Size and shape of the mobile applications development industry in the Western Cape, South Africa

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Size and shape of the mobile applications development industry in the Western Cape, South Africa

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Abstract

This study explores the landscape for mobile applications development in the Western Cape, South Africa. A Gartner Special Report on “the mobile imperative” warns that “organizations need to deal with the uncertainty and speed of the consumer-driven mobile landscape”. The proliferation of mobile technologies and “the increasing use of cloud back-end services”, according to another Gartner report, is challenging IT sensibilities and should therefore be regarded as a disruptive technology. The mission and mandate of the Cape Peninsula University of Technology (CPUT) emphasise its leadership role in human resources and service provision to the community and industry around the academic disciplines of the university. The university is particularly keen on developing its role with respect to technology skills development and transfer towards community development and the energising local industry. It is specifically with regard to the latter that this study was undertaken. In order to be of service to the local mobile applications development industry, the university needs to have a clear sense of its size and shape. The study seeks to profile the local mobile applications development industry in terms of – (a) focus and functionality of applications delivered, (b) profile of clients, (c) development platform, e.g. iOS, Android, Windows, Java, etc., (d) in-house expertise and special skills, and (e) scarce skills needs. It is instructive to note that on the websites of the Indeed online recruitment agency, there were 1200 vacancies for “mobile application developer jobs” on their “dot za” site and 14000 vacancies on their “dot com” site (on 14 July 2013). It is important for CPUT to understand the size and shape of the mobile applications development industry in its local region in order for it to fulfil its mission and mandate as a university of technology. Knowledge about the human resource needs of industry would inform curriculum design and student enrolment for academic programmes. These programmes could conceivably be either formal for qualifications or non-formal for “right skilling”. Knowledge about the technology needs of industry could inform the research and development (R&D) activities of the university. The university and the industry could partner in seeking appropriate solutions for technology challenges that might present. Knowledge about the nature of “disruptive technologies” would inform the business modelling and strategic management of the partner organisations. Finally, knowledge about the size and shape of the mobile applications development industry in the Western Cape, South Africa, could serve as a baseline study for future status and trend analysis. Extensive use will be made of Gartner resources to establish the parametric framework of analysis for this study. Scholarly articles elucidating the notion of “disruptive technology” will also be accessed. This is an exploratory study. The research framework will be benchmarked against Gartner approaches for “size and shape” research. This will allow for comparative analysis at a later stage. Data collection on the status of the local industry will be conducted using a structured survey instrument which will be administered using the dual mediums of personal and telephone engagement. This study provides a basic survey report on the size and shape of the mobile applications development industry of the Western Cape, South Africa.

Keywords: Disruptive technologies, Mobile applications development.

1. Introduction

This research project which forms part of a larger study explores the landscape for Mobile Applications (apps) Development in the Western Cape, South Africa. A Gartner Special Report on “the mobile imperative” warns that “organizations need to deal with the uncertainty and speed of the consumer-driven mobile landscape”. The proliferation of mobile technologies and “the increasing use of cloud back-end services”, according to another Gartner report, are challenging Information Technology (IT) sensibilities and should therefore be regarded as a disruptive technology [1].

The mission and mandate of the Cape Peninsula University of Technology (CPUT) emphasise its leadership role in human resources and service provision to the community and industry around the academic disciplines of the
university. The university is particularly keen on developing its role with respect to technology skills development and transfer towards community development and the energising local industry. It is instructive to note that on the websites of the “Indeed” online recruitment agency, that there were 1203 vacancies for “mobile application developer jobs” on their “dot za” site and 14121 vacancies on their “dot com” site [2].

It is important for CPUT to understand the size and shape of the mobile applications development industry in its local region in order for it to fulfil its mission and mandate as a university of technology. Knowledge about the human resource needs of industry would inform curriculum design and student enrolment for academic programmes. These programmes could conceivably be either formal for qualifications or non-formal for “right skilling”. Knowledge about the technology needs of industry could inform the research and development (R&D) activities of the university. The university and the industry could partner in seeking appropriate solutions for technology challenges that might present. Knowledge about the nature of “disruptive technologies” would inform the business modelling and strategic management of the partner organisations. Finally, knowledge about the size and shape of the mobile applications development industry in the Western Cape, South Africa, could serve as a baseline study for future status and trend analysis.

2. Literature Review

2.1. The history of mobile applications

The mobile phone has become the most popular form of electronic communication for many people [3]. Nearly a decade later, Clark [4] supports this view by suggesting that mobile communication has become such an integral part of people’s lives that many feel peculiar without a mobile phone. In the earliest forms, the most popular functions of mobile phones were calling and sending text messages. These functions were extended with the advent of the smart phone which is a multifunctional mobile device that not only communicates via voice and text, but also affords the user to research, work and have fun via the development of mobile applications. At the end of the twentieth century, mobile applications were typically small arcade games (like Tetris in 1994 [5], then Snake in 1997 [6]), ring tone editors, calculators, calendars, etc.

Early phones had very small monochrome low-resolution screens and limited storage and processing power. The phones could not handle the data-intensive operations required by traditional Web browsers. The bandwidth requirements for data transmission were also costly to the user.

The Wireless Application Protocol (WAP) standard was developed in 1997 to address the concerns that mobile phones could not handle the data-intensive operations required by traditional Web browsers. WAP was a stripped-down version of HTTP, which is the basic protocol of the World Wide Web. WAP browsers were designed to run within the memory and bandwidth constraints of the phone. Third-party WAP sites served up pages written in a markup language called Wireless Markup Language (WML) as opposed to Hyper Text Markup Language (HTML) and the pages were much simpler in design than the WWW pages.

The frivolity of the mobile applications changed significantly at the turn of the millennium when manufacturers tried to make their products more attractive for customers by introducing increasing amounts of applications. The BlackBerry 5810 released in 2002 was the first true BlackBerry device [7]. The mobile phone with integrated email functionality, calendar functions and a selection of primitive apps, was preferred by business users. The Treo 650 smart phone by Palm was a hybrid Personal Digital Assistant and cellphone that was introduced late in 2004 and eventually discontinued in 2008 [8]. The technology included increased memory, more interactive apps, a built in camera as well as touch screen capability which spelt a definite sign of things to come in mobile phone technology. The IPhone 5 by Apple, is regarded as one of the most impactful electronic devices in history. Its designer, Steve Jobs has not only impacted the technological community but the device is a cultural gem in the United States and worldwide. The smart phone is more powerful than the computer on the Apollo 11 space craft of 1969. The App Store has the world’s largest collection of mobile apps in 2013[9].

2.2. The dynamic mobile landscape

Leading IT companies like Gartner, Forrester and Juniper along with the ITU (International Telecommunication Union) who is the United Nations specialized agency for information and communication technologies reveal promising findings for mobile application development in the next few years.

Much of the enterprise application development takes place outside the scope of IT in the form of business unit application development, end-user application development and development outsourced by business units to
third parties. Historically, most mobile application development not performed by IT has been outsourced. This is beginning to change with the emergence of visual application (app) builders and other forms of rapid mobile application development tools. With the increased demand for mobile applications, non-IT developers will increasingly look for ways to provide mobile applications that satisfy their business requirements, and they will begin building their own mobile applications [1].

Innovation in the world of mobile apps is increasing dramatically with an expected market of $38 billion by 2015. Despite the thousands of apps already having been developed, business opportunities associated with apps are just at infancy stage. From one end of the spectrum with personalized, local and social apps right through to the enterprise market which alone is well on the way to spending $17 billion deploying apps, the overall market and number of use-cases are escalating exponentially. All of this is fuelled by modern smart phones [10].

By 2017 over 160 billion apps will be downloaded globally onto consumer handsets and tablets. This sharp increase, from 80 billion in 2013, is a result of many consumers in developing markets upgrading from feature phones to smart phones, and a growing number of apps downloaded at no upfront cost to the user [11].

There are 5.9 billion or 87% of the world’s population that are mobile subscribers. Of this China and India have nearly 1.8 billion subscriptions. The Global mobile statistics 2012 report states that mobile devices sales rose in 2011, with smart phones showing the resilient growth but feature phones are still selling intensely. Nokia remains the number one handset manufacturer, but Samsung is now the leading smart phone hardware vendor with the top smart phone operating system being Android. There are 1.2 billion mobile Web users worldwide, with the highest usage in Asia, particularly in South Korea and Japan who lead in mobile broadband penetration with 91 and 88 percent respectively. Mobile devices account for 8.49 percent of global Website hits. In the US, 25 percent of mobile Web users are mobile-only, i.e. they do not, or very rarely use a desktop, laptop or tablet to access the Web. Japanese mobile users are still more progressive in mobile behaviour, using mobile Web, apps and email more, but US and European users prefer to text (up to 8 trillion text messages worldwide in 2011) and play more games on their mobiles. Most popular mobile destinations are news and information, weather reports, social networking, search and maps [12].

In the subsequent report by the International Telecommunication Union [12] there appears to have been continued and almost universal growth in ICT uptake. Much of this enhanced connectivity is as a result of 40% rise in 2011 of mobile-broadband subscriptions, to the point where there are now twice as many mobile-broadband as fixed-broadband subscriptions. The surge in numbers of mobile-broadband subscriptions in developing countries has brought the Internet to a multitude of new users [13].

2.3. The Different Types of Mobile Applications

<table>
<thead>
<tr>
<th>Category</th>
<th>Description and example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calculate / Utilities</td>
<td>These apps are able to do calculations like mortgage payments, convert temperatures, etc.</td>
</tr>
<tr>
<td>Games Apps</td>
<td>These mobile gaming apps are entertaining and very popular.</td>
</tr>
<tr>
<td>News Apps</td>
<td>Users can get the news delivered to their smart phone in real time.</td>
</tr>
<tr>
<td>Productivity Apps</td>
<td>Users can be more productive by using their smart phone to scan and send documents, etc.</td>
</tr>
<tr>
<td>Search Tool Apps</td>
<td>These apps allow users to find information by using their smart phone.</td>
</tr>
<tr>
<td>Social Networking Apps</td>
<td>These apps include apps such as Facebook, Twitter, Pinterest, etc</td>
</tr>
<tr>
<td>Sports Apps</td>
<td>These apps are useful for those who want all the latest sports news.</td>
</tr>
<tr>
<td>Travel Apps</td>
<td>These apps are useful for those who are travelling.</td>
</tr>
<tr>
<td>Weather Apps</td>
<td>These apps allow users to receive their daily weather forecast to a smart phone.</td>
</tr>
</tbody>
</table>

2.4. Mobile Applications: a case of disruptive technology

A disruptive technology is, “One that causes major change in ‘the accepted way of doing things’, including business models, processes, revenue streams, industry dynamics and consumer behaviour.” There has been significant acceleration in the development of disruptive technologies like Mobile Computing and Cloud Computing in recent years [16]. Christensen [17] extends this definition by stating that disruptive technology is a new technology that unpredictably dislodges established technology. The author distinguishes between sustaining and disruptive technologies. Sustaining technologies depend on gradual improvements to entrenched technology. Disruptive technologies are unsophisticated, lack performance because of their novelty, appeal to a narrow audience, and may not yet have a tested practical application. An example of this would be Alexander Graham Bell's invention of the "electrical speech machine" in 1874, while he was toying with an earlier idea, the
"harmonic telegraph" that could send more than one telegraphed messages at once. These are the pioneering technologies to not only the telephone but also modern smart phones and tablet computers.

Even though Christensen [17] predates many modern disruptive technologies, the author’s argument is still true today. “Large corporations are designed to work with sustaining technologies. They excel at knowing their market, staying close to their customers, and having a mechanism in place to develop existing technology. Conversely, they have trouble capitalizing on the potential efficiencies, cost-savings, or new marketing opportunities created by low-margin disruptive technologies.”

Schadler [18] reinforces the Gartner view [16] by suggesting that businesses can improve efficiencies to their customers, partners, and employees with systems of engagement brought about by mobile, social, big data, and cloud technologies. Systems of engagement refer to the capability to empower all the business stakeholders with context-rich applications and smart products to assist them to make decisions and to take immediate actions at the appropriate time and place.

“These new systems harness a perfect storm of mobile, social, cloud, and big data innovation to deliver applications and smart products directly in the context of the daily lives and real-time workflows of customers, partners and employees. The compelling notion of context is the sum total of what your customer has told you and is experiencing at the moment of engagement is made possible with cloud delivery and predictive analytics applied to a blend of data from device sensors, social feeds, personal preferences, and systems of record” [18].

Tynan [19] supports Christensen [17] with the argument that IT is extremely dynamic and its development certainly has a means of grasping established ideas and engrained industries and turning them on their head. Information technologies will often pair up to become disruptive technologies. An example of significant partnering disruptive technologies is how digital video has encouraged mass movie production. Social media applications afford the masses an opportunity to stage their amateur movies which is having a significant impact on sectors like journalism, politics, and entertainment. Certain technological devices have been impacted by disruptive technologies. What was once indispensable devices are now being replaced by smarter and ostentatious ones. An example of this is how external Global Positioning System navigation devices are being threatened by smart phones largely on account of the Android operating system that extends Google Maps to phones and tablets.

3. Research Methodology

This explorative research project consisted of a literature analysis, a focused interview [20] with academics and students of the Department of IT at CPUT, as well as a survey of a stratified random sample of small Mobile Application Development and Software Development businesses in and around Cape Town. The aim of these methods was to obtain the status of the local industry by using a structured survey instrument which was administered using the dual mediums of personal and telephone engagement. The constraint on the sample size of the study was the availability of these businesses to be interviewed. The findings of the study were interpreted from a qualitative rather than a quantitative perspective due to the relatively small sample size of the respondents, where the validity and reliability of the data could be questioned.

Emerald, EBSCOhost and Google Scholar were the preferred means of searching for accredited journal articles, conference papers, white papers, associated business journals and other academic sources in order to produce a comprehensive overview of Cloud Computing, Mobile Computing, Disruptive Technologies and Mobile Application Development.

The available literature on the field of study is vast and as a result it was not realistic to make a comprehensive study of all previous knowledge of the relevant research themes. Instead, the focus was on searching and selecting high-impact references, with distinguishing accent on research providing concrete empirical evidence particularly when it applied to usage and adoption statistics. Information technology professionals’ insights posted on reputable websites and blogs as well as in business magazines were also deliberated. The purpose of linking the professional with the academic viewpoints was to reap more considerations from diverse sources as well as current statistics, to augment the research project.

A total number of seven Mobile Application Development and Software Development businesses were surveyed in and around Cape Town. The business representatives interviewed were 4 Managing Directors, 1 Founder, 1 Technical Adviser and 1 Senior Applications Developer.
3.1. Business involved in Mobile Application Development

Four of the seven of the businesses have already been involved with Mobile Application Development projects before. Those businesses who were involved with Mobile Application Development have been doing so for between 2 and 5½ years. Their largest budgets ranged between R200,000 and R700,000 and their number of completed Mobile Application Development projects were as low as 2 and the highest been 22.

Three of these businesses developed their apps specifically for clients and with the intention to generate revenue from them. The majority of their clientele were commercial entities and one business had mobile phone users between 12 and 40 years of age as clients. Commercial entities were prepared to pay between R40,000 and R80,000 for Search Tool Apps, Sport Apps and Travel Apps. Productivity Apps and Calculate/Utilities Apps are more costly and ranged between R100,000 and R1,000,000 depending on their functionality. Two of these businesses were unable to generate income from their apps after having successfully completing them.

All of the businesses designed cross-platform apps and believed that it did not make business sense to design platform specific apps as it restricted the commercial viability if it were designed specifically for Android, IOS or Blackberry. Table 2 lists the technologies and skills that these businesses suggest which are required for Mobile Applications Development:

<table>
<thead>
<tr>
<th>Technologies used in app development</th>
<th>Skills (Less Scarce)</th>
<th>Skills (More Scarce)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSS</td>
<td>CSS</td>
<td>Database Language - Oracle Apex</td>
</tr>
<tr>
<td>HTML5</td>
<td>Design</td>
<td>Jquery Mobile</td>
</tr>
<tr>
<td>Java</td>
<td>HTML5</td>
<td>Phonegap</td>
</tr>
<tr>
<td>Jquery Mobile</td>
<td>Javascript</td>
<td></td>
</tr>
<tr>
<td>Oracle Apex 4.2</td>
<td>Jquery</td>
<td></td>
</tr>
<tr>
<td>Phonegap</td>
<td>PHP Cake Framework</td>
<td></td>
</tr>
<tr>
<td>PHP</td>
<td>Web Services</td>
<td></td>
</tr>
<tr>
<td>Xamarin</td>
<td>General Mobile Application Development</td>
<td></td>
</tr>
</tbody>
</table>

The majority of these businesses outsource one or other function of their Mobile Applications Development project to other entities. Typical outsourced functions include design of the app. Trends in Mobile Application Development include:

- Perfect synchronisation between desktop and mobile
- More cloud services via mobile phones
- Increase in Productivity Apps

The majority of the businesses believed that a model which could provide a strategy for enhanced commercialization of Mobile Applications Development would assist them in Mobile Application Development. The model should assist them with the commercialisation of the app once it had been completed. Commercialisation is a major challenge. The business who marketed their app to the open market, suggested that the best commercialisation option would be to go via a service provider (like Vodacom, MTN, Cell C, etc.) so that users could pay for the app via air-time charges rather than a credit card transaction as many would not necessarily have access to a credit card.

All of the businesses collaborate with at least one other company when developing Mobile Applications for at least one of the following purposes:

- For mobile payment gateways
- Mobile marketing
- Design of the User Interface and User Experience
- Technical skills when they cannot meet the technical requirements of the app

3.2. Business not involved in Mobile Application Development
The majority of those businesses, who were as yet not involved in Mobile Application Development, intended to so imminently. Reasons why these businesses were not involved as yet but would consider getting involved with Mobile Application Development are listed in table 3.

Table 3: Reasons for either being or not being involved in Mobile Applications Development

<table>
<thead>
<tr>
<th>Reasons why not involved</th>
<th>Reasons why to be involved</th>
</tr>
</thead>
<tbody>
<tr>
<td>“It has not been the company focus up to now”</td>
<td>“Our customers are asking for it.”</td>
</tr>
<tr>
<td>“We don’t have the necessary skills”</td>
<td>“We believe that a mobile device without a mobile app is useless.”</td>
</tr>
<tr>
<td>“We would need assistance to get us started.”</td>
<td>“We believe in fostering a mobile application development culture to tap into the business potential of it.”</td>
</tr>
<tr>
<td>“We are an SMME. We don’t have the necessary skill and staff to do so.”</td>
<td>“We believe that the future is mobile. It is a niche area.”</td>
</tr>
<tr>
<td>“We believe that there are already many players in the space and it is problematic generating an income from the app.”</td>
<td>“Our clients typically want a .mobi site as well as a mobile app for their present business.”</td>
</tr>
<tr>
<td></td>
<td>“We believe that there is money to be made.”</td>
</tr>
<tr>
<td></td>
<td>“There seems to be opportunity in Mobile Application Development”</td>
</tr>
</tbody>
</table>

Of the businesses who believed that a model which could provide a strategy for enhanced commercialization of Mobile Applications Development, suggested that it should assist them with the following:

- “Give us guidelines as to how to approach this mobile application opportunity.”
- “Tell us where to start.”
- “It should tell us what skills and technologies are needed.”
- “Tell us what the trends are.”
- “What phases are involved in the mobile applications development?”
- “What architecture should be used?”
- “Describe the security considerations since this involves cloud computing.”
- “Tell us about design concerns.”
- “Inform us about the user interface and user experience.”
- “Help us to plug the gap between the end product and revenue generation.”

All of the businesses acknowledge that they would have to make some adjustment to their current business models but that it would not have to be drastic changes. Appointment of key staff appears to be the biggest adjustment to their current business.

These businesses regard the following categories of Mobile Applications as being most popular and those that they would consider developing in the near future:

Table 4: Popular apps and those that would be considered for development in the near future

<table>
<thead>
<tr>
<th>Most popular apps</th>
<th>Apps to be developed in the near future</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calculate/Utilities Apps</td>
<td>Calculate/Utilities Apps</td>
</tr>
<tr>
<td>Games Apps</td>
<td>Productivity Apps</td>
</tr>
<tr>
<td>News Apps</td>
<td>Social Networking Apps</td>
</tr>
<tr>
<td>Productivity Apps</td>
<td></td>
</tr>
<tr>
<td>Social Networking Apps</td>
<td></td>
</tr>
<tr>
<td>Weather Apps</td>
<td></td>
</tr>
</tbody>
</table>

The majority of the businesses were unsure of what category of applications they should develop in the near future and indicated that the strategy model should inform them.

All of the businesses believed that it did not make business sense to design platform specific apps as it restricted the commercial viability if it were designed specifically for Android, IOS, Blackberry, etc and that it should be designed cross-platform. Their client base would be their present customers from the corporate and SMME sector and not “the man in the street”. Most of these businesses will charge their business clients for the app and they believe that the client would pay as much as R100,000. The rest of the businesses will not charge for their apps as they believe that people want free apps. They will however charge for the services generated from the app and will focus on winning new clients in this regarding the app as a marketing tool.
All the businesses stated that they did not have the permanent and necessary skills for Mobile Application Development projects and that they would have to either outsource this function or make contract appointments in order to do so. They would obtain the skills from universities via the internship programmes or make use of web portals such as Gumtree where the relevant skills are advertised for employment.

As a means of marketing their apps, the businesses would make use of their normal marketing channels like their website, email and public relation campaigns to sell a solution and not an app in itself. One business indicated that they would make use of Google Play, App Store, etc.

3.3. Mobile Application Development at Cape Peninsula University of Technology

In a focused interview with key stakeholders (including students and academics) in the Department of Information Technology at Cape Peninsula University of Technology (CPUT) it was agreed that Mobile Application Development is not offered in the formal curriculum but rather at the co-curricular level, within a unit referred to as the Kujali Hub. The Kujali Hub harnesses human and research capacity to develop innovative ideas especially in mobile technologies. Presently, students are exposed to some of the technologies relating to Mobile Application Development in subjects like Development Software and Technical Programming but students do not design a complete Mobile Application project.

A comparative study of the websites of the “Indeed” online recruitment agency over a period of 17 days revealed a significant increase in the number of vacancies for “mobile application developer jobs” on their “dot za” site and on their “dot com” site.

<table>
<thead>
<tr>
<th></th>
<th>14 July 2013</th>
<th>31 July 2013</th>
<th>% Variance</th>
</tr>
</thead>
<tbody>
<tr>
<td><a href="http://www.indeed.co.za">http://www.indeed.co.za</a></td>
<td>1 203</td>
<td>1 527</td>
<td>+27</td>
</tr>
<tr>
<td><a href="http://www.indeed.com">http://www.indeed.com</a></td>
<td>14 121</td>
<td>25 162</td>
<td>+78</td>
</tr>
</tbody>
</table>

4. Discussion

Four of the seven software development businesses surveyed in and around Cape Town were already involved in Mobile Application Development and only one of the businesses are not doing so imminently. The majority of the seven businesses acknowledged the business potential of Mobile Application Development and half of them have generated income from their previous Mobile Application Development projects.

All of the businesses, excepting one expressed the importance for a model which could provide a strategy for enhanced commercialization of Mobile Applications Development. Those who are involved with Mobile Applications Development require the model to assist them with revenue generation once the app has been completed. Those businesses who are not involved with Mobile Application Development needs are far more intense and involve the full spectrum from the initiation through to commercialisation of the app. These businesses have expressed the importance of them being unable to take risks without a model that could help them to minimise these risks by providing them with clear guidelines, trends, technologies, skills, marketing, etc relating to Mobile Applications.

The participants in the focused interview acknowledged that Mobile Application Development should be offered in the formal curriculum at undergraduate level on the National Diploma of Information Technology. The students recommended that the learning must result in a complete Mobile Application Development project at the end of their third year of studies. They also proposed that they be taught design as a subject which would assist them with the designing of Mobile Applications Development. They believed that interaction with CPUT Design Department students could assist them, as they do not have the natural creative flair that the design students have. The introduction of the new National Diploma of Information Technology which is to be implemented in 2015 at CPUT, will allow for this opportunity.
5. Conclusion

The study is consistent with [1] regarding the fact that the proliferation of mobile technologies is challenging IT sensibilities and should therefore be regarded as a disruptive technology. There is a significant need for Mobile Application Development jobs as indicated by “Indeed”, an online recruitment agency. If CPUT wishes to remain responsive to the needs of industry, it should consider formalising Mobile Application Development into the formal curriculum rather than simply offering it as a co-curricular activity.

The software development businesses have acknowledged the potential in Mobile Applications but appear to have difficulty in commercialising these apps. Further research is warranted around the establishment of a model which could provide a strategy for enhanced commercialization of Mobile Applications Development that would assist businesses in Mobile Application Development. This model would have to address a number of concerns, depending on the propensity of the business towards Mobile Application Development. Research into what adjustments to the current business models of these businesses are required to enter into Mobile Application Development is also recommended.

6. Acknowledgements

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References


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Presenter: The paper is presented by Errol Francke