawi has a mix of both mobile applications and SMS projects. There are challenges and benefits to using each system. As part of the analysis of registration responses we separated mobile applications and SMS because these are the largest categories for projects, and there are large differences between the two types of projects.

**APPLICATIONS**
- Expanded functionality such as collecting surveys, GPS location, and images
- Uses data which is generally cheaper than SMS
- Requires a smartphone which is more expensive than a basic phone.
- More training is necessary due to complexity of applications

**SMS**
- Typically does not require hardware purchases since all phones can send an SMS
- Cost effective for mass communications
- Limited data collection abilities and functionality
- As smartphones become more common, the trend is moving away from SMS and towards messaging platforms such as WhatsApp
25. Application vs. SMS Projects

The average cost per SMS project is less than half the average cost of a mobile application project. The average cost of an application project across the 8 projects that submitted costing information is $1,159,959, whereas the average cost per SMS project across the 6 projects that submitted costing information is $507,247.

If we split mHealth users by applications and SMS, there are 3.5 times more SMS users (7,772) than application users (2,244). Application projects average 187 users per project, whereas SMS projects average 1,554 users per project.

Applications and SMS each have specific use cases for which they are appropriate, and the appropriateness of the technology, as well as the cost of the tool, should be taken into account with each mHealth project.

25.1 Cost of Application Projects vs. SMS Projects

On average, SMS projects cost half as much as application projects.

25.2 Applications vs. SMS Users

3.5 TIMES MORE SMS USERS than mobile application users
26. Key Takeaways

Malawi has a mature, geographically widespread, robust mHealth ecosystem with a variety of projects at different levels of maturity.

| There is a clear trend toward smartphone applications and away from the use of basic phones. |
| Projects are concentrated in 3 main healthcare domains: |
| Smartphone applications have not been able to reach a scale beyond a few hundred users, whereas SMS and voice-based projects are reaching regional and national scale. |

- Reproductive and Maternal Health
- Infant and Child Health
- Community Health

An annual registration process for mHealth tools provides valuable trend information. The registration should be continued to provide valuable information regarding future policies and standards. The registration should be expanded to include other digital health tools and continue to be conducted by the Ministry of Health.
## 27. Appendix 1: Registered Projects

<table>
<thead>
<tr>
<th>PROJECT NAME</th>
<th>ORGANIZATION</th>
<th>CONTACT PERSON</th>
<th>CONTACT EMAIL</th>
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<td>Argus Pilot for IDSR Weekly Reporting</td>
<td>Luke International Norway (LIN)</td>
<td>Joseph Wu</td>
<td><a href="mailto:wcsg@lukeinternational.no">wcsg@lukeinternational.no</a></td>
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<tr>
<td>ASPIRE</td>
<td>Malawi Liverpool Wellcome Trust, Clinical Research Programme (MLW)</td>
<td>Dr. Nicola Desmond</td>
<td><a href="mailto:nicola.desmond@lstmed.ac.uk">nicola.desmond@lstmed.ac.uk</a>, <a href="mailto:ndesmond@mlw.mw">ndesmond@mlw.mw</a></td>
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<tr>
<td>Barr Foundation iCCM mHealth Project</td>
<td>D-tree International</td>
<td>Christopher Kulanga</td>
<td><a href="mailto:ckulanga@d-tree.org">ckulanga@d-tree.org</a></td>
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<tr>
<td>Chipatala Cha Pa Foni (CCPF) Health Center by Phone</td>
<td>VillageReach</td>
<td></td>
<td>villagereachmalawi@village reach.org</td>
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<tr>
<td>CMAM Stock Monitoring System</td>
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<td><a href="mailto:drkovalan@gmail.com">drkovalan@gmail.com</a></td>
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<tr>
<td>Community Health Tracker</td>
<td>University of Malawi - Chancellor College</td>
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<td>e-Health for Community Intervention</td>
<td>The National TB Programme</td>
<td>Francis Muwalo</td>
<td><a href="mailto:fmuwalo@ntp.health.gov.mw">fmuwalo@ntp.health.gov.mw</a></td>
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<td>ECHS Project - Digital Village Clinic (DVC)</td>
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<td>Christopher Kulanga</td>
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<tr>
<td>EID ART Initiation Tracking</td>
<td>Clinton Health Access Initiative</td>
<td>Jonathan Mtaula</td>
<td><a href="mailto:jmtaula@clintonhealthaccess.org">jmtaula@clintonhealthaccess.org</a></td>
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<td>eIDSR Case Based Surveillance App</td>
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<td>Christopher Kulanga</td>
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<td>One Community Project</td>
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<td>Glory Mkandawire</td>
<td><a href="mailto:glorym@jhuccpmw.org">glorym@jhuccpmw.org</a></td>
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<tr>
<td>Mentorship and Enhanced Support at Health Facilities</td>
<td>Partners in Health (PIH)</td>
<td>Emily Wroe</td>
<td><a href="mailto:ewroe@pih.org">ewroe@pih.org</a></td>
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<td>mHealth4Afrika</td>
<td>University of Malawi</td>
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<td>Millennium Promise Inc.</td>
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<td><a href="mailto:abigail.simkoko@millenniumpromise.org">abigail.simkoko@millenniumpromise.org</a></td>
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<td>NeoCare</td>
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<td>Dr. Manda</td>
<td><a href="mailto:tmanda@cc.ac.mw">tmanda@cc.ac.mw</a></td>
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<td>Management Sciences for Health (MSH)</td>
<td>Rudi Thetard</td>
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<tr>
<td>Program for Social and Economic Rights</td>
<td>Partners in Health (PIH)</td>
<td>Dr. Emily Wroe</td>
<td><a href="mailto:ewroe@pih.org">ewroe@pih.org</a></td>
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<tr>
<td>Program Mwana - RemindMI and Results160</td>
<td>UNICEF</td>
<td>Marie-Claude Villacorta</td>
<td><a href="mailto:mvillacorta@unicef.org">mvillacorta@unicef.org</a></td>
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<td>RAce iCCM mHealth Application</td>
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<td>Staying Alive</td>
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<td>Madalitso Tolani</td>
<td><a href="mailto:Madalitso.Tolani@amref.org">Madalitso.Tolani@amref.org</a></td>
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<tr>
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<td>Joseph Wu</td>
<td><a href="mailto:wcsg@lukeinternational.no">wcsg@lukeinternational.no</a></td>
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<td>World Vision International (WVI)</td>
<td>Alexander Chikonga</td>
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<td>UBALE (MIRA Study)</td>
<td>Catholic Relief Services (CRS)</td>
<td>Dane Fredenburg</td>
<td><a href="mailto:dane.fredenburg@crs.org">dane.fredenburg@crs.org</a></td>
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