Mobile instant messaging: "Help at the fingertips of addicts"

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TO WHOM IT MAY CONCERN

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Abstract

An increase in gang and drug activity in South Africa has been causing tension within communities and has a negative effect on society. Treatment and counselling facilities are finding it difficult to cope with the influx of substance abuse cases. Traditional face-to-face counselling and telephone help-lines have come under pressure with this increased demand. This presented an opportunity to use mobile and web technologies to provide advice and support to people impacted by substance abuse problems. This study indicates how a substance abuse counselling service called Drug Advice Support (DAS) uses technologies such as Mobile Instant Messaging (MIM) and social networks to benefit and empower these communities in tension (CiT). The service makes it easy for persons with a mobile device with internet connectivity to access the service. This paper takes an evolutionary journey through the design and development of the DAS system. It studies how the system evolved as an environment in which DAS was operating and co-developed with citizens in the Athlone Living Lab (ALL). The DAS system started with one advisor advising a few people, to multiple advisors advising as much as 471 conversations during a two hour period. It also shows how the implementation of such a system could be used to aid communities facing other social issues in South Africa and other parts of the world.

Keywords: Mobile technology, mobile phones, mobile instant messaging, Drug Advice Support (DAS), substance abuse, Community in Tension

1. Introduction

The increased use of alcohol and other drugs in South Africa places a hefty burden on the health, social welfare and criminal justice sectors (Harker et al., 2008). Reports from treatment service providers and communities point to an increased demand for substance abuse treatment, with an increase in the number of people on the waiting lists. The increased demand has placed substance abuse treatment and counselling facilities under pressure to increase their coverage and provision of services (Myers et al., 2007). For many socio-economically disadvantaged communities the health services delivery system is not coordinated, but is rather fragmented and difficult to access (Parry et al., 2008).

Technologies, including mobile devices, which communities are already familiar with (Claasen, 2008), are not being used in ways to relieve some of the pressure experienced by counselling facilities. Just over 12% (5 million) of the population of South Africa now have access to the internet with either a computer or mobile device (Joubert, 2008). Technologies such as internet based messaging, social networking and social media can be leveraged in ways that can benefit both counselling treatment facilities and the victims of substance abuse.

This study suggests the use of mobile and web technologies as a possible solution for relieving some of the difficulties faced by substance abuse treatment and counselling facilities.

2. Substance abuse in South Africa

South Africa has experienced an escalation in substance abuse during its transition from apartheid to democracy (Central Drug Authority, 2006; UNODC, 2004). Since 1991, the number of people treated for substance-related problems increased significantly (Parry et al., 2004). Treatment facilities cannot keep up with the influx of substance abuse cases (Myers et al., 2007) therefore other ways of dealing with these issues need to be found.

The negative consequences of drug abuse affect not only individuals who abuse drugs but also their families and friends, various businesses, and government resources (NDIC, 2006). According to reports from the South African Police Services (SAPS), the number of drug related crime has increased dramatically over the past seven years (Haskin, 2008). Drug-related crime can disrupt neighbourhoods due to violence among drug dealers, threats to residents, and the crimes of the addicts themselves (SAPS, 2008). Teens between the age of 12 and 17 who reported alcohol and illicit drug use also report higher violent behaviours than those who do not report alcohol and illicit drug use (NHSDU, 2001). In a report published by the South African Department of Transport it blames drivers driving under the influence of alcohol or drugs as the number one cause of fatal road accidents on South African roads (Statistics South Africa, 2005).

Alcohol-related crimes (including the crime of drinking and driving) are not only committed by individuals who are high-risk drinkers and regularly drink to excess, but are also committed by individuals who occasionally drink at risky levels (Parry & Dewing, 2006). There is a growing body of research that links alcohol to violent crime, and in particular family violence and sexual violence. For example, a fifth of South African offenders arrested for rape reported that they were under the influence of alcohol at the time of the crime (World Health Organisation, 2005)

2.1 Methods of intervention

Despite the increased demand for substance abuse treatment services and evidence of the benefits associated with treatment, access to substance abuse treatment is limited in South Africa, particularly in Cape Town. This is partly due to the limited availability of treatment and counselling services, with existing resources in Cape Town only able to serve approximately 2500 to 3000 people per year (Pluddemann et al., 2006). This is grossly inadequate, given that there are an estimated 15 000 heroin users in the city (Dewing et al., 2006) and that conservative estimates from the South African

Demographic and Health Survey (SADHS) suggest that at least 10% of the population meet DSM-IV (Diagnostic and Statistical Manual of Mental Disorders) (First et al., 1997) criteria for alcohol abuse and/or dependence (Parry et al., 2005). In a region that is home to about 3 million people (Statistics South Africa, 2005), this would translate to about 300 000 people requiring some treatment for alcohol or substance-related problems. Coupled with a growing treatment demand, staff shortages have increased the caseloads of already overburdened counsellors. This restricts the number of people who can be served; thus limiting access to care (Myers et al., 2007).

Given that face-to-face counselling takes place with both parties being at a certain geographic location, the cost restraints can include transport, time taken for travelling and the cost of the counselling session itself. According to CTDCC (2009) the cost for counselling starts at R185 per session with some facilities requiring a minimum of 6 sessions. With substance abuse being a problem mostly in the lower income groups (Stats SA, 2007), most people find it difficult to get access to treatment. According to a study done by the Medical Research Council (MRC) most disadvantaged communities cannot afford treatment. Private treatment centres are more accessible for patients who can afford it or who have access to medical aid (Cerff, 2004).

Traditional face-to-face counselling uses a queuing system which by its nature is sequential. Queuing systems limit the number of people which can be attended to as treatment and counselling facilities are already under pressure and not adequately resourced to cope with the number of people which needs to be helped (Myers et al., 2007). Cases which require more urgent intervention cannot be filtered in a queue as depicted in Figure 1.

Figure 1: Traditional Counselling

2.2 Help-lines

Given the stigma of substance abuse, receiving help from an anonymous counsellor might be more acceptable than a counsellor in a face-to-face session (Hughes et al., 2000). Help-lines or telephone counselling is potentially free of certain constraining factors that affect traditional therapy, including geography, time, duration, and cost, making this form of counselling more accessible for a number of people who would be unable to attend traditional psychotherapy. It also relieves some of the pressures which current face-to-face counselling facilities are facing (Myers et al, 2007). Help-lines sometimes make available 0800 (Toll Free) numbers which people can access from anywhere but when callers are not near a land line these supposedly free lines may still

incur some cost to the caller. Some mobile networks charge for 0800 numbers and callers may not always be within range of a fixed line telephone. Both help-lines and traditional face-to-face counselling use queues to render services. As shown in Figure 2 even though the geographic constraints are eliminated, queuing systems does not have a mechanism to filter high risk callers (King et al., 2006).

Figure 2: Help-lines

3. Mobile technology

Mobile phones have become the primary form of telecommunication in both developed and developing countries (Bhatia et al., 2008). Moreover, the number of mobile phone subscribers in South Africa are more than 48 million (Claasen, 2008) which translates to almost 95% of the population having a mobile phone. Given the unprecedented growth of affordability and coverage of mobile telephony services, the mobile phone is now more accessible than the land line telephone (Bhatia, et al, 2008). These numbers are irrespective of class, race, age group or gender as is that of the substance abuse problems.

Mobile phone devices now have the ability to access the internet. There are the almost seven million (out of the current 9.5 million) South Africans who are browsing the mobile web regularly without access to the internet using a PC. Mobile devices can now use the latest internet tools from social networking, instant messaging, blogging and content sharing across the Web. Moreover, by 2010, GSMA (2007) projects that 90% of the world will be covered by mobile networks and mobile communication and will deliver data, internet and voice services to more than 5 billion people by 2015 – double the number connected today.

4. Mobile Instant Messaging (MIM)

Instant Messaging (IM) has also made its way into mobile technology. Instant messaging is technology which provides communication between one or more participants over a network or the internet. Instant Messages conversations initially used text-based methods but have recently also added sound or voice, video and images. Extended functionality now includes file transfers, group chat and conference services. Instant Messaging, as opposed to email, happens in real-time. Instant messaging applications originally ran exclusively on the desktop but have since been adopted by mobile devices known as Mobile Instant Messaging (MIM).

Instant Messaging is similar to SMS (Short Message Service) or Text messaging on mobile phones. The difference in SMS and MIM is cost factor. With mobile data rates

being on the decline, instant messaging applications costs as little as 1c per message (up to 1000 characters per message) compared to a text message (up to 190 characters per message) which cost between 35c to 80c (Vodacom.com, 2009). South Africans have already jumped onto mobile instant messaging and networking scenes with companies like Mxit having almost 11 million subscribers to date (Mxit.com, 2009). With the social network phenomenon taking off in South Africa MIM has been at the forefront of this sub culture. This has given new ways of getting in touch with people on a personal level. It is also quick and easy for youth to connect with one another and signing up for this service is quick.

## 5. Drug Advice Support (DAS)

The level of adoption of MIM and social networking by CiT's has created new opportunities to fight the scourge of substance abuse using these ICT tools and services. One such service called Drug Advice Support (DAS) has been developed to support persons seeking substance abuse advice and support. MIM is the basis on which DAS has been developed and designed.

The Drug Advice Support (DAS) platform was born out of the need to offer advice, support and frequently asked questions (FAQs) for people impacted by drug and substance abuse. The project was started by a community based organisation Impact Direct Ministries (IDM) who opted to use technology to offer additional support and advice to people affected by substance abuse. IDM is situated in Athlone, a suburb on the Cape Flats of the Western Cape which is plagued with violence, drugs and gansterism.

5.1 History of DAS

IDM launched an innovative support system called IDM Talk during January 2008 to assist the people who were part of their reconstructed program to use mobile instant messengers (MIM) and the web. Initially IDM used GTalk (See figure 3) as a solution to conduct their support services, but as the need increased another solution was required to manage the conversations. IDM Talk was integrated with a freeware application "GoTalkMobile" that gave advisors more flexibility and better management of conversations between advisors and persons in need. This solution worked well in the service's infancy stage when the number of subscribed users was less than 50 per week. The solution depended on advisors sharing the same GTalk account and having access to all conversations but did not always assure privacy of conversations.

Figure 3: IDM Talk system in GTalk environment
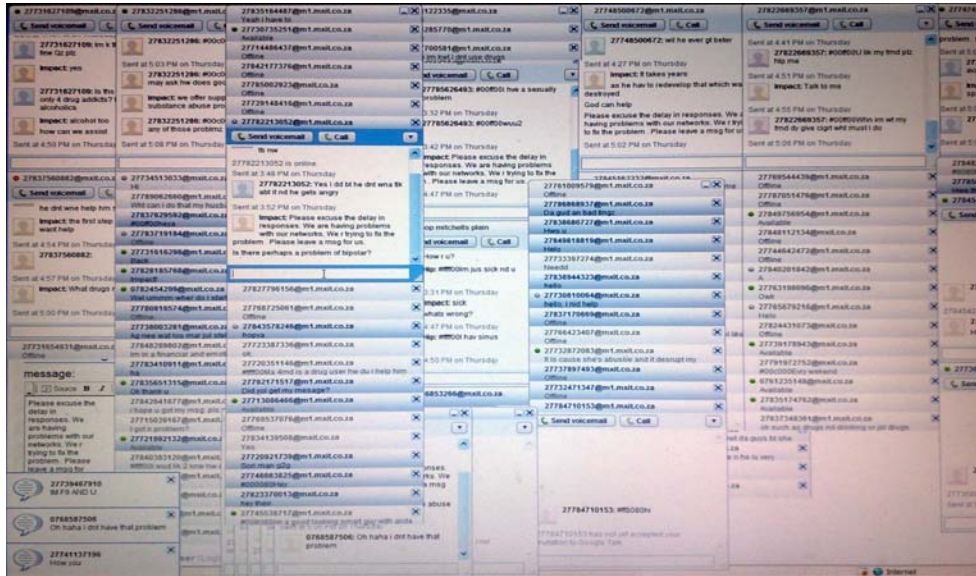
The introduction of an administrator called "the runner" was tasked with managing conversations and manually assigning them to a particular advisor. There was also a moderator function which would be responsible for ensuring conversations are in line with the service. This solution was manageable if advisors had a few conversations to deal with and if they were always at the same location. Some of the obstacles the initial solution encountered are as follows:

- Even though the number of conversations was low, the advisor's physical location was limited to where the application was deployed and used.
- Advisors can see all conversations which meant intruding on privacy concerns.
- The runner was constantly under pressure. Mistakes in tracking conversations were inevitable as this was done manually.
- Advisors all had similar access rights to IDM Talk account which posed a security risk.
- The administrator of the service found it difficult to manage the service due to the lack of control over the solution.
- The solution was not scalable to deal for expansion of advisors and large amounts of conversations.
- The moderator had to share the same account as the administrator which made management and moderation of conversations extremely challenging.

After IDM Talk appeared on national television in October 2008 and in many other media platforms the number of subscribers increased by 1000%. This overnight growth was more than what the service could manage and a need for a more stable solution to support the persons in need was evident. This journey started the birth of a web based advice and support system that would become known as the Drug Advice Support (DAS) solution.

5.2 Methodology

A key objective of the project was to make it easy for persons seeking advice (PSA) related to substance abuse to access the IDM services. Innovative ICT solutions were researched that would overcome barriers such as logistics, cost and time in order to address the pressures which counselling facilities and possible advisors are facing. However, due to financial constraints and limited scope of freely available software an

innovative ICT solution was required to address these needs. An approach to develop this solution was required and the Living Labs concept was adopted.

Living Labs are deliberate interventions in the real world, where actions and impacts are observed. They involve cyclical processes, familiar in action research, where actions lead to outcomes, reflection, new plans, and new actions (Ennals, 2005). A Living Lab is an environment in which people and technology are gathered and in which the everyday context and user needs stimulate and challenge both research and development, since authorities and citizens take active part in the innovation process. Hence, Living Labs has been defined as an environment, as a methodology, and as a system (Bergvall-Kåreborn et al., 2009). This approach suited the development of the Drug Advice Support (DAS) system as the environment merged the technologies, developers and the user community. The Athlone Living Lab was the outcome and it is a collaboration between Impact Direct Ministries(IDM), Cape Peninsula University of Technology (CPUT) and the Bridgetown Community (Sub-area in Athlone) that would become the community development and university innovation interactive space.

5.3 The technology/service

In order for DAS to conduct its services it identified the two parties involved in the conversation, namely the advisor and the person seeking advice (PSA). For the PSA there is only one advisor which he/she will be communicating with (Figure 4). On the other hand, the advisor has to deal with multiple conversations. The service aimed to relieve some of the queuing system issues which traditional face-to-face and helpline counselling are facing. The proposed solution to relieve these issues was to use MIM and the internet in a way to connect the advisor in the case of DAS and person seeking advice (PSA) as soon as both are available online. Another feature of the DAS system is that it allows multiple advisors opportunity to assist during a given advice support session.

**Figure 4: Advisor interacting with multiple substance abusers**

One of the main concerns for DAS was that not all advisors were always in the same location or even in the same time zone. This was solved by making the system distributed and web based taking advantage of everything the internet has to offer. This meant that an advisor can access the system and provide advice to a person in need from any device that is internet enabled and can connect to the jabber platform.

5.4 The solution

Key to the DAS solution was that it should have the ability to aggregate messages from multiple chat applications including Mxit, GTalk, Facebook Chat, AIM and MSN into one stream. The solution had to integrate these chat applications into one stream which then needed to feed it into a single view for an advisor who is online. The advisor view came in the form of a web interface. Figure 5 show how these IM applications are linked and integrated with the messaging engine and the web-interface. Even though the multiple chat applications are different, they all use a standard protocol called XMPP (Extensible Messaging and Presence Protocol). XMPP is the core protocol of the Jabber Instant Messaging and Presence technology.

Figure 5: DAS Messaging Engine Components
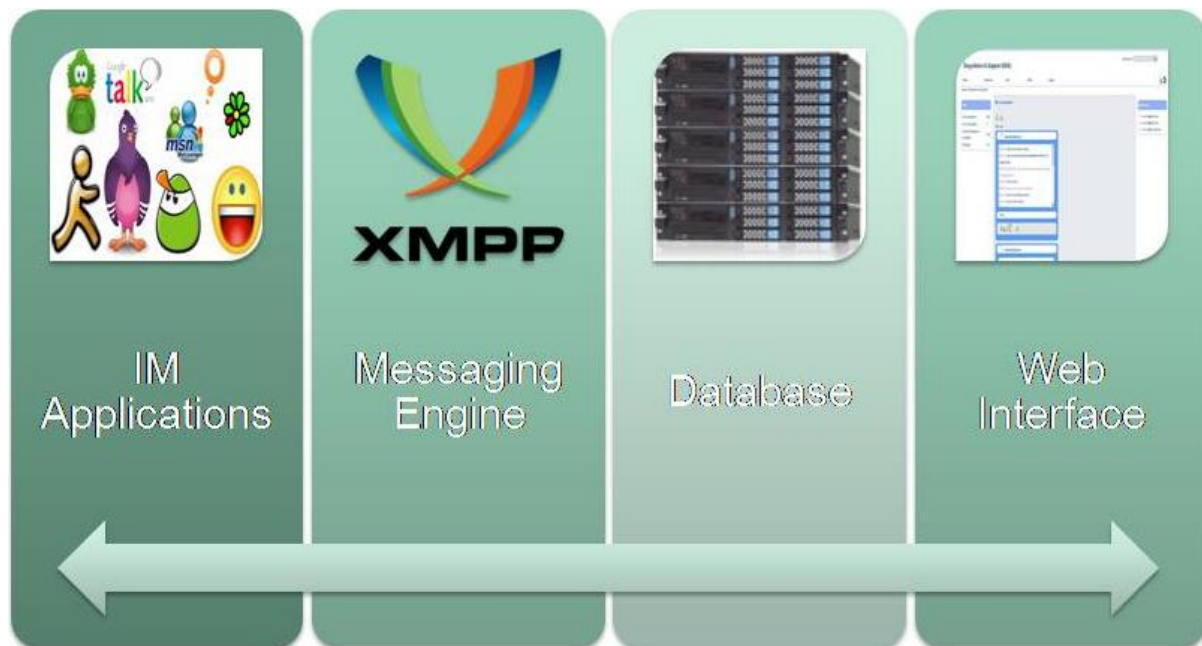
One of the primary goals for the DAS solution was to send and receive messages as quickly as possible and to handle as much conversations as possible. To achieve that goal the design of the architecture needed to be robust and scalable. The proposed architecture for the DAS solution consists of the following components:

- *IM Applications:* It was important for the DAS solution to be able connect to IM Applications which users were already familiar with.
- *Messaging Engine:* It should be able to handle multiple connections between IM Applications. It was also required to manage the transfer of messages between the Database and the IM Applications
- *Database:* Manages the messages and other data.
- *Web Interface:* The web interface provides a user interface for advisors to manage conversations via the internet.

The results of this solution had the following implications on the DAS service:

5.4.1 Productivity

The previous instances of DAS (ex-IDM Talk) made it difficult for advisors to have multiple conversations. In fact, because all advisors were seeing all conversations it made managing it a nightmare. Privacy issues also became a concern as the content of the conversations were exposed to all logged-in advisors. The new solution made it possible for conversations to be distributed evenly and shared between advisors. The system can be configured to have conversations automatically assigned to the advisor with the least amount of conversations. This in turn ensured an even workload. It also has the ability for some advisors to have conversations assigned manually. This feature is used in instances where the advisor may be a trainee and where the administrator of the session would assign certain conversations to the relevant advisor. It may also be used where there is a specialist advisor is online and will be assigned 'special' cases.

Even though the new solution makes it possible for advisors to have multiple conversations, mechanisms needed to be put in place to keep the list of conversations low. This means that idle conversations needed to be removed from the list. A key feature of XMPP which the DAS messaging engine takes advantage of is Presence Indication (Saint-Andre, 2004). The Presence Indication allows DAS to track the status of the conversation. The status of a conversation can vary between being 'online', 'offline', and 'away' or 'busy' (do not disturb). This means that the conversations with the status other than 'online' can be hidden thus reducing the number of conversations the advisors have to deal with. The DAS system has an additional feature which substitutes the Presences Indication in which the administrator of the session can configure the idle time for conversions.

5.4.2 Convenience

Being a web application it eliminates logistics of having all the advisors in the same location as this was one of the shortfalls of the initial system. Advisors can be anywhere and just require a computer connected to the internet. The web interface is managed by the session administrator. This person has special permissions on the DAS system. This includes managing advisors, starting and stopping the session, sending bulk messages to persons in need, and general managing of the web application.

As with help-lines, conversations can easily be reassigned to other advisors. This has been adapted into the DAS system. When an advisor does not have the necessary experience or skills to deal with a case it can easily be transferred to someone which has the necessary skills. The advisor receiving the reassigned conversation can also view previous content without having to question the previous advisor. DAS has also made available a feature to refer a person in need to any organisation. The system has the ability to forward the conversation to a designated email address or one supplied by the advisor.

Together with conversation reassigning there is also an archiving facility. After each session is completed, all the messages and conversations are archived in the database. When an advisor receives a conversation, a full history can be viewed. This enables the advisor to quickly summarise what the case was about and also which advisor the person was engaging with. This eliminates the need to do complicated searches thus freeing up the advisor to deal with a conversation more quickly.

5.4.3 Accessibility

One logistical issue that the DAS system needed to resolve was that of advisors having to be in the same physical location. By using an internet web application this constraint was resolved but the system still had to provide the advisors with the frame of mind of being connected with the rest of the DAS team. The DAS system ensured this by making available information boxes and internal chat. The information boxes included a session statistics box which showed the number of conversations advisors are dealing with as well as the number of messages which are passing through the system. It also shows the number of current conversations other advisors are addressing. A "quick link" box included quick links to conversations which the advisor might deem important. The chat box is used for communicating with fellow advisors, administrator and the moderator seamlessly.

5.4.4 Other Opportunities

DAS has proved itself to be a valuable tool in the fight against substance abuse and other social issues. The same ICT solution can be implemented to help other social issues which South Africa is facing. The following are examples of services already implemented and using the DAS principles:

- *HIV/AIDS Counseling:* Being the number one cause of deaths in South Africa and the rest of Africa (Gandhi, et al, 2006), an instance called Positive Advice Support (PAS) has been implemented to help victims affected by the HIV/AIDS pandemic.
- *Unemployment and Career Advice:* South Africa currently has an unemployment rate of 21%. Career Advice Support (CAS) is another service which could be offered to provide advice to university students, scholars and the general public seeking guidance.
- *Debt Counselling:* With the increase in the number of consumers being over indebted and an estimated 60% of approximate 19 million who require assistance in South Africa, this is another instance where Debt Breaker, in which the DAS solution has been adapted and implemented can provide assistance to people who are over-indebted.

5.5 Results due to using DAS

The results extracted from DAS solution shows that such a system can be useful for relieving tension. Advisors have the capacity to help more people (n=27) in a 2 hour session than that of help-lines (n=4) (Impact Direct Ministries, 2009). Since its inception and at the end of April 2009 DAS served approximately 87,624 messages amongst its 6,377 subscribers. A total of 16,609 conversations between persons in need and advisors took place over a period of 186 hours of being online and available.

During a DAS session, 2 hours duration, the average number of conversations is 178 which equates to an average of 943 messages. This is normally managed on average by 5 advisors using the DAS system. The maximum number of conversations achieved was 471 and this was the week after the appearance on national television. The least number of conversations was 21 and this was due to running the service on a public holiday. The most messages exchanged in a DAS session were 3678 with a minimum of 234 messages.

Advisors would normally have 27 conversations to manage on average with the maximum being 56 and minimum 4 conversations. Average messages per conversation are 29 with the minimum being 1 message and the maximum 202. According to reports by Mobile Industry Review (2008) the number of SMS-type MXit messages that can be sent in 1 Meg data is 3938 messages. At the standard cost of R2 per megabyte of data via GPRS a MXit message will cost the user an estimated 0.03c. With the average number of messages being 29 per conversation, a user seeking advice in terms of this service would pay 0.88c (zaR0.008) per counselling session compared to R185 for face-to-face counselling (CTDCC, 2009).

Majority of the conversations (62.3%) was related to substance abuse issues. Figure 6 shows the distribution related to substance types with the most popular drug query being "Tik" or "Crystal Meth". General drug queries were where subscribers just needed generic information about the services and general substance abuse queries. These results also supports the research done by Parry et al. (2008) where "Tik" and "Heroin" were the drug of choice amongst adolescents.

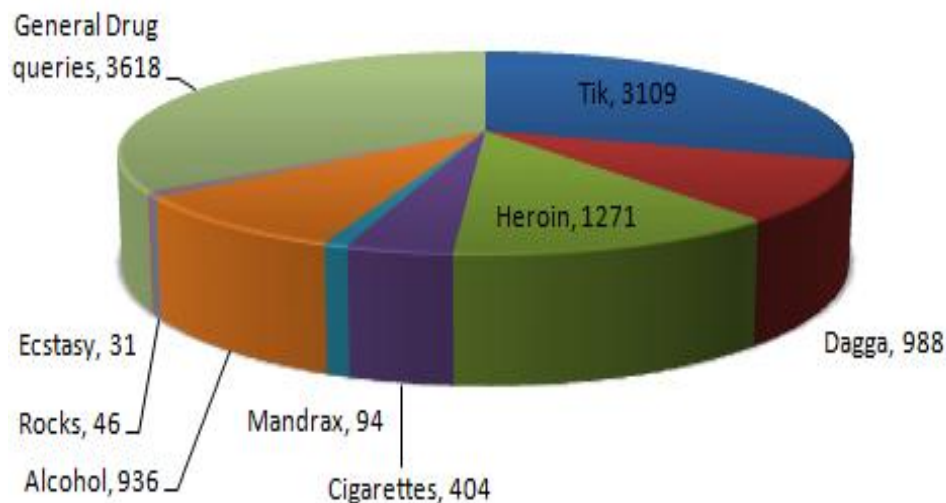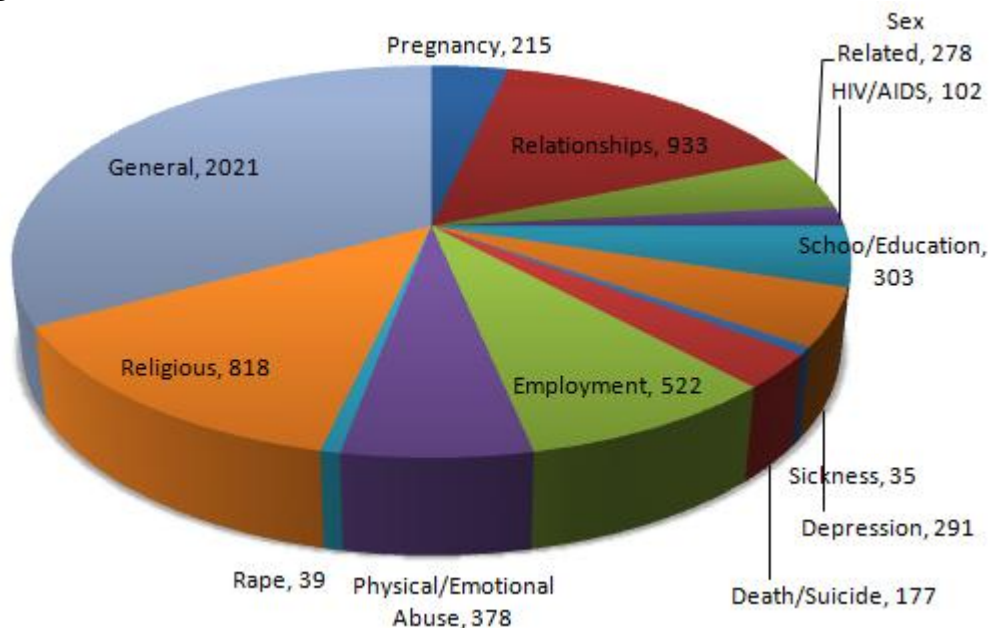**Figure 6: Number of Drug Conversations – 10,497 (62.3%)**

Figure 7: Other Conversations – 6112

Other interesting results were presented in Figure 7 where other topics were discussed on the DAS platform. This clearly indicates that there are other uses for such a system and many other social sectors could benefit from adopting mobile technologies as part of social services.

6. Conclusion

The Western Cape and the rest of South Africa are in the midst of a substance abuse pandemic. Substance Abuse is causing tension in communities and is the source of other related social problems including rape, theft, unemployment, driving under the influence and gansterism. Counselling facilities cannot cope with the influx of substances abusers. Telephone help-lines are limited in its efforts to deal with the number of persons seeking advice and support. Queuing systems employed by help-lines and face-to-face counselling make it difficult to identify urgent cases.

Mobile technologies have become the primary form of telecommunication for many South Africans. Moreover internet usage via mobile phones has surpassed that of the desktop computer. The adoption of MIM onto mobile device meant that people can now communicate irrespective of device or platform. The use of MIM also meant that people could participate in social networks.

This paper explored the possibilities of using Mobile technologies to support the fight against substance abuse investigating the Drug Advice Support (DAS) system. DAS embarked on tapping into popular South Africa IM social networks like MXit and Facebook to provide support and advice to persons seeking help with substance abuse problems. The service makes it possible for users to instantly have access to an advisor

hence eliminating the queuing structures used by face-to-face and help-line counselling. The solution made it possible for more people to have access to support earlier in the journey of rehabilitation.

The architecture and system, co-developed with the members of the community of the Athlone Living Lab (ALL), resulted in a solution that can handle large amounts of traffic through the system in an environment with limited bandwidth. Initial extracts of conversations (Figures 6 and 7) show that there is a definite need for such interventions. Conversations related to drugs are about 60% which means that for the other 40% there is a need for more services linked to suicide, pregnancy, relationships, employment and abuse using such platforms.

This solution provides a first line support to users. Further research needs to be undertaken into finding ways of linking users to second level support. For example linking users to drug rehabilitation centres in this instance or linking potential students to academic institution in the case of a Career Advice Support service. Extending the reach into more social networks via mobile technologies will give such a system a broader audience and greater reach to the platforms that the intended person seeking advice (PSA) is using as conversation device.

As with any technological solution DAS is always evolving. Some of the planned features for the system include automated responses, the ability to ban users, frequently asked questions and location based services. Other improvements include matching users to advisors by linking the user's topic to an advisor's expertise. Current limitations of the system include the lack of automated notifications of new messages and the usability of the web interface layout could be improved.

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