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Developing a Mobile Application to Reduce Risks for Runaway Youth in Bangkok, Thailand

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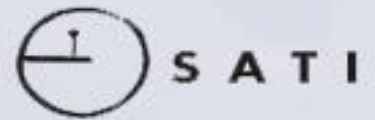*Worcester Polytechnic Institute*

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DEVELOPING A MOBILE APPLICATION TO REDUCE RISKS FOR RUNAWAY YOUTH IN BANGKOK, THAILAND

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Developing a Mobile Application to Reduce Risks for Runaway Youth in Bangkok, Thailand

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Sati Foundation

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Abstract

There are 100 million runaway youths worldwide. These youth face an increased risk of physical and emotional harm. Our team worked with the Sati Foundation, a non-profit organization in Bangkok, Thailand, to develop a mobile application to reduce risks for runaway youth. We designed our project using the Software Development Life Cycle methodology. To learn about the runaway youth and their needs, we conducted interviews and followed user-centered design to create our application. We created features that connect runaways to emergency help, show the locations of free resources, and teach runaways about health and wellness. These features help to ensure that runaways do not have to resort to dangerous or illegal activities to fulfill their basic needs.

Executive Summary

Around 400 youth run away from their homes each year in Thailand, but because youth who run away are often not reported to the police, the actual number could be as much as twice this number (The Mirror Foundation, 2017). Overall, UNICEF estimates that there are around 30,000 runaway youth in Thailand; most of them are located in major cities such as Bangkok, Chiang Mai, Pattaya, and Phuket (Keenapan, 2012). Once they run away, youth face numerous risks such as homelessness, gangs, human trafficking, and substance abuse. Youth are also at high risk for developing depression and hopelessness; 37% of 580 surveyed runaway youth in Bangkok reported previously attempting suicide (Techakasem, 2006). Running away also has long-term impacts on youth's future and ability to succeed in society. A National Runaway Switchboard 2011 Longitudinal Study found that U.S adults that ran away as youth were 2.5 times more likely to be arrested, 99% more likely to sell drugs, 53% more likely to have a sexually transmitted disease (STD), and had an income level roughly $8,800 lower than average (Impact of Running Away is Chillier Than Winter, 2011).

In Bangkok, Thailand, there are some, but not many, resources for runaway youth. One resource is the Sati Foundation, which sponsored this project. This organization works with a youth center called "The Hub." Together, they provide food, shelter, education, and healthcare to runaway youth and poor children. Unfortunately, The Hub's staff have no idea of where the youth are and what they are up to when they are not at the shelter. Youth often participate in dangerous activities such as drug use and prostitution; sometimes they never return to The Hub. Youth also have little idea of what other resources are available to them such as free clinics, food banks, and homeless shelters. Lacking information, runaway youth become heavily reliant on The Hub, but the benefits of The Hub are only accessible to the youth when they are physically there. Together, these lack of resources, knowledge, and propensity for high-risk activities creates this dangerous situation for runaway youth.

The goal of this project was to design and develop a mobile application that can improve the lives of runaway youth in Bangkok, Thailand by increasing their access to support systems. In today's tech savvy world, even homeless people and runaway youth have access to smartphones and mobile data everywhere, all the time (How homeless people use technology, 2013). Our team believes that a mobile application could help reduce risks for runaway youth by making The Hub's support accessible to them at anytime. To achieve this goal, our team developed four objectives for our research and application development: (1) learn more about the youth at The Hub to design a deliverable that will fit their needs, (2) address the basic physical and emotional needs of runaway youth, (3) address the safety needs of runaway youth, and (4) help prevent youth from permanently running away.

Our team accomplished these objectives by following Software Development Life Cycle (SDLC) and Agile-Scrum methodology. As shown in Figure A, we adapted the steps of both methods to meet the needs of our research and development.
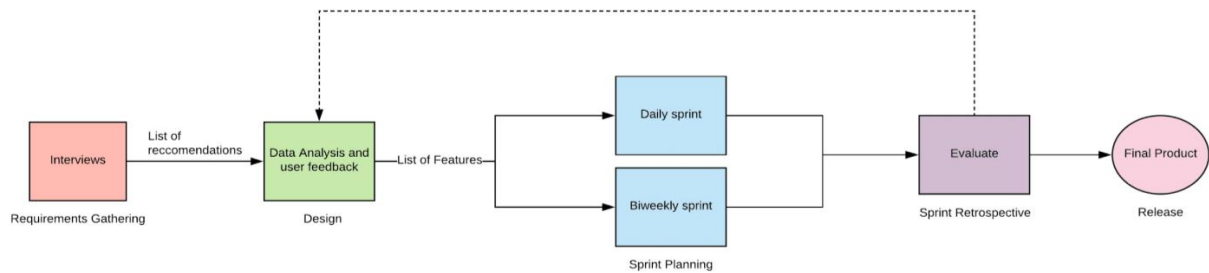
Figure A. An overview of our variation of SDLC methodology to create our final product, a mobile application.

Requirements Gathering: We conducted a series of interviews with the youth at The Hub and their caretakers, and the staff at The Childline, a phone line for children in need. After analyzing the information collected through the interviews, we created a list of findings and a list of features that needed to be included in our mobile application. The interviews helped us determine the main risks and concerns of runaway youth and whether a mobile application could efficiently address their needs.

Design: We analyzed the research from requirements gatherings to create a design of the application. When a design mockup was ready, we showed it to the youth, the caretakers, Mr. Sakson, founder of the Sati Foundation, and our peers in order to get their feedback. We used a user-centered design approach to ensure that we were addressing the needs of the runaway youth in an effective and efficient way. We based the designs on our findings derived from requirements gathering. The main features of our applications are: an emergency call that connects runaway youth to The Childline; an option to text caretakers at The Hub; a resource finder that utilizes Google Maps to identify nearby resources that could be inexpensively accessed; a check-in feature so that the caretakers know that runaway youth are safe; a news feed with the activities of The Hub; a lost youth feature; and an educational content section.

Sprint Planning: In order to make sure that all the tasks of our research and development would be completed in time, our team managed two different work cycles called sprints. The first one was a daily sprint: a set of tasks each member needed to complete by the end of the day that were then reported during daily meetings. The second one was a bi-weekly sprint: a set of implemented features and completed research that were then presented in front of our advisors and peers every two weeks.

Sprint Retrospective: This step was a reflection period at the end of each sprint about the progress of the project and the methods that needed improvement. During this retrospective, we would reiterate through the requirements gathering and design steps based on the feedback we received. Figure A indicates the iterative nature of our approach.

Release: The final step of the project. At the end of the third bi-weekly sprint, we submitted our application to the Google Play Store and Apple's App Store so that it would be available for runaway youth to download.

The analysis of our gathered data led us to nine key findings:
1.) The Hub is a crucial support system for runaway youth
2.) Runaway youth at The Hub frequently use their mobile phones
3.) Runaway youth are involved in high-risk activities
4.) The Hub has difficulty keeping in contact with the runaway youth when they aren't at The Hub

5.) Runaway youth seek education and have a desire to learn new things
6.) Runaway youth prefer information given to them in video, picture, or song format
7.) Runaway youth are not aware of resources available to them other than those provided by The Hub
8.) Friendship is very important to runaway youth
9.) Runaway youth lack conflict management skills

From these findings, we developed the features for our application, SATIconnect. we created a resource finder to address findings #1 and #7. This feature shows the user their location on a map and all the free resources such as food, shelter, and healthcare around them. To address safety concerns and anxiety over the wellbeing of runaway youth, findings #1, #3, and #4, we created check in and emergency call features. Users are encouraged to check in daily and can choose to additionally supply their location and an emoji showing how they are feeling. If users are in physical or emotional trouble, they can anonymously call a help hotline from our application. Additionally, they will also be able to text caretakers at The Hub. Since we found that runaway youth are involved in high-risk activities and lack conflict management skills, but still have a desire to learn new things, we created an educational information feature. This feature addresses not only findings #3, #5, and #9, but also finding #6, as we designed all the educational information using infographics, so anyone can use them regardless of their literacy level. Lastly, we created a news feed and missing youth feature to address findings #1, #3, #4, #5, #6, and #8. The news feed will be constantly updated showing the youth what activities are going on at The Hub and any new educational information that has been added to the application. The missing youth feature will be regularly updated by staff with photos of youth from The Hub who have not checked in lately. This feature will explicitly ask other youth to keep an eye out for their friends. By providing The Hub's support in a mobile fashion, Bangkok's runaway youth will have a higher chance of avoiding the myriad of risks they face on the streets.

Our team recognizes that seven weeks is not enough time to develop all the features and functionality we want for our application. Therefore, we came up with a list of eleven recommendations for the Sati Foundation to implement.

Recommendations for the Application:
1.) Assign someone to continually update the application through the SATIconnect admin version. This person would regularly update resources, activities, educational information, and keep track of users' check-ins.
2.) Hire freelance developers to evaluate the success of the application by implementing code that provides statistical information on the most used features. Additionally, the freelancer should test the security of the application regularly.
3.) The Hub should survey runaway youth immediately after the application release, once again a month later, and one year later to get user feedback
4.) Demo the application to similar organizations and get their feedback
5.) The Sati Foundation should share the application with other organizations that help runaways
6.) Hire freelance developers to upgrade the application based on the statistical data and feedback from the surveys
7.) Work with The Childline to recommend the application to people who call there

Recommendations for Application Features:

8.) Implement a points system for check-ins (e.g. youth receive one point per check)
9.) Update the resource feature to provide more in depth information about the services listed
10.) Connect the application with a platform where runaways can communicate with volunteer doctors to ask question about their symptoms
11.) Implement a security code to allow only users designated by The Hub or Sati Foundation to have access to the application

Currently there are approximately 15 runaway youth living at The Hub, but far more still roam the streets of Bangkok. Our long-term goal is to create an application that all runaway youth can use. If this application is a success at The Hub, we hope it can be distributed to other organizations in Thailand that are working with runaway youth. If every youth had this application, they would instantly know where to find free and reliable food, shelter, emotional support, and medical care. We want to help create a Thailand where no child has to resort to exchanging sex for food, where no child sleeps on the streets, and where no child has to steal to survive. We believe that this application, and further use of technology to solve social problems, is a step in the right direction.

Authorship

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2.2	Kim	Dickson-Burke, Karet, Kim, Zyla
2.3	Zyla	Dickson-Burke, Karet, Kim, Zyla
2.4	Dickson-Burke	Dickson-Burke, Karet, Kim, Zyla
3.1	Dickson-Burke, Zyla	Dickson-Burke, Karet, Zyla,
4.1	Apisaksirikul, Dickson-Burke, Fongsmut, Karet, Muhry, Singsathitsuk	Apisaksirikul, Dickson-Burke, Fongsmut, Karet, Muhry, Singsathitsuk
4.2	Karet	Apisaksirikul, Dickson-Burke, Fongsmut, Karet, Muhry, Singsathitsuk
4.3	Dickson-Burke, Karet	Dickson-Burke, Karet, Kim, Zyla
4.4	Dickson-Burke	Dickson-Burke, Karet
5.1	Apisaksirikul, Dickson-Burke, Fongsmut, Karet, Kim, Zyla	Dickson-Burke, Fongsmut, Karet, Kim, Singsathisuk,
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6	Dickson-Burke	Dickson-Burke, Karet

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Chapter 1: Introduction

There are around 100 million runaway youths worldwide (Slesnick, 2009). The primary reasons that youth run away are physical, emotional, and sexual abuse, and conflict with their parents or guardians (The Mirror Foundation, 2017). Regardless of the reasons youth run away, evidence shows that living on the streets greatly diminishes their quality of life, safety, and economic mobility.

When youth run away from home the risk of mental illness increases. Runaway youth are more likely to suffer from severe anxiety and depression, and up to 37% of them are estimated to have attempted suicide (Yoder, 1998). Substance abuse is one of the most dangerous problems runaway youth face. One study, *The Substance Abuse Disorders Among Homeless and Runaway Youth,* found that 60.5% of runaway youth surveyed met the criteria for abusing substances (Johnson, 2005). In addition to the risk of overdose, drug or alcohol dependency increases the chances of runaway youth catching a sexually transmitted disease (STD), becoming pregnant, weakening family ties, becoming a socioeconomic burden, and facing an early death (Johnson, 2005). In the U.S, 28% of street youth reported having participated in survival sex or the act of having sex in exchange for basic needs. Sex trafficking is also a major risk for runaway youth as they are often targeted by traffickers due to their age, vulnerability, and lack of parental protection. These runaway youth lack community support, guidance, and access to the necessary resources to address their physical, mental, and safety needs.

In Thailand, it is estimated that roughly 400 youths run away from their homes each year. Overall, UNICEF estimates that there are around 30,000 runaway youth in Thailand; most of them are located in major cities such as Bangkok, Chiang Mai, Pattaya, and Phuket (Keenapan, 2012). These youth, on average, are between 13 and 15 years of age with roughly 75% of them being female (The Mirror Foundation, 2017). They are also more likely to engage in substance abuse compared to non-runaways in Thailand (Techakasem, 2006). Furthermore, in a study of almost 580 runaway youth in Thailand, 37% of them reported a previous suicide attempt (Techakasem, 2006). It is estimated that 300,000 sex workers in Thailand are either underage, in involuntary servitude or debt bondage; homeless street youth are the most vulnerable (Meyer, 2006).

Our sponsor, the Sati Foundation, is an organization based in Bangkok, Thailand, that helps underserved communities. They are currently working with an organization called The Hub that provides food and shelter for runaway youth. One of the biggest problems this organization faces is maintaining contact with the runaway youth when they are away from The Hub. Youth will often disappear for days at a time making it almost impossible for the Hub's caretakers to know they are safe.

One possible way the Sati Foundation and The Hub could keep in contact with runaway youth is through a mobile application. Many organizations have created websites that provide information to homeless and runaway youth by connecting them to free resources and support around them. With the prevalence of smartphones, our project goal is to develop a mobile application that will address the needs of Thai runaway youth by using technology to connect them with support systems.

In this project, we identified the needs of runaway youth and developed a plan to address those needs through a mobile application. By providing such an application, the Sati Foundation and The Hub can help runaway youth reduce the risks of life on the streets.

Chapter 2: Background

In this chapter, we begin by discussing the risks runaway youth face and why these risk factors need to be addressed. We show examples of previous efforts to reduce these risks and examine the benefits of developing a mobile application for runaway youth. Unfortunately, there are not many statistics for runaway youth in Thailand. Therefore, we supplemented our research with information from other countries.

2.1 Risk Factors Affecting Runaways

There are an estimated 30,000 runaway youths in Thailand (Keenapan, 2012). Sadly, there could be as many as twice the number of runaways as the data shows, since it is estimated that at least 50% of cases are not reported (Shah, 2012). After running away, youth face increased physical, social, psychological, legal, and economic risks. These risk factors are summarized below in Table 1. If no intervention is taken to help these youth get off the streets, these risk factors lead to a decreased quality of life and social mobility. In the sections below, we discuss the specific risk factors that runaway youth face.

Risk Factor	*Result*
Severe Mental Illness	- Antisocial behavior - High hopelessness - Depression - Suicidal thoughts and attempts
Substance Abuse	- Use of first substance is strongly correlated with first runaway attempt - Significant rise in use of legally obtained inhalants to get high - Permanent physical and mental damage possible from substance abuse
Crime	- Running away increases the chances the youth will be involved in some sort of crime/illegal activity
Sex, Sex Work and Trafficking	- Survival sex is common among runway youth - Runaway youth are targets of sexual traffickers - Chance of unplanned pregnancy is almost two times greater in runaways than those who remain at home - Chance of contracting a STD increases
Issues Affecting LGBTQ Youth	- Higher risk of victimization, unsafe sex, and mental health issues than non-LGBT youth

Table 1: Summary of risk factors faced by runaway youth

Severe Mental Illness

One problem runaway youth face is the development of severe mental illness and lack of subsequent treatment. The presence of severe mental illness is rampant in the runaway youth population. One study based in India found that 81% of runaway youth surveyed exhibited antisocial behavior, 20.7% had high hopelessness, 8% had depression, and 2% had attempted suicide at least once (Khurana, 2004). In a study on the *Suicidal Behavior Among Homeless and Runaway Adolescents*, it was found that 53% of runaway youth surveyed had expressed suicidal thoughts, and 26.3% had attempted suicide in the past year (Yoder, 1998). Unfortunately, these statistics may be even higher as runaway children are difficult to track, and often their deaths, including suicides, are not well documented or recorded (Shah, 2012). For runaway youth, access to mental health care such as

psychiatrists, medication, and support groups is often limited or nonexistent as they live on the streets, have little to no income, and are unaware of resources available to them (Hughes, 2010).

Substance Abuse

Substance abuse, the harmful or hazardous consumption of psychoactive substances such as alcohol and drugs, is prevalent among runaway youths (WHO: Substance Abuse, 2017). In a 2005 study of runaway and homeless youth aged 16-19 in several midwestern U.S cities, researchers found that 60.5% of runaway youth surveyed met the criteria for abusing drugs or alcohol (Johnson, 2005). Even more alarming, it was found that 93% of the youth abusing drugs or alcohol also met the standards for at least one mental disorder. Additionally, it was recorded that 85% of the substance abuse cases coincided with the first runaway attempt (Johnson, 2005). Drug and alcohol abuse is often a means to deal with painful memories and the hardships of living on the streets or in shelters (Creating a Drug Prevention Program Targeting Inhalant Use in Thai Adolescents, 2017).

A large trend that has grown in popularity, specifically in Thailand and other Asian countries, is the abuse of cheap and legally obtained inhalants such as paint thinner and glue (Creating a Drug Prevention Program Targeting Inhalant Use in Thai Adolescents, 2017). These inhalants have serious effects such as kidney, liver, spinal cord, heart, and brain damage; inhalants also increase the risk of developing anxiety, sleeplessness, and other severe mental illnesses (Creating a Drug Prevention Program Targeting Inhalant Use in Thai Adolescents, 2017). Youth in Thailand have little knowledge of what qualifies as an inhalant and what the serious side effects are. One WPI-Chula team found that only 11% of 88 Thai school children knew that inhalants caused serious neurological damage, and 32% said they didn't know anything at all (Creating a Drug Prevention Program Targeting Inhalant Use in Thai Adolescents, 2017). This lack of information has real implications for runaway youth as they are the most at-risk population due to their poverty and homelessness (Creating a Drug Prevention Program Targeting Inhalant Use in Thai Adolescents, 2017).

Crime

A lack of support groups, parental guidance, shelter, food, and constant substance abuse can cause runaway youths to commit crimes or become part of gangs. The toughness of life on the street can also steer youth into illegal activities such as prostitution and survival sex (Kaufman, 1999). A study on childhood victimization, running away, and delinquency, found that youth that ran away were 4 times more likely to become delinquent than youth who did not run away (Kaufman, 1999). J.E Lansford, the author of the article "Early Physical Abuse and Later Violent Delinquency: A Prospective Longitudinal Study" found the act of running away was causative for delinquency. He also found that abused runaway youths were more likely to commit violent and nonviolent offenses (Lansford, 2017). Additionally, 80% of youth arrested by the police for running away had one or more other delinquency charges (Kaufman, 1999). This evidence points to the act of running away as a catalyst for involvement in future crime.

Sex-Work and Trafficking

Children and adolescents, especially females, have a high risk of being recruited into the sex industry, being sexually trafficked, and participating in survival sex. The lack of stable support networks, young age, sleeping on the street, panhandling, and exposure to criminal activities correlates with increased sexual victimization (Tyler, 2010). A news article by The Huffington Post, "To Human Traffickers, Runaway & Homeless Youth Are

Walking Prey," found that in New York City, 25% of homeless teens became victims of sex trafficking or were forced into having survival sex (Leahy, 2015). It is estimated that 300,000 sex workers in Thailand are either underage, in involuntary servitude, or debt bondage; homeless street youth are the most vulnerable (Meyer, 2006). In general, once youth enter the sex industry, whether it is consensual or not, it is extremely difficult to leave due to the stigma, lack of education, money, and substance abuse that often comes along with the industry (Tyler, 2010).

STDS and Unplanned Pregnancy

Life on the street, prostitution, and limited or nonexistent access to medical care and sexual education, is directly correlated with an increase in youth contracting sexually transmitted diseases (STDs) and becoming pregnant (Adolescents and Young Adults, 2017). In the U.S, 10 million teenagers will contract an STD annually (Adolescents and Young Adults, 2017). A study of midwestern U.S homeless and runaway youth found that the more time youth spent on the streets, the more likely they were to be involved in high risk activities such as unprotected sex and prostitution. Furthermore, survival sex and sex under the influence of drugs or alcohol decreased the likelihood that youth would have safe sex (Tyler, 2004). A decrease in safe sex leads to an increase in unplanned pregnancies. In the U.S, the chance of becoming pregnant increased 1.67 times one year after running away for females aged 11-17 compared to non-runaways. Female youth in general are more likely to have sex when on the streets; 3 out of 4 surveyed female youths had sexual intercourse in the 30 days before the interview (Thrane, 2012). Another study found that 33% of female youths in shelters and 48% of female youths on the street had been pregnant at some point (Greene, 1998). STDs and teenage pregnancies only increase youths' barriers to reintegration with society. STDs can lead to stigma and serious health complications while unplanned, teenage pregnancies can lead to a further cycle of poverty.

Issues Affecting LGBTQ Youth

In the United States, up to 40% of the population of homeless and runaway youth are members of the LGBTQ community (Lesbian, Gay, Bisexual, Transgender, Queer/Questioning). When considering that members of the LGBTQ community make up only 7% of the general youth population, these numbers are disproportionately high (True colors Fund, 2017). Once these LGBTQ youth run away they are at even higher risk of victimization, unsafe sexual practices, and mental health issues than their non-LGBTQ homeless youth (True colors Fund, 2017).

Summary

It is important to note that although these risk factors are categorized separately, they are often intertwined and dependent on each other. For example, mental illness is often caused by substance abuse, and runaway youth suffering from mental illness may seek out substances to self-medicate and deal with the pain. The lack of food and shelter may cause a runaway youth to participate in survival sex and then get pulled involuntarily into the sex industry, eventually causing an unwanted pregnancy or STD. All of these factors make runaway youth more desperate and, thus, could increase their chances of participating in criminal acts to survive.

From analysis of these various risk factors, it is evident that a number of problems runaway youth face come from a lack of support systems (e.g family, friends, or organizations) that offer mental support such as counseling, comfort, advice, and empathy, along with physical support such as money, housing, protection, and food (Cambridge

Dictionary, 2017). When runaway youth leave home, they lack this support and often have to resort to high-risk behaviors such as prostitution, crime, and drug-abuse to survive and deal with the harsh realities of the streets. Without support systems or the knowledge of how to access them, runaways often seek out unhealthy support such as gangs to fulfill their social, emotional, physical, and monetary needs. In conclusion, runaway youth are at a very vulnerable point in their lives; these risk factors and a lack of support systems, will have long-term effects on their quality of life and social and economic mobility if not addressed.

2.2 Efforts to Improve the Quality of Life of Runaways

In this section, we will review previous efforts of several organizations to reduce the risks that runaway youth are exposed to.

Activities and Events

Many organizations support runaway youth through projects and programs. The Sati Foundation is a non-profit organization that works with underserved populations in Thailand, and it has done a number of projects to serve this demographic. Some of their projects include creating educational resources to warn runaway youth of the dangers of inhalant use (Creating a Drug Prevention Program Targeting Inhalant Use in Thai Adolescents, 2017, 2017), decorating a bus to raise awareness about child abuse and the dangers of being a runaway (Kalampasut, 2017), and creating a scholarship program for underserved youth (Sati Foundation, 2016).

Emergency Contact and Counselling

Call centers and telephone helplines are another useful way of supporting runaway youth by providing emergency contact and counselling. Runaway youth can call these centers anytime and receive information about health and safety, as well as counselling or advice. Child helplines exist in over 100 countries worldwide (Childline Thailand, 2017). In Thailand, youth can call Childline Thailand, a 24-hour free nationwide telephone helpline for anyone under the age of 18. Childline Thailand encourages children to talk about their problems without the fear of judgement. They also have services that provide direct emergency help to children (Childline Thailand, 2017).

Call centers provide constant and speedy help to runaway youth. They are able to help runaway youth with emergencies and mental health issues, as well as provide information to them. However, call centers require personnel who are willing to help these youth through the telephone.

Outreach Websites

Mobile websites provide quick and easy access to information about existing facilities that can provide free food, shelter, hygiene, or healthcare. One example is MOKLI; MOKLI was designed by MOMO: an organization founded by former runaways. This organization has been attempting to help the 252,000 adults and 32,000 young people living homeless in Germany by providing directions to free resources through their website (Dorigo, 2017).

With the assistance of Google Maps, MOKLI helps runaway youth find food, shelter, and shower facilities. Many young people are already familiar with Google Maps, and the simple images on each button, as shown in Figure A, located in Appendix B, allow less literate users to easily navigate the website (Dorigo, 2017). MOKLI allows users to filter their search options based on what they need and provides anonymity while using the application (Ubilabs, 2017). This website has been a success. After the launch of MOKLI in February 2017, Google's statistics showed that 12,360 people and social workers have used MOKLI, and there have been 21,360 page views (Google Maps, 2017). Within less than a year of its launch, MOKLI has managed to reach thousands of people in Germany.

Another example is the Australian website, Ask Izzy. Similar to MOKLI, Ask Izzy is a free and anonymous service that connects people in need with over 350,000 free food, shelter, healthcare, and other essential services throughout Australia (Caneva, 2017). According to research done by the University of Sydney, about 75% of homeless people in

Australia have a smartphone making a mobile website a good strategy for reaching them (Gillett, 2016).

Ask Izzy is an extremely accessible nationwide website with numerous listed services, and its abundance of options makes it a powerful tool. As shown in Figure B, located in Appendix B, Ask Izzy has a search bar to find these services. To date, there have been over 500,000 searches for food, health, shelter, and other services made on Ask Izzy (Caneva, 2017). The vast amount of searches (a summary of the top searches can be found in Appendix B, Figure C) show that Ask Izzy is being used by people in need.

Summary

Each of the various approaches discussed in this section have their respective benefits and limitations. Call centers are able to provide constant and speedy services to runaway youth, but these centers require many personnel to operate, an expense for the organization. The Sati Foundation and its projects provide both direct and indirect support by hosting workshops and raising awareness. However, workshops and events may be costly and difficult to plan. A constant and frequent output of successful projects to support runaways would also be hard to accomplish. Lastly, the mobile websites discussed have a vast amount of information about directions to various services but do not have any direct information that could help runaway youth. They also sacrifice personalization for anonymity. Table A, located in Appendix A, summarizes the benefits and downsides of each approach.

A service that could mobily provide a vast amount of information, constant speedy access to resources, direct support, and anonymity could be a more effective tool for runaway youth.

2.3 Methods to Reach Runaways

Mobile phones have become the new device standard of the tech industry. Mobile phones have made their way to the hands of homeless people who have found creative ways to make use of this affordable technology. They use them to find food, jobs, and to stay in contact with government institutions trying to help them (How homeless people use technology, 2013).

Mobile phones have a very fast adoption rate in Thailand. For every 100 people in Thailand, there are 120 mobile phones (Statistics, 2012). Table 2 below shows the significant increase in mobile subscribers in Thailand between the years 2003 and 2010 (Srinuan, 2012).

	2003	2004	2005	2006	2007	2008	2009	2010
Subscribers (millions)	21.62	26.97	30.46	40.13	52.97	61.84	65.95	69.68

Table 2: Mobile adoption rate in Thailand, showing the number of subscribers in consecutive years (Srinuan, 2012).

There are two main methods to reach a target population through mobile devices: a mobile web application and a native application. We gathered information about the effectiveness of both methods in order to decide the most capable platform for our needs. In Appendix E, Table D, we summarize these reasons, and highlight the ones that were decisive for our choosing of a native mobile application.

2.4 Conclusion

Creating a mobile application could be an effective strategy of reducing risks for runaway youth in Bangkok, Thailand, due to the availability, cheapness, portability, and use of smartphones. A mobile application could help connect runaway youth with resources and support systems around them thereby increasing their safety, health, and overall well being.

Chapter 3: Methodology
3.1 Introduction
      The main goal of this project was to develop a mobile application that would reduce risks for runaway youth by connecting them to support systems. In this methods chapter, we will discuss how we determined the needs of Thai runaway youth and their caretakers. We conducted our research by focusing on four main objectives: (1) learn more about the youth at The Hub to design a deliverable that will fit their needs, (2) address the basic physical and emotional needs of runaway youth, (3) address the safety needs of runaway youth, and (4) help prevent youth from permanently running away.

3.2 Methodology Design
      Our research was designed based on a combination of Software Development Life Cycle (SDLC) and Agile-Scrum methodologies. SDLC is a frequently used process that developers utilize in order to implement software solutions to presented problems, while Agile-Scrum is a method of team management (Sami, 2012). In Appendix E, Figures E and F show the complete steps of both SDLC and Agile. Figure E shows the steps of SDLC, adapted to our team's needs. We discuss how we made use of each step of SDLC and Agile-Scrum in the following sections. Below is an overall flow chart showing our methodology for this project (Figure 1).
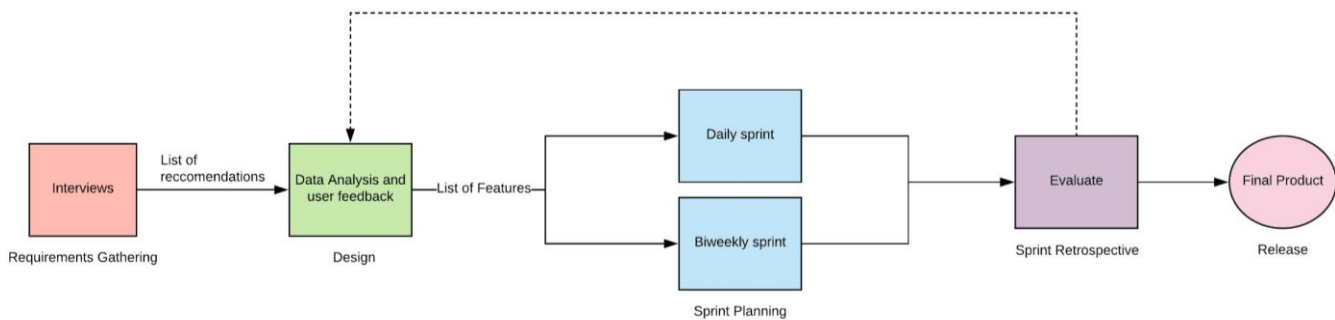
Figure 1. An overview of our variation of SDLC methodology to create our final product, a mobile application.

Requirements Gathering
      We conducted research with our target population, runaway youth in contact with The Hub, in order to create a relevant and useful application. Through a series of interviews with six runway youth and two non-runway youth at The Hub, two caretakers, Mr. Sakson (founder of the Sati Foundation), and two staff members at The Childline, we were able to gather the data to address our objectives.
      We interviewed youth at The Hub to confirm that a mobile application would address their needs and to better understand what physical, emotional, and safety concerns they have. Additionally, we wanted to learn their reasons for running away so we could come up with an effective strategy for preventing further runaway youth. Youth were selected based on willingness to participate in an individual interview; only runaway youth who gave oral consent were selected.
      To obtain additional information on the needs of the runaway youth and how our application would address them, we interviewed their caretakers and Mr. Sakson at The Hub. By interviewing the runaway youths' caretakers and Mr. Sakson, we wanted to

determine if the risks and needs perceived by the runaways actually matched what the caretakers perceived as risks and needs.

In addition, we decided to interview The Childline, a hotline organization The Hub works closely with, to see if they could help our objectives of addressing runaway physical and emotional needs, safety concerns, and preventing runaways. The Childline receives anonymous calls from youth who need help, so we believed that they could give us another perspective on the risks youth face and how we could address their needs through a mobile application. A list of all the questions asked to each group and their answers can be found in Appendix C.

Analysis of Data

Qualitative Analysis

Most of the information gathered through our research is qualitative, so all individual interviews were recorded with consent from the participants. This information was then translated by our Thai teammates to English and transcribed. To analyze the interviews and develop our findings, we used method of a qualitative analysis called "Open Coding." The definition of a code is "A code in qualitative inquiry is most often a word or short phrase that symbolically assigns a summative, salient, essence-capturing, and/or evocative attribute for a portion of language-based or visual data" (Saldana, 2015). Open Coding is concerned with identifying, naming, categorizing, and describing themes found in the text (Glaser, 2012). This means we based our codes on our objectives and goal for the project. A copy of the chart we used to code the interview answers can be found in the Appendix D under Table C. This process made it easier for us to recognize themes in our interviews and develop overall findings (Glaser, 2012). The diagram we loosely followed to develop our findings is located in Appendix D, Figure D.

Quantitative Analysis

We were able to obtain some quantitative data from the Sati Foundation, The Hub, and the runaway youth themselves. These groups contributed demographic information about runaway youth in Bangkok such as the number of runaway youth within a population who had experienced certain risk factors, and how many have at least one support system they could rely on. This information was compiled and put into an Excel sheet, located in Appendix D in Table D, to better understand, interpret, and assess runaway youths' needs.

Design

We based the design of our application on the findings from our interview analysis. To improve our features, we relied on user-centered design; this means user feedback and requirements dictated the design process. An overview of the process is in Appendix E, Figure G. By following this method, we ensured that our finished product met and addressed the needs of our target users, runaway youth.

Throughout this project, we constantly received user feedback from the Sati Foundation, The Hub, runaway youth, and our peers using UI mockups of our application. After creating a list of features to address our findings, we created user-interface mockups (screen views of how these features would look like on a mobile phone). As we wanted to get as much feedback as possible, we shared these UI mockups with the above-mentioned groups. Based on their feedback, we improved our design and features. By using this design method, we ensured that our final deliverable addressed the needs of the runaway youth and their caretakers by including them in the design process. Another advantage of user-centered design is that all the groups involved in the application development are familiar with the

application when the time comes for them to use it. In order to write the code for both main mobile platforms, iOS and Android, we used React Native and we stored all the information in the application in Google Cloud Firebase. More information about these platforms can be found in Appendix E.

Sprint Planning

To better manage our team and ensure that we met deadlines, we used the Agile-Scrum methodology. This method helped us break down all the tasks into daily and bi-weekly work known as sprints. We initiated our sprint planning by creating a detailed list of requirements, deliverables, writings, features, research, and other tasks needed to be completed by the end of the project. As this was a very extensive list, we used a project management platform called Trello to help us keep track of tasks. A screenshot of the software and how we used it can be found in Appendix E, Figure H.

Daily Sprints

At the end of each work day, our team held a Scrum meeting. During these meetings, each member described what he or she had accomplished since the last meeting, if there were any problems the team should know about, and what he or she planned to complete before the next meeting. Scrum meetings were used to keep each team member up-to-date and ensure that the work was being completed in a timely manner.

Bi-weekly Sprints

Every 2 weeks, we reported our progress to our advisors and peers through a 10-minute presentation and question session. We made sure that we had fully implemented a set of application features at each of these presentations. By the end of the third bi-weekly sprint, most of our application was completed, and it was ready for release.

Sprint Retrospective

Part of Agile-Scrum methodology is having a reflection period at the end of each sprint. To achieve this, we had *Scrum* meetings at the end of each daily sprint and the completion of a team assessment survey at the end of each bi-weekly sprint. In addition, after each presentation to our advisors and peers, we received feedback. This sprint retrospective ensured that our research and application development progressed in a timely manner. This reflection also ensured that team dynamic issues were addressed efficiently.

Release

The final part of SDLC is the release of the product. This is often scheduled at the end of the final *sprint* after the product is tested and improved. As we lacked the time required for testing, we released our application at the end of our third and final sprint. The process included requesting to publicly post our application in the Google Play Store and Apple App Store. A link to our full code implementation can be found in Appendix E.

Chapter 4: Results

This section will discuss the findings of our research, our deliverable, and the limitations we faced throughout our project.

4.1 Findings

Introduction

The goal of our research project was to develop a mobile application that would reduce risks for runaway youth in Bangkok, Thailand, by increasing their access to support systems that can fulfill their needs. Our team conducted research by interviewing six runaways, two non-runway youth, two caretakers at The Hub, two employees at The Childline, and the founder of the Sati Foundation, Mr. Sakson, to determine what specific features would be beneficial in a mobile application to reduce the risks runaway youth face. In this chapter, we will discuss the findings of these interviews.

Finding #1: The Hub is a crucial support system for runaway youth

We interviewed the founder of the Sati Foundation, Mr. Sakson, to learn more about the relationship between the Sati Foundation and a center for runaway youth called "The Hub." The Hub is a center in Hua Lamphong that provides food, shelter, and employment for runaway youth in this area. According to Mr. Sakson, the Sati Foundation works with The Hub to provide medical care and educational activities to runaway youth. The Hub has six trained caretakers and is currently in contact with around 15 runaway youths. We conducted interviews with six runaway youth and two non-runaways at The Hub to learn more about their relationship with The Hub and the Sati Foundation. According to our interviews, 50% of runaway youth surveyed said they rely on The Hub for food and shelter, and 75% said they rely on The Hub for medical care and emotional support. Additionally, many runaway youth participate in or have previously participated in activities at The Hub, such as an STD workshop, dance class, or Thai boxing lesson. On average, runaway youth stay at The Hub for 4 years. These youth develop a dependency not only on The Hub, but the people there as well; The Hub morphs into an irreplaceable pseudo-home for the runaways.

Finding #2: Runaway youth at The Hub frequently use their mobile phones

In our interviews, we asked runaway youth about their cell phone usage to better understand their relationship and access to technology. We asked the runaway youth questions like "Do you have a smartphone?", "How many hours a day do you use your phone?", and "Do you always have access to mobile data?". We learned through these interviews that each person had a smartphone and access to the Internet. While The Hub provides Wi-Fi connectivity on its premises, almost all the youth at the center were also subscribed to a data plan. 75% of youth claimed to spend over 2 hours a day on their phones, while many claimed to spend all day (8+ hours) on their phones. One youth said "I sometimes play from around 9pm until 5am." These responses show us that mobile phones are a big part of the youth's daily lives and confirmed our belief that a mobile application is the best way to provide information and services to this population.

This finding helped us determine what kind of deliverable was needed to address the needs of runaway youth at The Hub. We wanted to create something that would be able to provide the same information and services provided by The Hub for when the youth can't come to the center. To address this, we decided to create a mobile application. This finding confirmed that our sponsor's suggestion to create a mobile application was the right choice for this project.

Finding #3: Runaway youth are involved in high-risk activities

75% of youth we spoke with reported having participated in some sort of high-risk activity. One runaway youth told us "I do everything including meth, inhalants, alcohol, and marijuana." Another admitted "I was a prostitute before, and I believe that people do it because they need money." 50% had a history of substance abuse, 38% reported engaging in sex-work, 25% had past criminal convictions, and 75% had an incomplete sexual education. There are many reasons why runaway youth participate in these types of activities, because even though the youth in contact with The Hub are provided with free resources such as food and shelter, they may still engage in sex-work or organized crime as a source of income. Additionally, they may still abuse substances due to addictions, mental illness, or social pressure.

Finding #4: The Hub has difficulty keeping in contact with the runaway youth when they aren't at The Hub

Through our interviews with Mr. Sakson and two caretakers at The Hub, we learned that The Hub has difficulty maintaining contact with the runaway youth when they are not physically at the center. When we asked one caretaker if she ever had difficulty contacting the runaway youth, she said: "The youth keep changing their phone numbers." We learned that the runaway youth will often disappear for several days without telling the caretakers where they are going or if they are safe. The caretakers want to ensure that the runaway youth are safe, but they are not able to do so when they aren't at The Hub, since they are limited in the ways they can communicate with the youth. Sometimes, the only way to reach the runaway youth is through Facebook or their friends. One caretaker expressed a wish for the application to include a chat feature so that they could answer the youth's questions at any time.

Finding #5: Runaway youth seek information, education, and have a desire to learn new things

Another reason to interview youth at The Hub was to learn more about the way they use their phones and how they gain knowledge. We wanted to know if runaway youth seek information about safe sex, first aid, or conflict management. If they did seek this kind of information, we wanted to know if they used reliable sources. We asked the runaway youth questions like: "Do you use Google or Facebook? What do you search for?" From these interviews, we learned that 75% of runaway youth said they use Google for studying, learning languages, helping them with homework, or finding jobs. Google has become a supplement to the non-formal education provided by The Hub. However, not everything online is factual, and the youth have little training in distinguishing between reliable and untrustworthy sources. There are many websites that masquerade as educational resources but provide false or misleading information to youth. From a brief reading of articles posted on The Hub Facebook page by youth, our team was alarmed by the amount of false information, especially regarding safe sex, that was shared.

Finding #6: Runaway youth prefer information given to them in video, picture, or song format

We asked the runaway youth what format would be best to provide them with information. These interviews showed that 75% of youth at The Hub prefer information given to them in video, picture, or song format. One youth said that a video would be the easiest to understand. Providing information through picture, video, or song allows

educational information to be easily conveyed in an enjoyable and understandable way. In an interview with Mr. Sakson, we learned that the runaway youth are at a lower reading level than non-runaways of the same age, which explains why they may prefer information to be provided in a more visual manner. Additionally, the applications they use the most, like Facebook, already present information visually.

Finding #7: Runaway youth are not aware of resources available to them other than those provided by The Hub

In order to learn more about the resources runaway youth already use we asked the youth questions such as "Have you ever gotten sick and received free medical treatment?" or "Do you know about the anonymous clinic?" Additionally, we asked these questions to learn if runaways were aware of any services provided by organizations other than The Hub. When we interviewed the runaways, we found that 100% of them were unaware of free resources for food, shelter, and medical care provided by organizations other than The Hub. This finding confirms that most runaways rely heavily on The Hub for their basic needs.

Finding #8: Friendship is very important to runaway youth

Quantitative data from our interviews with both caretakers and runaway youth at The Hub shows that youth value their friendships very highly. In our interviews at The Hub, 100% of youth surveyed admitted to being close with other runaway youth and caretakers. One youth, when asked if he had any close friends at The Hub, responded "Yes, I came to The Hub because of these friends." Another runaway youth described the relationships between runaway youth at The Hub by saying "There may be some who are more extroverted and some which are introverted, but we all love each other." Additionally, many runaway youth value their relationships with friends more than their relationships with family. One youth expressed this sentiment, saying: "I can say that I love my friends more than my family." This situation may be due to the fact that many runaway youth experience abuse or conflict at home, which pushes them away from their families. During difficult times many runway youth admitted to relying on friends, which solidified the importance of these relationships to the youth. Overall, the relationship between a runaway youth and their friends is so strong that many youth are emotionally invested in knowing that their friends are safe and well.

Finding #9: Runaways lack conflict management skills

The interviews revealed that 37.5% of runaway youth ran away from home because of the conflict with their families. One runaway youth reported that she always got into fights with her mother and her stepfather because they often ordered her to do work, which was her main motivation for leaving her family. In addition, we found that 75% of the runaway youth have had conflicts with their families, friends, and other runaway youth at The Hub. Most of these conflicts were not resolved effectively. For example, one runaway youth described an encounter with his girlfriend after he learned she had engaged in survival sex. When asked if he ever abused her, he answered: "Yes, I use to beat her at first when I realized that she participates in survival sex." This youth's reaction reveals poor conflict management skills and coping mechanisms. Overall, runaway youth lack of strategies to properly avoid and resolve conflicts.

Finding #10 : The Hub is also a resource for poor children from Hua Lamphong.

According to the data gathered from our interviews, 25% of the youths at The Hub do not have conflicts at home and still reside with their parents or guardians. Hence, we asked the youth why they come to The Hub. Their answers revealed that The Hub provides

critical resources for poor children. One of the two non-runaway youth we interviewed said that she comes to The Hub "To get support, but mainly to study." She also comes to The Hub "To hang out with her friends." Our interviews show that non-runaway youth who lack financial support at home are also dependent on The Hub much like runaway youth. From our interviews, it is evident that these non-runaway youth rely on The Hub for educational support. Furthermore, we asked the youth if they rely on The Hub for other services as well. We found out that these non-runaway youth also rely on The Hub for food; one of the non-runaway youth we interviewed said that she "Ate at The Hub everyday." Apart from education and food, these non-runaway youth rely on The Hub for medical care as well. When asked if they rely on The Hub for medical care, 100% of the non-runaway youth we interviewed said that they did. One of the non-runaway youth also said that "The Hub has the medicine and first aid ready for us, and when we are really sick, The Hub takes us to the hospital."

4.2 Findings to Features: Designing a Deliverable
Introduction

Using the information we gained from our key findings, we began designing a deliverable that would address the needs of the youth and their caretakers. As a team, we came up with 5 main features that address our research objectives and findings. These features include: a check-in system, a resource finder, emergency call/text, educational information, and a news feed. Table 3, shown below, links each finding to the corresponding feature.

Findings	Feature(s)
Finding #1: The Hub is a crucial support system for runaway youth	● Emergency Call/Text ● Resource Finder ● Newsfeed
Finding #2: Runaway youth at The Hub frequently use their mobile phones	● A mobile application is a good tool to help reduce risks for runaway youth
Finding #3: Runaway youth are involved in high-risk activities	● Check-in ● Emergency Call/Text ● Educational Information ● Missing Runaways
Finding #4:The Hub has difficulty keeping in contact with the runaway youth when they aren't at The Hub	● Check-in ● Missing Runaway ● Emergency Call/Text
Finding #5: Runaway youth seek education and have a desire to learn new things	● Educational Information ● Newsfeed
Finding #6: Runaway youth prefer information given to them in video, picture, or song format	● Educational Information ● Newsfeed
Finding #7: Runaway youth are not aware of resources available to them other than those provided by The Hub	● Resource Finder
Finding #8: Friendship is very important to runaway youth	● Missing Runaway
Finding #9: Runaway youth lack conflict management skills	● Educational Information

Table 3: A summary table showing the correlation between our findings and the main features of our application

Check- In System

The first feature we designed was a check-in system. From Finding #4, we learned that the caretakers at The Hub have difficulty staying in contact with the runaway youth. We also learned from Finding #3 that runaway youth are involved in high-risk activities such as substance abuse, sex-work, and crime. Therefore, runaway youth are at high risk and don't have a proper way to let their caretaker know that they are safe when they aren't at The Hub.

In order to address these findings, we designed a check-in feature that would meet the needs of both the caretakers and the youth. When a runaway youth checks in by pressing the "safety check" button in blue, it will update their information in a database, letting caretakers know that they are safe (see Figure 2). Runaway youth have the option to share or not to share information about their location or how they are feeling. If the runaway youth does not feel like sharing this information, they can uncheck the "share location" box to do so. We do not make it mandatory for the runaways to share their location because we fear that it would deter runaways from checking in. Additionally, to remind youth to check in, they will be notified to press the "safety check" button once a day. If they check in for three days consecutively, a fire icon, similar to the one used for Snapchat streaks (when you have consecutively snapchatted a friend for three or more days), will appear next to "consecutive days."

Figure 3 is the screen view for admins (caretakers). The information from the runaway youth will be stored in a database that they will have access to through the admin view. They will be able to sort the information about who has checked in and when they checked in so they can better understand who is safe and who isn't.
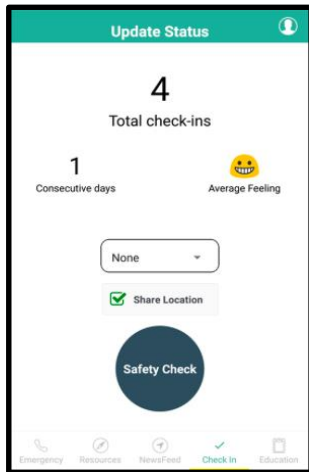
Figure 2: Screen Capture of the Check-In feature   Figure 3: Screen Capture of SATIconnect Admin
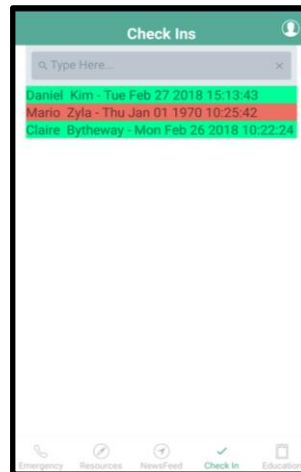
Resource Finder

The second feature we designed was a resource finder. From Finding #7, we learn that runaways are not aware of resources available to them other than those provided by The Hub. We also learned from Finding #1 and Finding #10 that both runaway youth and non-runaways rely heavily on The Hub. The problem with this is that youth have difficulty finding the resources that they need when it is inconvenient for them to come to The Hub. This then causes them to resort to illegal or dangerous activities to survive. In order to address these findings, we designed a resource finder that would show the location of free resources like food, shelter, and medical care. A screen capture of this feature can seen below in Figure 4.
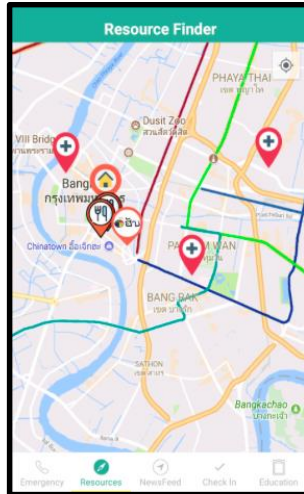
Figure 4: Screen Capture of the resource finder

Each type of resource is given its own symbol. The use of different symbols allows the user to easily identify the type of aid they can receive regardless of their literacy level. These symbols are then overlaid on a map of the user's location, which allows the user to see what resources are available near them. When a user clicks on a symbol, the phone automatically opens Google Maps and directions to the resource are given.

Emergency Services

The third feature we designed was an emergency service. From Finding #3, we learned that runaways youth are involved in high-risk activities. We also learned from Finding #1 that they rely on The Hub for emotional support. Hence, we created a feature that
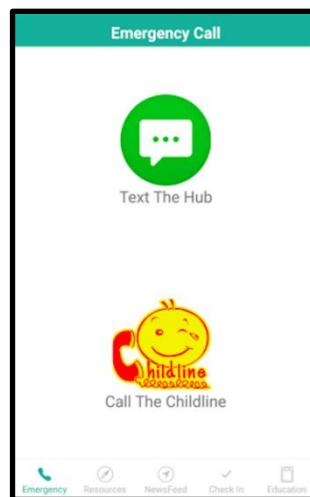
would make it easier for runaway youth to connect with services like the Hub and the Childline in case of emergency or if they need counselling. A screen capture of this feature is shown below in Figure 5.

Figure 5: Screen capture of the emergency services feature

Users can perform two actions from the emergency services screen (Figure 5). The first button connects runaway youth with a chatline ran by caretakers at The Hub for users who may need to consult with the caretaker about a problem. This addresses the issue in Finding #4: caretakers have trouble contacting youth when they aren't at The Hub. The

second button dials the Childline's phone number making it easier for the runaway youth to call the operators in case of an emergency.

News Feed

The fourth feature we designed was a news feed. From Finding #5, we learned that runaway youth seek education and have a desire to learn new things. We also learned from Finding #6 that runaway youth prefer information given to them in video, picture, or song format. In order to address these findings, we designed a news feed that would be able to provide the youth with information about activities they can attend, along with videos of activities that they can do on their own. A screen capture of this feature can be seen below (Figure 6).
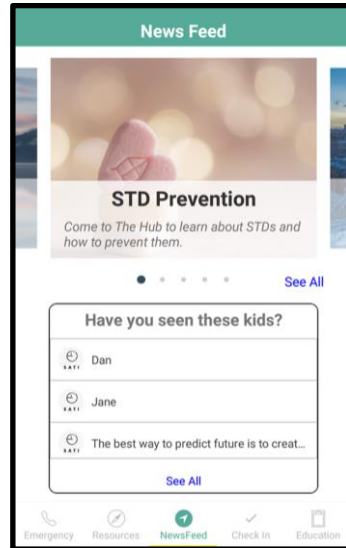
Figure 6: Screen Capture of the News Feed Feature

As you can see in Figure 6, this feature has two screens. The main screen is the "News Feed" which shows the most recent content added to the application. The second screen shows information about youth missing from The Hub. Runaway youth can report any missing youth they have seen and the last location they saw them at to The Hub in person. When a user clicks the "See all" button, they will be able to see all the past content posted on the application.

Educational Information

The fifth feature we designed was an educational information section. From Finding #9, we learned that runaway youth lack conflict management skills, and this is a major reason for them running away. We also learned from Finding #5 that these youth seek education and have a desire to learn new things. In order to address these findings we designed an educational information feature that has reliable information about conflict management, health issues, and first-aid. Additionally, we found from Finding #6 that runaway youth prefer information in a visual or audio format. To address this finding, we provide educational information in the form of pictures, videos, and songs. Written text will be minimized so youth don't skip over valuable information, and youth with literacy problems will not miss out. A screen capture of this feature can be seen below (Figure 7).
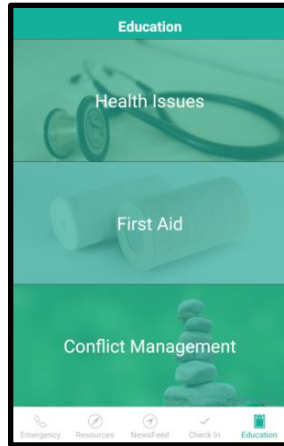
Figure 7: Screen Capture of the Educational Resources Feature   Figure 8: Example of secondary screen
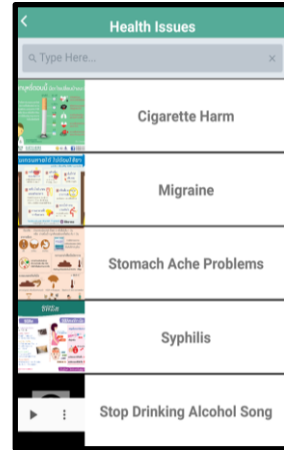
As you can see in Figure 7, this feature three options: health issues, first aid, and conflict management. The secondary screen, shown in Figure 8, is an example of an educational resource. In the secondary screen, there will be numerous infographics and videos about conflict management, health issues, and first-aid provided to the users.

4.3 Limitations and Considerations

This section presents the problems, challenges, and limitations we had in gathering and analyzing our data.

Perceived Risks

When we evaluated the information gained through the interviews, we recognized that Thai runaway youth may have different perceptions of their own risks. If they perceive their risks differently than what we as researchers perceive, then our deliverable will not help to solve their actual problems. To best mitigate this problem, we asked the youth to tell us about their lives and daily activities before we asked them specific questions. This strategy gave us a sense of their day-to-day activities and possible dangers. We also inquired about their own fears and ideas for the application before we made suggestions.

Ethical Considerations

Runaway youth are particularly vulnerable and require special protections in order to ensure that any risks associated with participating in our research are minimized. Many of them disclosed participation in illegal activities such as using drugs or underage sex work. If the details of their activities were disclosed to the police, it could put them in danger. In order to address these risks, we ensured that all information gathered was kept secret. We did so by making sure that information reported was not so specific that it could lead to the identification of individuals in our study. Additionally we did not and will not publish the research that we gathered directly, such as audio recordings, to ensure that none of our subjects' identities are made public.

Runaway youth may have trust issues due to past experiences so in an effort to mitigate any nervousness or resentment towards us, we tried to participate in their daily activities and conducted interviews at a place (The Hub) they felt comfortable. This way they felt less anxiety when they gave out personal information about themselves. We wanted them to see us as friends who want to help them instead of foreign investigators with only personal incentive.

4.4 Conclusion

Our application addresses our four main objectives and overall goal of the project: reducing risks for runaway youth in Bangkok, Thailand, by connecting them to support systems. Table 4, shown below, links each feature with the objective that it addresses.

Objective	Feature(s)
To learn more about the youth at The Hub to create a deliverable that meets their needs	● We determined that a mobile application was the best platform to address the needs of runaway youth ● We used pictures, icons, and videos when designing our application as runaway youth preferred this
To address the basic physical and emotional needs of runaway youth	● We created a resource finder so runaway youth know what free resources for food, shelter, and healthcare are around them ● We created a emergency call feature that links youth to a hotline and The Hub ● We included basic educational information on health and conflict resolution ● We created a missing youth feature that shows youth who haven't checked in recently
To address the basic safety needs of runaway youth	● We created a check in feature so staff at The Hub know runaways are safe when they aren't physically at the center ● We created an emergency call feature that links youth to a hotline and The Hub
To help prevent youth from permanently running away	● We included conflict resolution information since many youth run away due to conflict with family members

Table 4: A summary table showing the correlation between our research objectives and features.

This application and its features can used by The Sati Foundation, The Hub and other aid organizations that are seeking to help runaway youth. A link to our full code implementation can be found in Appendix E. Through our research, we have found that many organizations have started moving in the direction of outreach through mobile applications as the use of technology grows. If our application is successful and well-received by the runaway youth, we can share the information with groups such as AskIzzy and MOKLI, who have similar websites and applications already. Our end-goal and that of other aid organizations is to improve the lives of runaway youth. Any information we gather will be helpful in reducing the risks of this demographic. In the next chapter we will discuss our recommendations for the application after the completion of this project and the world-wide impact we believe this project could have.

Chapter 5: Recommendations and Conclusion

It is evident from our findings that runaway youth in Bangkok face serious risks and challenges. Regardless of these challenges, many of them have found a safe space through

The Hub and the Sati Foundation. We have found that through these organizations, the runaway youth have formed a pseudo-family and community of their own. With assistance from the founder of the Sati Foundation, Mr. Sakson, and the caretakers at The Hub, the youths' quality of life has improved through educational opportunities and access to free food, shelter, and healthcare. Unfortunately, these resources are confined to the walls of the center; our research led us to develop a mobile application that would make those resources accessible anywhere, at any time. By creating a check-in feature, the caretakers at The Hub and Sati Foundation can know runaway youth are safe when they are not onsite, giving the caretakers peace of mind. With the integration of emergency services, runaway youth can instantly get emotional or physical help anytime they need it. With the newsfeed they will know of events happening at The Hub, and with the missing youth feature, they can look out for their friends if one goes missing. Through the educational information, they can learn about ways to better resolve conflicts, take care of themselves, and reduce the risks associated with the activities they participate in. Lastly, through the resource finder, runaway youth can find free food, shelter, and healthcare when they aren't at The Hub. Our application acts as a wireless extension of The Hub providing access anywhere to the services offered by this organization.

5.1 Recommendations for the Application

Recommendation #1: Assign someone to continually update content in the application.

Our team developed two different views of the application: one for youth and the one for the caretakers. The admin view of the application should be used to update educational content, current and upcoming activities, and to add resources youth can access as they become available. Although our platform will allow for any approved caretaker to manage and update the app's content, we recommend that the Sati Foundation or The Hub assign this responsibility to a single staff member. This way, they can make sure that all the content is constantly up-to-date and that someone is continually monitoring whenever runaway youth check-in.

Another feature of our application that needs to be constantly updated is the lost runaway youth finder. Constantly updating this feature, along with the check-in and education tools, would be too much work and too complicated to synchronize among multiple people. Therefore, we recommend that one staff member is designated to monitor and update the application, using the admin account, as needed.

Recommendation #2: Outsource to freelance developers to evaluate the success of the application.

In order to gain an understanding of how the runaway youth are using the application and whether they are using all the features that we have implemented, we recommend that the Sati Foundation hires freelance developers to implement software that will measure different usage aspects within the application. This software should give statistics about usage such as the number of active users (per day, week, month, etc.), how long users spend in the application, which buttons are clicked, how often the application is opened, what time of day it is used most, and so on (Steur, 2012). Matomo is an example of an open analytics platform that, if implemented, can provide data for the above events (Steur, 2012).

In our application, we used Firebase, Google's database management system. The Firebase library offers analytics about application usage, but we were unable to implement statistical analysis as we were limited by time. By analyzing the data gained from analytics

platforms such as Matomo or Google Analytics, the Sati Foundation can understand what features are not being used, so they can make room for newer or improved ones.

Recommendation #3: Give users a survey after release of application, one month, and one year later to get user feedback.

The Hub should give runaway youth the same survey at the completion of this project, and one month and one year after the release of the application. This survey will be used to evaluate if the application is still being used, what the runaways like or dislike about it, and any ideas they may have for additional features or overall design. A survey provides both qualitative and quantitative data that can be used by the Sati Foundation and The Hub to analyze the success and failures of the application. If the application is not being used or is ineffective, the survey will help to figure out what The Hub should do to improve it. Since our application was created based on user-centered design, we need to gather feedback from our users to keep the application relevant. A copy of this survey can be found in Appendix F.

Recommendation #4: Demo the application to other similar organizations and get their feedback.

There are several organizations similar to The Sati Foundation who offer mental and physical support to runaways, homeless, or at-risk youth. We believe that the problems that these organizations face are similar to the problems that Sati Foundation faces. These problems include difficulty accessing and maintaining contact with at-risk youth. Hence, our team recommends the Sati Foundation share the application with similar organizations. Moreover, these organizations may be able to offer feedback that could be used to improve the application. Since each aid organization has its own way of solving problems, their feedback could help to add, fix, or modify features in the application. Ultimately, this feedback will help Sati Foundation to determine the best way to help runaway youth.

Recommendation #5: The Sati Foundation scale the application to other organizations that help runaways

Our team recommends that the Sati Foundation expand this application to other aid organizations that benefit runaway and homeless youth. While our application was designed with the needs of the caretakers and youth at The Hub in mind, the struggles they face are not unique. There are many at-risk youth, both in Thailand and all over the world, who could benefit from greater access to food, shelter, healthcare and reliable educational information. Our sponsor sees this potential and already plans to expand our application to other shelters in the greater Bangkok area. He has also expressed interest in giving our application to UNICEF, an organization that provides humanitarian and developmental assistance to children and mothers in developing countries, to help runaway and homeless youth all over the world. If this level of scaling of the application were to happen, the Sati Foundation and/or UNICEF would need to hire an app development company to adapt the application to work on a larger scale. Additionally, some features may need to be added or removed to better suit the needs of a broader audience.

Recommendation #6: Hire freelance developers to upgrade the application based on the statistical data and feedback from the surveys

In order to maintain our application and add more functionality in the future, we recommend that the Sati Foundation hires freelance developers to continue developing the application. These developers would be paid by the hour rather than by project. They are more practical for this project because they tend to be cheaper than mobile application

development agencies. There are a number of freelancing websites, such as Freelancer.com, Upwork, and GetACoder that can provide the services needed. By posting the project on these websites and detailing what kind of work needs to be done in the application, the Sati Foundation can get offers from a number of different developers, along with a range of hourly rates based on the developer's experience and the type of work that needs to be done.

Recommendation #7: Work with The Childline to recommend the application to their callers

We suggest that The Childline help distribute our application to their clients. The Childline shares similarities to The Hub, working with both runaways and at-risk youth who may be considering running away. However, The Childline serves a larger population by helping at-risk youth all over Bangkok. This makes them an excellent channel for distribution of our application.

5.2 Recommendations for Application Features

Recommendation #8: Points system for check-ins

In order to incentivize the check-in feature and make checking-in more exciting for users, we recommend that a point system be created and integrated with the check-in feature. Each time a user checks in they would receive a point; check-ins with statuses or locations might reward extra points. Additionally, if users checked-in for consecutive days, points could be given according to the number of consecutive days checked-in. These points could be used at The Hub to receive a reward. Caretakers at The Hub would determine the reward so it best suits the needs of the youth. User check-in statistics could also be displayed in the check-in view through a combination of icons and graphs.

Recommendation #9: The resource feature should be updated to provide more in depth information about the services listed.

For the resources feature, we recommend adding more information about each resource in our application. This information might include the capacity of shelters, how many spaces are still available, or the demographic they serve. This information will help to keep youth informed of what organizations can reliably provide the services they need.

Recommendation #10: Connect the application with a platform where youth can communicate with volunteer doctors to ask questions

We recommend adding a new feature in which runaway youth can communicate with doctors to ask questions about any health concerns they may have and possible treatment options. The user could ask doctors if his or her symptoms require immediate treatment, if they need to go to a hospital, and what medicine they should take. An example of this type of feature is the medical service *See Doctor Now*, a mobile application that provides a platform for people to receive medical advice from doctors and nurses either by messaging or video calling. This type of service usually is not free, but the Sati Foundation might be able to work with these organizations to provide runaway youth with free or discounted service due to their disadvantaged situations. This option may be preferable since the Sati Foundation wouldn't need to find any doctors themselves.

Recommendation #11: Implement a security code to allow only users designated by The Hub or Sati Foundation to have access to the application

In order to ensure security for the runaway youth and the sensitive information they might have access to on SATIconnect, we are recommending a security feature. We suggest a security code, provided by The Hub to the runaways, without which the runway youth cannot sign up for an account, even if they have downloaded SATIconnect.

5.3 Conclusion

        Over 100 million youths around the world live on the margins of society. These youth are runaways. They exist in a world full of violence, drugs, prostitution, mental illness, hunger, and homelessness - dangers that no child should ever have to experience. Organizations like the Sati Foundation and The Hub are important because they address the struggles and needs of these youth. They work to provide runaway youth in Bangkok, Thailand, with food, shelter, medical care, emotional support, and a sense of self-worth. Unfortunately, The Hub and other similar organizations cannot move with the youth, and they individually do not have the capacity to care for the over 30,000 runaway youth in Thailand (Keenapan, 2012). This why a mobile application, such as SATIconnect, is such a crucial and much-needed tool. With the mobile application we have developed, runaway youth, no matter their location, can access directions to free food, shelter, and medical care. They can access an emergency hotline service and contact The Hub. They can learn basic health information such as STD prevention and first aid, and they can give these aid organizations peace of mind by checking in. We firmly believe that with the creative use of technology, risks can be reduced for these runaways thus improving their lives.

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Appendix A: Comparison of different approaches for helping runaways

Approach	Advantages	Disadvantages
Call centers	Constant, speedy services	Personnel willing to work at call centers required
Non-profit organization projects	Personal, direct support (activities and events), and indirect support (raise awareness)	Hard to have constant successful projects
Mobile websites	Vast amount of information, easy access, anonymous	No direct information, no personalization

Table A. A summary table showing the advantages and disadvantages of three approaches to help runaway youth.

Appendix B: Figures and Charts for MOKLI and AskIzzy

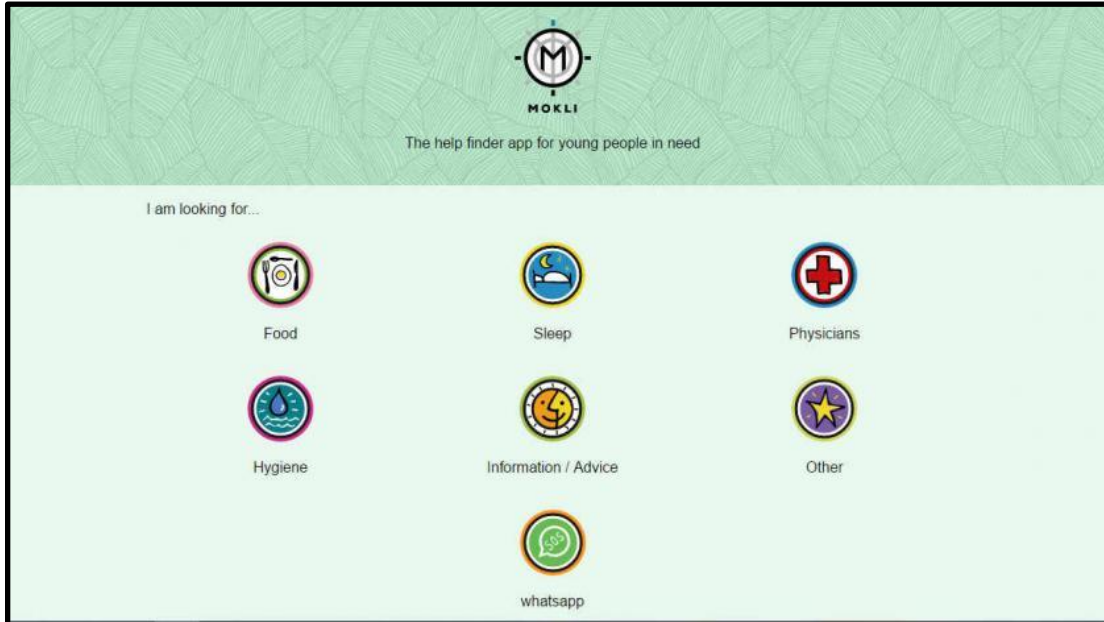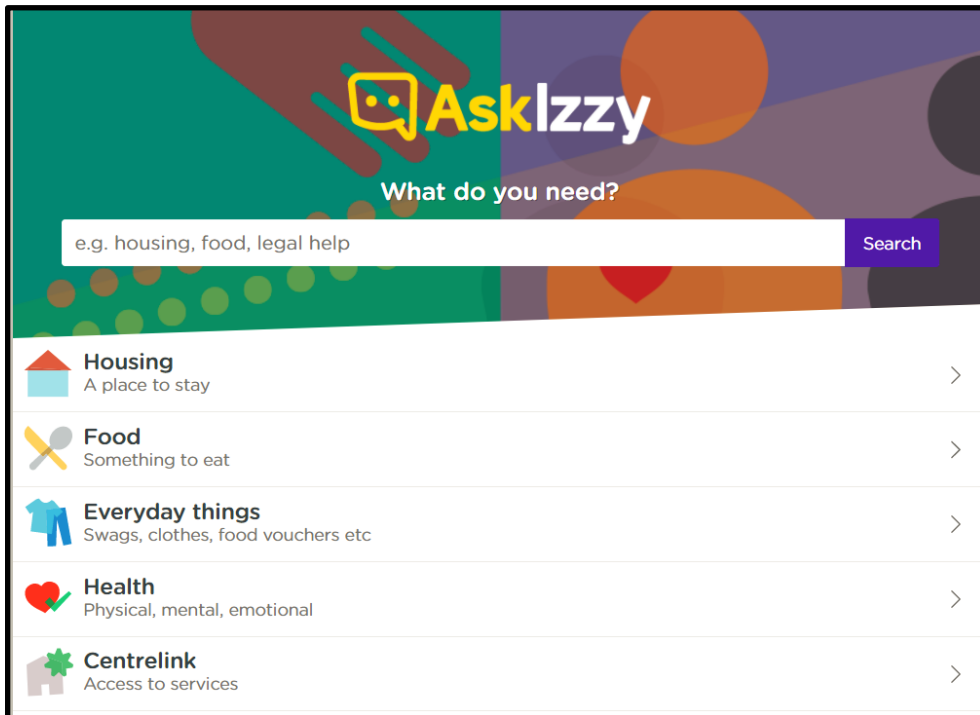Figure A. Various buttons with descriptive images and labels indicate options for users (MOKLI, 2017)

Figure B. A search bar is available to search from the 350,000+ services listed on the website (Ask Izzy, 2016)

Top 5 Categories Searched for on AskIzzy

Support and Counselling
5.3%

Money Help
14.5%

Food
22.4%

Housing
34.2%

Everyday Things
23.7%
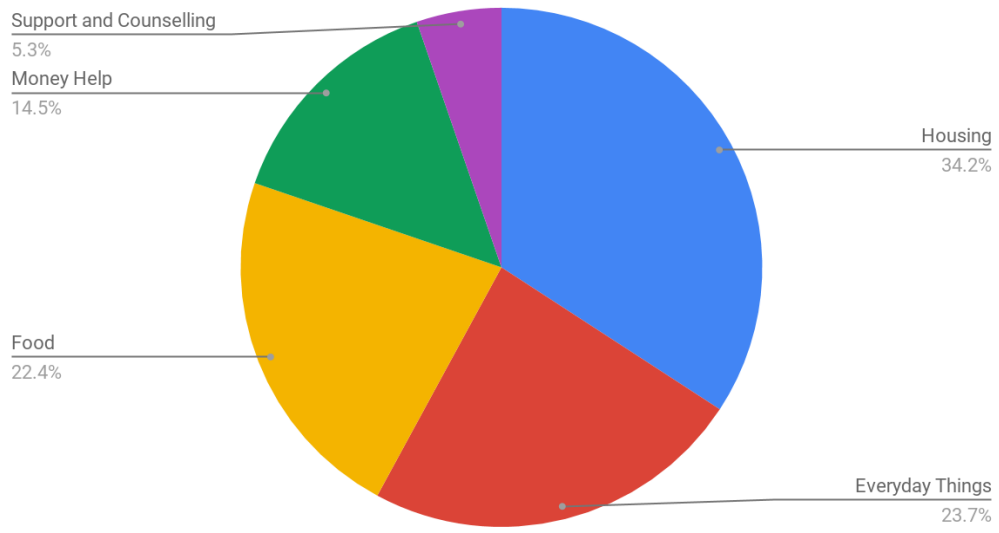
Figure C. Top 5 searches on Ask Izzy (Ask Izzy, 2016)

Appendix C: Interviews

Oral Consent Script
Please note that this Oral Consent script was translated to, and presented in Thai, the language spoken by our subjects before every interview with youth and caretakers

Hello, thank you for speaking with me today. Before we can begin the interview, I would like to ensure your consent in participating in our research.

Your participation in this interview is voluntary.

The purpose of the interview and our research is to assess the risks runaway youth face and how a mobile application can address these needs. Any information recorded will be used to determine how the features of our mobile app can be best adapted to fit the needs of runaway youth.

If you agree to participate we will ask you to partake in an interview lasting roughly 20 minutes; you can stop your participation in our interview at any time.

The information that we will be recording from the interview will be:
1. Age and sex of the subject
2. The audio recording of the conversation between interviewer and interviewee which may cover topics including but not limited to:
   a. Illegal activity such as drug use, underage sex work, and theft
   b. Reasons for running away
   c. Violence and/or sexual abuse
3. Confidentiality of members participating in the interview will be maintained by:
   a. Not recording the name of the subject
   b. Not revealing any identifying features such as tattoos, piercings, or facial/body features
   c. Not publishing any of the recordings
   d. Storing the recordings on an encrypted and password protected flash drive throughout the duration of our study
   e. Destroying all oral recordings and transcripts after research is completed

Do you have any questions now about our research or the interview? If you think of any after this interview, please contact us at this email: bkkc18satiapp@wpi.edu

Are you willing to participate in our interview?

Questions for the Runaway Youth
A categorized list of interview questions given orally to runaway youth at The Hub. Questions were approved by our sponsor, asked in Thai, and translated into English by our Thai teammates.

Sex Questions

1.) Do you have a boyfriend or girlfriend?
2.) Have you ever felt unsafe with your boyfriend or girlfriend?
3.) Do you use a condom every time you have sex?
4.) What other types of birth control do you use?
5.) Has anyone ever forced or pressured you to do something that you didn't want to do?
6.) Have you ever been paid for sex?
7.) Do you know about the anonymous clinic and what they do? Have you ever went there before?

Substance Abuse Questions
1.) What do you do for fun?
2.) Do you drink alcohol?
3.) Do you like to smoke cigarettes or marijuana?
4.) Have you ever tried to get high from things like paint thinner or glue?
5.) What side effects do you think drug or alcohol abuse have?
6.) Is there other substances you have tried?

Resource Questions
1.) Do you know of places other than The Hub where you can get free food or shelter?
2.) Have you heard of Planned Parenthood, Thai Red Cross, etc.?

The Hub
3.) How did you hear of The Hub?

App Questions
1.) What types of social media do you use?
2.) Do you use facebook?
3.) What do you like to read or watch on facebook?
4.) Have you ever use facebook or google solve any of your problems? What problems?
5.) The purpose of this mobile app is to help you improve your quality of life and reduce your risks, is there any more features you would like to have in this app?

Childline
1.) Have you ever called the childline service?
  a.) If yes, what is your reason for calling them?
  b.) Would it be easier for you to have a line chat with them instead of a call?
2.) Who do you usually go to for help or advice?

UI Mockup (Interviewees will be shown pictures of our application)
4.) Would you use an app that would show you places around you where you could get free food and shelter?
5.) Would you like to know about the activities happening at The Hub when you aren't there?

Questions for the Caretakers
Interview questions given orally to caretakers at The Hub. Questions were asked in Thai and translated into English by our Thai teammates.

1. How long have you been working here?
2. Roughly, how many hours do you spend with the kids?
3. What kinds of activities do the kids like?

4. Do the runaways come for only free resources or do they also come to participate in activities to gain knowledge?
5. How does the kids behave? is it difficult to talk to them? (asking about our activities, will the kids gonna like it?)
6. Is there any topic that they are sensitive to? topic that we should not talk to them about?
7. Are there any youth who have depression or other mental illness here?
8. Do kids ask for your advice about their personal problems? If yes, what problems?
9. What do they do when they have free time?
10. Where do kids get their dinner?
11. Do they already have shelter for the night?
12. Around how many kids come sleep at the hub at night?
    a. Any ideas where the kids who don't come sleep at night are?
    b. Will finding shelters at different locations help?
13. Did the past runaways go back to their homes?
    a. After how long did they go back?
    b. Do you know the reason they went back?
14. Do you know any ex-runaways who has a better life now? do you have their contact?
15. What do you think about this mobile application? *show UI*
16. Do you have ideas for features in our app that could help prevent youth from permanently running away?
17. What type of things are the runaway youth receptive to?
18. Can you tell us runaways that is easy to talk to?
19. Can you tell us runaways that is hard to talk to?

English translation of interview #1.

I: Denotes Interviewer
R: Denotes Runaway

I: Can you tell me briefly about your story?
R: Before I came to live with The Hub, I was being unruly and I liked to skip classes. My step dad hit me oftens and one day I decided to leave my house and come to live here.

I: How do you hear about The Hub
R: During the camp (Sit-ti camp) I met new friends and they told me about the hub

I: How long have you been staying at the hub
R: 5 years, I live at the hub almost everyday

I: Can you tell me about your daily life
R: Tuesday-Sunday selling food at the hub Study on monday and thursday

I: Do you know any places other than The Hub where you can get free food or shelter?
R: Sapanput for free food and friend's house for shelter

I: Have you ever been sick and got a free treatment

R: once, the hub was the one who pay the bill.

I: Do you know anonymous clinic?
R: yes, I'm going there every 3 months for STD test.

I: have you ever use google or Facebook to find some new knowledge
R: use for studying, finding about symptom of disease
I: Do you have any best friend?
R: yes (older runaway at The Hub)

I: How is he?
R: friendly, always help me and other, love other younger runaways like they are his brother, sister.

I: Do you drink alcohol?
R: only at the birthday party

I: Do you like to smoke cigarettes or marijuana?
R: Yes

I: Have you ever tried to get high from things like paint thinner or glue?
R: yes glue (in the past)

I: Do you know the side effects of drug or alcohol use?
R: yes

I: Is there other substances you have tried?
R: yes amphetamine and meth

I: Do you have a boyfriend or girlfriend?
R: I have a boyfriend, we have been in a relationship for about 3-4 years

I: Do you know any ways to protect you when having sexual intercourse?
R: yes, condom

I: Do you know birth control pill?
R: yes

I: Other ways than just condom and birth control pill?
R: no

I: What do you think about prostitution?
R: I'm okay with it because I was a prostitute before and I believe that people do it because they need money.

I: Do you know childline ?
R: yes.

I: Have you ever call the childline?
R: no

I: Often, who do you approach to ask for help?
R: Cooker and caretaker,

I: Usually, how many hours do you spend on your phone?
R: About 6-8 hours per day

I: what application do you use on the most?
R: facebook, line

I: which feature do you like the most?
R: resources feature because some kids don't have money

I: Do you have any diseases that you want to know about but don't know how to treat them?
R: high fever, headache

I: How about conflicts? Would you like to know about solving conflicts?
R: No, because each person have different ways to solve their conflict

I: what kind of information you want in the application? speech, picture or video?
R: Picture with speech

I: anything you want to add?
R: no

English translation of interview #2
I: Denotes Interviewer
R: Denotes Runaway
I: How long have you been at The Hub?
R: I came to stay here around a year already, around 7 or 8 months

I: What made you want to come stay at The Hub?
R: Friend recommended and told that this place is free to stay. There are food over here as well and a place to sleep as well.

I: Could you tell me your experience when firstly running away from home?
R: I came out of my house since I was 12 years old. I came out and stayed around Sanam Luang area for around 3 years. Then I came to stay here when I was 16 years.

I: Normally do you stay at The Hub everyday?
R: Yes

I: Could you tell me what you do in your daily life?
R: I help clean The Hub by mopping. Sometimes I go hangout and sing Karaoke with my brother. I go to Karaoke a lot. I go walk at Siam, hangout, and go around.

I: Where do you normally have food?
R: Over here

I: Apart from The Hub do you know any other places which gives free Food?
R: No

I: When you were sick have you ever been to a hospital which treats patients for free?
R: Never been to free. Only to hospitals which is 300 baht.

I: Do you know the anonymous clinic? Have you ever been there before?
R: I know, I've been. Teacher took me there.

I: Have you ever used Google or Facebook in finding new information or knowledge?
R: Most of the time I use Google to find a Job

I: Any other examples from Google or Facebook?
R: No there is nothing else

I: Do you have close friends? Are you close to everyone at The Hub?
R: Yes, I came to The Hub because of these friends. I do not have any other close friends.

I: Have you hangout with your friends? Do you drink alcohol with them?
R: Yes, we usually go to karaoke together. And sometimes when we are stressed we go have beer.

I: Have you ever used a cigarette?
R: Never, I don't have any business with cigarettes.

I: Have you ever used glue thinner and those stuff?
R: Never, I do not use any drug. Ever since I came to stay at The Hub I don't have anything to do with drugs.

I: Do you know the disadvantages about the drugs? Is that why you don't use drugs?
R: No, I just don't like drugs and I don't do it. I have never had any business with drugs.

I: Do you have a boyfriend/girlfriend?
R: Yes

I: Normally what do you guys do with each other? Like where do you hangout?
R: Boyfriend is at Laos

I: Do you know the safeties while having sex?
R: Yes

I: Do you know how to use condom or protective pills? And do you know any other methods other than these 2?
R: No

I: What do you think about prostitute? Is it okay to be one?
R: Yes, I am currently doing it

I: Do you know Sai Dek? The emergency call center
R: Isn't this [The Hub] Sai Dek? I don't know

I: Have you ever called Sai Dek?
R: No

I: Do you normally play your phone?
R: Yes

I: What do you normally play on your phone?
R: Internet, Facebook, and other apps

I: How long do you play your phone?
R: Play the phone all day

I: What applications do you usually use?
R: Messenger of Facebook and youtube

I: What do you think about this application?
R: It's great. I like all the feature

I: Is there anything you like or dislike or would like us to improve on? How do you recommend us to improve it?
R: I like all the features.

I: Do you have any sickness, not feeling good or sick, but don't know how to cure? So we can add it into the application
R: About Private problems. I have Asthma.

I: Are there any stress, anger, and sadness in your life? We want to try to find a way to reduce those.
R: There are Boyfriend, Friends, Brother, Father and Mother, that's it.

I: What deliverable do you want it in?
R: Video and Pictures. Can you make it in a form of music? It could be music with images

I: Are they anything you would like to add to the app?
R: No, just this much.

English translation of interview #3
I: Denotes Interviewer
R: Denotes Runaway
I: What made you want to come stay at The Hub?

R: A senior recommended this place. Senior told that this place is good and to come stay here. Senior told all the details about The Hub.

I: Could you tell me your experience when firstly running away from home?
R: I didn't run away from home, I came out to find job. It was a good experience.

I: Were there any difficulties when you firstly came out of your house?
R: No, everything went well. I liked it.

I: How long have you been at The Hub?
R: For around 2 to 3 months

I: Normally do you stay at The Hub or go out?
R: Stay at The Hub everyday

I: Could you tell me what you do in your daily life?
R: Play with older friends, listen to Song and make Dance moves, make covers of songs with older friends

I: Where do you normally have food?
R: Over here

I: Apart from The Hub do you know any other places which gives free Food?
R: No

I: Where do you normally go in the day?
R: Sometimes I go to the mall. I go once in a while to purchase personal goods.

I: Where do you normally sleep at night?
R: Over here

I: When you were sick have you ever been to a hospital which treats patients for free?
R: No

I: Do you know any hospitals which treat patients for free?
R: No

I: Do you know the anonymous clinic? Have you ever been there before?

R: I don't know

I: Have you ever used Google or Facebook in finding new information or knowledge?
R: Use google to find song lyrics

I: Any other examples from Google or Facebook?

R: Use google to find knowledge and help in studying. Something like learning about the universe and galaxy

I: Do you have close friends?
R: Everyone at The Hub

I: How are your friends? What do you do with them?
R: They are all good and nice. We play with each other.

I: Are all of your personality somewhat similar? Or are there any people who are quiet as well?
R: So there may be some who are more extrovert and some which are introvert but we all love each other

I: Where do you normally hangout? What do you guys do?
R: Sometimes we go play games.Sometimes we play dancing games and stuff like that.

I: Do you drink alcohol with them?
R: No

I: Have you ever used a cigarette?
R: No

I: Have you ever used glue thinner and those stuff?
R: Don't do drugs and all

I: Do you have a boyfriend/girlfriend?
R: Yes

I: Normally what do you guys do with each other? Like where do you hangout?
R: We like to study with each other because she's a nerdy type. She is studying at Chulalongkorn University.

I: How is your girlfriend like?
R: Have good habits but may be like to hangout a little too much.

I: Where do you usually like to hangout with your girlfriend?
R: Normally natural beauty like greenery and beach.

I: Do you know the safeties while having sex?
R: Yes

I: Do you know how to use condom or protective pills? And do you know any other methods other than these 2?
R: Have an idea about about condom and protective pills. I don't quite know about other methods.

I: What do you think about prostitute? Is it okay to be one?
R: Maybe it is not okay. Because for example if I get into this business I can get infected by diseases. And if there is AIDS is is very hard to cure and maybe impossible to cure

I: Do you know Sai Dek? The emergency call center
R: Yes

I: Have you ever called Sai Dek?
R: Yes I have

I: How was you experience calling? What did you talk about?
R: I called to ask for help. I Told about other kids who either runaway, lost, or don't have parents anymore.

I: Who do you usually ask advice from?
R: Teacher at The Hub

I: Do you have a smartphone which you use or play?
R: Have

I: How long do you play your phone?
R: I play from around 9pm-ish and sometimes up until 5am

I: What do you normally play on your phone? What applications do you usually use?
R: Most of the time I use App Boom. Sometimes Facebook and Line. I also listen to music on the phone.

English translation of interview #4
I: Denotes Interviewer
R: Denotes Runaway
I: Can you tell me your life story?
R: Last time, I stayed with my dad and stepmother. They always order me to do work at home and we often got into a fight.

I: Why did you choose to come to the hub?
R: When I ran away, I met my friends and they brought me here

I: Can you tell me your first day of running away?
R: So, I ran away and got lost. So I contact the friends and they brought me to the Hub

I:. How long have you stayed at the Hub?
R: around 6-7 years

I: Usually, have you been staying at the Hub everyday?

I: What do you think about this application?
R: Easy to use

I: Which feature do you like the most?
R: I like check in the most

I: Is there anything you dislike or would like us to improve on? How do you recommend us to improve it?
R: No dislikes and no recommendations

I: Do you have any sickness, not feeling good or sick, but don't know how to cure? So we can add it into the application
R: Swollen Ankle when dance too much. Something like when sprain ankle.

I: Are there any stress, anger, and sadness in your life? We want to try to find a way to reduce those.
R: Things like having a fight with girlfriend or having problems with others. Mostly about problems and fights.

I: What deliverable do you want it in?
R: If you are convenient then preferably Video or even Picture.

I: How about speaking or teaching composed of image or something like this?
R: This is also okay but preferable videos and pictures

I: Are they anything you would like to add to the app?
R: Nothing else

R: At first, like when I was a kid, I stayed here everyday. But when i become 16-17 years old, the officer at the Hub will ask me about my family, maybe to ask if I am ready to go back

I: Your daily life?
R: Monday and Thursday, I have a lesson at the Hub. For Tuesday, Wednesday, Friday, Saturday and Sunday is a holiday, so I will work. Work outside the Hub, find job outside

I: Where do you eat everyday?
R: the Hub or buy it nearby. There's a lot of food around here.

I: Besides the Hub, Are there any place you know provide free food?

R: When we did activities outside, sometimes there will be free food provided.

I: Where do you sleep every night?
R: Everyday at the Hub

I: Have you ever get sick and get free medical treatment at the hospital?
R: Yes. at Ramathibodhi hospital. I got an appendicitis and get free surgery. I went in the name of the Hub Foundation.

I: Do you know the anonymous clinic?
R: No. Usually I will go for check up at Chula Hospital

I: Have you ever use google or Facebook? what did you usually search or look at?
R: yes. like investment and some academic like learning english

I: Do you have best friend?
R: yes

I: How do you know her? What is her personality?
R: We met at the Hub. She is a good person, love friends and like to help others.

I: Have you ever drink alcohol with friends?
R: yes

I: Have you ever smoke?
R: yes

I: Have you try something like glue, thinner?
R: I have used drug and that things before. but i have quit, but I'm trying on permanently quit on smoking

I: Why did you try?
R: friends recommended and my urge to try

I: You think that your friends play a part in you trying things?
R: yes

I: Do you know the disadvantage ?
R: yes. like inhaling glue, it will destroy our lungs, left with only one lung, dementia. One of my friends also got infected with incurrent disease from inhaling glue

I: Do you have boyfriend?
R: yes

I: What do you guys usually do together?

R: we went shopping or walked around the shopping mall or relax and chill out

I: What is his personality?
R: He is Myanmar, shy, playful, get angry easily but also easily calm down. When I was at home, I worked at the factory, we met there.

I: Do you know any ways to protect you when having sexual intercourse?
R: yes, condom

I: Do you know birth control pill?
R: No

I: Other ways than just condom?
R: Anti-HIV drugs

I: What do you think about prostitution?
R: I'm not okay with this because it is illegal

I: Do you know childline ?
R: yes.

I: Have you ever call the childline?
R: no. but usually, we get to know them and talk to them through activities outside the Hub. They will always be there.

I: Often, who do you approach to ask for help?
R: caretaker who they call 'mom' like mom bee, mom neoy

I: Usually, how many hours do you spend on your phone?
R: not so long

I: what application do you use on the most?
R: facebook, play game

I: which feature do you like the most?
R: resources feature

I: dont like? improve?
R: no

I: Do you have any diseases that you want to know but don't know how to treat them?
R: high fever, migraine

I: How about management on conflicts that you want to know but don't know how to fix them?
R: fight, quarrel.

I: what kind of information you want in the
application? speech, picture or video?
R: speech

English translation of interview #5
I: Denotes Interviewer
R: Denotes Runaway

I: Can you tell me the reason why you runaway?
R: When I was in the fifth grade, I got into a fight with
my parents. The reason I got into a fight with my parent
is because they physically abuse and they were addicted
to alcohol. Therefore, I decided to run away from home
and come live around Hualumpong. The place I use to
slept and eat is the Hualumpong railway station.

I: Where did you find food?
R: I wait for the train to arrive and I go inside the train
to find leftover foods.

I: How long have you been staying at
   Hualumpong?
R; Around 10 years or so.

I: How did you know about the hub then?
R: My sister brings me here, because she lives here (at
the hub) before me. After I came here, the hub provides
me Non-Formal and Informal Education along with a
job to do.

I: How long have you been in the hub?
R; Around 4 years or so.

I: How often do you stay at the Hub?
R: I came here to study and work Monday to Friday.

I: What do you do on the weekend?
R; I usually go to my friend's house and drink.

I: And do you smoke?
R: Yes, sometimes.

I: Do you think that you're addicted to cigarette?
R: It's a 50:50 situation, sometimes I don't feel like I'm
addicted to it but sometimes I feel like I do.

I: Do you inhale thinner, glue, or etc.?
R: Yes, but I have never try to inject any types of drugs.

I: List the drugs that you have tried?
R: Glue, meth, thinner, 3k, and weed.

I: Are you still using these drugs today?
R: Not anymore

I: anything you want to add?
R: no

I: What is the reason of you quitting these drugs?
R: My mom asks me to stop, because I have been in
jailed for drug abuse for 5 times already.

I: Is there other reason for to be in jail?
R: Well I use to steal things, so that is another reason
for me to be in jail.

I: What is your age when you were in jail for the
   first time?
R: About 15-16 years old.

I; Do you think that your friends influence you to
   do these drugs?
R: Yes, but it is also due to myself too because I cannot
abstain myself from doing it.

I: Do you know about the bad effects of these
   drugs?
R: Yes, I know that it is bad for me.

I: Do you have a girlfriend?
R: I use to have many but I broke up with all of them
already.

I: Did you have sex with your girlfriend?
R: Yes.

I: Did you use condom?
R: Sometimes, but I did not use it during my most
recent sex.

I: Do you know about STDs?
R: Yes, recently the hub took me to checkup at
Chulalongkorn hospital and my blood report was fine.

I: Do you know about anonymous clinic?
R: I've heard about it as an illicit clinic.

I: Have you ever called the child line?
R: Never.

I: Who do you ask for advice when you need one
   then?
R: The staffs at the hub. We called the staffs who gives
advice as the "wind walker". When youth have any type
of problems or something that they worried, they can go

to talk with the wind walker. Moreover, these wind walkers will keep the conversation a secret.

    I: How many hours are you on your phone each day?
R: Many hours. Maybe above 10 hours per day, because I play Facebook and other games on my phone.

    I: Do you use google? If so, what do you search on google?
R: Yes, I google for homework stuffs. I also google for a place to go, like place where I can go hangout or travel to.

I: This is the UI mockup of the application we are developing for you guys. The first feature is the news feed feature where you can find out about upcoming events/ activities at the hub along with the good resources about conflict management. There is also an area announcing the lost children in case you guys can help us find them. The next feature is the resources feature where you can find the available resources around you such as free food, shelter, and medical care. The last feature is the check in feature where you can check in at any location at any time like Facebook. This feature is built so that the staffs at the hub knows that you guys are safe.

English translation of interview #6
I: Denotes Interviewer
R: Denotes Runaway

    I: How long have you been at the hub?
R: Since I was 15. I am 21 now. So, 7 years.

    I: Can you tell me the reason why you runaway?
R; Well, back then I was studying in a boarding school. Then I start to sneak out and go live with my friend or girlfriend. I go to wherever my friend take me, I never reject them at all. I can say that I love my friends more than my family. Therefore, I decide to run away from home. I don't know what I would face in the future, but I don't care because I believe that my friend got my back.

    I: Do you have any money when you runaway?
R: I start with some money; my friends also have money. As time pass by, we ran out of money.

    I: What do you do then?
R: Well I called my mom, but she rebuked me. So I go live with my girlfriend. Consequently, the fight between me and my family got worst. That's why I don't want to go back home.

    I: What do you think about the app?
R: I think the app is useful to the runaway youth.

    I: In your opinion, which feature is most useful for runaway youth?
R: In my opinion, the most useful feature is the check-in feature. This is because a lot of my friends (who also use to be here at the hub) went to live on their own. 4-5 of them is renting an apartment.

    I: Where do you go for medical care?
R: If it is a serious symptom, then the hub will take us to the public hospital. If it is not a symptom, then I'll come to the hub for medical care.

    I: What conflict should we address in the conflict management feature?
R: Usually the conflict at home (with the parents). Since there are many runaway youths who run away from their home due to this (conflict with parents).

    I: Which medium/ format should we use for addressing these conflict management?
R: video would be easiest to learn and understand.

I: Lastly, is there any more features you would like to have in this app?
R: No, it's OK…. It's fine already.

    I: Do you still go back to school during that time?
R; Yes, but not for long.

    I: Why not for long?
R: I got into a fight with my teacher, and I feel like I can't stay there anymore. So I leave school.

    I: What did you do after you live school?
R: I decide to ordinate (become a monk) and stay at the temple instead. However, during my time being a monk, I don't follow any precept (a rule that monk must follow). For example, I drink, I touch women, I eat during the forbidden time, I do everything. Then I saw my monk friend leave the temple, so I leave with him and go stay at his house. I can't stay at his house for long though because his mom won't let me.

    I: Where do you go then?
R: With my aunt & uncle at Bangkok (At first he live in Prichit province).

I: Do you go back to school after that?

R: No, my aunt & uncle ask me to go back, but I don't want to. I want to work so I found a repairing job. I got a lot of friends from work and we do a lot of stuffs, such as smoking, drinking, and inhaling glue.

I: Aren't you scared of the cops?

R: To be honest yes but I can't stop myself to the point that I use meth, weed, and etc.

I: Is there other illegal act that you do?

R: Yes, I start robbing things. Along with assaulting people.

I: What did your aunt & uncle say then?

R: They were mad at me, so I run away from their house and go live with my friend from work instead.

I: Have you ever been caught by the police because of illegal acts?

R: Yes, 3 times. The first time is from assaulting. The second time is from stealing motorcycle. The third time is from stealing a car.

I: Did you change yourself after being caught for three times?

R: During my third time of being caught, the court wants to send me to the army. However, my grandfather came into the court and help me before the jury were made. After that I went back to live with my family and promise to my grandfather that I would behave better than before. So, I went back to work (being a light mechanics), and I brought a phone with the money I got from work. However, my mom pass away and I got a dirty job (drug dealer). Hence I was once again a drug addict (did not change myself after all). Everything got worst to the point that my family members decided to abandons me from the family.

I: Have ever been paid for sex?

R: I have been paid by gay men but not for sexual intercourse just hugging and kissing.

I: How did you know about the hub?

R: My girlfriend during that time take me here.

I: At what age did you came to the hub?

R: 18 years old.

I: How does the hub look like back in the day (when you first came here)?

R: Everyone was abusing drug (inhaling glue) in here to the point that the police close this place down once.

I: Do you have a girlfriend right now?

R: Yes

I: Have you ever abuse your girlfriend in anyway?

R: Yes, I use to beat her (use violence against her) at first when I realize that she participates in survival sex.

I: Do you use condom while having sex with your girlfriend?

R: No, but my girlfriend have contraceptive implants.

I: Are you still abusing drugs right now?

R: Well, my girlfriend left me and I have nothing left. So, I do everything including meth, inhalants, alcohol, and marijuana.

I: Now that you won't be going home, what is your plan for the future days?

R: I've been called for the military for 2 years, so I guess that is where I will live in the next 2 years.

I: Honestly, what do you want to become?

R: I want to become a boxer. I use to train as a boxer when I was younger, but I broke the rules there and got kicked out.

I: This is the UI mockup of the application we are developing for you guys. The first feature is the news feed feature where you can find out about upcoming events/ activities at the hub along with the good resources about conflict management. There is also an area announcing the lost children in case you guys can help us find them. The next feature is the resources feature where you can find the available resources around you such as free food, shelter, and medical care. The last feature is the check in feature where you can check in at any location at any time like Facebook. This feature is built so that the staffs at the hub knows that you guys are safe.

I: In your opinion, which feature is most useful for runaway youth?

R: The resources feature. I really like it. Do they really have a free shelter? How does it look like? Is it like the hub?

I: Lastly, is there any more features you would like to have in this app?

R: I want you guys to add the location of free activities inside the resources feature, such as activity that provide runaways like me to do good things.

English translation of interviews #7 and #8

I: Denotes Interviewer
Y1: Denotes Youth #1
Y2: Denotes Youth #2

I: Why did you came to the hub?
YI: I came here to get support from the hub, mainly to study. I also come to hang around with my friends here.
Y2: I also came here to get supports from the hub. The teachers (probably the staffs at the hub) take care of me well. (Y2 also have one child so she would bring her child here and the peoples at the hub help her take care of her child).

I: Do you have any problems with your family?
YI: No, I still stay with my family
Y2: No.

I: Where do you sleep at night?
YI: With my family.
Y2: At my home.

I: How often do you come to the hub?
YI: I came here everyday at day time. At night I go back home.
Y2: Everyday too.

I: How did you find out about the hub?
YI: I find out about the hub from my friends.
Y2: My boyfriend brings me here. He live here before I met him,

I: How long have you come to the hub?
YI: About 1 year
Y2: Almost 2 years old.

I: Do you rely on the hub for food?
YI: Yes, I eat here everyday
Y2: Yes, but not that often

I: Do you rely on the hub for place to sleep?
YI: No
Y2: No

I: Do you rely on the hub for medical support?
YI: Yes, the hub has the medicine and first aid ready for us. And when we are really sick, the hub take us to the hospital.
Y2: Yes, sometimes

I: Do you rely on the hub for consultant?
YI: Yes, I use to consult with the staffs here.
Y2: Yes, I do.

I: Do you rely on the hub for education? If so, what grade are you now?

YI: Yes, I'm in middle school now.
Y2: I stop studying for now, because I have to take care of my child.

I: How many more years do you need to take to finish school here?
YI: About 1 more year.

I: Where do normally go to apart from the hub?
YI: I go to meet my boyfriend.
Y2: I usually stayed at home.

I: Do you know about the anonymous clinic?
YI: No
Y2: No

I: Where do you go when you are sick then?
YI: Public hospital
Y2: Public hospital

I: Do you about a place where you can go to consult about family planning?
YI: No
Y2: No, I only consult Dr. Great.

I: Do you know about sexually transmitted diseases? If so, can you give an example of YIe symptoms?
YI: Yes, they taught us about STDs here. I don't know the symptoms but I know how we can get it and how we can prevent it.
Y2: Yes, I don't know the symptoms but I know that you must wear condom to prevent it.

I: Where do you hang around with your friend?
YI: Here at the hub.
Y2: The market and stuff.

I: How many hours do you spend on your phone each day?
YI: All day. But I won't play it when I work here (the hub food truck). Every other time when I am free I will play it though.
Y2: About 2-3 hours a day.

I: Have you ever use google to find out about thing? What do you google?
YI: Yes. I google about my homework stuff. I also use youtube to watch many things because I like to watch videos.
Y2: Yes. I google about how to take care of my child and also how to myself (ways to be more beautiful).

I: Do you know about the child line? And do you ever call them?
YI: Yes, but I never called them. I directly came here instead.
Y2: Yes, but i never called them too.

I Who do you get advice from then?
YI: The teachers at the hub.
Y2: Dr. Great.

I: Between getting advice by speaking and typing which one do you prefer?
YI: I like typing
Y2: I like speaking

I: Do you always have data on your phone?
YI: Yes, I always refill my data.
Y2: Yes, I pay my data monthly.

I: Do you want the app to update you about activities/ events at the hub?
YI: I think it is good too, because our house is faraway so we don't really know about the activities/ events that will be happening at the hub.
Y2: I think it is really good.

I: What do you think about the app (the UI mock up)?
YI: I think it is a good app too.
Y2: I think it is a good app. And I would use it because I like the lost and found feature.

I: Which feature do you like the most?
YI: Every feature seems useful to me.
Y2: The news feed and the lost and found feature (I will use it to find my child *laugh*)

I: Do you want to add anything else in this app?
YI: No
Y2: No

English translation of caretaker interview #1
I: Denotes Interviewer
C: Denotes Caretaker
I: How long have you been here?
C: since the hub opened, 6 years

I: Everyday, How many hours you spend with the youth?
C: Monday to Sunday: 9am - 6pm. Except Friday: 9am - 8pm

I: What youth usually do or join activities?
C: learning, dancing, B-Boy Monday, Wednesday, Friday, Swimming, Cycling, Activities that youth can relax

I: How's youth behavior? Will they be difficult to talk to?
C: Depends, when they have problems or need help, they will just come to us and ask for advice

I: Do most of the youth come into the Hub to just get free snacks or do they also join activities at the Hub?
C: They usually join activities with the community children

I: What do youth most sensitive to?
C: If they like, they will do or go for it. But if they dont, they won't do it

I: What we shouldn't talk to them about?
C: their private matter

I: Are there any kids face with sadness?

C: yes, but we will keep in touch with these kids and constantly give them support and advice, along with doctor consultation

I: Are there any kids come to discuss their life issues? If yes, what is it usually about?
C: yes, but often not with me, there will be youth worker, like volunteer, to give counselling. There is a counselling room upstair. So when the youth have any problems, they will go to counselling room and share their problems one on one with the youth worker.

I: Do you know what they like to do when they are not at the Hub?
C: hangout, watch movie

I: Where do youth eat dinner?
C: at the Hub

I: Are there any places to sleep other than the Hub?
C: no

I: Around how many kids sleep at the Hub?
C: 5-10, used to have 17
I: What about if the kids that don't sleep here?
C: their house or their friend's house. If they not coming back to sleep, they will inform us

I: If we going to find other places for them to sleep, will that help? and should we just find in bangkok area?

C: i think you should find it near the Hub first

I: Are there any kids who go back home?
C: some of them, but most of them, when they go back home, they will still come back to the Hub.

I: What's the reason they go home?
C: They will come to us and tell us that they want to go home, but we need to check that if they go home, will they be safe

I: Are there any kids that doing well in their life now? Are there any ways to contact them?
C: There are kids who keep working and improving their quality of life. They often come back to visit the Hub. We have all of the kids' contact and stay in touch with those kids

I: What do you think about this application? What should we improve on?
C: That's great. Emergency, When the kids are in the emergency case, the service should serve fast and

help the kids in time. At the Hub, when kids need help, they can press on a button 24 hours to get help.

I: What ways do you think can prevent kids from running away?
C: Family, parents

I: What things or snacks do they like?
C: any snacks

I: Are there any diseases that kids usually face but don't know how to treat?
C: Usually, they won't tell us until it got worse then they will tell us.

I: conflict management?
C: They will have their own way of dealing with their conflicts

I: What form of information into the application? text, picture, video
C: Picture

English translation of caretaker interview #2
I: Denotes Interviewer
C: Denotes Caretaker
I: How long have you been working here?
C: It's almost 2 years

I: Everyday, How many hours do you spend with the youth at The Hub?
C: So I come to work at 9am and leave at 6pm so it must be around 8 to 9 hours.

I: What do the youth usually do or which activities the participate in?
C: Over here there are some who practice certain skills by selling in the food truck while some comes in to The Hub to play around or sit and play.

I: How's the youths behavior? Will it be difficult to talk to them or...?
C: No it won't. It is normal they will tell their stories or reply us.

I: Do most of the youth come into the Hub to just get free snacks or do they also come to join the activities and gain knowledge?
C: They also come in to do activities. If they stay the whole day they eat as well.

I: And when Doctor comes to teach do the youth enter the class and study?
C: Enter, they enter.

I: What are the youth most sensitive to? Like what we shouldn't talk to them about?
C: Most of the times when they have any problems they come speak with us. So over here there are room upstairs which they can sit and talk with us in private where they talk and tell the story to the caretaker.

I: Are there any kids who is filled with sadness or sickness at heart?
C: No, over here as it can be seen everyone is really happy and outgoing

I: Are there any kids who come to discuss their life issues with the caretakers? If yes, what is it usually about?
C: They come to talk about their family, boyfriend or girlfriend, and stuff like this. Which isn't too big of a problem. There may be times where they fight so they come and tell what happened in the day time then by the night they are fine already. There aren't serious problems but it is very rare.

I: Do you know what they like to do when they are outside or not at the Hub?
C: They will go eat pork (moo-kratha), pang-yen (bread or something), and something like that. They go roam around for a bit because they know that at night they must come back here (to The Hub).

I: Are there any places to sleep other than the Hub?
C: If they do not sleep at The Hub they go back and sleep at home. But if it is the kids who come from other provinces then they stay here.

I: Around how many youths sleep at the Hub?
C: Around these days there are around 6 to 7 youth. But it depends, for instance if there are activities or exams the next morning then they would stay here (at The Hub)

I: What about if the kids that don't sleep here?
C: They go back and sleep at home.

I: If we going to find other places for them to sleep, will that help? For example other organizations that has place to sleep for the youth similar to this place.
C: It would be good if there are a lot of places which helps the youth. So the youth can have options.

I: Should we find places for them to sleep only in Bangkok or other provinces as well?
C: Most of the kids who come in here are from Bangkok only. They stay nearby this place. They stay around Hua Lamphong.

I: Are there any kids who ran away and then went back home?
C: There are.

I: Around how long after running away do they go back home?
C: Around 2 months, or 3 months. After not too long.

I: Do you know the reason that they go back home?
C: It may be because of misunderstandings. Then they talk to us, the caretakers, and then they understand and go back. Some of them also just think too much, they are scared of their parents. When we talk to their parents we find out that there is no actual problem, the kids just thinks themselves so we tell the kids and they go back normally.

I: Are there any runaway youth that are doing well in their life now?
C: They are happy.

I: Most of them go home or go and find a job and stay by themselves?
C: Most of them go back home and find a job at their homes.

I: Are there any who does not end up going back home and find a job outside?

C: No, from what I know they go back home. Their homes acknowledge and the youth finds a job near home.

I: What do you think about this application?
C: It is good. It's a page which helps youth with problems, they can find answers or ask questions. It is another choice for the youth which is good. Sometimes it is inconvenient for the youth to come to The Hub, the youth's life is based on the phone and so they can contact through phone. So it is good.
I: Should we change anything in the app? Or anything that we should add into the app?
C: It is enough.

I: What ways do you think can prevent kids from running away?
C: It must start from the basics which is the family.

I: What does the youth like to play with or which snacks do they like to eat?
C: They have sweets, desserts. They only play with phones because they are a bit older. The younger kids would play with toys.

I: Which youth would be most cooperative with us interviewing?
C: Everyone.

I: We need a little more information regarding the app. Are there any diseases that kids usually face but don't know how to treat? Which treatment should we add?
C: Like First Aid. It would be good if you gave the basic treatment method. The problems should be based on teenagers. About risks, protective methods (in sex), and basic first aid treatment.

I: There may be stress, anger, or sadness which the youth have felt in life. We want to find a way to solve the problem in the app. Do you know if the youth want to know what problems to solve?
C: Stress would be about fights between friends and something like this. They are stressed about small problems so ways to solve these issues. Sometimes they come and talk to us (caretakers) about it. They fight in the morning and by evening they are okay already. But we (caretakers) are the ones who are stressed instead. When they fight they do get angry and in a bit they are fine. So we tell them to talk together, we make them sit down and talk together, they understand each other, and then they talk normally after that.

I:What form of information should we put into the application that the youth would like most? Video, speech/written, or picture
C:It should be something like they can ask us questions and we reply them. It would be good if it is written. For example if this happens what should we do. So written and maybe a picture.

I: Are there any other features you would like in the app?
C: Just the feature where they can ask question and we answer them. Because they may have questions which is not already in here or the videos may not have that information.

I: How many youth does The Hub look after?

I: Is it okay if we make the lost kids feature managed by caretakers at The Hub? (Not through a web crawler)
O: Yes. (We can still provide a link to the site)

I: How many caretakers are employed at The Hub?
O: Six.

I: Can you tell us about the LINE group chat? That is, usage and topics of discussion in the chats.
O: This does not exist, however it could be possible for caretakers and me to have shifts to answer messages in the chat. LINE would be prefered for anonymity.

I: How many runaways usually participate in group activities?
O: Usually 10 to 20. More community kids (younger kids who come on the weekends) come

C: There is a lot. If those who keeps on coming in there are about a hundred. But if those who comes here often then around 20 to 30. On the weekends there are more because there are small children as well. Or if those who has come to ask for help in the past then there are a lot, they come and go. On the weekends there are also around 20-30 people, there are a lot of community kids who comes in because we have activities.

I: Sometimes do you have problems in contacting the youth? When they are not at The Hub.
C:We call and ask them, or ask on Facebook sometimes. Because the youth keeps on changing their phone number so Facebook. We also ask their friends.

English Interview with Mr. Sakson

than street kids (older kids who come during the week).

I: How many runaways are employed at The Hub?
O: None. There are around 70ish street kids at The Hub. Some do work as activities and may receive money, but they are not employed.

I: How many runaways receive some form of education at The Hub?
O: About half. There are sometimes tutors that come in to teach for exams, but attendance is wholly dependent on the street kids.

I: Can we use the content from the website of the IQP group last year (drug prevention program)?
O: Yes.

I: Can you come to our final presentation on Feb. 25?
O: Yes, but in the afternoon 11 - 3. Would prefer if both Sati groups were together.

Interview questions given orally to operators at The Childline. Questions were asked in English.
I: Denotes Interview
O: Denotes Operator
I: How long has the Childline been operating for?
O: Childline has been operating since the year 2003. It was known as "Phunkaewsamakhom". We used to work with Channel 9. We have a show which we kids ask questions and we answer them. We also work with UNICEF. We developed into an organization in the year 51 (2551 which is 2008).

The Childline Thailand Foundation works with Childline abroad as well such as in UK, etc. The Childlines have meeting together and Childline Thailand is the one who organizes it. The most recent meeting was last year (2017). There are 181 Childline operations from 147 countries. Some are for kids, teenagers, etc. Each country may have more

than one operation. Each year depends on the country which join, close down, etc. There are few changes but usually the country increases.

I: How does the call line work?
O: We have an express call where youth can talk to us, they can talk to us about sadness. We go do activities at school and places that sponsor us. Youth knows us, the childline, by two ways. First is by us doing activities or their friend who has done activities with us. Second is from The Hub. Youth knows that this is a safe platform and recommend Childline to others, they tell all the details. 1387 (Childline's phone number) is free of charge so youth who does activities calls in. We do get some calls from youth in other provinces. "Phun-kaew-samakhom" knows and calls them as well. There are also youth from the North and South who calls [Kha-ra-waan-sai-dek]. We focus on helping youth under the age of 18. If there are youth who are above 18 we try to arrange something for them by passing on the problem to other organizations.

I: Where do youth over the age of 18 call? After they call the Childline
O: They call 1300, a government organization (Krasuang patana sangkhom lae khwaam mankhong khong manut.).

I: What are the problems youth face?
O: Youth faces many problems which they need someone to talk to. It usually isn't about running away from home though. They just need someone to talk to. So when they are curious or need someone to talk to, feeling or wanting to express happiness or sadness, they call in to talk. They ask stuff about love as well like "Can I have a crush? Can I talk to them? Is it good?" They also just call in to talk to us [Childline call center] normally like "Did you eat yet? What are you doing?". We do not get money or anything from this, we just want to help the youth.

I: Do youth call and ask about sexual abuse?
O: Youth do not really call and talk about sexual abuse, there are very rare cases and sometimes they just think about it or see from drama/serial.

I: About the Childline Thailand Website, we found an article and a website. Is there anyone who maintain or update the website?
O: Kaew, an admin at The Hub, takes care and manages the website. We do not hire anyone, basically anyone available can update the website. But there are really less admin while there are a lot of youth and work, hence only important things such as main activities are updated for example food truck

at a function or participating in a contest. Information such as weekly activities at The Hub are not updated. Small activities and checkup are not updated because there are not enough workers. The Hub does a lot but does not show much of what they do. We also have B-Boy dances and youth goes to dance in shows as well. There are places that send messages to The Hub for the youth to take part in activities or contest fairly often. But there are less volunteers and workers at The Hub so it is hard to participate. We do offer Informal education, have a counselling room where youth can talk 1 on 1 with Dr. Great, for instance about depression, we teach them how to cook, stitching, and art and crafts about beads. We take these stuff and show, sometimes we even sell it. On Saturdays the youth go swim at KIS. KIS fully support these youth and even treat them food after swimming. Some of the youth have diseases or rashes but KIS are very open and don't mind that. They allow the youth to swim in the same swimming pool as their students. On Sunday they clean the swimming pool. Now there is skating for the youth as well somewhere around sukhumvit area. So when we take the youth, they specially close the rail only for these youth to skate.

I: Can we update activities in the app?
O: Teacher B is a caretaker at The Hub, Teacher B is the head at The Hub. You can contact Teacher B to ask for activities and put it in the app. Want to help youth to prepare them for life; be able to help themselves and go find a job. Some go out and work but have strong bond at The Hub so come back to sleep at The Hub. One went to work at emporium and is earning 20,000 baht per month.

I: How do you operate?
O: We are a NGO, not the government, so we coordinate work. We do home assessment, interview both child and parents, and fully get involved. Nonetheless, we do not have the authority to do everything by ourselves. We coordinate with Kom-kichakarn-dek Yawochon. They are the government so they have the rights to take away the kids to foster care, orphanage, etc if youth is facing risks at home. Childline finds prove and make a case for government so they can help the child. Childline is always involved, so after passing or requesting the case to government agencies they work together. We also work with 1300, an agency that protects and helps youth. 1300 works with both youth and adults. So when there is a problem Childline can't go in alone but can tell 1300 and go in together. Childline identifies the risks, protection, health - can take to consult doctor, and for feelings can take to psychologist.

I: Could we include your number in our Emergency feature? Could we include a messaginging feature as well?

O: You can include our number, 1387, in the call feature. We would appreciate it if you put our logo as well. On our facebook page we somewhat update project and post activities. However, there's no admin who looks after the chat. Moreover, no one has yet discussed their problem through chat on Facebook so we do not think we would do messaging.

Ran through each feature

I: What do you think about the News Feed feature? Is it okay to include images of youth doing activities?

O: We do not want to post any pictures of the youth. We are working under the government and we have to ask the youth for permission if we wanted to post their pictures. We have a protection or line that youth and caretakers are not friends on Facebook. But we are able to find youth on Facebook and contact them when needed through messenger. We do not want to give out information about the youth.

I: How did you like the Safety Check feature? Could it replace the sign in sheet at The Hub?

O: Right now there is a sign in sheet at The Hub. We do provide them both food and shelter. The sign in sheet is a prove that there are youth we are offering food to, when we go around to get food donations and stuff like that from other organizations. We need their signature in their handwriting as a prove. However, the share location and safety check would be good when the youth are not at The Hub. This way we will know they are safe.

I: How could we improve our Educational Resource feature?

O: We want to let them know about risks from survival sex or sex. We want to tell them about STDs and unprotected sex. The youth are often shy to tell us if some sort of this happens to them. It should be in the application so they can look at it in the app and know. They are afraid if one friend knows about it and the news will spread, eventually everyone else will know. Caretakers do have medicine for the youth, teach them about it, and take youth to the doctor. What usually happens is that youth reads from google then tells the caretaker, caretaker give basic help and see through for 3 days. If the youth

does not get better then the caretaker takes the youth to the doctor. Sometimes youth has a hard time believing or trusting others. There are some youth who have STD but can't tell because it's a sensitive topic. So it'll be good if there are ways to protect from STD in the app. Another thing is that youth don't really have alcohol. It is mostly about drugs because it is a dangerous area and drugs can be easily obtained. So for the app it would be good if you included information about drugs.

I: Do you think the Resource Finding feature would be helpful?

O: We do have some connections with hotels. The hotel is nearby The Hub and has buffet, sometimes there are less customers so there are a lot of leftover food. The problem is we need to send someone in to get the food but no one is available to go get the food. You can ask Kaew about this, I'm unsure about the name of the hotel. Youth don't eat much anyways. They usually eat sticky rice with pork, make rice themselves. There is an organization, katanyu, that they have connection with and can go get free raw rice. The youth then cook the raw rice by themselves. Youth chooses the menu of the food themselves. Every Friday we finish at 8pm because there's a meeting and update about activities. There used to be one person who does activity at The Hub but youth gets bored of the same person so now there are three people. We do not offer much money so only those with big heart or those who want to help comes and do the activities. Dr. Great has some connection as well so they can ask for help.

I: How do you promote The Childline?

O: What we are planning to do right now is we are starting by letting the youth scan a QR code. We are making an application or line group right now for an event on the 21st Feb 2018. We are going to go give knowledge to 120 kids. We can only give out the app through the event. We want to have just one web, such as QR code for line. We are printing QR code on shirts so that youth can scan and enter the line group. We haven't yet thought of the name of the group. This is for those who wants to chat and not call. There are no admins as yet and this is still in progress. Our activities are mostly in Bangkok, we have very less in other province due to our budget. We did go to Koh-Larn to give knowledge. We told them about physical abuse and told them that they can call and talk about other stuff as well. We are not sure if we want to expand our organization.

Appendix D: Interview Analysis
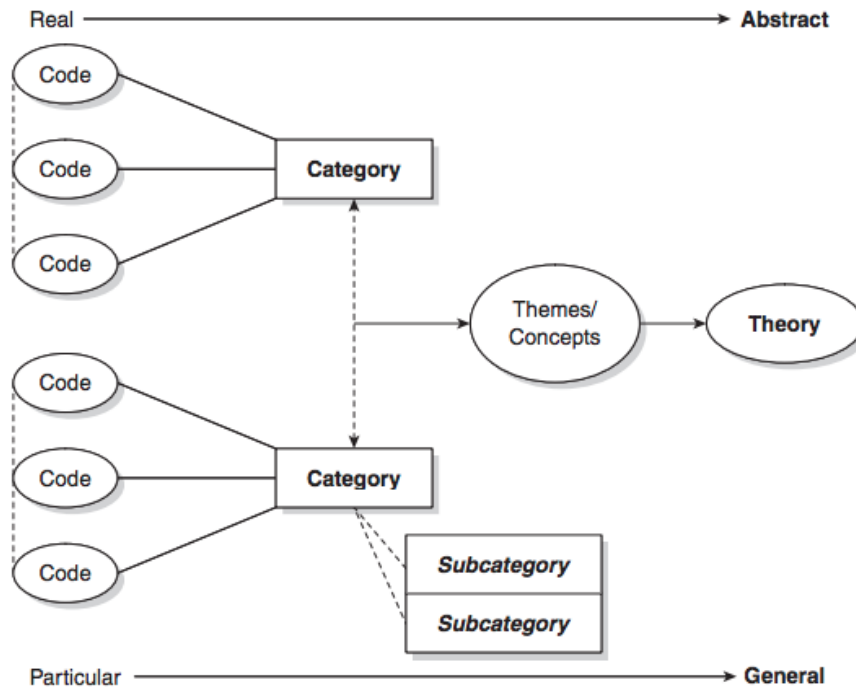*Coding the interviews*

Figure D. Coding manual for qualitative researchers (Saldana, 2015)

| Category	Question	Answer	Notes
Personal	Can you tell me your life story?	Last time, I stayed with my dad and stepmother. They always order me to do work at home and we often got into a fight.	■ Trouble w/ authority ■ Substance abuse ■ Hub dependency ■ Literacy problems ■ Friendship ■ Violence ■ Physical Abuse ■ Lack of Resources ■ Conflicts ■ Cell phone usage ■ Sex work ■ Childline ■ Delinquency ■ Incomplete Sex-ed ■ Education desire
	Your daily life?	Monday and Thursday, I have a lesson at the Hub. For Tuesday, Wednesday, Friday, Saturday and Sunday is a holiday, so I will work. Work outside the Hub, find job outside	
	Where do you eat everyday?	The Hub or buy it nearby. There's a lot of food around here	
	Where do you sleep every night?	Everyday at the Hub	
	Have you ever get sick and get free medical treatment at the hospital?	Yes. at Ramathibodhi hospital. I got an appendicitis and get free surgery. I went in the name of the Hub Foundation.	

Table B. An example of how we coded our interviews

	Youth #1	Youth #2	Youth #3	Youth #4	Youth #5	Youth #6	Youth #7	Youth #8	Average
Age of First Running Away	n/a	12	n/a	n/a	11	15	15	16	13.8
Years at The Hub	5	0.6	0.2	6.5	10	7	1	2	4
Current or Previous Substance Abuse	1	0	0	1	1	1	0	0	50%
Incomplete Sexual Education	1	1	1	1	1	0	1	1	88%
Conflict with Family and/or Friends	1	1	1	1	1	1	0	0	75%
Involved in Sex Work	1	1	0	0	0	1	0	0	38%
Show Signs of Literacy Problems	1	1	1	1	1	1	0	1	88%
Use Cell Phone more than 2 hours a day	1	1	1	0	1	0	1	1	75%
Have a phone and generally use them	1	1	1	1	1	1	1	1	100%
Close Bonds with Friends	1	1	1	1	1	1	1	1	100%
Lack of Resource Knowledge	1	1	1	1	1	1	1	1	100%
Called Childline	0	1	1	0	0	0	0	0	25%
Some Form of Dependency on The Hub	1	1	1	1	1	1	1	1	100%
Past convictions	0	0	0	0	1	1	0	0	25%
Relied on The Hub for Food	0	1	1	0	0	0	1	1	50%
Relied on The Hub for Medical Care	1	1	0	1	1	0	1	1	75%
Relied on The Hub for Shelter	1	1	1	1	0	0	0	0	50%
Relied on The Hub for Emotional Support	1	0	1	1	1	0	1	1	75%
Participation in High Risk Behavior	1	1	0	1	1	1	0	1	75%
Were encouraged by friends to visit the Hub	1	1	1	1	1	1	1	1	100%

Table C. Quantitative information spreadsheet

Appendix E: Software Engineering Practices and Technical Background of Development

Software Engineering Practices
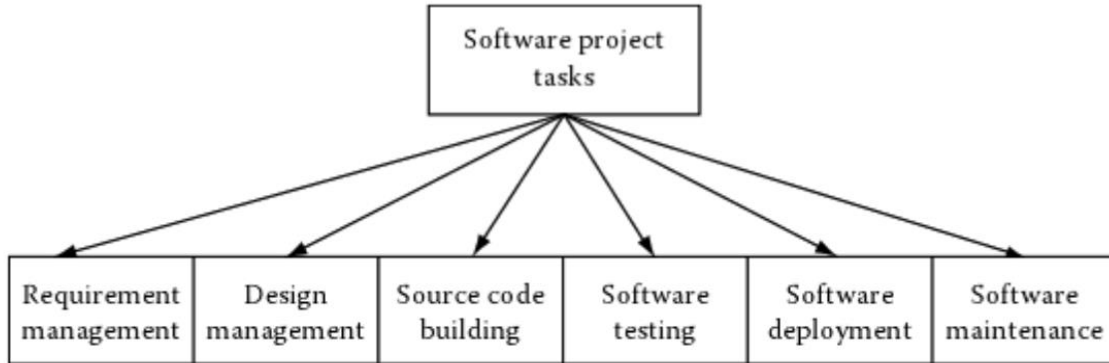
Software Development Life Cycle

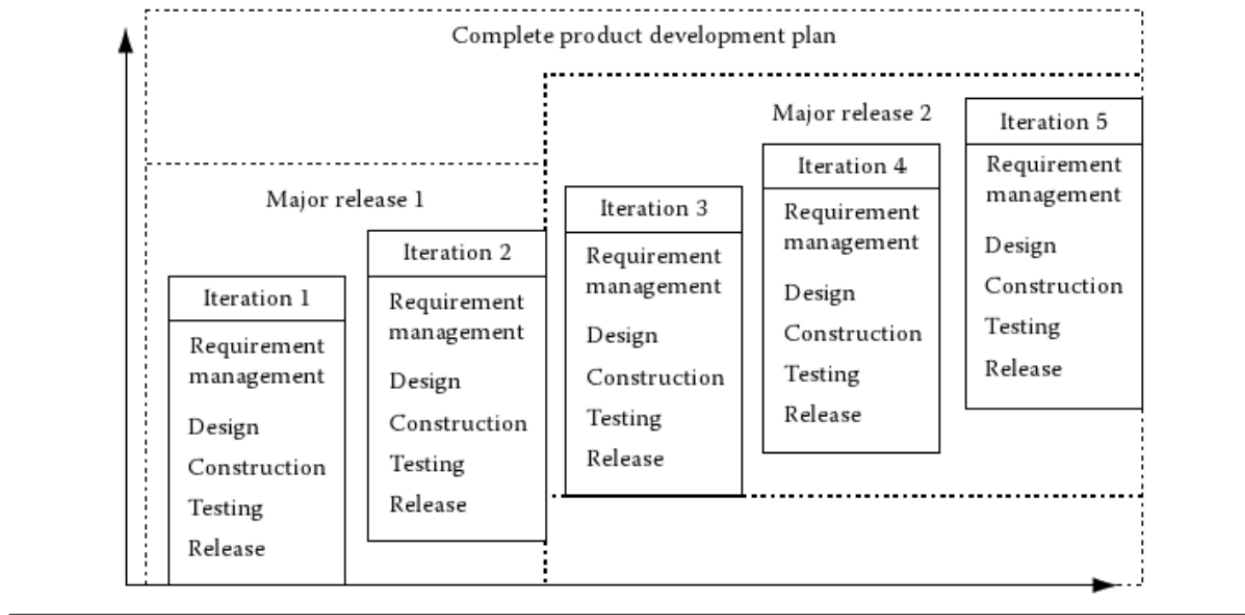Figure E. Tasks in software projects (Ahmed, 2014)

Figure F. Agile Scrum methodology: complete product development plan. At the end of each major release, feedback from target population is collected.

Application Technical Development

Website	Mobile App
+ Easier to develop, websites are compatible across devices.	- **More variability in development, because of different phone systems, types and operating system versions (solved by our choice of React Native)**
+ Easier to maintain.	- Difficult to maintain, because of manufacturer's constant system upgrades.
+ Instantly available, by providing the URL.	- Need download from respective application store first.
+ Broader reach because they are instantly available and compatible across devices.	+ **Personalization - If target users have personal information and usage, then an app offers better experience.**
- Less integration with specific device resources.	+ **Easier access to device resources, like GPS or camera sensors.**
- **Relies on an active internet connection.**	+ Offline access.

Table D: A comparison between websites and mobile apps as a platform (Separate sites for mobile and desktop, 2013; Summerfield, 2017).
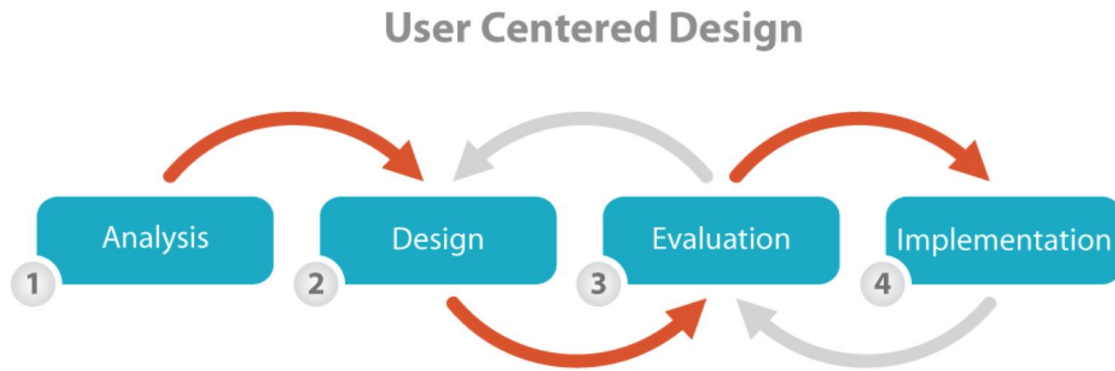
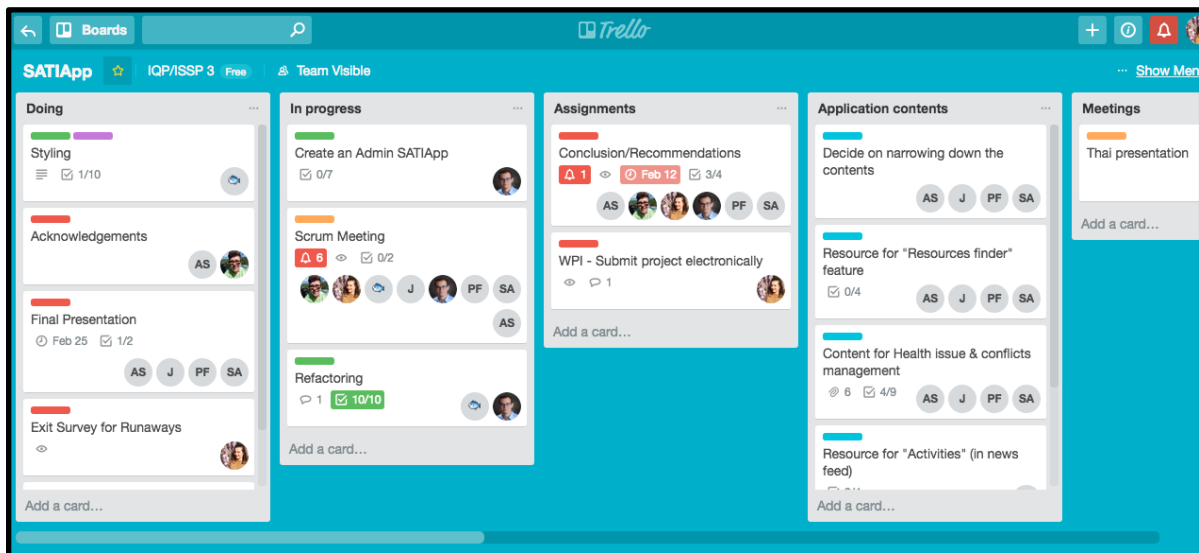Figure G. User Centered Design (What is User Centered Design, 2017)

Figure H. Screenshot of Trello board used for organization of the project. Trello is a website that allows group members to easily collaborate with each other by showing what's being worked on, who's working on what, and where something is in a process.

React Native

React Native is a framework for building native mobile applications using React, a Javascript library for building user interfaces (Boduch, 2017). The framework was released by Facebook in March, 2015. It is an open-source framework available free in Github (A Brief History of React Native, 2016). Although it started at Facebook, now it has grown to more than 1000 contributors and it is one of the most used repositories on Github (Boduch, 2017). Using React Native, we were able to develop a native mobile application, ready for release for both iOS (Apple) and Android (Google) mobile operating systems. The fast development cycle and the shared code base between the two major mobile platforms helped us decide to use this framework rather than the respective native solutions of the mobile platforms. For more information on React Native, visit Facebook's website: http://facebook.github.io/react-native/

Firebase

We used Google Firebase Realtime Database to store all the information online on Google. There are four main reasons we chose Firebase as our cloud solution:

1. Automatic scaling for storage needs, in case our application grows to be used by other organizations
2. Automatic data synchronization and conflict resolve
3. Speed of initial set up
4. Data security provided by Google

Link to our full code implementation on Github

We used Github as a version control system throughout our development of SATIconnect. A list of guides to use Github can be found on the following website: https://guides.github.com. Our sponsor and future developers hired to work on the mobile application can find the full code implementation on the following Github repository: https://github.com/mazyla/SATIApp.
This repository is free for anyone to read and use.

Appendix F: Exit Survey
Survey to be Given at: End of Project, One Month After, and One Year After

    1.) How often do you use SATIconnect?
       (Everyday, every other day, once a week, once a month, never, n/a)

    2.) How often do you check-in with The Hub?
       (Everyday, every other day, once a week, once a month, never, n/a)

    3.) How many free resources for food, shelter, and medical care other than The Hub do you know?
       (0, 1, 2, 3, 4, 5, 6+)

    4.) Have called The Childline using SATIconnect?
       (yes, no, I do not know what The Childline is, n/a)

    5.) Do you feel like the educational information on the app is given to you in a way that is easy to understand?
       (yes, no, I do not know the educational information, n/a)

    6.) Do you have any suggestions for features on the application?

    7.) Do you have any suggestions for the design of the application?