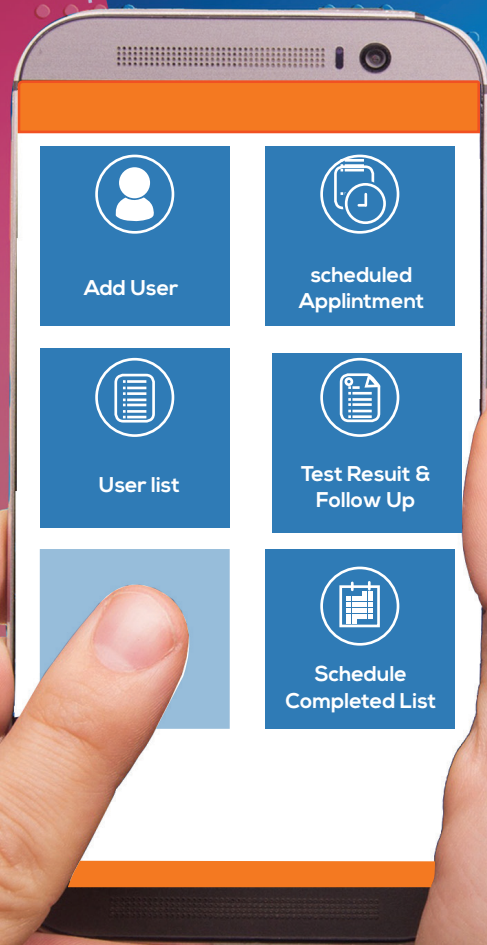




## DIVA – Innovations and Learning Site Project

# PREVENTION AND TREATMENT CASCADE MOBILE APPLICATION



© Voluntary Health Services, Chennai, Tamil Nadu, India

**Year of publication**

**August 2018**

**Writer**

**Mr.Gideon Balasingam**

**Editorial team**

**Dr.Joseph D Williams, Dr.Vijayaraman, Shankar Silmula, Ms.Priya**

**Disclaimer**

This document is prepared under the Global Fund – Round 9: Multi-Country South Asia HIV Program grant in India as part of the Innovations and Learning Site project. The content expressed will not directly reflect the intention of the Global Fund.

The content expressed are draft guidelines proposed and will be piloted during the implementation with the support of the respective Community Based Organization (CBO) and Delhi State AIDS Control Society (DSACS), New Delhi. The lessons learnt will be shared with National AIDS Control Organization (NACO), Ministry of Health and Family Welfare, Government of India, New Delhi.



## Foreword

We are pleased to share the process manual showcasing the step-by-step development of the Prevention and Treatment Cascade Mobile Application to address the growing need for enhanced monitoring and evaluation of TG-TI programs. This mobile application was developed as an innovation in the learning site project. This project has significantly contributed to the development of an enabling environment for effective HIV response in Delhi State AIDS Control Society (DSACS).

We truly believe in knowledge and experience exchange and do hope that this process manual compiled by VHS and our partners would serve this purpose. This Process Manual for the development of Prevention and Treatment Cascade mobile application is the outcome of an extensive, collaborative process involving technical experts of government agencies, non-governmental organizations and major partners, in particular: VHS (Chennai), DSACS (Delhi State AIDS Control Society, Delhi) and Radiare Pvt Ltd (Chennai).



A handwritten signature in black ink, appearing to read 'Joseph D Williams'.

**Dr. Joseph D Williams,**

**Director - Projects,  
Voluntary Health Services**

## Preface

The UNAIDS directive of 90:90:90 is the objective in multiple initiatives targeted for People living with HIV in the world. Outreach workers are faced with the issue of ensuring adherence and regular follow up to testing and treatment of Transgender people. They suggest the use of a prevention and treatment cascade to facilitate the fulfilment of this objective. Currently, an excel based tracking system does not enable communication and reminders to be sent to both health workers and transgender people on upcoming testing and appointment scheduled. This challenge is in effect contributing to the inability to meet the Fast Track requirements as stated by UNAIDS (2016).

Information technology systems can provide a crucial bridge to ensure that health of transgender people are cared for and to ensure they are empowered to come into the mainstream of Indian society. As of now, not much technology based health care management innovation is available treating HIV/AIDS patients, especially transgender people. Technology plays a key role to remove bias and provide an optimum solution to maintain continuous interaction with transgender to make sure that they are not marginalized or stigmatized to avail their required health needs.

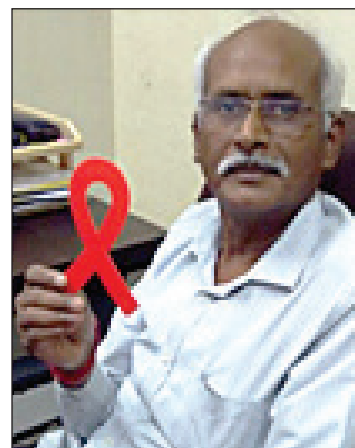
The availability of mobiles amongst HIV-high-risk population, affordable mobile technologies, and increasing use of social media may be tapped to increase awareness for prevention and control of spread of HIV/AIDS for the benefit of the high-risk population.

The key objective of the proposed mobile based outreach in TIs is to ensure regular and sustained engagement of young and hidden key population for behaviour change and regular service uptake through TIs. This Process Manual for the development of Prevention and Treatment Cascade mobile application. This process manual highlights the prevention & treatment cascade mobile based application that is been piloted in the TG-TIs at Delhi SACS.

VHS expresses its special gratitude and thanks to the Delhi SACS in rendering their technical expertise and for evincing their interest in piloting the application.

We owe our sincere thanks to the Director – Projects, VHS Management and the PR Agency – Save the Children International, Nepal for encouraging us to have this innovation as part of the MSA initiative and for their continuous support and motivation.

We hope that our mobile application continues to contribute to the Fast Tracking of UNAIDS HIV goals by 2020.



**Dr.A.Vijayaraman**

**Deputy Director, VHS-MSA DIVA Project,  
Voluntary Health Services**



## Contents

1. ACRONYMS	8
1. BACKGROUND	10
2. INTRODUCTION	12
3. PRINCIPLES OF MONITORING AND EVALUATION	13
4. STRENGTHENING M&E SYSTEMS	14
<b>Figure 1:</b> M&E Framework for Health System Performance Assessment	
5. CHANGING TRENDS AND EXISTING GAPS: THE DELHI SCENARIO	16
6. OBJECTIVES OF THE MOBILE APPLICATION	18
7. IDEATION	19
<b>Figure 2:</b> TI Outreach Model: Technology-Network based Outreach Strategies	
<b>Figure 3:</b> Outreach and Service Delivery Cascade of TI Program	
8. DESIGN	23
<b>Figure 4:</b> Steps in designing User-Experience (UX)	
9. DEVELOPMENT	25
<b>Figure 5:</b> Steps in developing User-Interface (UI)	
<b>Figure 6:</b> Steps in developing a functional Mobile Application	
10. DEPLOYMENT	29
11. DASHBOARD	31
12. POST-LAUNCH PHASES	32
<b>Figure 7:</b> Steps involved in dashboard designing and report generation	
13. WAY FORWARD	34
14. Annexure - FlowChart	35

# ACRONYMS

<b>AIDS</b>	-	Acquired Immuno-deficiency Syndrome
<b>API</b>	-	Application Programming Interface
<b>ART/ARTC</b>	-	Antiretroviral Therapy (Centre)
<b>BCC</b>	-	Behaviour Change Communication
<b>CBO</b>	-	Community Based Organization
<b>CSS</b>	-	Cascading Style Sheets
<b>DSACS</b>	-	Delhi State AIDS Control Society
<b>DSRC</b>	-	Designated STI/RTI Clinics
<b>FSW</b>	-	Female Sex Workers
<b>HIV</b>	-	Human Immuno-deficiency Virus
<b>HRG</b>	-	High Risk Group
<b>HSPA</b>	-	Health System Performance Assessment
<b>HTML</b>	-	Hypertext Mark-up Language
<b>ICT</b>	-	Information Communication Technologies
<b>ICTC</b>	-	Integrated Counselling and Testing Centre
<b>iOS</b>	-	i- Operating System
<b>KP</b>	-	Key Population
<b>KPI</b>	-	Key Performance Indicators
<b>M&amp;E</b>	-	Monitoring and Evaluation
<b>MDG</b>	-	Millennium Development Goals
<b>MSA DIVA</b>	-	Multi-country South Asia - Diversity in Action
<b>MSM</b>	-	Men who have Sex with Men





<b>MSU</b>	-	Michigan State University
<b>MVP</b>	-	Minimum Viable Product
<b>NACO</b>	-	National AIDS Control Organization
<b>NACP</b>	-	National AIDS Control Program
<b>ORW</b>	-	Outreach Worker
<b>PE</b>	-	Peer Educator
<b>PLHIV</b>	-	People Living with HIV
<b>PHP</b>	-	Hypertext Processor
<b>QA</b>	-	Quality Assurance
<b>RMC</b>	-	Regular Medical Check-up
<b>SACS</b>	-	State AIDS Control Society
<b>SDG</b>	-	Sustainable Development Goals
<b>SMS</b>	-	Short Messaging Service
<b>SQL</b>	-	Structured Query Language
<b>STI</b>	-	Sexually Transmittable Infections
<b>SMS</b>	-	Short Messaging Service
<b>TB</b>	-	Tuberculosis
<b>TI</b>	-	Targeted Intervention
<b>TG-H</b>	-	Transgender – Hijra
<b>UX/UI</b>	-	User-Experience/ User-Interface
<b>VHS</b>	-	Voluntary Health Services
<b>WBC</b>	-	White Blood Cells



# BACKGROUND

---

**T**he National AIDS Control Program is in its extended fourth phase (2012-2019) of activity. The first three phases of activity undertook the ambitious objective of laying down the infrastructure required for providing comprehensive services for Prevention, Care & treatment with massive scale up in Phase III.

In the current phase, National AIDS Control Organization (NACO) seeks systematic and evidence-based scale up of HIV service delivery. India through its National AIDS Control Program stands committed to Millennium Development Goal (MDG), further to Sustainable Development Goal (SDG) of reversing the spread of HIV/ AIDS by 2020 and 2030 along with UNAIDS and other partners.

To accomplish these goals, NACO plans to decentralize the management of HIV/AIDS control activities, giving greater responsibilities to the state and district level, while emphasizing its own role to coordinate, guide, monitor and facilitate sharing of best practices and innovations across the SACS programs. This approach requires significant investment in piloting innovative ideas/approaches at the state level and strengthening the SACS's ability to monitor the performance of their program in terms of addressing the needs of the HIV epidemic in their state.

Voluntary Health Services (VHS) is a sub-recipient of Global Fund's Multi-Country South Asia HIV Program. VHS is one among the collaborating partner agency for National AIDS Control Organization (NACO), Ministry of Health and Family Welfare, Government of India in strengthening the Transgender/Hijra interventions in the country. As part of innovations and learning site project, the baseline CBO needs assessment had been carried out in the selected States of Andhra Pradesh, Delhi, Karnataka and Odisha. Further, this was brainstormed in a meeting to formulate innovative HIV service delivery strategies for reaching the hard to reach Transgender-Hijra (TG-H) people in four sites – Delhi, Bhubaneswar, Machlipatnam and Bangalore in India.

VHS proposed to incorporate newer strategies within the existing intervention framework and implement four community-driven, innovative ideas to improve the overall HIV service delivery program and encourage



community-led advocacy. The overall purpose of the community-driven innovation project is to create safe physical and online avenues and link the unreached TG-H people with intervention services, facilitating quality health services and social protection opportunities, which will support the national program in identifying newer avenues to reach the key population and strengthen National Strategic Plan of NACP in India.

The Process Manual is designed to assist and implement the techniques and ideas that make the innovation executable in the field. This document lays out in detail every step that was involved in developing this mobile application for the purpose of enhancing the efficiency of prevention and treatment cascade of the TI program.

This Process Manual for the development of Prevention and Treatment Cascade mobile application is the outcome of an extensive, collaborative process involving technical experts of government agencies, non-governmental organizations and major partners, in particular: VHS (Chennai), DSACS (Delhi State AIDS Control Society, Delhi), Radiare Pvt Ltd (Chennai). Inputs from several work streams addressing health and M&E issues helped to shape the relevant sections of the manual. The collaborative and consultative process ensured that the documentation of work done in this Process Manual is in accordance with those used across most organizations, promoting a common understanding of M&E and Outreach within HIV/AIDS Intervention Programs and strengthening health systems, along with the use of a common set of indicators.

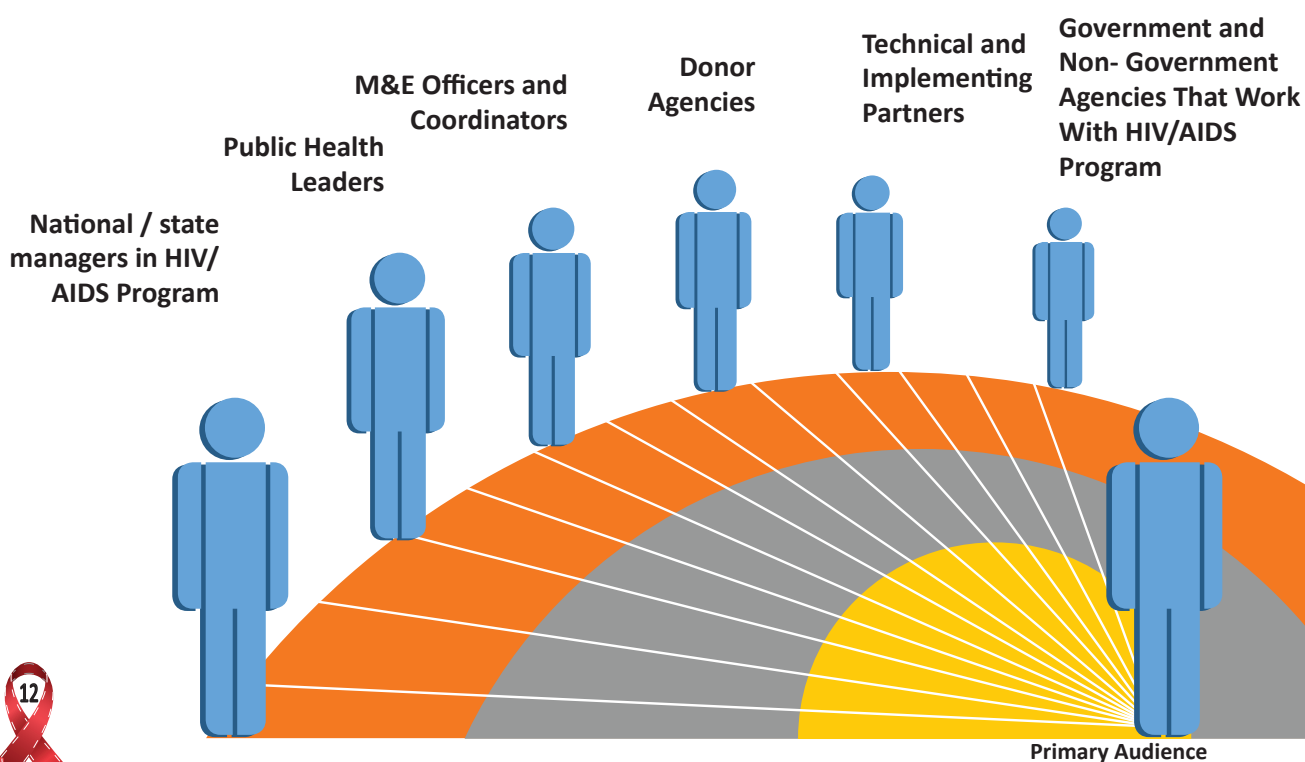


# INTRODUCTION

**T**he scale and increased complexity of HIV/AIDS programs in recent years has enhanced the need for data to inform decision-making and demonstrate progress towards international goals and targets. To meet these needs, India needs strong monitoring and evaluation systems to report accurate, timely and comparable data that can be used to strengthen programs.

This Process Manual aims to present the innovation in the M&E systems that supports stronger HIV/AIDS health and community systems.

The primary audience of the process manual are national / state managers for programs involved in HIV/AIDS, and health and community systems strengthening; public health leaders; M&E officers and coordinators; donor agencies; technical and implementing partners, government and non-government agencies that work with HIV/AIDS programs.



# PRINCIPLES OF MONITORING AND EVALUATION

---

**M**onitoring and Evaluation are indispensable learning and management tools for improving current and future planning, implementation and decision-making. M&E structures, systems and processes should be built into public health programs from the design phase and carried out throughout the lifetime of the project.

The use of one national system to collect, analyse and apply M&E data, rather than using multiple parallel systems, reduces the reporting burden for countries. It is also more cost-effective and improves the quality and consistency of the information. With this aspiration, ideas were brainstormed on how the monitoring and evaluation systems could be integrated at the state levels first. The use of single state system across all districts of a state will consequently facilitate in integrating a single common system across the states to develop a national system.



# STRENGTHENING M&E SYSTEMS

---

**I**n recent years, efforts to strengthen national M&E systems have yielded significant progress and improved harmonization of M&E activities.

However, certain weaknesses in both monitoring and evaluation have persisted.

In terms of monitoring, data that are routinely collected are often not analysed to inform program management, especially at local program management levels. With reference to evaluations, very few programs plan or conduct evaluative activities. Thus, strengthening state wide M&E systems needs to be of high priority with the capability to collect high-quality data.

Efforts to drive the M&E agenda forward began with a look at the current M&E systems. It was realized that there was a need to improve measurement methods, data quality and evaluation capacities. This had to be aided with improvisations in M&E planning, investment, performance and their technical capacities.

After the assessment of domains within M&E where there are gaps to be improvised, a detailed brainstorming was done to identify activities and innovations that would cater to fill the existing gaps. These activities should also be supported by adequate financial and technical resources, and incorporated in the workplan.

Significant time was invested to assess the M&E systems and develop the M&E workplan. If these innovations are not implemented and the systems do not function adequately, the credibility of data for analyses are also at risk. Also, programs that are not based on evidence (for example, epidemiological data) can result in inefficient use of resources.



# Monitoring & Evaluation of health systems reform / strengthening

A general framework for HSPA

	Inputs & Processes	Outputs	outcomes	Impact
Indicator domains	<p>Governance</p> <p>Financing</p> <p>Infrastructure / ICT</p> <p>Health WorkForce</p> <p>Supply Chain</p> <p>Information</p>	<p>Intervention Access &amp; Services readiness</p> <p>Intervention quality, safety and efficiency</p>	<p>Coverage of interventions</p> <p>Prevalence risk behaviours &amp; Factors</p>	<p>Improved health outcomes &amp; equity</p> <p>Social and financial Risk protection</p> <p>Responsiveness</p>
Data Sources	<p>Administrative Sources</p> <p>Financial Tracking System; NHA Databases and records; HR, Infrastructure, Medicines etc. Policy data.</p>	<p>Facility Assessments</p>	<p>Population-Based Surveys</p> <p>Coverage, Health Status, Equity, Risk protection, Responsiveness</p>	
		<p>Clinical Reporting Systems</p> <p>Service Readiness, Quality, Coverage, Health Status</p>		<p>Vital Registration</p>
Analysis & Synthesis	<p>Data Quality Assessment; Estimates and projections; in-depth studies; Use of Research results; Assessment of progress and Performance of health systems</p>			
Communication & use	<p>Targeted and Comprehensive reporting; Regular Country Review processes; Global Reporting</p>			

Figure 1: M&E Framework for Health System Performance Assessment

# CHANGING TRENDS AND EXISTING GAPS: THE DELHI SCENARIO

---

**T**he face of sex work is dramatically changing with advances in technology and sex workers (FSWs, MSMs and transgender) and their clients are increasingly using cell phones for client solicitation. The use of cell phones by commercial sex workers is changing the traditional methods of sex work practice where sex workers congregate at hotspots and wait for prospective clients.

In India, the first HIV infection was reported in 1986 in a commercial sex worker in Chennai and since then the number has increased to over 2 million. The extremely large population of India poses a high threat in terms of the spread of HIV infection. In the future, India is estimated to have the greatest number of HIV-infected individuals. Apart from the large population density, causes of the growing epidemic in India include stigma associated with infected people, cultural taboos against open discussion about sex, high levels of poverty and malnutrition in the poorest sectors, low literacy rate, lack of dedication and commitment to studying and controlling the disease, limited resources, high migration due to India's central location with respect to global trading and particularly, deficient communication between health officials, state governments, and their communities.

As technology becomes more accessible in the developing world, a few studies have investigated the degree of media access and propagation in these populations that suggest a role for media in affecting behaviour and knowledge about HIV. Various studies from India have linked media exposure or campaigns to sexual behaviour and HIV/AIDS knowledge. With easy affordable availability, the use of mobile phone and social media has become quite common. Internet user base in India was expected to reach between 450 and 465 million by June 2017, up from 432 million in December 2016, according to a report Internet in India 2016, jointly published by the Internet and Mobile Association of India and other international organizations. Urban India has close to 60% internet penetration, reflecting a level of saturation. With rural India having only 17% penetration, there is still large scope of development. In terms of numbers, urban





India with an estimated population of 444 million already has 269 million using the internet. 51% of urban internet users or 137.19 million use the internet daily. The social media usage is also increasing and India's internet user base is projected to reach 450–465 million by June 2017. The role of media in educating individuals on HIV/AIDS issues is uncertain. Media sources such as newspapers, radio, and television constantly attempt to increase HIV/AIDS knowledge through advertisements, shows, and movies. Several government programs and AIDS organizations utilize media to convey AIDS information to citizens. However, at the same time, numerous newspapers and radio and television broadcasts increase misconceptions about AIDS by providing inaccurate or exaggerated AIDS information.

Therefore, even though media has potential to educate people on HIV issues, the current impact of media on HIV knowledge is indeterminate. The study by Mary Finn of Michigan State University's (MSU) School of Criminal Justice revealed that with the spurt in social media platforms and the sale of sex shifting online, more and more pimps are avoiding detection by using underground websites, social media, and mobile apps to sell sex. The emerging affordable technological revolution in India and the use of cell phone among sex workers for client solicitation is also likely to increase rapidly. This study explores the status of cell phone use amongst various high-risk populations.

### **Delhi Scenario:**

Delhi State AIDS Control Society (DSACS) has conducted a study on Use of Mobile Phone and Social Media in Sex Work Client Solicitation amongst Clients of HIV Targeted Intervention Projects. The study found that, around 87.8% of the respondents admitted to be in possession of mobiles with the lowest levels being amongst IDUs. The truckers, female sex workers, transgender, and migrants data shows more than 90% of the clients being in possession of mobiles, while only 58.3% of injectable drug user clients reported possessing a mobile phone. Only 8% of the respondents reported using the mobiles for HIV awareness, though around two-fifths of the respondents reported having ever used them for social media. The use of mobile phones in soliciting clients amongst the groups involved

in sex work, viz., MSM, transgender, and female sex workers was reported to be 83.5%, 80.0% and 77.6% respectively. Messenger apps and video calls are commonly used for solicitation. Voice calls have been a common way of soliciting clients. WhatsApp messenger was found to be the most commonly used messenger amongst all the three categories of respondents.

The availability of mobiles amongst HIV-high-risk population, affordable mobile technologies, and increasing use of social media may be tapped to increase awareness for prevention and control of spread of HIV/AIDS for the benefit of the high-risk population.

### **Current Outreach strategy and its challenges:**

The current mechanism for on field interaction is paper based, time consuming and resource incentives. There is no continuation of the previous interactions and follow up of the previous discussions. The new, young and hidden population are not reached with current outreach strategy in TIs, as most of the KPs are become invisible from hotspots. In the absence of technology solution, information cannot be tracked over time and for insight and decision making. The specific challenges in current outreach are as follow:

- Most of the key population are network based, hidden and not available at hotspots and not present with network operators and mobile in nature hindering reaching out new key population regular outreach with them.
- The reach of Peer educators has been limited, in view of changing pattern of sex work.
- Regular engagement, behaviour change communication (BCC) and counselling with KPs become difficult.
- Follow up and tracking of KPs also become challenge with present outreach strategy.

There is a need to develop mobile based outreach solution for community engagement, service delivery and follow up of key population. The development of mobile phone-based app for outreach workers has the potential to improve outreach, increase HIV testing and treatment among high-risk population.



# OBJECTIVES OF THE MOBILE APPLICATION

---

**T**he key objective of the proposed mobile based outreach in TIs is to ensure regular and sustained engagement of young and hidden key population for behaviour change and regular service uptake through TIs.

## **The specific objectives are as follows:**

- To ensure regular contact and interaction with key populations
- To fix prior appointment with network operators and their associated KPs for one to one counselling and follow up
- To inform key population about HIV prevention, testing and treatment services
- To ensure follow up of previous task and discussions completed.
- To offer services to KPs as per vulnerability index to ensure that last tail of population is identified and reached for support and services.
- To track information about contacts, interactions, counselling and services provided to key populations across TIs in Delhi

Each day thousands of mobile apps are developed and published on the internet. Each app is different and the application development methodologies are always evolving, but this is a fairly standard process when developing mobile apps. This mobile app development process typically includes ideation, design, development, deployment, and post-launch phases.



# IDEATION

---

**A**s trite as it sounds, all great apps began as ideas. The next thing to do was to understand why this problem exists and think about why nobody else has made an app to solve this problem previously.

After immersing oneself in the problem space as much as possible and having a complete grasp of the gap, evaluation on how a mobile app could solve the problem was done.

This is where having some understanding of what mobile apps can do is extremely valuable. We are frequently asked, “Is this even possible?”. Fortunately, the answer is often yes, but it is imperative that this answer is sound.



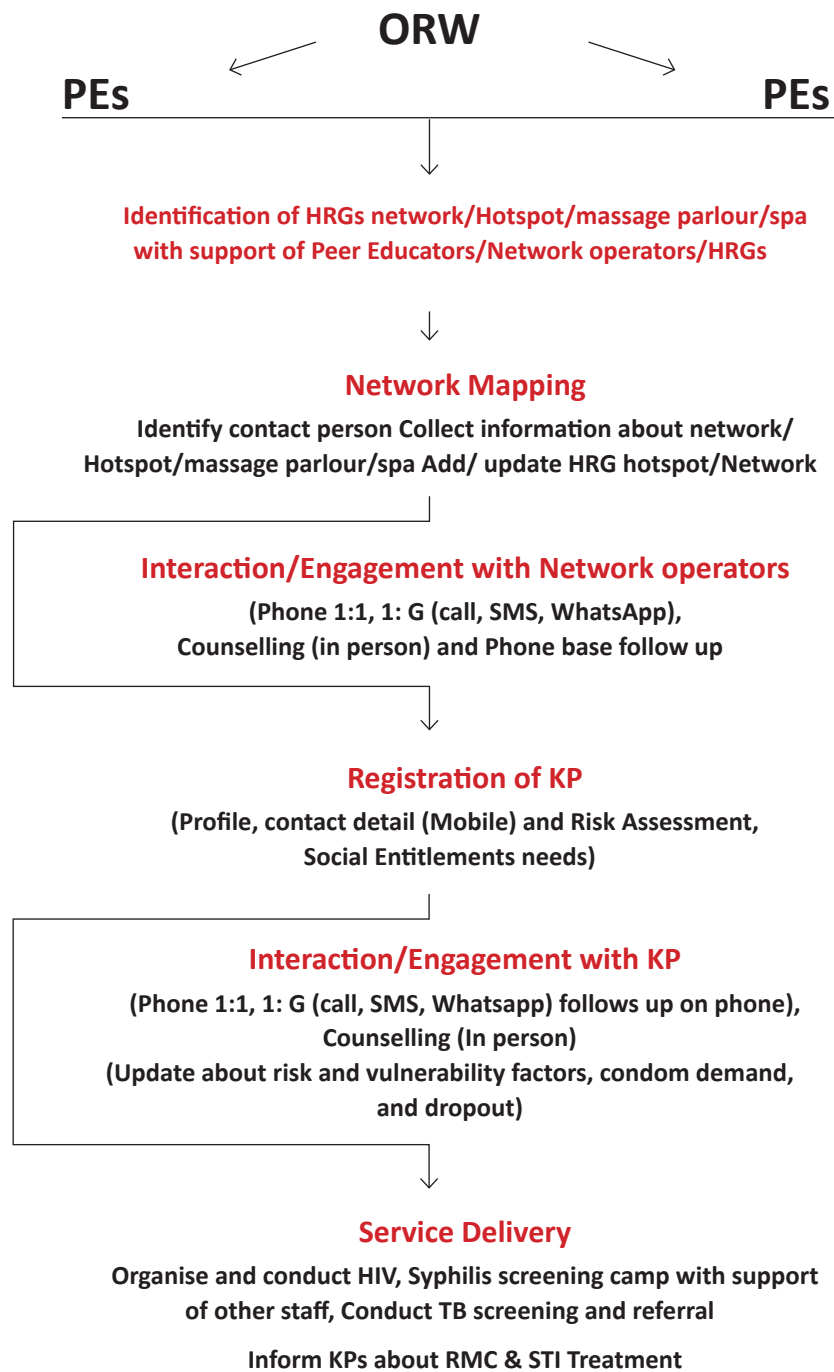


Figure 2: TI Outreach Model: Technology-Network based Outreach Strategies

1. **Network Mapping:** The outreach worker with support of peer educators conduct network mapping to identify the new networks and update existing networks to assess the number of high risk population available at any point of time with networks. It will adopt active and forward proving method. Previously discovered local HRG and Pimps in network will provide data on KP and other potential Networks. Unreached and hidden population is identified through connectors to explore the networks. The steps involve in network mapping at field and at TI level are as follows:



## Field Level

1. Identification of starting point person/connectors
2. Establish good rapport with starting point person
3. Understand the network of starting point person

## TI level

1. Prepare the list/ visual map
  2. Prepare the list of not contacted members
  3. Progress review and data compilation
  4. List out next level starting point/connectors
2. **Engagement with Network Operators:** The network operators become central point of key population. They facilitate KPs to obtain clients, provide safety, and manage financial system of these networks. Most of the sex workers associated with them are not physically available there rather they are available on phone call. There is a need to engage such network operators in the program as well as in the outreach to reach out such sex workers. The involvement of network operators will be one of the important features of new outreach model.

No engagement	Engagement once in a quarter	Engagement once in a month	Involvement of Network operator in Outreach
ORW visit, dialogue, follow up with phone (call, SMS, Whatsapp)	Sensitization (in person), Phone 1:1 (call, SMS, Whatsapp)	Phone 1:1 (call, SMS, Whatsapp), counselling (in person and follow up)	Phone based 1:1 interaction (call, SMS, Whatsapp) with associated KPs, Support ORW in registration and referral of KP

The detail of network operators and their willingness to involve in outreach will be recorded as per format of reporting

3. **Registration of Key population:** The outreach worker meets KP member directly or with support of network operator, dialogue and register them in TI project as per their willingness and collect contact detail, profile, risk behaviour and mobility pattern, social entitlement needs etc. as per the prescribed registration form.
4. **Engagement with KPs:** The members of key population are categorised based on number of interaction and type of phone they used. Accordingly, different mechanism of engagement like in depth discussion, phone-based interaction, counselling and follow up will be determined and implemented as described below:



Phone	No engagement	Engagement once in a quarter	Engagement once in a month
No phone	ORW visit, dialogue, (enrol/de-enrol)	in-depth discussion, 1:1, 1:G, counselling	1:1, 1:G, counselling
With basic phone	ORW visit, dialogue, (enrol/de-enrol), follow up phone (call SMS)	In depth discussion, phone 1:1, 1:G (call, SMS) follow up on phone, counselling	Phone 1:1, 1:G (call, SMS), follow up on phone and counselling
Smart phone	ORW visit, dialogue, (enrol/de-enrol), follow up phone (call SMS, WhatsApp)	In depth discussion, phone 1:1, 1:G (call, SMS, WhatsApp), counselling and follow up on phone	Phone 1:1, 1:G (call, SMS, WhatsApp), follow up on phone and counselling

5. **Outreach and Service Delivery:** The outreach workers will conduct outreach by using mobile device via SMS, voice call and WhatsApp, follow up KP on phone for service uptake and conduct counselling and in-depth discussion in person. He/she will conduct community-based HIV screening in the field and place of network operator/massage parlour by involving them. Thereafter, ensure referral for confirmatory HIV testing those screened positive at nearby ICTC. Further he/she will support KP those were confirmed HIV positive at ICTC for HIV treatment program at ART by using mobile device. He/she further send reminder SMS about appointment date at ART and accompany for registration at ART. He/she regularly follow up for ART adherence to PLHIV via SMS and facilitate TB patient care regularly for one year

The final stage of the ideation process is defining the app's roadmap. The goal of this process is to understand what the app could one day become and what it needs to be successful on day one. This day one version is often called the Minimum Viable Product (MVP). During this process, it can be helpful to write on a whiteboard all of the things the app needs to perform and then ranking these items by priority. Consider what the app's core functionality needs to be, what is needed to fill the identified gap, and what can be added later. If there are some features that the users might want, they are likely great options for later versions. As the app is rolled out with the MVP, one can solicit feedback on what additional features are desired.

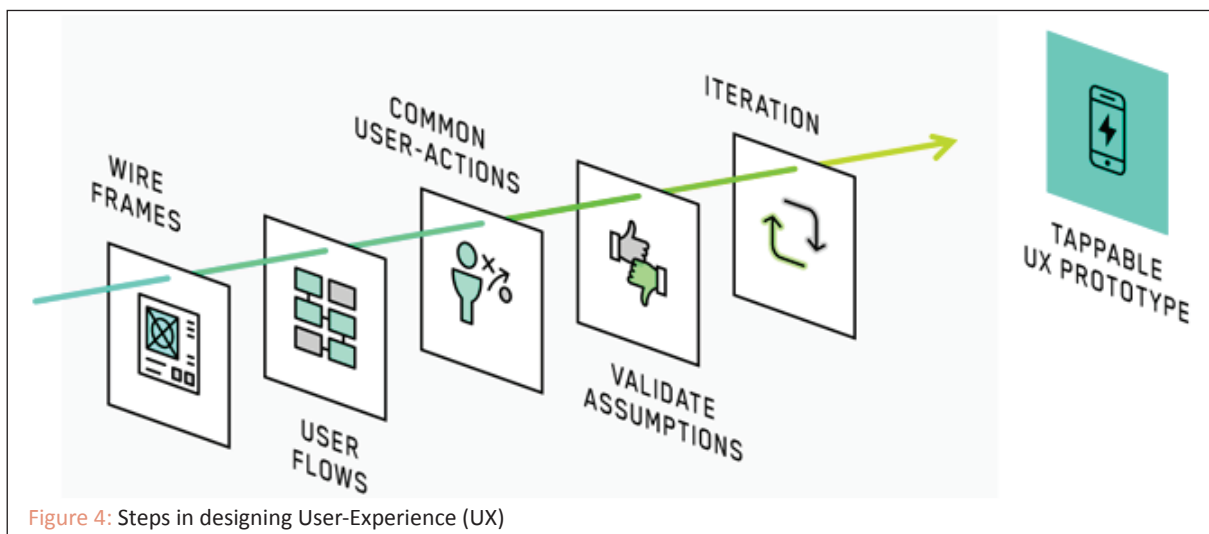
OUTREACH & EDUCATION	CBS (HIV and Syphilis) Screening	Confirmative HIV testing	Linkage to ARTC	ART initiation	Treatment and Adherence
HIV prevention messages (video, SMS, WhatsApp, voice message) using mobile device	HIV and Syphilis screening using WB C Kit and reporting via mobile device	Accompanied referral at ICTC Appointment reminders via SMS Reporting result	Support to PLHIV for ART treatment Using mobile phone Appointment reminders to PLHIV by SMS for CD4, viral load and other test and initiation of ART		
Engagement and follow-up with KP and Network operators (Phone call: 1:1, 1: G and phone based follow up)					ART adherence Reminders to PLHIV via SMS



# DESIGN

## Information Architecture

Information architecture is the process of designing the User-Experience in which the data and functionality that needs to be presented within the app is decided and, data and functionality are organized. Typically, this process is begun by writing down a list of features we want the app to perform and a list of what needs to be displayed somewhere in the app. These are the basic building blocks with which we will build the wireframes.



## Wireframes

Next, the screens are created and functions and data are assigned. It is fine if some things live in multiple places, but it is to be ensured that each item has a home. This process often takes place on whiteboards or paper initially. It is better to make changes here, rather than later in the process, because it is much cheaper to erase some marks than to rewrite code. Once several screens have been drawn up, the app's workflows need to be figured.

The important functions of the App need to be continually focussed without diluting the objective of the App (which is simplifying the work of ORWs). The screens for the functionalities are designed and then the work flow is determined.

## Workflows

Workflows are the pathways users (here ORWs) can travel within the app. Each of the things the users are expected to be able to do is considered and the number

of clicks needed to complete that action is also finalized. It is to be made sure that each click is intuitive. If something takes a few clicks to accomplish, that might be fine, but it should not take a few clicks to perform common tasks. As and when problems are found with the workflows, the wireframes are to be updated and tried again. All the features are to be run through in each iteration, just to ensure that the difficulty of one action isn't increased in an attempt to improve another. Whiteboards, Pencil & paper, were the tools used in this step.

### Click-through models

Click-through models help in testing the wireframes and workflows. They are basically a way to experience the wireframes on a phone for more realistic testing. For example, the clients simply receive a link, which when opened on their phone allows them to click through the wireframe. Although the app has no functionality at this point, they can click on each page in the app and begin testing the app's navigation. As issues are found in this step, changes and iterations are to be made with the wireframes until satisfaction.

### Style guides

Style guides are basically the building blocks of app's design. By having a consistent design language, users are more likely to be comfortable within the app. There is a lot that goes into determining an app's style guide. One needs to consider who the provider is and who the customers are. If the app is going to be used at

night, then maybe a dark theme will work best, as to not blind the users. Given that ORWs (Outreach Workers) will be using the app, it is essential to keep clutter to a minimum and get the main points across. An experienced designer or design team has a wide range of output and can deliver an app that is a great fit for the users. The output of this phase is a set of colors, fonts, and widgets (buttons, forms, labels, etc.) that will be drawn from in the design of the app.

### Rendered designs

Rendered design is the process of taking the wireframes and replacing the grayscale elements with elements from the style guide. There should be a rendered screen for each wireframe screen. Try to stay true to the style guide in this process, but one doesn't have to be dogmatic about it. It is okay to freely update or amend the style guides but it is to be ensured that the design is consistent when this stage is complete. Whiteboards, Pencil & paper, and Sketch were used in this step.

### Rendered Click-through models

Once all the screens were rendered, click-through model application was tested again. This is the step in the mobile app development process which is to be done very patiently. Although a considerable amount of effort has already gone into the app, after this point changes can become increasingly costly. Think of this as reviewing a floor plan before a home's concrete is poured. Fortunately, mobile app development is a bit more adaptive than construction, but thinking of it in these terms can be the most cost-effective.





# DEVELOPMENT

---

## Design-to-Development Handoff

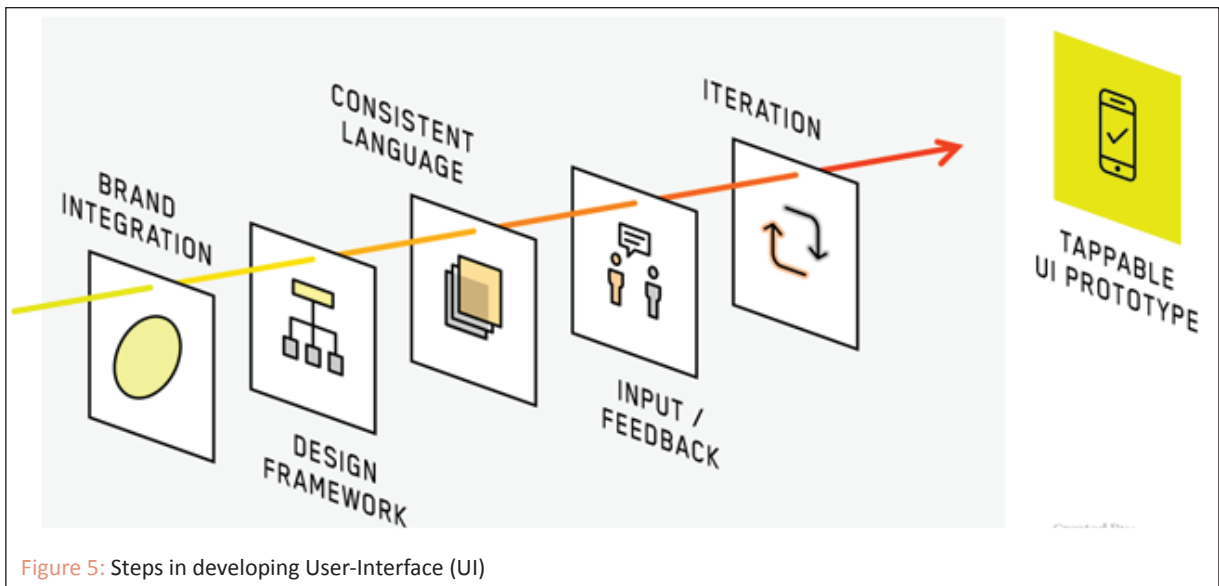
**A**fter having put in so much effort into the form and function of the app, it is imperative that this vision is properly realized by the development team. It is highly recommended that a team, that can provide both design and development services, needs to be identified.

Part of what helps ensure a smooth transition and exact implementation is the proper use of the available tools. It is immensely beneficial if the developers can also use design applications (such as Sketch or Photoshop). The important thing here is that the team does not simply best guess at dimensions, hex values (colors), and positioning. The design team had put in tremendous effort to ensure things were properly aligned and positioned. The development team's goal should always be a pixel-perfect implementation.

### High-level Technical Design (Tech Stack)

There are numerous approaches, technologies, and programming languages that can be used to build a mobile app. Each with its own strengths and shortcomings. Some might be cheaper to use, but are less performant, whereas others might take longer to implement and be overkill. The worst possibility is building on a dying or unreliable technology stack. It is essential that the development partner is seasoned in making these decisions is vital in this process.





### Front-end (the mobile app)

For front-end development, there are basically 3 approaches. They are platform-specific native, cross-platform native, and hybrid. Here is a brief overview of each approach.

**Platform-specific Native** - Apps built with this approach are written separately for each mobile platform. Code can't be reused between Android and iOS, but these apps can be fully optimized for each platform. The UI can look entirely native (so it will fit in with the OS) and the app should work fluidly. This is often the most expensive approach, but is very tried and tested.

**Cross-platform Native** - Apps built with this approach have some (or entirely shared) code, but still run natively. Common technologies used for this are React Native, Xamarin, and Native Script. This is a nice middle ground between the various approaches in that it is more cost-effective, but can still be optimized and styled for each platform.

**Hybrid** - Hybrid apps are built using web technologies (HTML, CSS, Javascript) and are installed via a native wrapper. This can be done using technologies such as Cordova, Phone Gap, and Ionic. This option can be the cheapest, but also presents some very real difficulties.

### Back-End (Web API & Server)

The server is responsible for much of the app's performance and scalability. The technologies used here are similar to those used to power web-based applications. Here are a few things that were decided before writing the code.

**Language** - There are dozens of languages that can be used to build the API. Common languages used are Java, C#, Go-lang, javascript, PHP, and Python. Most languages also have numerous frameworks that can be utilized. The front-end tool chosen and used, for the server-side scripts in this App is PHP.

**Database** - There are two main types of modern databases. SQL and noSQL. SQL is more traditional and the best choice in almost all cases. Common SQL implementations include MSSQL, MYSQL, and PostgreSQL. In addition to selecting a database engine, the particular database schema also needs to be designed. Having reliable and well-organized data is crucial to long term success. So, it was ensured that it was well thought out. MYSQL is the SQL implementation chosen for this application.

**Hosting Environment (Infrastructure)** - In this step it is to be decided where and how the API and database will be hosted. Decisions made here will help determine the hosting costs, scalability,

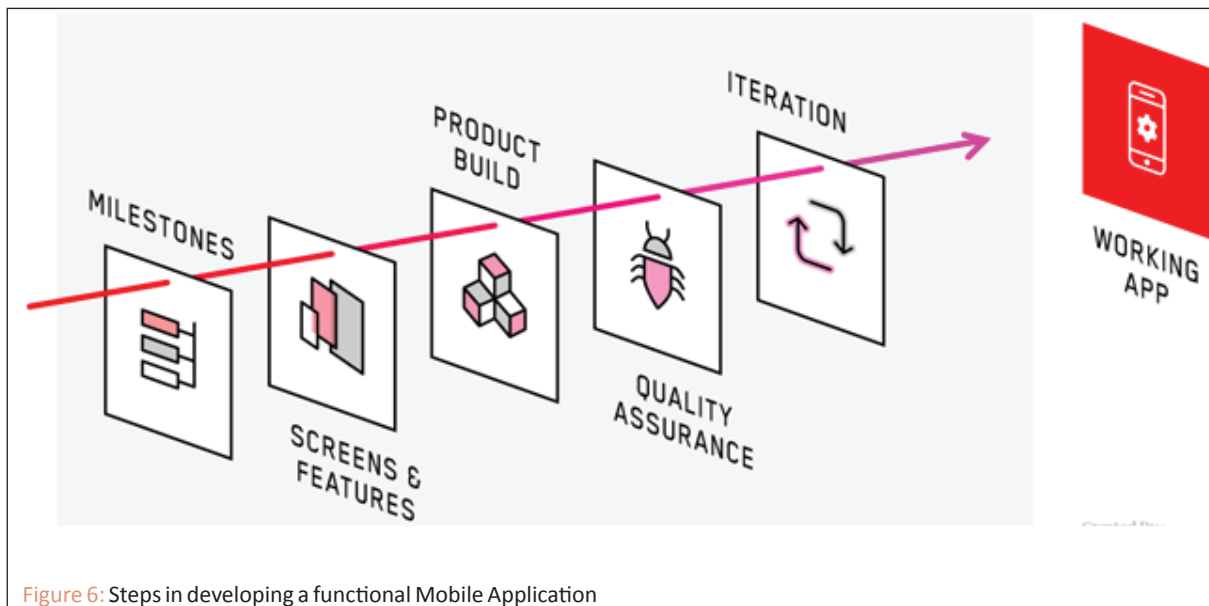
performance, and reliability of the application. Beyond picking a provider, it is to be planned how the system will scale as the user base grows. Cloud-based solutions allows to pay for resources as a utility and scale up and down as needed. They also help with database backups, server uptime, and operating system updates. Apache server had been chosen for this application's hosting environment.

## Development & Iteration

A sound mobile app development is an iterative process. This basically means that one breaks up all development work into smaller milestones and build the app in a series of cycles. Each cycle will include planning, development, testing, and review. Further, each task needs clearly defined requirements. Once these requirements are understood by developers, they will often estimate the time needed to complete each task, so that the tasks can be evenly distributed to ensure a balanced workload during the sprint. Developers also begin planning

During the development phase the development team will begin implementing the styles and functionality of the app. As they are completed, they are assigned back to a project manager or QA tester for review. Good project managers are able to fully optimize developer workloads during this process by properly redistributing assignments throughout the sprint. It is important that the development team fully understands the goals of the application as a whole and for the specific feature they are working on. Nobody is more in-tune with that particular feature than the assigned developer. They should understand the intent of the requirements. If something starts to not make sense, it is often developers who will be the first to point it out.

Most testing should be performed by non-developers or at least people who are not the app's primary developer. This will help ensure a more genuine testing experience. There are several types of testing that should occur during each sprint. These typically include the following:



their approach to solving their assigned problems during this phase. Skilled software developers find ways to intelligently reuse code throughout an application. This is especially important for implementing styles and shared functionality.

Functional Testing - Testing to ensure the feature works as described in the requirements. Usually, a QA team will have a test plan with a list of actions and the desired app behavior.

Usability Testing - Testing to ensure the feature is user-friendly and is as intuitive as possible. Often it is helpful to bring in new testers for a “first-use” experience during this step.

Performance Testing - The app might work perfectly, but if it takes 20 seconds to display a simple list, nobody is going to use it. Performance testing is typically more important in later sprints, but it is essential to keep an eye on the app’s responsiveness as one moves along.

Fit and Finish Testing - Designers should review each feature and ensure that their vision was implemented as described in the design. This is another reason why having one agency for both design and development is so beneficial.

Regression Testing - Good QA teams will have a list of tests to perform at the end of each sprint, which will include tests from previous sprints.

Device-Specific Testing There are tens of thousands of device and operating system combinations in the world. When testing, it is to be made sure that the app is tried on numerous screen sizes and OS versions. There are tools that can help automate this, such as Google’s Firebase, but always test the app on at least a handful of physical devices.

User Acceptance Testing - This is testing performed by either the app owner or future app users. Remember who the app is being built for and get their feedback throughout the process. If a feature passes all the above tests, but fails this one, what use is it?

As problems are discovered in this phase, reassign tasks back to developers so that the problems can be resolved and the issues closed out. Once testing has been completed and each task is done, move on to review.



# DEPLOYMENT

---

**A**t the end of each sprint, talk with each of the stakeholders and determine how the sprint went. If there were difficulties, try to eliminate similar issues from future sprints.

If things went well in one area, try to apply them elsewhere. No two projects are the exact same and everyone should always be advancing in their roles, so aim to improve, during iteration.

Once review is complete, begin again with the planning phase and repeat this process until the app is done.

## Extended Review

At this point the app should be fully testable and feature complete (at least for the MVP). There are two main ways to go about this.

## Focus Groups

Focus groups involve conducting an interview with a tester or group of testers who have never seen the app before and conduct an interview. It is essential to understand who these testers are, how they learn about new apps, and if they use similar apps already. Try to get some background info out of them before even getting into the product. Next, let the testers begin using the app. They should not be coached during this process. Instead, let them use the app as if they had just found it in the app store. See how they use the app, and look for common frustrations. After they are done using the app, get their feedback. Remember to not be too strongly guided by any one tester, but combine feedback and make intelligent decisions using all available feedback.

## Beta Testing

In addition to, or instead of focus groups, one can do a beta launch of the app. Beta tests involve getting a group of testers to user the app in the real world. They use the app just as if it had launched, but in much smaller numbers. Often these beta testers will be power users, early adopters, and possibly the best users. Make sure they feel valued and respected. Give them ample opportunities to provide feedback and let them know when and how the app is being changed.

Beta Testing is also a great time to see how the app performs on various devices, locations, operating systems, and network conditions. It is imperative that



one has sound crash reporting for this step. It does no one any good if something goes wrong, but is not discovered and diagnosed.

### **Refinement**

After these extended review periods, it is common to have a final development sprint to address any newly discovered issues. Continue beta testing during this process and ensure that the crash and issue reports are declining. Once the 'all-clear' is received from the testers, it is time to begin preparing for deployment.

### **Deployment**

There are two main components to deploying the mobile app into the world. The first involves deploying the web server (API) into a production environment that is scalable. The second is deploying the app to the platform from where the potential users can download it from, in this case, it is the DSACS Website.

### **Web API (Server)**

Most mobile apps require a server back-end to function. These web servers are responsible

for transferring data to and from the app. If the server is overloaded or stops working, the app will stop working. Properly configured servers are scalable to meet the current and potential user base, while not being needlessly expensive. This is where the "cloud" comes in. If the server is deployed to a scalable environment then it should be able to better handle spikes in traffic. It is not terribly difficult to scale for most mobile apps, but it is essential to ensure that the team knows what they are doing or the app could fall apart, just when it gets widely used.

### **Circulation**

Submitting the apps to the app stores is a moderately involved process. It is to be made sure that the apps are properly configured for release, fill out several forms for each store, submit screenshots and marketing materials, and write a description. For this Prevention and Treatment Cascade Application, DSACS (Delhi State AIDS Control Society) will privately circulate the application among the ORWs involved in the TI Programs. Alternative, this could also be uploaded on the DSACS Website so that the updated version can be periodically downloaded by the ORWs from the website itself.



# DASHBOARD

---

**A**n intelligence dashboard is a data visualization tool that displays the current status of metrics and key performance indicators (KPIs) for an organization. Dashboards consolidate and arrange numbers, metrics and sometimes performance scorecards on a single screen. They may be tailored for a specific role and display metrics targeted for a single point of view or department. The essential features of a dashboard product include a customizable interface and the ability to pull real-time data from multiple sources.

The "dashboard" has another name for "progress report" or "report." Benefits of using digital dashboards include:

- Visual presentation of performance measures
- Ability to identify and correct negative trends
- Measure efficiencies/inefficiencies
- Ability to generate detailed reports showing new trends
- Ability to make more informed decisions based on collected information
- Align strategies and organizational goals
- Saves time compared to running multiple reports
- Gain total visibility of all systems instantly
- Quick identification of data outliers and correlations

There are a lot of things that were considered to make the dashboard reporting informative and easily comprehensible. There are a few key elements to a good dashboard:

- Simple, communicates easily
- Minimum distractions...it could cause confusion
- Supports organized business with meaning and useful data
- Applies human visual perception to visual presentation of information
- It can be accessed easily by its intended audience.

The KPIs of the TI Programs were noted and sorted based on their importance and the dashboard was designed keeping the objectives of the intervention program in mind. This is an important step because the dashboards help in monitoring and evaluation of the entire program, and thereby realigning the roadmap of the intervention program.

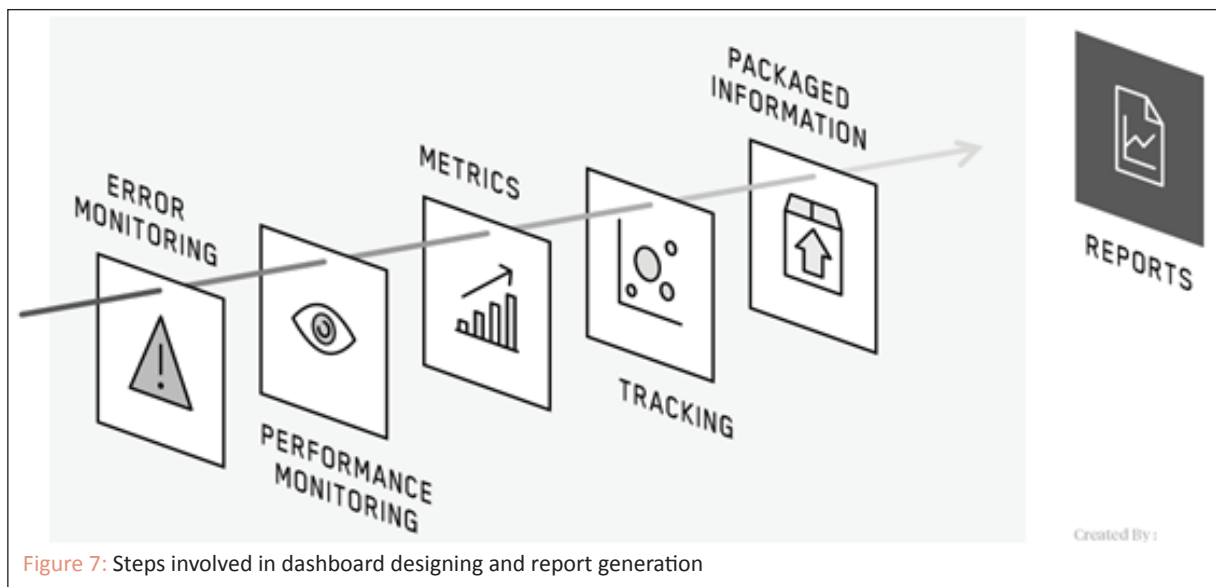


# POST-LAUNCH PHASES

---

## Monitoring and Evaluations

It would be incredibly naive to think that the mobile app development process ends when the app is shipped. Go look at any even moderately popular apps and one will see a long history of app updates. These updates include fixes, performance improvements, changes, and new features. Thorough monitoring is essential to best understand what sort of updates are needed. Here are a few things which need to be monitored.





## Crashes

There are numerous libraries that can be used to reliably track app crashes. These libraries include information about what the user was doing, what device they were on, and plenty of technical info that is crucial for the development team in resolving the problem. Apps can be configured to send an email/text/alert when crashes occur. These crashes can be viewed and triaged accordingly.

## Analytics

Modern app analytics systems are treasure trove of information. They help us understand who is using the app (age, gender, location, language, etc.) and how they are using it (time of day, time spent in app, screens viewed in app, etc.). Some even allow to view heat maps of the app, so we know what buttons on each screen are clicked most often. These systems provide an invaluable glimpse into how the app is being used.

Use this information to best understand where to invest future efforts. Don't build onto portions of the app that are seldom utilized, but invest where there is action and the largest potential for growth.

## Performance

One vital metric not covered by the previous two monitoring categories is the apps technical performance, i.e. how quickly it works. Any system we deploy has extensive performance monitoring in place. We are able to track how many times an action occurred and how long that action took. We use this to find areas ripe for optimization. We also put alerts in place to let us know if a particular action is slower than expected, so we can quickly look to see if there are any issues. These performance tools typically have dash-boarding, reporting, and alerting functionality included.



# WAY FORWARD

---

## Further Iteration and Improvement

**T**he purpose of all this monitoring is to know what one needs to do next. Most apps are never really done. There are always new features that can be added and things that can be improved upon. It would be incredibly wasteful to blindly build on the app. Use the information received from the users and the monitoring platforms. Then repeat parts of this mobile app development process. Continue to improve the app, the conversion rates, and the install base. Mobile apps are fluid. Take advantage of that by continuing to grow and improve.

## Conclusion

The mobile app development process might seem overwhelming and involved. There are a lot of steps and difficult decision making is required along the way. But, it is an extremely rewarding process and can be quite lucrative. Also, there might be some temptation to skip steps in this process, but this Process Manual is built upon valuable experience of working with app owners that chose to skip certain steps.

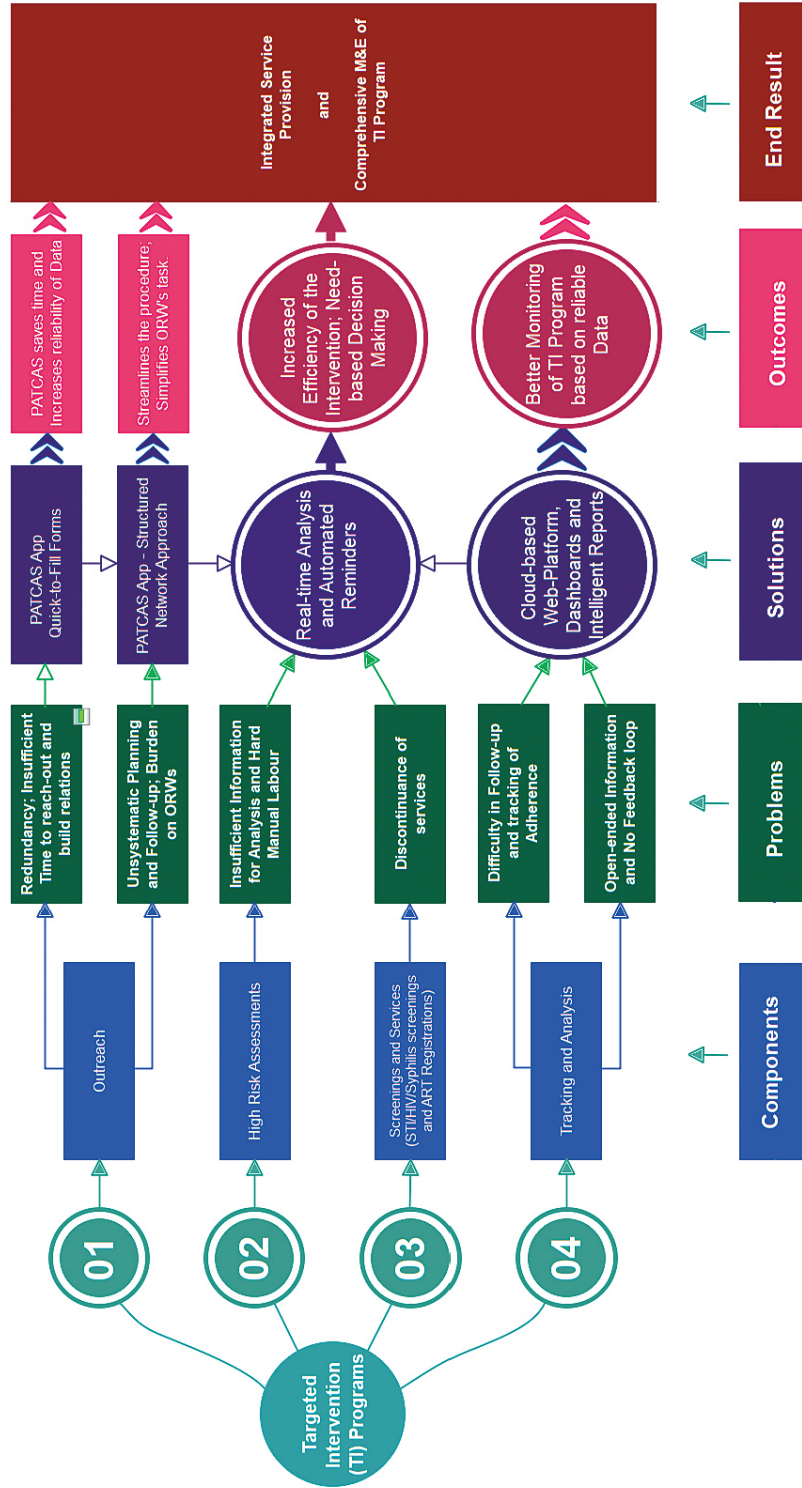
This mobile application can also be test piloted in SACS of other states and then implemented for their regular TI Program as a comprehensive approach to enhance efficiency, save time and digitize the entire process.



# Annexure - FlowChart

## PATCas Application - Prevention And Treatment Cascade Application

VHS MSA DIVA Project, Chennai





**Contact us:**

**Dr. Joseph D Williams**

Director - Projects

VHS-MSA DIVA Project

Voluntary Health Services, Chennai - 600 113

Tamil Nadu, India

Ph: +91 44 22541965 | email: [admin@vhsprojects.org](mailto:admin@vhsprojects.org)

Facebook: [vhsdivaproject](https://www.facebook.com/vhsdivaproject) | [www.vhsdiva.org](http://www.vhsdiva.org)