Proceedings of the 3rd Software Engineering Colloquium SE10

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Foreword

Saurabh Sinha
IEEE South Africa Section Chair

The IEEE South Africa Section is a proud supporter of the 3rd Software Engineering Colloquium 2010 (SE 2010), an event bringing together technology evangelists, technologists, engineers and technology managers from various spheres of industry, academia and government.

The formal association between SE 2010 and the IEEE South Africa Section was established via the South African IEEE Computer Society Chapter. The IEEE Computer Society (www.computer.org) was founded in 1946 and has over 85,000 members worldwide. It is today IEEE's largest society and this is also the case in South Africa: the Computer Society Chapter has one of the most members of all South African IEEE technical society and council chapters. IEEE's Computer Society has developed over several decades and enjoys support from over 400,000 IEEE members distributed in over 150 countries. The association of SE 2010 creates an opportunity for extending our boundaries of SE influence, as IEEE remains the leading global family of individuals inclined towards "Advancing Technology for Humanity" (IEEE's tag-line – approved by the IEEE Board of Directors, Sept. 2009). The association enables us to share our SE challenges and solutions globally.

Several areas proposed for SE 2010 include: cloud computing, awards and recognition, legal compliance, standards, intellectual property, public visibility for SE, etc. IEEE has grown in these areas over 125+ years and is today enabled with resources well positioned towards accelerating our works locally, if the resources can be aligned to serve our local SE community. Towards this alignment, IEEE's Computer Society Head Office, based in Los Angeles, supports IEEE Computer Society volunteers globally, and if utilized correctly can facilitate our administrative efforts locally, allowing for a greater emphasis on our SE strategy.

A recent report, which examined patents filed with the U.S. Patent Office between 1997-2009 revealed that IEEE journals and conference proceedings received over 125,000 patent citations - more than three (3) times the number of citations of any other publisher. 1790 Analytics conducted a study resulting in a database of all small and large firms with significant patent portfolios, which was utilised by IEEE in 2009 to identify emerging technology patents. While the study was US centred - it was noted that in each of the identified eleven (11) technology categories (including the Computer Software category), small firm patents on average referenced twice as many scientific articles as patents from large firms. The reasons vary: perhaps as small firms have less "old" patents to refer to … or perhaps they have aimed towards newer inventions or innovations rather than incremental improvements? Outcome performance matrices for these patents by smaller firms remained significantly positive, perhaps giving an indication that there must be a strong relationship between the success of a patent and IEEE scientific papers. In 2009, IEEE Sales and Marketing moved towards providing access to the IEEE/IET Electronic Library (IEL) from only two (2) South African universities to developing a Southern Africa consortium expanding IEL access to ten (10) universities, including the University of Cape Town (UCT), which has been an active supporter of SE 2010. In 2011, we envisage more academic partners joining the mentioned consortium. Several undergraduate and postgraduate students/researchers have in recent years started their own SE firms, some shortly after exiting Universities - some are still small firm leaders: will earlier access to IEL elevate our intellectual property (IP) as a Nation? In between the very high demand for "routine work" in SE, will IEL influence our way of thinking enabling for a new(er) level of SE innovation?

I would like to extend sincere gratitude to all members of the organizing team for their exceptional work: preparation of proceedings, engaging various stake holders, attracting sponsorships, etc. Particular thanks to Jenny McKinnell, Cape Town IT initiative (CITi) for serving as a catalyst for SE

2010 and best wishes to the Black Information Technology Forum (BITF), who will serve as the "business owners" for SE 2011.

We look forward to your support for SE 2011.

Editors' Introduction

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The IEEE Computer Society Chapter of South Africa coordinated the technical agenda of a Colloquium on Software Engineering (SE10) under the Cape IT Initiative (CITi.) SE10 is the third in the series after SE07 and SE05. About 130 senior engineers, technical managers and academics attended the day-long event at the Radisson Blu Hotel on 16 March 2010. The Colloquium was intended to be a structured discussion between academia, industry and government. SE10 was entitled "Building Value through Engineering." There were 10 main areas under review including certification, skills, compliance and privacy, agile in the enterprise, investment and R&D, FOSS, awards and recognition, and cloud computing. SE10 ended with an award to Professor Jean Cleymans (of the University of Cape Town) and Dr Zeblon Vilakazi (Director of iThemba Labs) for a particularly noteworthy local software project – the UCT-CERN group at the University of Cape Town and iThemba Laboratories wrote the software for the High Level Trigger for the ALICE experiment at CERN.

We would like to thank Saurabh Sinha and the IEEE South Africa Section, and all the SE10 presenters whose talks are summarised in this proceedings. We are extremely grateful to Roderick Lim Banda, who co-ordinated and documented the Cafe Conversations that led up to the colloquium – his report on these Conversations appears at the end of this proceedings. Our very special thanks go to Jenny McKinnell of CITi for her boundless energy and enthusiasm and her excellent organisation of the event; without her SE10 would never have been the great success it was.

There were at least 80 delegates at every session, with around 130 registered delegates in total.

Editors' note: The views expressed in this proceedings are those of the individuals concerned, and not necessarily those of the editors, or of the IEEE or of CITi.

Message from the SE10 Technical Committee

On 16 March 2010, 126 senior engineers and technical managers got together in Cape Town for the 3rd Software Engineering Colloquium to identify and address common business impediments and visions to technology. The intention of these conversations is to build upon the idea that for technology to succeed in its business aims, technologists must be in the highest decision-making bodies in business, academia and government.

The proceedings of SE10 are intended to represent a baseline for future deliberations. (See the appendix for related documents.) There are many similar initiatives to kick-start the software sector that seem to be still-born – this is different in that it is driven by the movers and shakers of tech, business.

If creating long-term sustainable value is our wish (as we believe it should be), then one needs to look to engineering. If our strategy is to bet on being the next Facebook or Twitter then we will all fail. (Focusing systematically on building a platform to create value is not to say someone won't strike it lucky.)

We will look back at the days when exponential growth was the get-out-of-jail free card for economists and techies alike. Jobless growth is the reality of our time. As a community, we need to build structures that engage the critical issues of our times correctly. This can only be achieved through respectful and constructive communication. On the technology front, Moore's Law will not be with us for always – the value created in Moore's Law needs to be banked now. With versatile and resourceful competitors in India and China, we need to avoid fatuous claims and programs that have no hope of success. (That is not to say we must not dream.)

The IEEE is not only the home to Electrical and Electronic Engineers in the United States, but is a federation of other clubs (like the Computer Society) in many countries and embraces many disciplines, including science. There is no doubt that in South Africa and as Africans we need our own prestigious professional societies to showcase our expertise and to represent us – until that time we would do worse than associate ourselves with the IEEE.

Software is a creative activity, and in this performance, our role as engineers may be off-stage. The fact that we seek to be more adept at our profession is not intended to undermine the importance of other actors such as designers, managers and administrators.

Professor Sonia Berman has performed a monumental task in assembling proceedings. We are deeply grateful to her. Some additional thanks are needed: we need to give particular thanks to Nithia Govender, Professor Saurabh Sinha, Sian Evans, Professor Nico Beute and Dr Joseph Balikuddembe. Also, we need to recognize all those many people who facilitated and attended the preparatory workshops.

The Executive Director of the Cape IT Initiative, Jenny McKinnell, managed the business aspects of the event with a degree of mastery seldom seen in technology circles in South Africa. My thanks to all the people who worked to prepare and present the positions in addition to those mentioned above: Sean Grant, Dr Pawel Lubczonok and Alex Fraser.

We are already planning SE11, the 4th such Software Engineering Conversation. As before, the IEEE will be convening technical input along with our peers, such as SPIN. The Black IT Forum will be providing business ownership on a national level. The event is planned for August 2011.

Already, coming out of SE10 there has been a number of developments – such as IEEE President elect Professor Moshe Kam's visit to SA around Accreditation or the marketing presentations at the ICSE at CTICC in May 2010. We expect CITi will host a feedback meeting in March 2011.

Yours in technology

SE10 Technical Committee,
Dr David J Hislop (SMIEEE), Jan Pool and Marius de Beer (MIEEE) on behalf of the rest of the committee, Gerhard Esterhuizen (MIEEE), Roderick Lim Banda.

Appendix

This is a reasonably complete list of software related surveys or reviews in South Africa. There are others such as the Meraka / Innovation Labs survey of 2009 or the Provincial Government of the Western Cape's software policy, but these are either unpublished due to deficiencies or due to their becoming policy (what is the point of secret policy?).

(1) CITi's Software Engineering Colloquium SE07 Research Report, Knowledge Crucible (Melina Ng), 2007-05-08.

(2) Innovation Towards a Knowledge-Based Economy: Ten –Year Plan for South Africa (2008-2018) Department of Science and Technology – #114538, 2007-08-14.

(3) South Africa Software Market 2005: Market Overview and Value Proposition Analysis. Africa Analysis (Andre Wills et al), 2005-05.

(4) Research study into the South African software market, Africa Analysis (Mark Rotter et al), 2004-05

(5) Report on CITiCafe Round Table Discussions, Cape Information Technology Initiative. Roderick Lim Banda, 2010-05-26.

(6) "'One voice' from Software Engineering Colloquium, Report on SE10 Outcomes by Jenny McKinnell. Jenny McKinnell, 2010-03-18.

Keynote Address on IEEE South Africa

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Abstract: *The IEEE is one of two major international organisations for software professionals, and is the leading publisher worldwide in the field of electrical engineering and computing. In South Africa and in Cape Town, the IEEE is thriving and hosts a number of major conferences, meetings and colloquia as well as many other initiatives. One example is GEOSS: the South African Department of Science and Technology is part of a worldwide group building the Global Earth Observation System of Systems along with the IEEE Group on Earth Observations. The IEEE aims to create value through engineering, to recognise excellence, and to increase software engineering professionalism through certification and improved interaction with government, academia, business and other professional communities.*

1. IEEE Overview

The IEEE (Institute for Electrical and Electronic Engineers) aims at advancing prosperity through technological innovation, enabling members' careers and promoting community. The IEEE has approximately 384000 members, of whom about 85000 are student members. While the majority are from the United States, there are members from over 150 other countries who together comprise over 40% of the organisation. The approximately 210000 USA members are divided into 6 regions; the 7th region is Canada (about 16000 members), the 8th region is Europe, Africa and the USSR (total 67000 of whom about 1000 are from South Africa); the 9th region is South America (about 15000 members) and the 10th region Australasia (about 74000). About half the IEEE members work in private industry, 10% in government and 20% in academia; with the remaining 20% comprising others such as the self-employed and the retired. There are over 27000 societies affiliated to the IEEE.

The 62-year-old IEEE Computer Society has 85000 members, and its journals, conference proceedings and standards are published in its CSDL digital library. Its certified software development professionals (CSDP) are mid-career software professionals and its certified software development associates (CSDA) are graduating software engineers and entry-level software professionals.

2. IEEE Publishing

The IEEE hosts more than 400 meetings, conferences, workshops and tutorials that attract over 350000 participants a year. Their proceedings form part of over 2 million documents available from the IEEE/IEE Electronic Library (IEL), which contains 30% of the world's current literature in electrical engineering and computer science. Members have full-text access to this resource through IEEE Xplore, where they can browse IEEE standards dating back to 1948, and conference proceedings, letters, journal articles and magazines from 1988. There is also access to selected content dating back as far as 1913.

Based on impact factor and citations, the globally recognised measures of publication significance, the IEEE is the world's leading publisher in the field of technology. The IEEE publishes 18 of the top 20 journals in its field, as well as 9 of the top 10 journals in telecommunications, 5 of the top 20 in

[1] This paper is based on the talk given by Professor Beute at the colloquium.

Information Systems and 8 of the top 20 in Software Engineering. It also publishes the world's number one journals in three areas: in Electrical and Electronic Engineering (Proceedings of the IEEE), in Imaging Science and in Robotics. Its nearest competitors in technical publishing, Elsevier and the ACM, are significantly less successful, with IEEE articles cited nearly 4 times as often as Elsevier papers and more than 5 times as often as ACM articles. The IEEE Computer Society has historically been the primary competitor of the ACM (Association for Computing Machinery) - the former focuses more on hardware and standardization, the latter more on theoretical computer science, but there is considerable overlap. The occasionally cooperate on projects such as the development of computer science curricula.

3. Global Earth Observation System of Systems (GEOSS)

The South African Department of Science and Technology and the IEEE's Committee on Earth Observation are part of a worldwide effort to build a Global Earth Observation System of Systems, GEOSS. This aims to enable countries to better respond to, and better manage, the challenges we face from climate and environmental change. GEOSS was launched in 2002 by the World Summit on Sustainable Development and the G8 group of countries. "A capacity building programme involving the Institute of Electrical and Electronics Engineers is underway and will be implemented with the involvement of the National Research Foundation." said the Honourable Minister of Science and Technology, Mrs Naledi Pandor, at the SAIEE Centenary Breakfast on 5 June 2009. GEOSS aims to link millions of national, regional and international data sources and data sets into one network that is able to track environmental change in the oceans, the atmosphere and earth ecosystems around the world. This will reduce disasters, and improve health and agriculture, and extend our water and energy resources, among other benefits.

4. IEEE South Africa

The IEEE and SAIEE are bounded together by a National Society Agreement of cooperation. IEEE sponsors and/or indexes in its IEL a number of South African activities each year. In 2010 these included the IEE Senior Member Elevation Workshop and the IEEE RAS and CSS Chapter Committee Meeting in Pretoria, The Teacher In-Service Programme (TISP) Expansion Committee teleconference, the ACM/IEEE 32nd International Conference on Software Engineering ICSE2010 and the International Communications Conference ICC2010 in Cape Town.as well as the Information Security for South Africa Conference ISSA2010 in Johannesburg. Keynote speakers at these events included Nobel prize-winner The Most Reverend Desmond Tutu and the Honourable Minister of Science and Technology, Naledi Pandor.

Locally there have been three software engineering colloquia in Cape Town: SE05, SE07 and SE10 in 2005, 2007 and 2010 respectively. Their aims are: to create value through engineering, recognise excellence, remove barriers into the software community and broaden this community, improve interaction with the legal and accounting communities and put engineers on the board of companies that use software as a differentiator. They also aim to build interaction between government, academia and business and to improve professionalism by improving skills and promoting certification.

5. Engineering and Value

Semiconductor-based technologies show exponential growth due to Moore's Law, and to harness this growth effectively requires engineering, not serendipity. Opportunities for new solutions and services are limited only by our imagination and competence. We need to interact with business better, and to look to software for government service delivery and efficiency. There are claims that anyone can program, but perhaps they shouldn't. Software development problems range from Frustration to Catastrophe; but software projects can be systematically managed e.g. using Agile methods. And there are many kinds of software professionals beyond software engineers, such as design, database and analyst specialists. Software should be seen as CAPEX, not labour broking. Examples of

engineering that has added value abound – GSM (IP) value was developed through 3GPP processes involving choreographed interaction of big companies; the World Wide Web started at CERN, a large science and technology institute; the IEEE, W3C and other standards build value; the TM Forum and other industry-wide frameworks share value, and SoX, Boti, ITIL and others measure and contain IT value. The GSM standards stand shoulder to shoulder with the discovery of the semi-conductor. The development of the GSM family was done through massive capital and investment by companies such as Nokia, Vodafone and Qualcom. And locally we have Roelof Botha, a schoolboy at Jan van Riebeek who went to California to seek his fortune and, together with another South African, Elon Musk, developed PayPal. Elon went on to Prius and Space-X; Roelof is now CEO of Sequioa Asset Management, one of the world's leading venture capital firms.

Maximizing marketing opportunities presented by ICSE:

A proposal for showcasing our industry

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Abstract: *The world's premier international conference on software engineering, ICSE 2010, took place in Cape Town in May; the first time this event has been held in Africa since its inception 32 years earlier. The City of Cape Town's Department of Economic Development invested in this initiative to enable local companies and universities to exhibit their work and tell their stories to the international software engineering community. The Cape IT Initiative (CITi) agreed to drive this endeavour on their behalf. This paper outlines the proposal presented by CITi, a themed display with an African feel, highlighting local IT success stories and showcasing the creativity and attractions of IT in Cape Town. It describes a number of ways in which this exhibition has already been used to sell our strengths not only to ICSE delegates but also to learners, teachers and others in the community. Extension and on-going use of the material is planned to publicise the region, increase networking opportunities and extend the benefits of the showcase to a wider audience.*

1. Background

The 32nd International Conference on Software Engineering (ICSE [1]) took place in Cape Town in May 2010. Over 700 delegates, including leading software engineering academics, masters and doctoral students, research specialists from global software companies, and software engineers and executives from major users around the world, attended this event.

ICSE's conference programme, technical tutorials, workshops and demonstrations provided a world class forum for software engineering professionals from industry, government and academia to discuss the latest developments, trends and innovations in software engineering.

Whilst local attendance was low (around 5% of 683), the event provided an excellent opportunity to showcase our software engineering and software industry. The "Marketing at ICSE" agenda group, which had been created out of the Third Cape Software Engineering Colloquium held on 16 March 2010, had met with a range of stakeholders to discuss how to make the most of the ICSE opportunity. As a starting point, the City of Cape Town's Department of Economic Development had agreed to invest R140 000 towards supporting Cape companies at an ICSE Pavilion, and CITi (the Cape Information Technology Initiative) was nominated to drive this on behalf of the City of Cape Town.

2. CITi's proposal for ICSE

SBS, the ICSE conference organisers, proposed a pavilion comprising approximately 16 stands in the Ballroom West of the CTICC. In consultation with industry and academia at round tables held in February 2010, CITi proposed that the ICSE pavilion showcase successful Western Cape technology entrepreneurs, software projects and software companies, in a way that emphasizes that there is value and depth in our region's software engineering community, whilst at the same time emphasizing our creativity and innovation, and aligning our region's IT behind Creative Cape Town and the World Design Capital 2014 bid.

CITi elected to represent the following strengths of the Cape software industry to be developed further into a brand positioning, viz.: able to solve problems that seem unsolvable, bold designers who invent against the common wisdom, a place to go for "out of the box" software design, with a knack of design around architecture and good software quality. We are "more nimble, more whacky and more out of the box" and our innovation is where we add value

CITi proposed that instead of creating a room with square stands selling different companies, the story of our region is told in a way that makes it implicitly obvious that our region is creative. CITi also wanted to showcase our lifestyle and other factors that attract talent to our region.

One of the ideas raised was the possibility of using the material developed for the Design Indaba South exhibition as a display tool for "brag boards" about software engineering pioneers and success stories from the region. The intention would be to have a common look and feel around themes - the creation of a "forest" that can be explored with different "branches" or sections. These would highlight the quality of life of our region, our Smart City initiative and infrastructure, our strengths, our pioneers – people, companies, innovations and software engineering success stories big and small, from business and academia.

3. What we wanted to achieve

The Pavilion showcase and related initiatives planned to achieve the following. Firstly, to sell the idea (through a creative, story-telling approach) that we offer value and depth to any organization wanting to do innovation and development in our region; that we are entrepreneurial, innovative and creative; and that we are a platform into Africa. The software we develop is bold, nimble, whacky and out of the box. We wanted a space for our local experts to tell "stories" about their projects and their journey as entrepreneurs, both to the visiting delegates and to our own Cape IT community.

A second aim was to attract smart research into the region, by giving the visiting software engineers, especially the academics, an enticement to want to come and do sabbaticals at our universities. This would have the benefit of attracting more research funding to the region, and of bringing world class expertise here for the benefit of our students and businesses.

We investigated opportunities to get international experts who are already supportive of the Western Cape (eg Kent Beck, Scott Ambler and David Anderson) to do a webinar or a video feed speaking of why they like to work on projects with Cape software engineers. This would have had the advantage of giving additional support to our saying that we have depth and can add value.

In addition to the pavilion, we also wanted to create an opportunity to do a presentation to the visiting delegates on our region and the value we can add at the cocktail function.

We did not however want to stop at just an ICSE Pavilion exhibition. We wished to sell the strengths of our software engineering to our own local community, to inspire learners and students to become technology entrepreneurs and to choose careers in the profession.

We also planned to investigate opportunities to create twitter feeds, simulcasts etc. out of the conference into, e.g. Cape Town's digital business centres and schools.

We wanted create opportunities (eg Design Indaba's idea of locals hosting visiting delegates to a dinner party at their homes) for networking and knowledge exchange between our local IT community (very few of whom will attend the conference) and the visiting delegates. This will have the advantage of creating relationships that may lead to cross border business deals and R&D collaborations. CITi assisted the City of Cape Town in identifying leading thinkers and entrepreneurs from the Cape software engineering community to invite to the Mayco cocktail party, and to the Round Table Discussion with Microsoft Research and other international industry delegates.

Overall, we wanted to extend the benefits of the conference to our local community. We see our ICSE exhibition as more than just an opportunity to showcase our region's strengths. We also wanted to use it as an opportunity to bring smart research to the region; sell IT entrepreneurship and a career in IT to our own learners and students; and create opportunities for our own local IT industry to network with the visiting delegation and hopefully co-create research projects.

4. What has been achieved

Making all of this happen was an enormous undertaking and a team of volunteers was needed to assist CITi with the project – titled "The Cape Software Showcase," and its various sub-projects. Additional funding and sponsorship was also necessary, not just to match the City of Cape Town funding, but also to cover the costs of developing the display boards and implementing the planned additional initiatives. In total, CITi invested a further R 100 000 on top of the City of Cape Town funding. Some of this cost (approximately R 45 000) was recovered through companies sponsoring boards. Companies were charged R4000 for one board, or R 2 500 per board if more than one board was developed.

The following companies contributed boards on their organization to the display: Bushfire, Cape IT Initiative, City of Cape Town, iKubu, Korwe Software, NetProfit, RSA Web, Stone Three, Stellenbosch University (Computer Science and MIH Lab), University of Cape Town (Information Systems and Computer Science departments), Viadata, White Wall Web and Yola.

In addition, CITi also funded the creation of boards to showcase seventeen IT entrepreneurs (as part of CITi's IT Heroes campaign) and 3 Agile case studies (MXit, Viadata/Catalyst and Astrata), and two boards on Agile development in Cape Town. This was part of a brief arising out of the Agile theme of the Software Engineering Colloquium of March 2010, to showcase case studies.

CITi also funded the development of boards to highlight other success stories - including the Centre for High Performance Computing (the fastest computer in Africa), the Cape Town Entrepreneurship Competition, and the fact that the Amazon Elastic Compute Cloud (EC2) was developed in Cape Town. In addition, boards showing funding available for startups and highlighting the entrepreneurial ecosystem were also developed.

Thirty three (33) boards were printed in total. In addition, we used blackboards to add constantly changing content. Various people from industry spoke at the exhibition and visiting schools and university students were taken around the exhibition by software engineers who volunteered to assist us.

Subsequent to ICSE, CITi has used the Cape Software Showcase boards to promote the Western Cape to visiting international delegations from Google (10 August 2010) and to Nokia and InfoDev (20 July 2010) as well as to the new head of the Department of Economic Development and Tourism at the Provincial Government of the Western Cape.

Four additional boards were developed for the national ICT Teachers Conference, which was held at The Cape Academy of Mathematics, Science and Technology in Bergvliet, Cape Town, from 26 – 28 September 2010. Over 300 teachers from around South Africa attended this conference. The new boards promoted IT as a career option – highlighting the salaries that can be earned and motivating the case for more girls to become software developers. In addition, we also showcased our IT Heroes.

5. Next steps

CITi has received additional funding from the City of Cape Town to expand the Cape Software Showcase and IT Heroes material. The goal is to increase the material to 50 entrepreneurs, 15 companies and 5 innovations. In addition, we plan to add 25 IT careers, 10 educators and 5 future heroes by end June 2011. The goal is to use this material, both online and as part of the Cape Software Showcase exhibition, to continue to promote IT entrepreneurship and increase the desirability of IT as a career option. We will continue to use the material as and when opportunity presents itself.

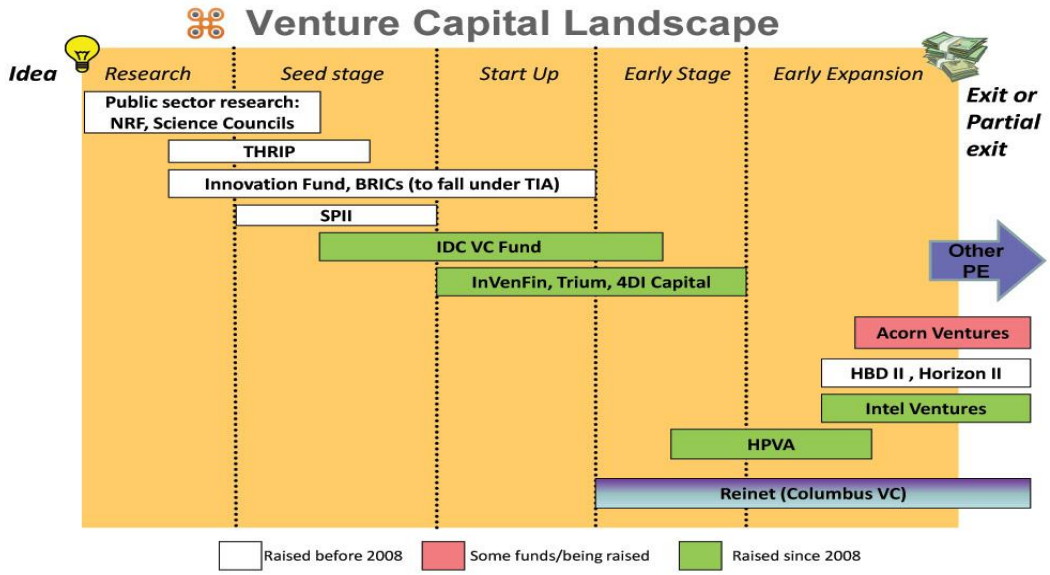
References

[1] International Conference on Software Engineering 2010. http://www.sbs.co.za/ICSE2010/

Delegates reading the posters in one section of the Cape Software Showcase.

A selection of posters from the Cape Software Showcase:

Funding for Startups in South Africa



The graph above lists the key organizations that fund technology related businesses in South Africa, and highlights which part of the landscape they operate in, be it research, seed stage, start up, early stage or early expansion phase.

Here with more detail on the funds listed above, arranged by whether the funding is from government, South African based Venture Capital firms, or international venture capital firms.

South Africa's VC industry is relatively under-serviced and the IDC is one of the biggest players. There are a limited number of true VC firms in the private sector. Angel investors, or high net worth individuals who take a stake in start-ups, also play a role in the industry, but on a relatively small scale. The South African VC industry is regulated by SAVCA (South African Venture Capital Association) - www.savca.co.za. Download the KPMG and SAVCA Venture Capital and Private Equity Industry Performance Survey of South Africa covering the 2008 calendar year at www.savca.co.za/downloads/PrivateEquitySurvey2009.pdf.

South African government and parastatal related research and funding

NRF = National Research Foundation - www.nrf.ac.za
Science Councils include: CSIR = Council for Scientific and Industrial Research - www.csir.co.za and Meraka Institute - www.meraka.org.za

THRIP = Technology and Human Resources for Industry Programme
www.dst.gov.za/s-t-landscape/S-T%20Funding%20Agencies/
Innovation Fund - www.innovationfund.ac.za - Currently being migrated into TIA

BRICs = Biotechnology Regional Innovation Centres. These include LifeLab, Cape Biotech, PlantBio, AMTS, Tshumisano Trust and BioPam, all of which are currently being integrated into TIA

TIA = Technology Innovation Agency - www.tia.org.za
Focus is very oriented on Biotech. The BRICs (listed above) are currently being integrated into TIA, together with the Innovation Fund

SPII = Support Programme for Industrial Innovation
www.spii.co.za or www.idc.co.za/SPII.asp
The SPII is focussed specifically on the phase that begins at the conclusion of basic research (at the stage of proof of concept) and ends at the point where a pre-production prototype has been produced.

IDC VC Fund = Industrial Development Corporation Venture Capital Fund
www.idc.co.za/Venture%20Capital.asp
The IDC is a self-funded state-owned national development finance institution.
The IDC's Venture Capital Fund provides equity funding of between R1m and R30m per project for a significant minority equity stake (between 25% and 50%). This fund is primarily for the development & commercialization of globally unique technology-rich products aimed at high margin, high growth market segments.

South Africa-based Private Sector Venture Capital Companies

InVenFin - www.invenfin.co.za. InVenFin, part of listed South African investment holding company Remgro, is a seed and early stage venture capital fund. Funding requirements are flexible but all investments must have unique intellectual property. When investing they look for innovation and the ability for it to be profitable internationally.

Trium Investments (aka TriVest) - www.trivest.co.za. Trivest is a provider of equity for growth capital financings, middle market corporate acquisitions and recapitalizations. TriVest prefers to invest in quality small to medium sized companies, which possess or promise strong and defendable market positions in growing or fragmented industries.

HBD II. This is the second fund of HBD Venture Capital - www.hbdvc.com. A South African company, founded by Mark Shuttleworth in 2000, HBD has invested in early stage South African companies with high growth potential. HBD's second fund ran from 2006 to 2009 and offered growth capital to a range of early stage businesses. The fund is closed for further investments and is focused on growing its investments. This fund invested in ordertalk, clicks2customers, EDH, Fundamo and sacab.co.za. The first fund, HBD I, is also closed. It ran from 2000-2006 and is focused on growing its investment in CSenseSystems. It has exited its investments in Red 5 Labs and MyBeat.

4Di Capital - www.4dicapital.com. 4Di Capital provides funding and mentorships to promising technology and IP start-ups.

HPVA = Hasso Plattner Ventures Africa - www.hp-ventures.co.za/index.php. HPVA is a venture capital fund of 29m (approximately R350 million) based in South Africa. The company invests in promising innovative technology companies, As an affiliate of Hasso Plattner Ventures Europe, they offer extensive added value via their network of experienced entrepreneurs, partners, industry networks and third party professional service providers.

Reinet Investments SCA (Columbus VC) - www.reinet.com. Reinet Investments was established on 21 October 2008 when the former Richemont SA changed its legal form to that of a partnership limited by shares and adopted the name Reinet Investments S.C.A. Reinet Investments S.C.A. is a securitisation vehicle incorporated under the laws of Luxembourg. It is listed on the Luxembourg Stock Exchange. Their investment strategy is long term and over a wide range of asset classes.

International based Venture Capital Funds that have made/or are looking to make investments in South Africa

Acorn Ventures - www.acornventures.com. Acorn Ventures manages an investment fund and portfolio with broad coverage of emerging Internet, E-Commerce, Wireless Services and Software companies. Currently the company is seeking investments for its $100,000,000 Acorn Ventures VI Fund. Acorn is closely affiliated with major Angel and Venture Capital Companies in Silicon Valley.

Horizon II is a fund of Horizon Ventures - www.horizonvc.com. Horizon Ventures is a California, USA based company. It has invested in technology start-ups with an emphasis in the following areas: Communications and Systems, Component Technologies, Healthcare IT, Software Applications for Business. Their current fund, Horizon Ventures II, is an SBIC (Small Business Investment Company) backed by the U.S. Small Business Administration. Funding for this program has not been authorized for 2009 and beyond, so they are not currently making any new investments.

Intel Ventures (Intel Capital) - www.intel.com/capital/. Intel Capital is California based. It seeks out and invests in promising technology companies worldwide. The focus is on both established and new technologies that help to develop industry solutions, drive global Internet growth, facilitate new usage models, and advance computing and communications platforms.

Columbus VC - www.columbusventures.com. Columbus Ventures is based in Virginia, USA and is a seed-stage venture capital firm that provides start-up financing to emerging enterprises. They invest in only a few select companies each year to ensure entrepreneurs access to their people. Columbus VC is invested in Yola.

Sequoia Capital - www.sequoiacap.com. Sequoia Capital is California, USA based and invests between $10M-$100M in companies addressing the energy, financial services, healthcare services, internet, mobile, outsourcing services and technology markets. Sequoia is invested in Cape Town-linked technology startups such as Clickatell.

Agile Case Study

Mxit

Background

MXit is a next generation free mobile instant messenger and social networking software application. It was developed in Stellenbosch, a university town near Cape Town. In 2000, the research and development division of Swist Group Technologies, developed a Massive Multiplayer Mobile game. The game was SMS based and was not successful due to the high cost of SMS, since GPRS was, at that time, not widely implemented. In 2003, the game's functionality was re-assessed and in the latter half of the year the first version of MXit was released – as the **first mobile instant messenger of its kind in South Africa**. In April 2004, Swist's R&D division achieved independence as Clockspeed Mobile and on 1 July 2006 the entity became MXit Lifestyle. MXit crossed the boundaries of affordable communication and connected people from around the globe.

The Agile Story

In March 2005 MXit went live with its instant messaging platform. The total full-time staff consisted of 15 people of which 6 developed and maintained the platform. It was a dynamic and self-managed team with specialists for databases, networks, mobile applications and client-server architecture. During that year, MXit experienced phenomenal user growth, reaching 1 million users early in the next year. MXit not only drew the attention of the media, but also those of several investors.

In January 2007, South African media giant Naspers acquired a stake in MXit. Although MXit was already profitable, this brought capital for significant expansion of its operations in all departments in order to keep up with the relentless pace. Significant changes were made to the company's middle-management structures, which introduced classical methods and skills, such as waterfall and traditional project management.

During 2007, MXit's core infrastructure started to show its age. Relying on an open source product for its instant messaging core complicated development. There were also concerns regarding intellectual property flowing to competitors in the market using the same software. MXit decided to re-engineer its core infrastructure in order to have full control over it.

In March 2008 MXit was in a crisis. After several rollout attempts, the new software couldn't hold up. Chaos and panic ensued. Besides some managers and developers leaving, a new CTO was appointed, who promised to bring change for the better. Most importantly, the company was introduced to an agile development framework named Scrum. It promised to focus on making progress visible and delivering business value quickly. Everyone went on Scrum training and the team developing the new core infrastructure switched to this paradigm.

MXit literally flipped the switch in April 2009 after several trial runs of the new software. But this was only the beginning. Having proved the success of agile development, all development teams made the switch. ScrumMasters received formal training. Engineering practices were improved by defining software repository procedures clearly and introducing continuous integration. Test-driven development is currently being formally introduced.

Today, MXit runs a development department of 25 out of a total staff of about 100. Naturally, removing one bottle neck only emphasises another. In this case, it has shifted to the feeding tray: the product owners. Managing a company efficiently is a never-ending task. There is always space for improvement and reasons to adapt.

Entrepreneurs

Vinny Lingham
Founder and CEO, Yola

Vinny Lingham is a seasoned, globally acclaimed entrepreneur who has founded a number of businesses in Cape Town, including the award-winning search engine marketing company, Clicks2Customers, as well as IncuBeta and Synthasite (trading as Yola.) He has a personal investment fund, Lingham Capital which has invested in Cape Town startups like Personera and Skyrove. Vinny was also an early investor in ChessCube. He was recently chosen as a Young Global Leader Honoree 2009 by the World Economic Forum. He has been recognized as a high-impact entrepreneur by Endeavor Global and was the 2006 Top Young IT Entrepreneur. Vinny studied Information Systems at the University of Cape Town and graduated with an honours degree in Electronic Commerce from the University of South Africa.

www.yola.com

Henk Kleynhans
Co-founder and CEO, Skyrove

Henk Kleynhans co-founded wireless Internet hotspot provider, Skyrove in 2005 with Allister Kreft, after graduating from University. With Skyrove, anyone can start their own Wi-Fi hotspot and in this way provide cheaper internet access to more people, whilst also providing an additional income for those who share their internet connection. Skyrove now has more than 550 hotspots in South Africa. In 2005 Henk was named Top ICT Entrepreneur by Enablis and Business Report and in 2006 Skyrove won the Technology Top 100 Award for the Most Promising Emerging Enterprise. Skyrove investors include 4Di Capital, Cybersmart, Michael Leeman and Vinny Lingham. Henk studied medicine for 3 years before deciding to pursue his true passion, technology. In 2004 he graduated with a BSc in Computer Engineering from the University of Cape Town.

www.skyrove.com

Mark Levitt
Founder and CEO, ChessCube

Four times South African chess champion, Mark Levitt was involved in chess publishing in the early 1990s. From 1997 to 1998, Mark built the online Chess World for British Telecom's GamePlay.com, but GamePlay.com dropped its board and card games in 1999 after it listed. Mark launched ChessCube as a market test in 2007 in South Africa, and ChessCube was offered internationally in January 2008. ChessCube now has over 1 million registered users from over 180 countries. ChessCube has secured $1.8m to date in venture capital. Investors include InVenFin, a subsidiary of Venfin Limited, Michael Leeman and Vinny Lingham. Levitt was also an early investor and CIO of search engine marketing company Clicks2Customers and a founding member of TEIM Ventures. He is a BCom graduate of the University of Cape Town, with an additional diploma in Computer Programming from the Control Data Institute.

Sheraan Amod
Co-founder and CEO, Personera

In February 2008, Sheraan Amod and Jaco de Wet co-founded Personera, a Facebook-based personalized publishing platform allowing users to order useful print products enhanced with their social network content. In November 2009, Personera launched the world's first print calendar that is automatically customized with a user's Facebook friends' birthdays, upcoming events, and photos. Personera won the FNB Enablis Business Launchpad in 2009 and in 2010 won the Startup Category of the Cape Town Entrepreneurship Competition. The company is supported by IS Labs, an Internet Solutions corporate initiative to catalyze promising web startups. Sheraan founded his first company, Trafik Student Networks, when he was 18. He has a MSc Engineering Management from Stellenbosch University and a BSc Electrical and Computer Engineering from the University of Cape Town. He is also an alumnus of the Brightest Young Minds leadership project.

This information was collected as part of the IT Heroes & Pioneers initiative, a project created and managed by the Cape IT Initiative (CITi). The key objective is to grow the technology entrepreneurship pipeline in the Western Cape. Funding for the project was provided by the Department of Economic Development and Tourism of the Provincial Government of the Western Cape.

CITi cape information technology initiative

IT HEROES & PIONEERS

WES-KAAP INTSHONA KOLONI WESTERN CAPE

www.itheroes.org.za

Did you know?

Amazon EC2 was developed in Cape Town

The Amazon Elastic Compute Cloud (EC2) is a central part of Amazon.com's cloud computing platform, Amazon Web Services (AWS).

EC2 is designed to make web-scale computing easier for developers and allows users to rent virtual computers on which to run their own computer applications.

Amazon EC2 was primarily developed by a team in Cape Town, led by Chris Pinkham and Willem van Biljon. Pinkham provided the initial architecture guidance for EC2 and then built the team and led the development of the project.

Find out more about EC2 at:

http://aws.amazon.com/ec2/

South African ICT Skills Crisis

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Abstract: *Skilled individuals are the lifeblood of industry. In 1999 the international software industry experienced the first wave of ICT skills crisis. Rapid changes paralyze traditional corrective behaviour to the point where the crisis can now be classed as a catastrophe. Recovery and growth will only be possible with a sustained ICT Skills Pipeline. In this paper we call on the ICT profession to own, and solve, the crisis through an ecosystem of initiatives. Popularising ICT careers at school level, industry involvement in tertiary education, learnership programmes, and continuing education programmes form the action plan backbone. Coordinated effort is key to maximising the success of existing and future initiatives.*

1. Overview

ICT growth initiatives will fail without sufficiently and appropriately skilled individuals and effective application of their efforts. Reports of high levels in simultaneous unemployment and skills shortages in the ICT industry, is a clear indication of a skills mismatch or so called "gap". In August 2006 e-skills UK conducted a survey in which over 1000 businesses reported the skills gap impact as 48 on a scale of 0-100 where 0 is "no effect" and 100 is "company closure". Sadly this survey has not been repeated in the UK or South Africa, but indications are that the situation has since deteriorated. Even worse, the same survey revealed that despite skills gaps being more common, firms surveyed stated that they would still not train staff over the coming year. South African industry complacency of this nature will irrecoverably damage our future in ICT world economy. Software development specifically does not have traditional industry corrective behaviour, where output diminishes with key element shortage (skills). Improperly skilled developers can produce ever increasing volumes of software where maintenance is at least twice as expensive as development, thus increasing the need for skilled individuals (positive feedback loop).

The ICT industry cannot afford to wait for local, regional, or national government to provide solutions to the skills crisis. Tertiary education institutions do not possess the required responsiveness. The ICT profession will have to own, and solve, the crisis through an ecosystem of scalable initiatives. A culture of "learn from at least one other, and train twice as many" is required.

2. Call to Action

It is the responsibility of every ICT professional to contribute towards alleviating the skills crisis. Succession planning is ultimately the prime directive of a professional. The past decade of efforts from committed individuals provides a platform from which to re-launch a concerted effort. It is equally important to only commit to realistic objectives while prioritising efforts with potential to scale. We propose the following for 2010/2011.

2.1 Goal

Create an action group to actively engage industry in sustaining the ICT Skills Pipeline by maximising impact of existing initiatives through collaboration, centralisation and where necessary, consolidation.

2.2 Strategy

- Build an electronic platform of existing initiatives and services where stakeholders can access a knowledge base in an easily digestible format with guides on leveraging the information to train internal staff.
- Establish base-line data to quantify and qualify the skills gap.
- Create a framework to popularise ICT careers at school level.
- Establish learnership and mentorship frameworks.
- Create a recognition framework for "breeding success with success".
- Advertise, popularise and socialise continuing education.

2.3 Tactics

- Form a task-force responsible for researching and engaging all existing skills development initiatives.
- Establish a round table framework for collaboration between existing initiatives.
- Engage an existing electronic platform to publicize a knowledge base and FAQ to the industry.
- Create and launch a skills matrix database where industry can accurately track skills shortages and gaps. Identify custodians of the database and facilitate training.
- Trial, aptitude assessment programmes for leveraging directed training initiatives.
- Engage schools to create a programme through which teachers can popularise math, science and technology skills.
- Initiate an ICT learnership placement programme.
- Create and establish a peer recognition framework aimed at affording ICT employers, dedicated to tangible skills development, the opportunity to showcase their success and entice skilled individuals to join their community.
- Advertise, popularise and socialise a culture of "learn from at least one other, and train twice as many."

3. Contributing factors

The ICT industry is filled with extremely talented and highly educated individuals, which begs the question how the skills crisis came about. Especially since the situation has been repeatedly reported on for more than a decade, yet no significant solution has been implemented. Obviously it is a complex problem and every prospective solution must understand and manage the contributing factors.

3.1 Lack of statistics

Dated international surveys revealed that on average it takes 42 days to recruit a new ICT professional and each ICT position advertised externally will attract around 26 applications but just seven applicants (27 per cent) will fully match the requirements set out within the job description [1].
The South African ICT industry has missed an opportunity to learn by not collecting data and producing detailed statistics on skills shortages. Any ICT professional will quickly point out that a control system does not exist without a measurement and feedback loop. Yet the ICT profession has been incapable of accurately classifying the nature of the skills shortage and by extension the skills gap, thus rendering the system unmanageable.

3.2 Skill half-life

Students of ICT are outpacing their teachers in their knowledge of technology [2]. 70% of the UK workforce in 2020 has already graduated and their skills are atrophying. In the case of ICT skills the half-life is about 18 months - unless renewed [3]. Indications are that Moore's law has an exponential component, in that there is an exponential rate of change [4]. The ICT industry has not responded by accordingly adapting skills management.

3.3 Ignorance and lack of vision

Zig Ziglar once said that "there was only one thing worse than training staff and having them leave, and that was not training them and having them stay!" Unfortunately the majority of employers in the ICT industry will still rather increase their developer count by more than 25% than spend the equivalent of one month salary on training for existing staff. Yet 80% of these employers view the skills crisis as the toughest challenge in the 21st century [5]. Training in-house staff is a pattern known to combat skills shortages and increase skills retention. Failure to implement such a simple pattern can only be a symptom of ignorance or lack of vision.

3.4 Undervaluing continuing education

ICT professionals at the dawn of large scale commercial software development had an almost "savant" status, abstracting them from society's expectation of professional behaviour. Garage to riches stories of T-shirt, shorts and flip-flop wearing brilliance has fuelled the association of seemingly non-professional behaviour within the ICT profession. Perceived arrogance is not uncommon in the industry. Reality is of course substantially different. Most of the individuals in the ICT industry are of course, at best, average. Yet the expectation is there that the average can enjoy privileges endowed on the brilliant. Professional behaviour and practices have taken a back seat, and respect and value for continuing education along with it.

3.5 Education in theory

Interviews with ICT employers revealed a near zero respect for the standard of tertiary education and qualifications. General consensus is that a new graduate can offer little value to a development environment. Equally, it is felt that a practical training ground would help improve the situation. Yet none of the participants have, or are willing to, engage with tertiary institutions or provide internships.

3.6 Reduction in quality

ICT employers eager to grow their staff count, but faced with the severe skills shortage, often opt for a reduction in search criteria under the auspices of future training and skills development. Unfortunately the follow-up training and skills development is seldom implemented. The net effect is an overall reduction in skill level and by extension, quality. As mentioned earlier, this is a positive feedback loop since invariably additional skilled individuals are required to manage the reduction in quality.

3.7 Lack of recognition

No platform exists for recognition of skilled professionals committed to continued education and excellence. Similarly, organizations committed to skills development receive little public recognition. This omission robs the ICT industry of the opportunity to capitalize on "success breeding success".

3.8 Lost experience

Succession planning is almost non-existent in the ICT industry. Consequently, individuals have to continuously re-learn through mistakes without ever leveraging experience gained through mistakes made by others

3.9 Skills pipeline management

Latency in the skills pipeline combined with a high rate of change in the ICT industry requires early and decisive action if South Africa and specifically the Western Cape aim to position themselves as a competitive Software Engineering centre. An interest in ICT must be cultivated in scholars from primary school.

3.10 Disjointed initiatives

The ICT skills crisis is clearly not new, and as such has attracted a number of initiatives. Elementary investigation revealed a seemingly endless range of initiatives:

- Presidential National Commission on the Information Society and Development
- Presidential International Advisory Council on Information Society and Development

- New Partnership for Africa's Development - eSchools Programme
- State Information Technology Agency
- Education Network and E-rate
- E-education White Paper
- Technology Access Programmes
- E-Schools' Network
- Gauteng Online
- Khanya Project
- Meraka Institute
- Microsoft Schools Agreement and ASTIC
- Shuttleworth Foundation
- TuxLabs
- Teacher Professional Development and Training
- Microsoft Partners in Learning (PiL)
- Intel Teach
- Digital Education Content
- Mindset Network
- The AVOIR Project
- Sakai SA
- TVET, ABET, and Informal
- ISETT SETA
- Digital Doorway
- SANGONeT
- Enablis

Unfortunately interviews with around 20 Western Cape ICT employers revealed they have not heard of most of these initiatives and do not know any details of the ones they have heard of. Additionally, most of the initiatives suffer a struggled existence since they all compete for the same funding. Corporate Social Investment (CSI) can be added to the list of failed initiatives. Corporate institutions do not have the bandwidth to efficiently manage such investments, and the ICT industry has not stepped up to provide a vehicle to channel CSI into skills development.

4. Conclusion

To say our industry has been in a rut is an understatement. Now is not the time to sit back and worry about a skills crisis. Now is the time to build recovery and retention strategies [7]. It is possible to secure a sustained ICT Skills Pipeline by leveraging experience from existing initiatives (local and international) with industry involvement. All that is required is a handful of individuals with the will and energy to answer the call.

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Accrediting Software Engineers in South Africa: a Strategic Agenda

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Abstract: *Accreditation is the procedure by which an authoritative body gives formal recognition indicating that a body or person is competent to carry out specific tasks. Professional accreditation has played a critical role in our lives; from the bridges we cross to the highways we use to the health care we receive. This all has been a result of efforts of professionals in various fields who produce and live by high standards. However, the software engineering community hasn't given it much attention lately. Varying views on this subject could explain this general state of affairs. In this paper we establish the bottom-line for advocating for accreditation of software engineers in South Africa after assessing the prevailing situation. We offer options and draw our conclusions based on the propositions.*

1. General overview

Over the last decade, South Africa has experienced a boom in the software industry. Unfortunately there has been significant paralysis of the best industrial practices; specifically within the software engineering discipline. Currently, professional standards required in practising internationally accredited software engineering principles and practices are polarized. There are many software professionals without a broad understanding of what the discipline entails. Equally, some of those that have taken formal training in this discipline have to a large extent neglected their professional obligation of undertaking continuing professional development. Worse still, there is no unifying professional certification program in South Africa that accounts for this need.

1.1 Intensity of the discipline

Software engineering can be viewed as a discipline that creates practical, cost-effective solutions to computing and information processing problems, preferentially by applying scientific knowledge to develop software systems [1]. It is a decision-intensive discipline which entails making decisions when facing constraints of time, knowledge and resources [2].Such a creative design activity must be practiced systematically. To increase our confidence in our development efforts by emphasizing the need for rigor is a necessary complement to creativity in this discipline. This is only achievable if we have capable managers and engineers [3].

1.2 Focus

By accrediting software engineers, appropriate engineering principles will be emphasized in the development of enabling technologies. Accreditation is both a status and a process. As a status, accreditation provides public notification that an institution, person or program meets standards of quality set forth by an accrediting agency. As a process, accreditation reflects the fact that in achieving recognition by the accrediting agency, the institution or program is committed to self-study and external review by one's peers in seeking not only to meet standards but to continuously seek ways in which to enhance the quality of education and training provided [4].

2. Weighing in on accreditation

2.1 Divergent views on accreditation

Whereas several pros and cons for accreditation can be advanced, there are contrasting views on this important subject. Various schools of thoughts advance various arguments against and for accreditation. Some of these debates concentrates on whether to go the skills-based certification route

or the knowledge-based certification route or both. However, these debates are outside the scope of this paper

These divergent views on accreditation thus leave us at a professional cross-road. Moreover, current certifications on the market today seem to be product-driven rather than broad-based. These product-specific certifications have been proven to be lacking when compared against addressing the need for establishing and assessing fundamental software practices. This situation thus creates a huge skills gap that has to be filled if we are to embrace the strategic needs of our discipline.

Importantly, as a profession we have to advance; providing our services according to the expectation of the industry while at the same time maintaining high standards that reflect the true value of our existence.

2.2. Our certification needs

We require a sound accredited certification, one that is broad-based and one that provides significant value to our customers from industry; particularly those that buy our skills in return for efficient production. This push is rooted in the software problem which has typified the software producing industry. Software has become larger and more complex; there is the question of quality; many software projects are unsuccessful according to some industry yardsticks; and the cost of defects is not always understood. Although major progress has been registered in the line of software processes and technology capabilities, the remaining contention however, is that without capable managers and engineers who understand and practice software engineering as an intellectual activity, the most advanced technology and most mature processes will not solve software's problems.

The required certification therefore must provide skills that cut-across the established methodologies to eliminate any bureaucratic tendencies that hamper efficient production in software development. We have practitioners in industry that are not certified or those that lack any formal training in software engineering; yet they are central in making key decisions in the software development environment. Calibrating their correct engagement is not easy.

Further other professional disciplines have ended up being usurped in the methodology debate rather than addressing the required principles and practises. Excluding them from this debate is a poor business decision. We have to recognize their expertise and also provide the required standards in advancing this discipline. Equally, emphasizing the view that continuing professional development is a must within the software engineering discipline will re-echo the need for adaptiveness in this evolving engineering discipline.

3. Certification options

We have two certification options at hand, either taking a home-grown certification program or CS certification program provided by other organisations such as the IEEE. The overall aim of this initiative is to promote the view in the market that recipients of this specialized certification have been exposed to particular knowledge within the software engineering discipline.

If we consider the home-grown option, we have to take into perspective the various technical input and output concerns such as time frames for establishment, learning support needs, research scholarship and influence, staff development, relationship development, marketing or communication strategy, infrastructure development, the success criteria, criteria for accreditation, maintenance of accredited qualification, code of conduct, appeals, confidentiality and disciplinary issues among others. The IEEE CS certification program however seems to be way ahead of these concerns [5].

4. Conclusion

Indeed software engineering methods and technology have advanced greatly and the demand for professionals with software engineering knowledge and skills is unprecedented. Our drive is to adopt a certification program that measures knowledge of software engineering fundamentals and also

ensures that standard yet disciplined practices are established and followed. Invariably, we have to emphasis that as practitioners we are obligated to live by our professional code of conduct, that is, "*software engineers shall participate in lifelong learning regarding the practice of their profession*" [6].

Depending on which path taken, the benefits accrued from this certification initiative must surpass the skills need and production efficiency requirements of our target market and also of our overall professional development. This initiative must thus ensure that software engineers stay competitive in the market place and also employers drive a disciplined approach to product development by protecting their investment in their workforce through career development initiatives.

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Venture Capital Funding: Barriers to Deal Flow and Globalization of Investments

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Abstract: *Venture capital is defined as funding of potentially high-growth businesses, typically through global scaling, and normally based on technological or other innovative ideas. The South African venture capital landscape is described in terms of key players and the life-cycle stages where they typically come into play. Barriers to funding are presented, some of which serve as guidelines for entrepreneurs to ensure that they do all the necessary preparation before approaching venture capitalists. Others are barriers to globalisation inherent in South African legislation, which the entrepreneur needs to be familiar with. At the same time, low research and development costs, excellent skill levels of local software developers, and high mobile penetration make this country an attractive springboard for potentially high-return IT ventures The paper concludes with guidelines for those seeking venture capital in South Africa.*

1. What is Venture Capital?

The South African Venture Capital Association, SAVCA, defines venture capital as follows: "Funding (predominantly equity funding) of high growth potential businesses, whose growth potential is typically achieved through radical global scaling, and which normally have technological or other innovative concepts at their core." It is thus often the case that software-based or IT businesses meet the needs of venture capital investments, as they have the potential to achieve all that is embodied in this definition.

It follows too, that venture capital investments have the following characteristics: they are high risk endeavours, with the funding put forward at an early stage but, crucially, after the research and development has been undertaken. In IT, ventures are high risk because they typically involve new technology, are capital- and cash-intensive businesses, and the company is usually in the early stages of establishment. Innovations often play in rapidly changing markets, where new product acceptance and business models are generally unknown. The investment is typically in a product that is a soft asset, or intellectual property, rather than a tangible asset. Such a project must show potential of providing significant return on investment, and as such the investment is typically milestone based. Significant minority shareholding is the norm.

2. Venture Capital in South Africa

The South African venture capital landscape can be best understood by considering the timing of the investment. There are few early-stage investors, some of which have a highly niche-oriented focus; but as the business progresses through its lifecycle and the risk decreases, many more funders become available, including private equity and commercial banks.

During the Research and Development stage of a project, angel investors and government funding agencies such as the NRF (National Research Foundation), the DST (Department of Science and Technology) and a TIA (Technology Innovation Agency such as Cape Biotech, PlantBio, LifeLab, BioPad) would play a role. Venture capital investment occurs mostly during the seed and start-up stages; examples of local companies are InVenFin, Hasso Plattner Ventures Africa, 4Di, Triumph, TriVest and Bioventures. Google, Intel and IBM have entered the arena now too. Investment managers and organisations such as the IDC (Industrial Development Corporation) will come into play at the start-up stage and growth stage, and even through to the mature product stage. As

[2] This paper is based on the talk given by Alexandra Fraser at the colloquium.

mentioned earlier, software-based businesses meet the needs of Venture Capital investments as they have the potential to achieve global scalability, rapid growth and high returns. The question therefore is why aren't more IT based companies being funded?

3. Barriers and Success Factors

Venture capital in South Africa is limited and "unforgiving" and investment strategies may be misaligned. One of the main barriers to VC funding is failure to demonstrate product differentiation through appropriate competitor research. A concept that is the "same but different" to existing technology will have difficulty attracting venture capital. The concept needs to be able to scale to a truly global business from the start; software that is a solution to a local problem will not be funded because it lacks applicability in an international context. Additionally, if there are no barriers to entry, no prospects of protection within the domain, then this will impact upon venture capital funding. Venture capital should furthermore not be sought for any idea until it has been beta tested, with a "proof of concept" to demonstrate feasibility. A product with high resistance to environmental threats such as changing technology or economic conditions is more likely to attract funding. Entrepreneurs without key management skills or direct experience of the market are not a good business venture and often have unrealistic expectations; a project led by successful entrepreneurs has a greater chance of being funded.

Technology start-ups have shown that with the right vision, a tech company can achieve great things. Many international successes set major milestones for themselves that were not financial - user base, dominance in a vertical market, etc.

Investors need to allow tech companies to drive their strategy around what matters – if it succeeds, the financial success will follow.

4. Globalisation

One of the key requirements of venture capital funding is that the business be targeted at the global marketplace. There are, however, considerable barriers to international business transactions in this country. As regards corporate or investment transactions, exchange control, transfer of IP and licensing are problematic. Assignment of a patent from a SA company to a foreign company amounts to an export of capital under section 10(1)(c) of the Exchange Control Regulations requires prior approval from the Reserve Bank. Lack of prior approval renders the transaction null and void from the outset.

Licensing costs are prohibitive. Traditional software licensing models means that tech start-ups spend an exorbitant percentage of their capital in order to be legitimate. Flexible licensing, rented models, and varying degrees of software ownership need to be made more readily available. Microsoft, for example, offers a rented licensing model, but getting access, information, or engaging them on this model is a challenge in itself. Licenses need to be more 'consumable' on a self-service model. Open source software is becoming stronger as a result of licensing costs, and has assisted many start-ups in ramping up quickly; however, the next big challenge for open source is adequate documentation.

As regards operational transactions, the ability to bill and receive payments in foreign currency, exchange control and banking regulations are considerable barriers to internationalisation. Since the Reserve Bank prohibits foreign currency transactions locally (even though it is technically feasible through Visa/MasterCard), companies wishing to bill in US dollars or other international currencies need an offshore payment solution. In order to have this in place, a South African company needs to setup an International entity with direct relationships to a foreign payment processing partner. FNB's recent news on PayPal may assist in alleviating this requirement. However, unless FNB can offer PayPal's complete integration service (that doesn't need a shopper to be a PayPal customer) PayPal in

South Africa will have a limited positive impact. Billing by credit card linked to the exchange rate is not a solution and appears unprofessional.

Inadequate infrastructure and broadband also make globalisation of IT solutions far more difficult. In South Africa hosting and bandwidth are very costly – an alternative is to house equipment in 'the cloud' using services such as Microsoft's Azure or Amazon's EC2. Unless hosting costs reduce drastically, businesses will progressively engage international vendors.

5. Advantages in South Africa

While there are considerable barriers in this country as outlined above, on the other hand, there are also definite advantages. The cost of research and development is low, and skill levels are high, which makes for an environment that is highly conducive to implementing and testing software innovations. Local grants are available and the IP Act offers protection. Furthermore, our high levels of cellular telephone penetration in South Africa affords an excellent test base for mobile software solutions.

6. Conclusion

To attract venture capital it is necessary to provide a proof of concept and back up claims of uniqueness with good competitor research. The concept must be one that is protectable and that can scale to international markets. Barriers exist in this country because of exchange control and IP legislation, and lack of broadband and infrastructure to support globalization. However there are a number of research agencies and venture capitalists, and research and development can be done at low cost by highly skilled software developers. Cellular penetration levels make this country a good test base for mobile software innovations in particular. For new software companies to attract venture capital they need to have an international focus from the outset and address a global need; they should concentrate on the long-term outlook rather than short-term gain, and ensure that legislative preparation takes place.

Legal Compliance Issues Facing IT Companies

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Abstract: *There are a number of issues relating to legal compliance and IT governance that need to be addressed urgently. First there is the King III Code which aims to ensure IT governance is aligned with business strategy and effectively managing risk and security. As such it should not be seen as a "stick" requiring compliance with a new law, but as a "carrot" leading to better business practice and productivity. For this to happen, company strategy needs to be communicated down through the company to development teams. Secondly, privacy is the focus of the new Protection of Personal Information Bill expected to pass into law in 2010; software to manage the tracking of personal data acquisition, usage and granting of consent is needed for this. Lastly, the Companies Act of 2008 will require reviewing Shareholder Agreements, Contracts with Directors, the Memorandum and Articles of Association and other structure/governance documents to ensure compliance with King III.*

1. KING III and IT Governance

1.1 Rationale for King III

The King III Code [1] focuses on the alignment of IT governance with business objectives and with security issues. As regards the latter, King III involves risk management and controls, data recovery, privacy and information security. In the IT arena, security alignment means providing the triumvirate of confidentiality, availability and integrity of data; as well as protection of information in the knowledge economy. As regards the former, it is concerned with value delivery, resource management, business continuity, change management, strategic alignment with business goals and collaborative solutions. King III compliance requires understanding of risks and controls, review of risk management plans, and education and awareness of the underlying issues. As Dion Hinchcliffe of US-based Hinchcliffe and Company states, "When any worker can easily disseminate information across an entire organization, or even across the world, some organizations want to be aware of problematic situations before they occur." [2]

1.2 Basic Principles of King III

The basic principles of the King III Code as it relates to Information Technology are:

(A) The Board should ensure that IT is aligned with business objectives and sustainability

(B) The Board can delegate responsibilities of risk management to risk committees

(C) An audit committee should be an integral part of IT risk management.

1.3 Benefits of King III

The primary benefit arising from King III compliance is the creation of an environment that is an enabler of business strategy, that sustains normal operations while effectively managing risk, and that avoids unnecessary costs, both legal and operational.

[3] This paper is based on the talk given by Sian Evans at the colloquium.

2. Preparatory discussion on King III

The CITi Cafe Conversation group included an IT architect, software engineer, software architect and developer, electrical engineer and attorneys. Discussion revolved around the "optional" compliance with King III as an evidentiary indicator of fulfilling standards of care for Directors as required by law. The group felt that IT and software should provide a technical compliance solution for companies.

Compliance is currently seen as a matter of ticking boxes to avoid the "stick" of the law – as opposed to being the "carrot" of achieving better productivity and business practice. The tick box view is relevant and important but not sufficient. What was needed was that people understood why the box was there and what the outcomes of compliance are, so that with technological advances the box maintains its relevance.

Company strategy should be communicated down through the company. Senior technology managers should have an understanding of the strategy and their role in achieving this, so that they in turn can communicate this to their technology teams. In this way all software development can be done with a view on its strategic relevance, resulting in a cohesive and aligned company strategy and performance. It was however noted that cost is very often a real issue, and companies, perhaps unwisely, all too often push enterprise architecture and legal compliance to a low priority in the budgeting process.

The group proposed that a specification be drafted for a compliance tool relating to the strategic use of software within an organisation. Regarding security, the suggestion was to draft a map of data protection issues, and specifications for a software tool to assist companies in complying with data protection requirements. [This should be acted upon by someone who is at least half awake.]

3. The Protection of Personal Information Bill

The Protection of Personal Information Bill or POPI is expected to be passed into law in 2010. This Bill will radically alter the way that companies deal with personal information and privacy issues. This compliance can only be effectively managed from a technological perspective through software, so this Bill is of particular interest to software engineers. [Once again, what a business lead for someone!]

The Bill requires that companies identify the personal data they hold, how they obtained this and what they do with such data. It requires that they get specific and explicit consent to utilise this data. A software application could be used to record categories of data, filter specific uses thereof, and obtain consent to such use. The software could enable companies, in a fairly sophisticated manner, to query for any instance of personal data how it was obtained and used, and the associated consents.

4. The Companies Act of 2008

The Companies Act of 2008 is yet another new legal compliance issue for IT companies. In terms of this Act, Close Corporations (CCs) can no longer be created. For those CCs already in existence, certain laws have been amended so as to bring them in line with those applying to companies. For companies, the Memorandum and Articles of Association will be replaced by a prescribed Memorandum of Incorporation (MOI) and rules. The MOI will consist of the Memorandum and Articles of Association, and any other document by which the company is structured and/or governed. This must contain certain proscribed information and furthermore will comprise alterable and unalterable provisions. Any Shareholders Agreement and any rule must be consistent with the MOI and the Act; if there is conflict the MOI will prevail.

How does this impact upon companies? A grace period of 2 years from the general effective date will be granted, during which time existing provisions relating to the governance of a

company will continue to apply as is. Post the two-year grace period, such provisions will continue to apply but only to the extent that they do not conflict with the 2008 Act.

All companies operating under a "trading as" name should amend their registered name, as this will no longer be compliant with the Act. Companies should review the following documents:

- The Memorandum and Articles of Association
- The Shareholders Agreement
- Contracts with Directors
- Any other document by which the company is structured and/or governed.

Any conflicts with the unalterable provisions of the MOI or with the Act should be noted due to the potential voidability thereof and the inability to enforce these provisions; any conflicts with the alterable provisions of the MOI should be amended and reflected in the same manner in any Shareholders Agreement. The Shareholders Agreement's provisions which should be reflected in the MOI must be reflected there, and any provisions which need to be altered should be altered to mirror the MOI. In many instances the Shareholders Agreement may no longer be worthwhile and it is worthwhile checking whether this is necessary or has in fact become part of the MOI.

5. Conclusion

There are a number of new legal compliance issues facing companies. The King III Code, when implemented, will serve as an enabler of business strategy, where normal operations are sustainable, and risk controlled and managed. In CITi Café Conversations it was proposed that specifications for compliance tools for strategic use of software and for data protection be drafted, as compliance is best managed through software. A software solution to manage compliance with the Protection of Personal Information Bill (POPI) will also be needed once this is passed into law as expected in 2010. Finally, the Companies Act of 2008 will require review of Shareholders Agreements, contracts with directors and other documents relating to company structure/governance to ensure compliance after the 2-year grace period.

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Professionalising Free and Open Source Software

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Abstract: *This paper details the principles on which free and open source software is based, and gives some example of FOSS success stories. There are also risks and barriers to FOSS adoption however, and professional FOSS companies, or POSS, aim to support customers in utilising FOSS and integrating this into their systems. The Bee Keeper model is presented as a means of understanding how professional FOSS organisations should operate. The paper concludes with some objectives for a FOSS group in order to grow this community.*

1. Introduction

The freedom, transparency and accessibility of free and open source software are appealing, but this has to be balanced against the risk factor. The basic rationale of professional open source is to provide organizations that offer an alternative to 'going it alone' with open source.

2. Principles of Open Source

In order to understand professional open source companies there are firstly certain characteristics of open source that need to be considered.

2.1 Principle of Freedom

Open source is not free. In 1998 the term 'open source' was coined to replace the term 'free software' because many people assumed 'free' to mean 'zero cost' whereas it was always intended to mean 'freedom'. If you accept that open source software is not a zero cost solution you must then accept that these costs can occur in the form of time (internal man hours) or money (given to some external organization) or both. An organization could use open source software and support itself by hiring technical staff with the necessary skills to:

- Evaluate and select the most suitable open source software or software distribution.
- Integrate and embed the open source software in internal systems.
- Fix any critical defects that are found.
- Decide which patches and releases to migrate to and ensure migrations between versions are free from problems.
- Participate in the communities to ensure the direction that the software is taking suits the organization.
- Train any users or new technical staff.

Organizations have the freedom to do all these things but they should not consider fulfilling these needs to be of zero cost.

In addition to the costs above there are also risks to be managed. In fact if you look at the commonly listed barriers to the adoption of open source software you will find that most of them are related to some kind of risk and not to any kind of cost. It is difficult for most organizations to manage all of these risks themselves: the number of people and the range of skills required to do so is prohibitive. For small organizations or low-risk projects these risks can be tolerated but for larger projects risk management is a significant issue.

2.2 Principle of Openness

[4] This paper is based on the talk given by Sean Grant at the colloquium.

Accepting feedback through a web page and providing mechanisms for people to report defects is one thing. Allowing everyone else to see that feedback and all those defects is another, much more uncomfortable, step. Allowing everyone to see the source code so they can review it and try it is also an act of faith. Providing a public forum where people can openly criticize and contribute to the design and implementation of the software is another act of faith. These are difficult behaviours for a proprietary organization to accept but open source projects rely on them. If the project administrators do not provide mechanisms for people to communicate openly amongst themselves there can be no community. The availability of the design documents and source code enables the community to provide peer reviews and to use the software for their purposes and provide feedback on the quality.

2.3 Principle of Transparency

Transparency is the ability of the community to see what's going on. This involves a published road map so they know where the administrators plan to take the project, a public defect tracking system so they can report and review defects, published design documentation and communication about schedules and hurdles. Without transparency it is hard to grow a community. Transparency and openness are not the same thing. A glass door is transparent but whether it is open or not is a different matter. Transparency is the ability to witness the inner workings, openness is the letting outsiders 'in' so they can participate.

2.4 Principle of 'Early and Often'

This is the philosophy of making information available in its earliest drafts and updating it often. This includes, but is not limited to, the source code of the software. Zipped archives of the source code are available for every open source project. Many projects go further and have a public repository where the current code is always available. As the developers change the source code and check it in, it is available to anyone who wants to review it or use it. The principles of open source compound and combine together. Each one is a leap of faith. In order to be successful all the principles must be observed: merely letting someone view source code, or giving someone a free evaluation license does not have the same power as the open source model. The tendency of the open source model to resolve design defects early in the software development cycle only occurs if all three principles are applied.

2.5 Expectation of 'Community'

When it comes to open source the web site, source code, roadmap, defect tracking system, and forums are the 'project' and the community participates in the project. That the source code and roadmap are available is a result of openness. That the defect tracking system and forums are available is a result of transparency. That the design and initial code is available is a result of 'early and often'. It is these principles and the results they lead to that ultimately attract and retain the community. The community is a by-product of the project, and the project a by-product of the open source principles. Participants in open source have an expectation of a community and the development model and professional open source company relies upon it.

3. Barriers to Open Source Adoption

Open source is a model of software development that has been growing since the 1970's. It is a very effective model for producing high quality software. As the number of open source projects grew, along with the scope of what could be done with it, it attracted the attention of IT organizations, systems integrators, software vendors and other commercial consumers. These organizations identified a number of barriers that make it hard, and in many cases impossible, for them to adopt open source. The primary barriers are: functional gaps, lack of roadmap, lack of endorsements by independent software vendors (ISVs), lack of formal support and services, license types, and speed of change.

4 Professional FOSS

There are entire industries whose sole purpose it to provide risk management. When you look at the offerings of POSS companies you will see that many (and sometimes all) of them are there to help the consumer manage the risks of deploying open source software. Professional open source companies

usually offer some or all of these:

- Formal support with service level agreements (SLAs)
- Professional services
- Certified software stacks
- Certified partners
- Product management and roadmaps
- Advisory boards
- Closer functional parity with proprietary alternatives
- Business-friendly licenses
- Reference accounts, cases studies, and user groups

	Open Source	Proprietary	POSS
Rate of innovation	Higher	Lower	Higher
Visibility into product design / implementation	Higher	Lower	Higher
Quality of software	Higher	Lower	Higher
Reliability of support	Lower	Higher	Higher
Reliability of roadmap	Lower	Higher	Higher
Ownership of solution	Higher	Lower	Higher
Availability of professional services	Lower	Higher	Higher
Availability of references and case studies	Lower	Higher	Higher
Ability to prototype and 'try before you buy'	Higher	Lower	Higher
Cost of license or subscription	None	High	Lower
Ability to customize software	Higher	Lower	Higher

5 Success stories

There are many highly successful open source systems. Some well-known examples are Alfresco, the enterprise content management system; Cleversafe dispersed storage technology; Compiere, the open source ERP and CRM business solution for SMEs; Digium communications and telephony software; Hyperic network monitoring software; AMANDA and Zmanda Recovery and backup tools; and database systems such as Postgres and MySQL; among many others.

There are also several professional FOSS companies. Funambol is an American corporation that earns revenue from its dual-licensing business model that includes commercial software and free open source mobile data synchronization software. Intalio delivers an integrated cloud computing platform designed for the Enterprise. Intalio is made up of two divisions, Intalio|Cloud and Intalio|Works. The Intalio|Works division develops and supports industry-leading applications and infrastructure software including Intalio BPMS and the Jetty family of lightweight application servers. Intalio has over 500 customers in over 50 countries. Optaros's Assembled Web framework helps clients respond to the convergence of content, commerce and community and the growing control of consumers to assemble their own experience on the web. The Pentaho BI Project is open source application software for enterprise reporting, analysis, dashboard, data mining, workflow and ETL capabilities for business intelligence needs. Qlusters is the company behind openQRM, the leading open-source systems management solution for software provisioning and managing virtual environments.

Red Hat is the bridge between the communities that create open source software and the enterprise customers who use it. Red Hat makes the rapid innovation of open source technology consumable in mission-critical, enterprise environments. They share their expertise, code and knowledge, and foster greater participation in the open source process. Other examples are rPath, SpikeSource, Zend and Zimbra.

6 The Bee Keeper Model

The Bee Keeper model [1] is a useful way of understanding professional FOSS and how it should be undertaken. A Bee Keeper creates an environment that is attractive for bees. The bees do what they do naturally and the Bee Keeper sells the honey to his customers and uses the money to grow his bee farm. Professional FOSS is akin to a Bee Keeper. In order to achieve maximum growth the Bee Keeper must grow both his bee population and his customer base. Likewise a POSS company must perform a balancing act and grow the FOSS community and customer base together. The Bee Keeper has very little control over his bees. Similarly, the FOSS community can desert, or even worse fork, an open source project if they so desire (i.e. start an independent project, as in a Unix "fork"). So the POSS company must keep their community happy and cannot rely on them to follow any directive or schedule it might have. And, just as bees can sting, community members can publicly object or criticize the POSS company on its own or other web sites.

Bees and honey come first, before customers. There is no chicken-and-egg dilemma here. The more time and effort spent building the bee population, the quicker the hive will grow. Likewise the POSS company must build a community that helps create the software before they can engage in the commercial world. The longer the POSS company can focus on adoption before having to worry about revenue the better it will be. It takes a large number of bees for a successful outcome, since each individual bee makes a small contribution. The POSS company's community is vital too, but the individual contribution of most community members is small. Each bee hive has a queen to attract enough bees to make the hive viable. Similarly, open source projects often have a single founder or administrator that is the main leader of the project. Open source projects can be 'acquired' or 'merged' if the project leader and prime contributors are convinced that the move is beneficial to the project.

Just as customers don't want to deal with honey in the hive, commercial customers don't want to deal with open source. They want 'whole product'. Nor is the customer's cash any good to the bees.

Likewise the POSS company's customers do not directly help the open source community. It's only when the POSS company uses that money to pay for engineering resources to improve the open source software that the community benefits. Customers are not bees, bees are not customers, and you cannot convert one to the other. I call this the Consumer Dichotomy. The sales and marketing groups within a POSS company need to be aware that, in most cases, it is not possible to convert a community member into a customer. However is it possible to convert the employer of a community member into a customer, and community members have the potential to persuade their employer of this. A POSS company needs to educate its members on the services that are available and the long term advantages to everyone if those services are used. The POSS company needs to find a way of presenting this, and enabling members to present it to their employer, without de-valuing the capabilities of the community member.

7 Conclusion

By March 2010 we want to grow POSS enterprise and the FOSS community. We need to determine baseline numbers now, and to measure again in November 2010. What do we want to achieve? Measured growth in POSS & POSS Skills, and to audit the quality and professionalism of FOSS services and products. We need to identify and build community. We need software engineers to join the group, share their views and tell us what they think about this initiative.

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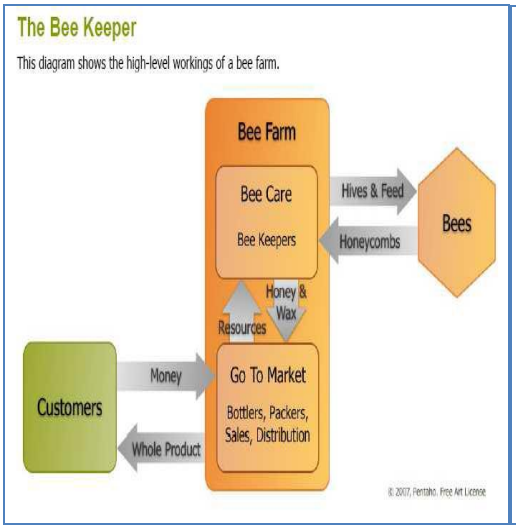

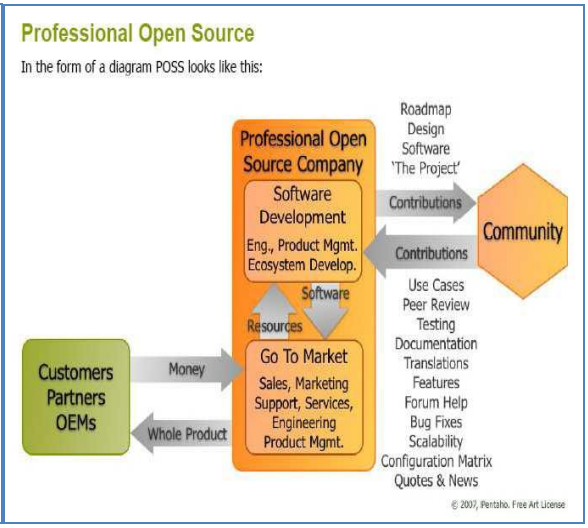

Cloud Computing for the Western Cape

Dr Pawel Lubczonok[5]
ThoughtExpress

Abstract: *This paper proposes that we focus on our customers and real world problems rather than technology. Cloud computing offers several advantages especially for small companies, but we must develop solutions for customers and then use cloud computing, rather than concentrate on the technology first. Our location in the Western Cape presents difficulties as regards scalability of cloud computing, but also advantages as a result of our proximity to African countries, a good platform for global success.*

1. Focus on solutions

The hype that exists around technical advances can be destructive. Durability of companies does not lie in fickle technologies, but in addressing real life problems. The greatest innovation comes from immersing ideas in the real world – most innovation comes from customers not the research laboratories. In this regard, there is value in knowing your neighbour; we should look to Africa because of customer proximity. Winning in Africa is a good platform for success in the rest of the world.

Hence we should forget about the cloud, and rather think about solutions and customers, and then considering using the cloud. We should look to using cloud computing as a tool to solve problems and increase our own profit margins. But there is a danger – it is difficult to compete on technical and scalability levels from the Western Cape. Even EC2 which was developed here is not hosted here.

2. Forget local maxima

As Larry Ellison said, "best of breed is dead except at dog shows". Instead of concentrating on optimal or improved solutions to individual aspects of a problem or system, we must seek the best ways to deal with ever-increasing complexity, because overall performance is the most important. At present interfaces are the biggest part of solutions. But our greatest new challenge is managing complexity, and we may have to find a different paradigm e.g. semantic technologies. Software engineering is a creative activity, which derives from the individual to a significant extent, so different environments and support structures are needed. Cloud computing will be an enabler for smaller companies.

In the 1980s Peter Russell put forward the inevitability of the Global Brain – total convergence towards one global machine, the Internet of things. However the current approach does not make composition of services or of knowledge easy or coherent. According to Gartner, 70 percent of enterprise wide implementations fail. A new approach is needed and we must think in these terms in building long-term IT business strategies.

[5] This paper is based on the talk given by Pawel Lubczonok at the colloquium.

Rewards and Recognition for Software Development in South Africa: a Proposal

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Abstract: *There is a need to systematically recognise relevant excellence and innovation in our own community in order to able to exploit the virtues bestowed upon us through hi-tech. Through recognising and rewarding noteworthy proponents of software development, we will need to define terms, such as software roles, the reaches of our community, sectors within the development community, and therefore gain acceptance of subtle but important distinctions. We identify here the long term intentions of this program.*

1. General overview

Software development can lead to the creation of substantial value, if approached correctly. One way of measuring value criteria is to determine publically in advance exit criteria for programs relating to software innovation. One such criterion should be the recognition and reward from one's peers.

2. Introduction

There is no use appropriating winning models from other countries, for example India, Israel, Ireland or Brazil. As a country we need to do the business analysis, design and implementation ourselves. The path to monetisation of our R&D must logically be different to that of our peers – roads already walked in the quest for value will not lead to the same rich destination for later travellers. With this in mind, we need to recognise excellence and innovation in our own community. This excellence must be defined in our own context, and must try and build upon our strengths, rather than aping others' elsewhere.

This document contains a vision and stipulates requirements in recognising and rewarding local talent, able to create value from technology.

3. Introduction

Here we propose a number of key considerations in setting out criteria and processes to recognise and reward software innovation.

3.1 Peer and formal

Due to the fluid nature of technology, this recognition needs to be done both through a peer review type process, and trough a formal checkbox process.

The formal part of the process should be done in conjunction with best practices, academic review and industry norms.

It is proposed that a Secretariat is established and funded to manage the criteria and review. It has been suggested that the marketing and financial model is derived from Lurie awards.

3.2 Regional

We need this recognition to be both inclusive of as wide a group as possible and predicated on producing appropriate quality. The awards may initially be focussed on the Western Cape, but in time the awards needs to be extended nationally and then perhaps into the SADC, and sub-Saharan Africa.

However, we do need to acknowledge the diaspora of South Africans as well – people like Elon Musk, Roelof Botha, Theo de Raad, etc.

3.3 Intentions:

- encourage locally developed software
- promote the development of solutions and services for our business and government dynamics
- promote architecturally well-defined components to encourage interoperability
- promote the adoption of standards and recognised architectures
- promote collaboration – this is to prevent a lot of trivial organisations operating independently

3.2 Format

It is proposed that the event is made as accessible as possible – it is not intended to be a world showcase for software prestige, but an engine to drive innovation in the right direction.

Therefore we need to strike the balance between being too exclusive and red-carpet, and being too introverted. We need to celebrate our successes publicly and tell people about us.

3.5 Sectors

It will be of considerable importance to recognise not only different software roles, but sectors as well. By roles we refer to job titles such as “business analysts”, “designers”, etc. By sectors we mean the embedded industry, web design, film industry, etc.

4. Award proposals

The intention of the awards is to recognise individuals that are adding value in some way. What is value? The answer to this is to uncover the unique selling proposition of locally produced software...

1. Stand-alone - non-profit
2. Just software
3. IT infrastructure - network
4. Management services
5. Open source
6. Best proprietary product or service
7. Most stylish IT Person
8. Best project by scholar
9. Best project by student
10. Best community project
11. Soft aspects of IT - project management, BA,
12. Convergence ...

5. Real world

Focus is on recognising software projects post deployment.

At this stage there is no specific award for black and women software professionals – we have set criteria for the awards such that the relevance of the award will exclude shrink wrapped solutions being parachuted in for the US / EU.

6. Conclusions

We hereby propose that letters are sent out to DST, DoC, DHE, PGWC, CoC, IEEE, SAIEE, da Vinci Institute, and other organisations seeking support.

We already have recognised the UCT/CERN and iThemba collaboration for the HLT at CERN. Dr Vilakazi and Professor Cleymans received the reward in this regard.

At the next Software Engineering Colloquium, or a similar event, this basic recognition needs to be built upon into an award. To do this sponsorship should be sought to make the reward sufficiently prestigious. Then entries into the awards should be publically advertised.

For the time being award areas can be confined to the above twelve. The criteria can be assigned to an independent group consisting of an industry, government and academic representative. There could also be a public show & tell and votes.

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Software Development Award to UCT/iThemba Labs

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Abstract: *At SE10 a software development award was made to Prof J Cleymans and Dr Z Vilakazi, in recognition of their contribution to the multi-national grid technology project ALICE. Besides several publications in IEEE journals, the work also resulted in the UCT CERN cluster joining the worldwide ALICE grid for high-speed computation.*

1. Introduction

This software award was made to the team of the UCT-CERN and SA-CERN programme's High Level Trigger group at UCT. The team was led by Prof. Jean Cleymans (UCT), director of UCT-CERN and SA-CERN programme, and Dr. Zeblon Vilakazi (iThemba Labs), former leader of the HLT group at UCT.

2. Background

ALICE (A Large Ion Collider Experiment) is a detector dedicated to the study of nucleus-nucleus collisions at the Large Hadron Collider (LHC) in Geneva, Switzerland. ALICE is an international collaboration of over 1000 researchers from 70 institutes formed to study ultra-relativistic heavy-ion collisions at the highest energies possible. Experiments will yield mass data storage *requirements* of the order of petabytes per year. It therefore poses a conceptual and technical challenge in data management, storage, distribution and analysis. Furthermore, these data sets have to be fanned to analysis centres in different countries far from the main experimental venue. Online data filtration and analysis between the event builder (DAQ) and the front end processors was needed. It has been shown that such refined event selectivity can be accomplished by the high level trigger (HLT) complex because this will allow the rarest signals (in terms of cross-sections, which are topologically distinct tracking signatures in detectors) to be measured.

3. UCT/iThemba Contribution

Researchers at UCT (and later iThemba LABS) were heavily involved in setting up an HLT prototype, which includes data filtration algorithms, physics analysis flow-chains and hardware implementations, amongst others. The ultimate aim of such processes is to improve momentum resolution of the tracks and identify valid physics candidates. Preliminary estimates based on extensive simulations done using the UCT Linux cluster have indicated that background rejection factors of 5 - 10 can be accomplished. Moreover, indicators are that such implementations can also yield a reduction of data bandwidth by a factor of 5 and thereby make it easier (and cheaper) for data to be stored and/or shipped to other places. It is in this context that the UCT CERN group has found itself an important *niche* in this large experimental project.

4. Significant Outcomes

The HLT code developed in Cape Town was successfully commissioned and committed prior to the LHC inauguration in September 2008! This was a remarkable achievement which we can take particular pride in. The group was able to put SA on the map in this great scientific experiment. Four papers in a highly prestigious IEEE journal came out of the work carried out by the UCT-CERN team and colleagues in the ALICE experiment. Publication in high impact journals will continue as soon as the LHC starts producing data. New applications of GRID technology are likely to be spawned from

these endeavours. Paramount among these is the use of the newly inaugurated UCT-CERN cluster as a node for high speed computation on the world-wide ALICE grid, which includes all major research laboratories in Europe, India, China and the USA.

Jo-Ann Johnston of the Western Cape Provincial Government making the award to Prof Cleymans and Dr Vilakazi at the end of the colloquium, while Jenny McKinnell looks on.

Appendix - Report on CITiCafe Round Table Discussions

Roderick Lim Banda
2010-03-28

Executive Summary

The Purpose of this Document

Document for Discussion

This document is a draft concept document for discussion and interaction with stakeholders of the Cape Information Technology Initiative on the CITiCafe round table discussions and recommendations for CITI's own program development undertaken by KASE in 2010.

The CITiCafe Round Table Events

The Need to Engage Stakeholders

The ICT Cluster: Speaking with One Voice

The driver behind the CITiCafe is to provide a series of round table conversations that will engage stakeholders in Information Communication and Technology (ICT) cluster in the Western Cape and Cape Town. A cluster forms a grouping of the diverse role players and structures making up the public and private sectors. The aim of the formation of these clusters in regional and local government is to enable the dynamics of interaction to develop and for government to both understand and channel its strategies and implementation thereof to better effect.

The Cape Information Technology Initiative (CITI) was in part formed around this cluster development structure and represents the bridge between public programs and the private ICT cluster and sectors. However, defining a program for the ICT cluster has been a challenge given the complexity of this formation, the technical nature of the industry, the diversity of bodies of knowledge and the wide range of perspectives. Government representatives as policy makers are dependent on industry stakeholders to set the agenda.

Where other clusters have been able to develop programs with government support and funding, the ICT cluster has struggled to outline its agenda with government. CITI has been tasked with establishing round table conversations to begin a conversation that will enable the ICT cluster stakeholders "to speak with one voice". It is therefore the intention that through these conversations we will begin to define the agenda and program for the ICT cluster in Cape Town and the Western Cape.

Why Café Conversations?

Café Conversations is based on the World Café format which originated in San Francisco but has since been adopted by practitioners around the world. It is a method of facilitating round table discussions in groups and smaller table discussions with a Café atmosphere.

When Jenny McKinnell took up the appointment of Executive Director of CITI, she faced some daunting challenges. CITI had been re-structured during the period of 2008-2009 and by the time of her appointment in 2009, there was much negative sentiment about CITI and its role. In looking back at what CITI had and had not achieved, Jenny began looking at organizations that were functioning in the region in terms of building communities and came across the Academic CIO Forum.

The adoption of the Café Conversations style of round table discussions was based on its successful use with the CIO Forum. The local Academic CIO Forum has made use of social media and Café Conversations to engage stakeholders. It had created a former for Chief Information Officers (CIO), aspiring IT leaders and senior IT managers and professionals. It had successfully engaged and networked with academics of the 4 universities: The Cape Peninsula University of Technology (CPUT), the University of the Western Cape (UWC), Stellenbosch University (SU) and the University of Cape Town (UCT). It also launched a Master Information Officer (MIO) program, a centre for CIO research in Africa (CenCRA) and the 1st Conference for CIO Research.

Developing Common Themes

Towards the end of 2009, Jenny had also started working closely with the team planning and coordinating the 3rd Cape Software Engineering Colloquium for 2010 (SE10) with members of the IEEE. This included David Hislop, who had helped organize the previous software engineering colloquiums and Roderick Lim Banda, who is a co-chair and co-founder of the CIO Forum.

The SE10 agenda was initially developed out of a list of ten themes that followed on from the CIO Conference on CIO Research. Some of these agenda items have evolved and were changed as we engaged others to help drive these themes. The aim of developing the agenda in this way was to unify common themes between academics, CIOs and software engineers. This is significant in that the development of a common agenda was thought to be a way of unifying efforts in the various communities.

Working groups were formed around the themes to do research and engage others in the development of the topics and agenda. By December 2009, we had formed regular meetings to report back on progress and established a management team to coordinate the working group efforts.

When Roderick Lim Banda presented his work on the Cape Software Factory and the Hollywood Reference Model, it was decided by the management team for the SE10 to adopt the Cape Software Factory as the unifying vision for the agenda items covering Agile, Skills Development, Cloud Computing, Legal and Compliance, Marketing Software, Open Source, Accreditation and Rewards and Recognition.

Re-vitalizing the Cape Information Technology Initiative

After further discussions it became evident that the Cape Software Factory model addressed primarily the Software Engineering themes and that there was a broader theme around the Hollywood Reference Model which applied to the wider ICT cluster and the region.

Jenny felt that the life style business aspects of the model could help bridge the divide between creative designers and software engineers. This is in line with the Creative Cape initiative and the Cape Town bid to host the World Design Conference in 2014.

There were also aspects of the model that could help stimulate a conversation on how to re-vitalize the Cape Information Technology Initiative in the region. It was felt that aside from the organizational structure itself, that a strong information technology initiative in the region was important in benefiting everyone in that it represented the bridge between public and private sectors. There was no other structure in the region that cut across the diversity and complexity of ICT.

Reviewing Key Questions and Development of Reference Model

In preparation for the Software Engineering Colloquium, members of the working group and management team reviewed existing and extensive documentation on research studies, policy development and programs relating to software, software engineering and ICT in the Western Cape.

The group also explored various issues that had been repeatedly raised and formulated some key questions regarding ICT in the Western Cape. The introduction of a reference model came about as a result of reviewing these questions and in trying to find a way forward that would enable these questions to be addressed.

The main questions with regards to the development of ICT in the Western Cape that were formulated were the following:

Are there conditions that are impeding Cape technology companies from growing and sustaining their revenue? What can we do collectively, to address them?

How can the technology sector help to address unemployment and increase job opportunities in the Western Cape?

Is it possible for large corporations in the province to keep all their software development work in the Cape and what is the likely impact of this?

Cape Town is globally recognized as a creative city. What might happen if we create spaces and opportunities for designers and developers to work more closely together?

Why is it said that a "lifestyle" business inhibits investment? If money chases value, what can we do to increase our value proposition to investors?

What reference models should we be considering and how do we leverage what makes our region unique?

Preparation of a Series of 8 Café Conversation

In preparation for the Café Conversations, the study on reference models of CITies and innovation was prepared into a topic called “CITies as Cultural Innovators”. This is based on a thesis of “Building Architecture as Reference for Architecture Intensive Disciplines” by Roderick Lim Banda and includes references to stories where social pre-occupation enabled the development of a culture of innovation.

Venues were carefully selected for the eight round table conversations and were scheduled to be undertaken in a period of three weeks. It was decided that we would aim to invite representative stakeholders across the four universities, ICT organizations, local government, the Black IT Forum, the Software Process Improvement Network, IEEE, CIO Forum, the film industry, Creative Cape, Accelerate Cape Town and Cape Town Partnership, Cape Tourism and Routes Unlimited, IT professionals, software engineers, venture capitalists and entrepreneurs. We envisaged about 15-20 people attending these conversations.

Schedule of Round Table Events

The following represents a table of schedule of the Café Conversations held in February 2010 just prior to the Software Engineering Colloquium on March 16.

Date	**Time & Venue**
8 February 2010	Time: 08:30am – 11:00am Venue: Sinns Café (Gardens, Cape Town) Wembley Square
10 February 2010	Time: 08:30am – 11:00am Venue: Sinns Café (Gardens, Cape Town) Wembley Square
12 February 2010	Time: 08:30am - 11:00am Venue: Cantina Tequila (Bellville) 86 Edward Street

15 February 2010	Time: 08:30am - 11:00am Venue: Time Cafe (Century City) The Colloseum, Century Boulevard
17 February 2010	Time: 08:30 am - 11:00am Venue: TrumpetTree (Stellenbosch) 84 Dorp Street
19 February 2010	Time: 08:30am - 11:00am Venue: Cantina Tequila (Bellville) 86 Edward Street
22 February 2010	Time: 08:30am - 11:00am Venue: Sinns Café (Gardens, Cape Town) Wembley Square
24 February 2010	Time: 08:30am - 11:00am Venue: Sinns Café (Gardens, Cape Town) Wembley Square

There were in attendance on average of between 15-10 per Café ***C***onversation. On average 3 to 4 groups or table conversations of 20-40 minute duration were held. And groups presented their summary of points or solutions added to the graphic wall or recorded for later addition. Two of the Café Conversations did not have table conversations as the questions and answers evolved into a discussion naturally which raised valuable input into the broader conversation.

The Conversations

Recording the Conversations

Conversations as a Narrative & the Graphic Wall

The aim of this section is to provide a summary of the events and the conversations held. This section provides some context of the conversations held at the round table events with extracts relative to the evolving issues and solutions. This section does not capture all the points of the conversations and many of the essential thoughts were captured on the graphic wall and discussed in explaining elements of the graphic model.

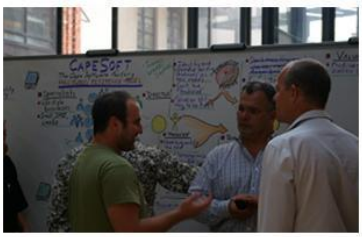
As stated in the Café Conversations round tables, often when we document these conversations much of the thought and essence is already lost. Hence, along with a narrative perspective or report, we adopted the "design method" to capture viewpoints, ideas and solutions into the model.

Because of the method chosen to provide a more constructive approach towards designing a reference model and focusing on solutions, it is important to note the process in the narrative form of the conversations. There was much debate and discussion around the problems and issues. These need not be seen as negative but part of the natural and organic flow of the conversations.

As expected, there was disagreement on various issues. The aim of this section is to provide a report and context to the events held. But it is also to identify issues and viewpoints that may not have been explicitly captured on the graphic wall and to include them in follow up conversations, dialogue and initiatives.

Event 1: Monday, 8 February 2010





The Reference Model

In our first Café Conversation and round table discussion, there was a mixed response to the reference model. Comments included "Not sure how relevant" and that the "Hollywood reference model can be very useful." However, a number of suggestions and issues were raised which helped to rapidly develop the graphic wall from its initial "sketch".

Producers and Entrepreneurs

Of particular significance was the discussion on entrepreneurship in the Western Cape with a number of attendants representing small to medium sized companies that were marketing their products and services with relative success locally and overseas.

The issues raised included the lack of presence of success stories at international conferences and the lack of visibility of the region as a centre of innovation. We are not known or recognized yet there are many entrepreneurs that are settling in Cape Town with businesses that generate revenue in overseas markets.

A comment was made regarding the role of the producer and whether there was any need for seeing this as a focus of a program or intervention, "I do not see the need to create 'Producers' should be up to each company, business or entrepreneur." It was felt that this role is undertaken by entrepreneurs and that there should be more focus on other aspects such as technical skills.

It was mentioned that this viewpoint should be taken into account as there was a "need to validate what is being presented and not simply present views …" and that we need to ensure that we were not simply imposing a view point or model that was not supported by evidence and engagement. We needed to "listen and not discount or disregard these concerns." We undertook to gauge perception in coming events about the producer role in the reference model.

There was some discussion on whether entrepreneurship was working in the region or whether we were producing good entrepreneurs. It was highlighted that the region demand individuals who were also prepared to commit towards social and technical development as skills and capacity often needed to be grown and hence the "need for entrepreneurs who can mentor and give."

Event 2: Wednesday, 10 February 2010

Table 1: Entrepreneurship

The topic of entrepreneurship continued in the second event. There were a number of comments relating to the need to develop innovation from concept and a process to assist in "idea incubation and protection".

It was expressed that we need to focus on the continent and "go to Africa, not United States and Europe" in terms of marketing our products and services and developing locally relevant innovation.

There was also debate and discussion on the question, "Do we have the good entrepreneurs and good skills?" It was felt that there was a need of a "Connecting Point" which enables entrepreneurs to network and helps to support them in developing their capability and their business enterprise.

Table 2: Networking

There was significant focus on the issue of networking in the region. "Networking is essential but difficult." It was felt that there was a need to have more events of this nature that brought people together and to provide a means for people to engage in more business networking perhaps broken down to more specific focused groups. The Hollywood Model of bringing people together to work on developing a product seemed relevant in this context.

The role of the producer and script writer that put together the concept and business plan was considered and it was felt that "IT needs individuals who are more business orientated". There were discussions on the challenge and difficulty of strong technically-orientated people moving into a more business role.

It was also felt that there was a need to ensure a process or culture where "quality and shared risk model" was widely adopted "down to the individual level". In order for the region to compete, we need to be driven by quality and be prepared to share risk as in the Hollywood Model where everyone from the large studios and producers to the aspiring actors and actresses and technical specialists take personal risks to achieve their goals and dreams.

It was also felt that there were success but these were not being shared and celebrated and that "we need to get together to produce success stories."

Table 3: Producers

The group felt that there were "some very good entrepreneurs in the region". There was a need to give these entrepreneurs more exposure and that "like the Hollywood model, creating glamour and success stories could be CITI's role."

It was also pointed out that there was a lack of capacity in terms of "the doers" and that "there may not be enough 'actors' who are willing to sweep floors here." People need to be prepared to do what it takes and that may include the tedious work or moving out of their comfort zone and not be constrained in placing too much emphasis on "job descriptions".

The need for "uplifting and creating 'Directors', 'Producers' or entrepreneurs" was seen as a very important aspect of the model and relevant for the region. It was felt that there was a need for someone to bring together the market and the innovation. We need to find ways of "smoothing the friction between supply and demand."

Role of Producer

There was significant discussion on the role of Producer and the analogy of script writing and directing. This was of interest and a number of possible synergies were seen in its application in ICT. Firstly, it was felt that the relevant elements of the model were already in place in the Western Cape and that the role of producers was to "connect to what is already available – bring together, including the public relations element."

It was a given that "IT professionals as entrepreneurs may struggle to present ideas in the right way." Hence, Producers with the right skills needed to be developed. "The person must understand innovation, business plans and technical issues." When discussing some of these business and technical skills and facets (e.g. communication and an understanding of innovation), it was clear that

this encompassed a wide set of skills. It may also require an organization and that "in terms of a role of a 'Producer', this may not be possible to find in one person."

Fear of Failure

There was some discussion on the challenges facing individuals seeking to become entrepreneurs. There is often a lack of support from family and friends and that this stems from the fear of losing a good reputation. "Not every own is prepared to take risks and there is the issue of culture and an aversion to risk and fear of failure." There is a strong worker mind-set and parents encourage their children to find work in large companies or in manufacturing and industrial enterprises (e.g. generations of family working in the textile industry).

Role of CITI

There was also discussion on CITI's role. It was felt that we need to "understand the scale of what is required." One question raised was "What is CITI's role?" As well as the question "Who does CITI represent?" Jenny explained the ICT cluster and how CITI was established to act as the bridge between initiatives undertaken by government and the public sector.

Reference Model

The group was more positive than in the first event about the reference model and engaged in a very meaningful conversation on solutions, suggestions and ways of adopting or furthering the model.

Event 3: Friday, 12 February 2010



The Reference Model

As with the previous event, this group was very positive about the reference model and that "the Hollywood Reference model is a very useful model." But it was also felt that "the model is very supply side orientated". It was difficult "to see anything representing the demand side." The group had a lively discussion on the market with a number of suggestions added to the graphic wall.

Ideas and Implementation

A very interesting aspect of the discussions came from comments about the focus on ideas and the fear of sharing them. "We hide our successes and ideas and do not want to share them." We spoke about the "fear of people stealing our ideas."

It was felt that we as "South Africans value our ideas too much." We need to focus on how we implement and that "success is in the implementation." In some regions internationally, people sit down and engage in putting a plan together without asking for a Non-Disclosure Agreement (NDA). We need that sense of openness and trust in the region. This led to further discussions and elements added to the graphic wall.

Role of the Producer

"Producer and 'writer' role is important." There were some very important thoughts on the need for Producers to be developed with a strong set of ethical values and standards and to focus on gaining the trust of innovators.

Table 1: Clumps and Clusters

The group discussed the nature of the region as having pockets of excellence but often in disparate divides and that we need to be "moving from clumps and cluster …"

The group "discussed how we have been evolving from the early 1990s with Internet protocols, standardization and pipes and plumbing, computing modules or modularization, etc and moving towards 'Lego Blocks' in the way we assemble a 'Series' or 'Movies'."

There was a very useful insight that software development was iterative in nature and was more like making a TV series than a movie and distributing it. "For software systems and IT, the Hollywood model is more like producing 'Series' or 'Sitcoms' than 'Movies'." But it was emphasized that "this could not be achieved without standards for writing, stunts, etc."

There was discussion on education. "We need to look at the way computing is taught. The traditional approach puts emphasis on mathematics. But perhaps we should focus on language and the spoken word at the primary and high school level. Perhaps we should consider using language teachers where we have more teachers available and a scarce pool of mathematics teachers."

Table 2: Cultural Paradigm

The focus of the group's discussion was on "cultural paradigms first. People are not encouraged in their communities and by their family to become entrepreneurs. Fear of failing and loss of reputation." It was felt that "entrepreneurs need to be encouraged and groomed."

The focus also turned to government and black economic empowerment initiatives. "There is still a lack of Black and BEE entrepreneurs." It was emphasized that "government plays a role but the solutions need to come from industry."

It was felt that CITI needed to facilitate the conversations and that "the rich and 'geeks' are not talking – CITI needs to stir the pot."

The dynamics between big business and small medium enterprises was discussed. "Large corporations and small medium size enterprises (SMEs) are not working effectively enough." The big fish from small fishes was highlighted and that "SMEs need to get together to present on big front. This is the network enterprise model."

It was also felt that there needed to be a focus on what the customer needed and to deliver in an agile fashion. "We need to move from producing 'Proof of Concepts' to 'Proof of Value'."

Table 3: Direct/Producer

On whether an program to create producers and to develop this role was important, it was noted that "the 'Director'/'Producer' need to be found. This does need a program or intervention to create and bring together effectively." Intervention in the form of a program, perhaps to mentor or train and certify people into this role and to ensure they abide by a code of ethics was seen as important. "Without an initiative or program to create these 'Producers', it will not happen as everyone has their own agenda."

It was also noted that the "Western Cape is a DA government and it is a political reality so it may be difficult to get national buy in." People in the region need to make things work and get involved in order to overcome political agendas on any side from becoming the driver of the region.

Table 4: Execution

There was discussion on the synergies in the model. "The arrows in the model need people with mandate to go to market and to get the feedback and input process back into the 'machine' or 'factory'." This required effort and hence "needs a focus group to deliver and coordinate."

The conversation followed on how "the 'Producer' keeps the momentum going through to execution." The process of production and the collaborative nature of the enterprise as a network were discussed.

This led to a discussion on the Agile software development approach. "Agile development method is important in the execution process."

Event 4: Monday, 15 February 2010



Table 1: Everyone Wins

There was interest on the method and process of engaging especially from a systems architect perspective and creative thinking approach. It was felt that individuals also needed to understand what value they could gain. "What am I willing to contribute without getting back?"

There was further discussion on education. "We discussed education and the gap of old and young."

In terms of the concept of awards and recognition, it was felt that "the 'Academy Awards' works but we also need to advance towards the idea where everyone wins."

Table 2: Good Thinkers

The group struggled to see the value of the model. "We don't see the business value of the Hollywood Model." Those having companies that develop software products "are skeptical about sharing ideas."

It was felt that the focus should be on technical skills. "There is a problem in the pipeline of skills, education and universities." It was especially in the development of thinkers – such as software architects who can abstract complexity and are object orientated – where there is a need. "It is difficult to find good spatial thinkers, object orientated thinkers in project teams."

There was also a need to focus on specific sectors. "We need to develop the Western Cape as a region of innovation in the financial services and other sectors."

The Hollywood model may not appeal to software developers. "Is it attractive for developers to be creative? No. They want fun, exCITing and cool environment."

Collaboration is also not necessarily something organizations will want to do. “Where in IT do we need to collaborate? – perhaps in skills development”

Table 3: Education System

It was felt that the “education system is too rigid.” The need for an apprenticeship or internship program was expressed. “There are no apprenticeship programs and assistance with getting into the working environment.”

The system was not encouraging creative thinking and innovation. “Students and academics are not innovating.” This was gap. “We need to bridge the gap between academic institutions and enterprises.” Mentorship and mentorship programs were encouraged. “There is a lack of mentors.”

It was also felt that the existing organizations and bodies needed to be taken into account. “What about industry bodies: Computer Society, Chamber of Commerce, IEEE? Need to work together and not duplicate.”

A discussion of government policies in ICT and their negative impact was an important aspect of the conversation. “We need to lobby against legislation where well intended but badly implemented.”

Event 5: Wednesday, 17 February 2010



Table 1: Lack of Skills

There was much discussion on the model and how it resonated with in terms of the lack of skills and need for specialization. “Invest in technical writers, lack of technical writers.” The group focused on conversations relating to skills in the industry and the need for both specialists and generalists.

Table 2: Communication

Communication was a key aspect of the group conversation “…lack of communication. These Café events help.”

There was discussion on the diversity of communities in the region and whether this was a good or bad thing. “There are different creative communities. SiliconCape has lots of creative professionals but not necessarily of interest for software engineers.”

It was however felt that conversations need to move towards action. “Talk is cheap. Need movement towards improving things. Create visibility.”

The role of CITI was discussed. “What about involving more people in government? What is the CITI’s role in government?”

Table 3: Academics

It was highlighted that there we need "not just create noise but must understand roles and be self-regulating." It was important for knowledge to be "created by companies, academics and students together." There was diverse academic representation and it was felt that "academics are insular with loose affiliations – e.g. MediaLab, Stellenbosch MIO program in Stellenbosch University."

In considering some of the challenges facing academia there seemed to be "lots of disabling conditions or constraints, no growth in computer science, lack of understanding of software practices and disciplines."

It was also mentioned that there existed a "need to address the pipeline of computing students into universities or lack thereof." More ICT related education programs within schools and encouraging students to become technology innovators. The declining interest in computing amongst high school students and learners is of a concern. We need to be able to map the intake process and "the model needs to breakdown the process to go through."

ICT Cluster and Role of CITI

Extensive discussion and debate was held on the role of CITI. It was felt that there a competition between CITI and SiliconCape to be the centre of ICT initiatives. This was in part due to the introduction of an updated graphic wall because there was a need to re-organize the inputs to make more space. In the new version, CITI appeared at the centre. This was not the intent of the graphic but it highlighted the importance of visualization as a communication medium.

The ICT cluster was discussed and it was pointed out that the role of CITI is unique in that it represented a bridge between public and private sector initiatives and was aimed at supporting communities rather than replicate or compete with them.

Event 6: Friday, 19 February 2010



The Reference Model

There were mixed comments with the majority of the comment being positive. "It's very useful to have a reference model like the Hollywood Reference model." However, there were strong objections regarding what was felt as a "very risky, you need the infrastructure to create more software developers." This was followed by a discussion on open source software. Despite the objection however, some very positive solutions and ideas were derived and added to the graphic wall.

Relevance to Majority of South Africans

A key part of the conversation at this event was the issue raised around the need to make these initiatives relevant to people in our communities and that it is developed to assist the majority. "We need to make it relevant for the majority of people. How does this help people in townships and poor communities?" There was a discussion of two worlds (rich and poor and the cultural and racial

divides that are the cultural legacy of South Africa and Africa) and the need to focus on development in the continent of Africa.

Education and Universities

There was extensive discussion on education and universities. There was discussion and debate on whether government policies in education were doing more damage than good as well as the negative impacts of policies.

Event 7: Monday, 22 February 2010



Film Industry

There was representation from the film industry and so much discussion on software and IT industry in comparison with film industry.

Competition

There was also discussion on competition and the perception "that the pot is too small."

Venture Capital

Venture Capital (VC) was discussed and it was felt that alternative methods of funding needed to be explored. "Education was needed on alternative funding to venture capital. We need more success stories of companies and entrepreneurs not accepting venture capital. VC makes business lazy and kills innovation. VC is an expensive way to borrow money."

Education

It was felt that there had to be some radical shift in the current direction of education. "Education is not fun. There is a perception that tertiary education is too old or conservative and slow for industry and software development. The process of research and updating the curriculum is too long a process. There are lots of processes to get through to change. Universities are not aware of the market and environment – out of touch. Teachers are limited in what they can do. Government policies are doing more harm than good."

Quality of User Experience

South Africa was falling behind the global trend to be user centric driven and hence quality was deemed to be poor. "The quality of user experience is bad. There are few places to learn about interaction design. There are few information architects. There is very little emphasis on user interaction, user experience, usability and service design. Unless this is addressed, the quality of our products and services will be poor."

Quality is not a priority in our local businesses. Because of the lack of funding, there is a focus on delivery and often unrealistic project time lines. "There is too much emphasis on timely delivery in software development rather than on the quality of software. Product owners in companies can be problematic where there is no buy in on the importance of design. There is often a perception that if you don't code, you are not working."

Success Stories

We need to have role models that are accessible and realistically attainable. There were simply "not enough success stories. What is success and how do we define it? There are success stories but the problem is that we limit ourselves to the well-known stories of 'Mark Shuttleworth' and 'Vinny Lingham'. We need to look at less well-known role models such as Adrien Pienaar or Adii, a co-founder of WooThemes and serial entrepreneur from Cape Town."

Entrepreneurship

We discussed entrepreneurship as being relatively new in South African and that we have a history and legacy of state owned enterprises and protection of large corporate monopolies. Our small business and entrepreneurship is more like the "ou with a bakkie" rather than "a graduate of Harvard Business School".

"In the 'Harvard Business School' you have older entrepreneurs in their 50s and 60s passing on their experience and knowledge to young entrepreneurs. We need more schools for entrepreneurs. There is a fear of failure amongst many - Cape Town is a small place. South Africans need to see failure as a part of the learning process."

Scope and Need for One Voice

We had a discussion on the scope of the conversation and the goal of finding that "one voice".

Event 8: Wednesday, 24 February 2010



Schools

We focused on schools. "We need to introduce technology to students in schools not at university. Students do not have a good concept of what software is about."

Investing in Entrepreneurs

The conversation also turned to Investors and how we can develop young entrepreneurs. "Failure and learning is like getting experience on the streets. Bring young people in to generate ideas. Software does not generate ideas, people do. Subsidy needed to fund writers to create a script. Most will need a day job."

Professional Skills

Professional skills were discussed. “Hype a career and skills get expensive and pricey and is not sustainable. No professional organization for accreditation and to explain the difference in quotes. A body is needed to accredit and to market to other countries. Film industry as an example is fragmented but gets together to present a case to government for funding. There is diversity of specialists. IT freelancers are underpaid. IT professionals are not well understood. IT person is not a generalist as in Information Communication Technology (ICT) – a software developer or a general IT professional cannot fix telecommunications and audio visual equipment.”

Platforms

There was further discussion on the reference model with regards to the distribution channel for innovation. “We discussed the Cloud and leveraging platforms like MXIT and Facebook.”

Industry Bodies

There was a discussion on industry bodies. “We discussed industry standards body and one organization, the role of SETAs in development.”

Opportunities

Opportunities represented another stream of conversation. “There is a need to understand what opportunities exist for innovation in gaming, mobile and poorer communities. What is the impact of technology on social developmental issues? Need to research.”

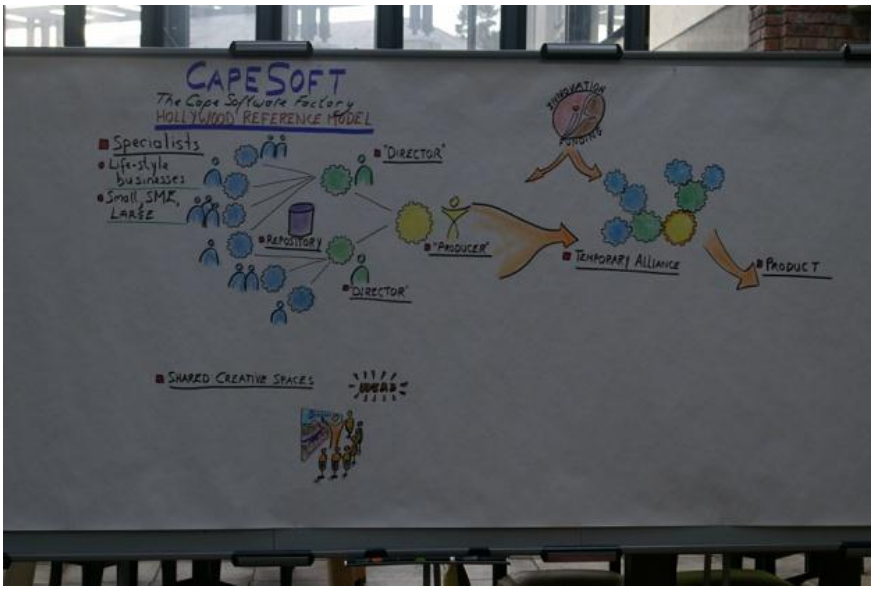
Role of CITI and ICT Cluster Development

In conclusion, we discussed the role of CITI and cluster development. “We have had positive experiences in finding schools and education from CITI. There are great ideas and just need to communicate what we are going to do. We need to capitalize on Creative Cape initiative and Design in the centre of the city and to create linkages with business and design. We need to figure out unique selling proposition of the region.”

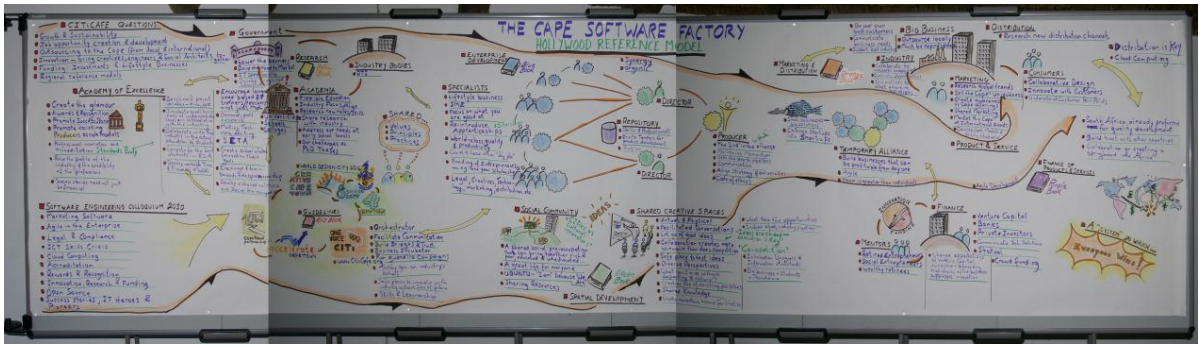
The Evolving Reference Model

The Graphic Wall

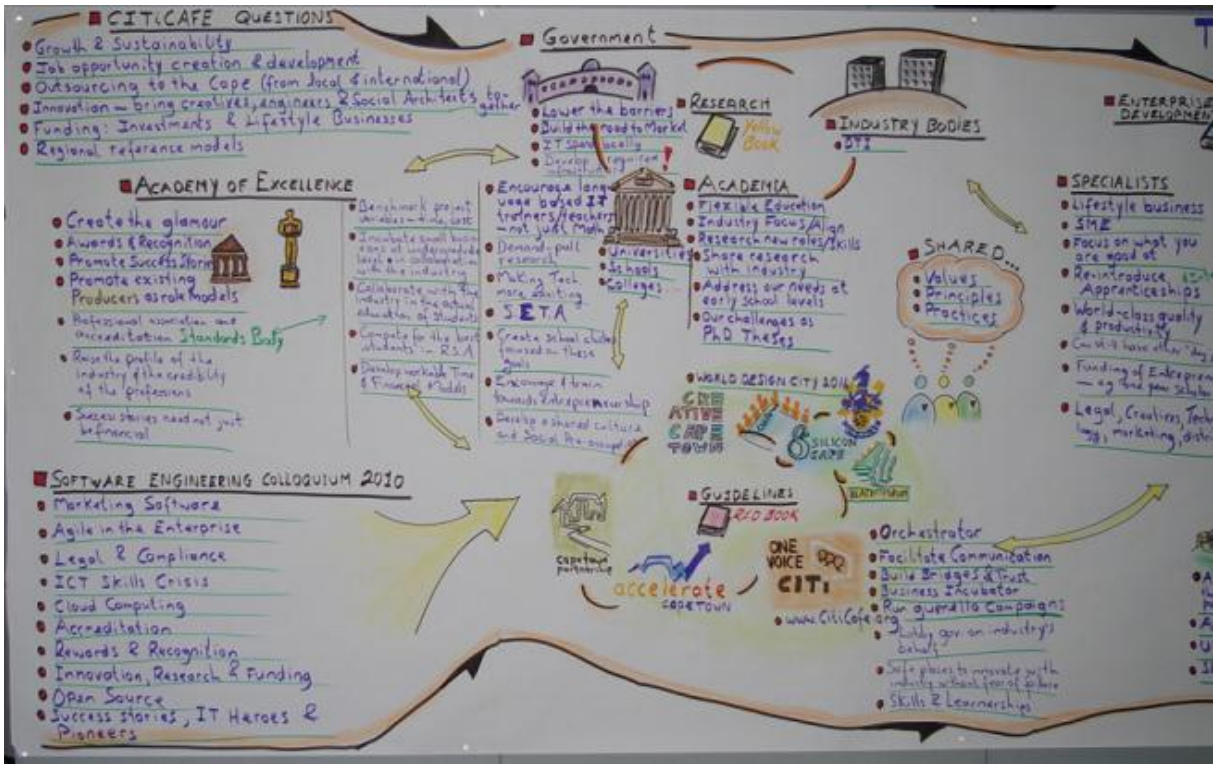
Baseline Sketch



The Final Version



CITiCafe Questions



Growth and Sustainability	Are there conditions that are impeding Cape technology companies from growing and sustaining their revenue? What can we do collectively, to address them?
Job Opportunity Creation & Development	How can the technology sector help to address unemployment and increase job opportunities in the Western Cape?
Outsourcing to the Cape (Local & International)	Is it possible for large corporations in the province to keep all their software development work in the Cape? What will the impact of this be?
Innovation - Bring Creative Designers, Engineers & Social Architects together	Cape Town is globally recognized as a creative city. What might happen if we create spaces and opportunities for designers and developers to work more closely together?
Funding: Investments & Lifestyle Businesses	Why is it said that a "lifestyle" business inhibits investment? If money chases value, what can we do to increase our value proposition to investors?
Regional Reference Models	What reference models should we be considering and how do we leverage what makes our region unique?

Software Engineering Colloquium 2010

Marketing Software
Agile in the Enterprise
Legal & Compliance
ICT Skills Crisis
Cloud Computing
Accreditation
Rewards & Recognition
Innovation, Research & Funding
Open Source
Success Stories, IT Heroes & Pioneers

Books as Body of Knowledge

Red Book	Guidelines > Collaborating Community and Organizations based on Shared Values, Principles and Practices
Yellow Book	Research > Academics and Professionals understanding industry, roles, skills and disciplines, applied research & projects
Blue Book	Enterprise Development > Enterprise as a Network of Collaborative Organizations - creating collaborating specializations, assisting enterprises to work together
Green Book	Creative Designers and Software Engineers > or Technologists to work together on Spatial Development which in turn is key to developing Social Communities
Orange Book	Marketing, Sales & Customer Service > Marketing and Distribution Structures and how to establish the flow of supply side to demand side - industry, big business, global markets, developmental communities
Purple Book	Funders and Product Innovators > Finance of Products and Services focused on creating the product and infrastructure for distribution and channels to market, lower costs and obstacles

Academy of Excellence

Create the glamour
Awards & Recognition
Promote Success Stories
Promote Existing Producers as Role Models
Professional Association and Accreditation and Standards Body
Raise the Profile of the Industry & the Credibility of Professionals
Success Stories need not just be financial
Benchmark Project Variables - time, cost
Incubate small businesses at undergraduate level in collaboration with industry
Compete for the best students in RSA
Develop Workable Time and Financial Models

Government – National, Provincial & Municipal

Lower the barriers
Build the road to Market
IT spend locally
Develop require infrastructure
Encourage language based IT trainers/teachers - not just maths

Demand-pull research
Making technology more exCITing
SETA
Create School Clusters focused on these goals
Encourage & train towards entrepreneurship
Develop shared culture and Social Pre-Occupation

Academia

Universities, Schools, Colleges …
Flexible Education
Industry Focus/Align
Research new roles/skills
Share research with industry
Address our needs at early school levels
Our challenges as PhD Theses

Industry Bodies

DTI	

Communities

CIO Forum
Black IT Forum
SPIN
SiliconCape
Creative Cape Town - World Design City 2014
Cape Town Partnership
Accelerate Cape Town

Shared Values

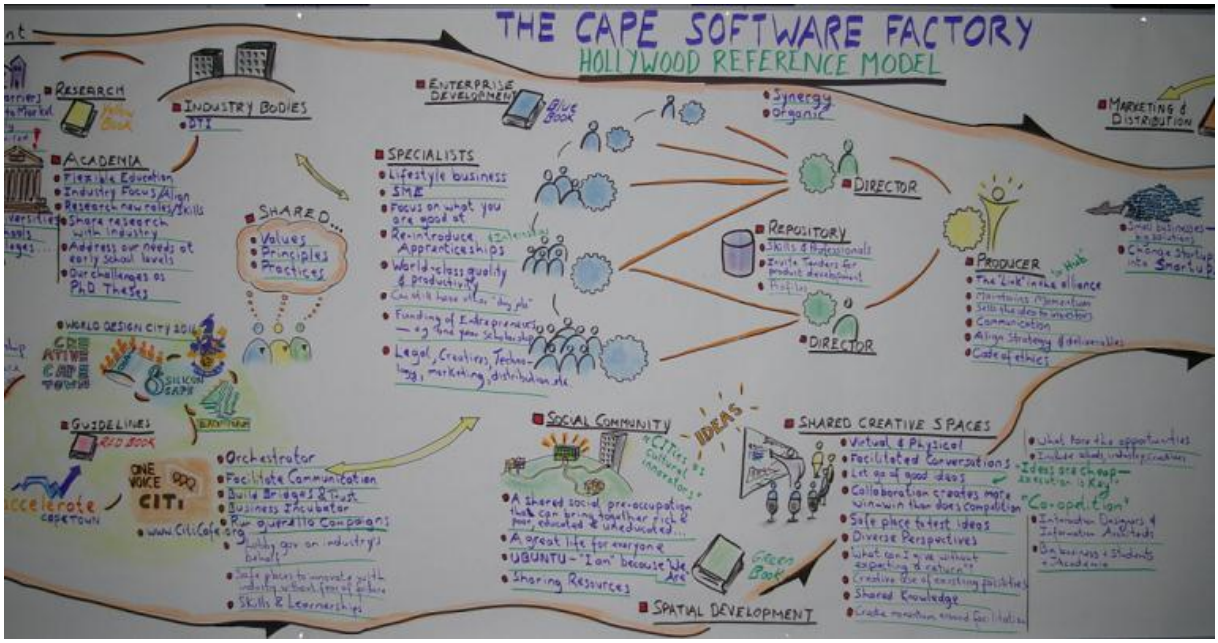
Values
Principles
Practices

CITI

Orchestrator
Facilitate Communication
Build Bridges & Trust
Business Incubator
Run Guerrilla Campaigns
Lobby Government on Industry Behalf
Safe places to innovate with Industry without fear of failure - note guarantee success but overcome fear

Skills & Learner-ship

Hollywood Reference Model



Synergy
Organic

Specialists

Lifestyle business
SME
Focus on what you are good at
Re-introduce Apprenticeships & Internships
World-class quality & productivity
Can still have other "day jobs"
Funding of Entrepreneurs e.g. One Year Scholarship
Legal, Creatives, Technology, Marketing, Distribution, etc.

Producers, Directors

The Link in the alliance
Maintains Momentum
Sells the idea to investors
Communication
Align Strategy & Deliverables
Code of Ethics

Repository

Skills & Professionals
Invite Tenders for Product Development
Profiles

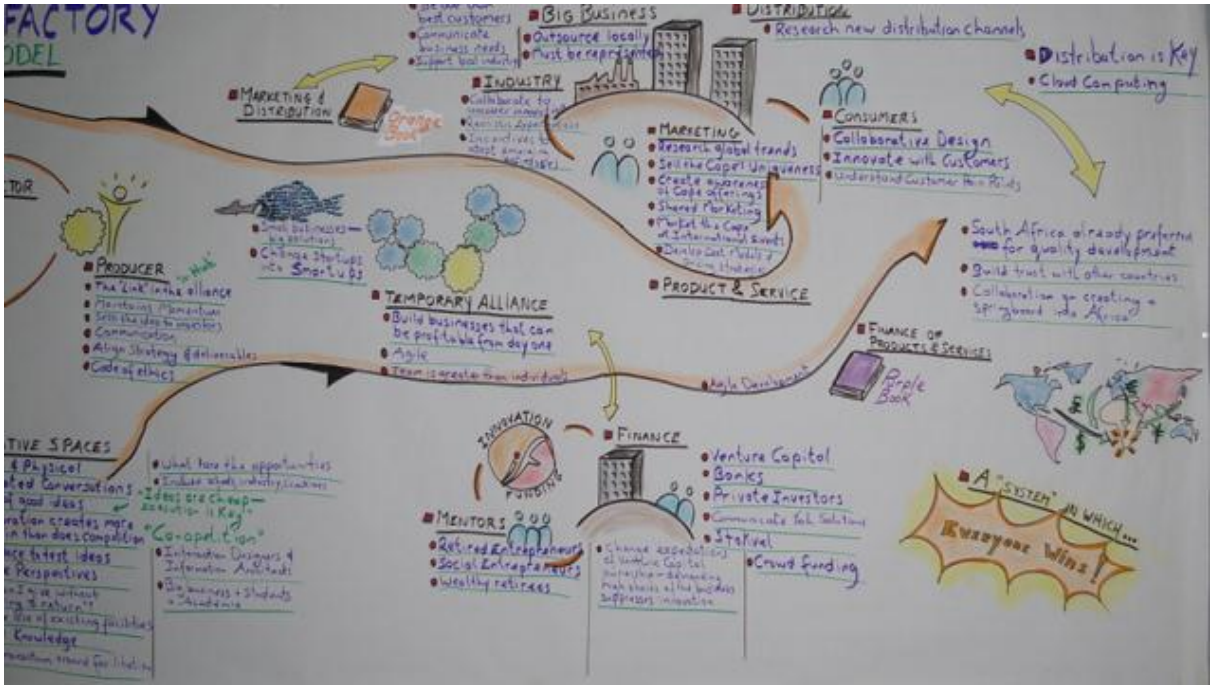
Social Community

CITies as Cultural Innovators
Shared Social Pre-Occupation that can bring together rich & poor, educated and uneducated ...
A great life for everyone
UBUNTU - "I Am" because "We Are"
Sharing Resources

Shared Creative Spaces

Ideas
Virtual & Physical
Facilitated Conversations
Let go of good ideas - Ideas are cheap, execution is key
Collaboration creates more win-win than does competition
Safe place to test ideas
Diverse Perspectives
What can I give without expecting a return?
Creative use of existing facilities
Shared Knowledge
Create momentum around facilitation
What are the opportunities
Include schools, industry, creatives
"Co-opetition"
Interaction Designers & Information Architects
Big Business, Students & Academics

Temporary Alliance



Making a Movie or TV Series
Process of Producing Products and Services
Small business - big solutions
Change Startups to Smartups
Build business that can be profitable from day one
Agile
Team is greater than individuals

Marketing and Distribution

Be our own best customers
Communicate business needs
Support local industry

Big Business

Outsource locally
Must be represented

Industry

Collaborate to uncover innovation
Realistic Expectations
Incentives to adopt emerging businesses

Marketing

Research global trends
Sell the Cape's Uniqueness
Create Awareness of Cape Offerings
Shared Marketing
Market the Cape at International Events
Develop Cost Models & Pricing Strategies

Distribution

Research new distribution channels
Distribution is key
Cloud Computing

Consumers

Collaborative Design
Innovate with Customers
Understand Customer Pain Points
South Africa already preferred for quality development
Build trust with other countries
Collaboration on creating a springboard into Africa

Finance

Change Expectations of Venture Capital ownership, demanding high shares of the business suppresses innovation
Venture Capital
Banks
Private Investors
Communicate Tech Solutions
Stokvel – CrowdFunding

Mentors

Retired Entrepreneurs
Social Entrepreneurs
Wealthy Retirees

Products and Services

Low tech solutions, Socio-Tech
Mobile
Cloud Computing
Open Source
Agile Development

Everyone Wins

A System in Which Everyone Wins

Conclusion – The CITiCafe

Architecting a System as a Whole

The CITiCafe initiative set out to architect a system whose elements consisted of a diverse group of industries within the Cape region and whose goal was to be a vehicle for addressing the CITiCafe Goals.

- Growth and sustainability
- Job opportunity creation and development
- Outsourcing to the Cape (from local and international)
- Innovation – bring creatives, engineers, and social architects together
- Funding: investments and lifestyle businesses
- Regional reference models

An interesting aspect of this initiative was that it was conducted in such a way as to become its own proof of concept.

The CITiCafe Series

Jenny McKinnell of CITi approached a number of specialist companies to assist her in achieving her goal. KASE (Knowledge Architecture Systems Engineering) was retained to assist in developing a reference model and theme for discussion and facilitate the Café Conversations.

Café's in the region were selected as ideal venues for the shared creative spaces. A diverse grouping of creatives, consultants, engineers, big business, government, academia and venture capitalists were invited to participate.

A draft description of the architecture was presented to the Café participants who participated in refining, modifying and enhancing the architecture of the proposed system.

By the end of the design process spanning eight Café Conversations, an architectural blueprint for the system emerged. It was presented at the Third Software Engineering Colloquium, before being presented to the sponsors of the initiative – the target of this report.

The Hollywood Reference Model and Role of the Producer

The story above is a Case Study for the proposed system that was the product of the initiative.

It proposes a model of networked organizations that emulates the highly successful movie production industry in Hollywood. Up until 1950s, movies were made by a few vertically integrated large studios that controlled every aspect of production, distribution, and display of films. Today, movie production has shifted to project-based teams assembled to make a single film. Film production has become a project-based virtual enterprise.

A key player in what makes Hollywood such a success, is the Producer. The Producer is someone who makes things happen and forms the pivot or link in the temporary network alliance of specialists assembled to develop a product of some kind.

The "Producer" knows how to sell the ideas / solution to investors or sponsors and maintains the momentum, is the keeper of the knowledge and code of Ethics, the chief communicator and the one who maintains the alignment between the strategy and deliverables.

The Producer is responsible – though usually delegates the work – for the design, not just of the system, but of the collaborative and development process. For the purposes of the project, the Producer places his or herself at the centre of this flexible, net-worked alliance and temporary grouping of sometimes physically dispersed, independent individuals or companies. She controls the system information and is responsible for maintaining conceptual integrity throughout the system and the engagement lifecycle.

Ultimately he/she is responsible for ensuring that the solution is fit to purpose. If necessary, partitioning this larger system into subsystems each of which can be handled by subordinate specialist system architects of the subsystems and cross-functional issues.

The culture of networked organizations is based on cooperation and trust rather than hierarchical command and control. Individual small businesses are free to innovate, and these innovations are diffused throughout the project life cycle. By allowing small companies to concentrate on what they do best, networked organizations foster innovation and responsiveness to market or customer requirements. In this environment, standards—accepted ways of doing things—become ever more important, enabling specialists who have never worked together to quickly become productive with each other in the same way that makeshift surgical teams of doctors and nurses are able to work effectively in emergencies, using well-defined protocols and procedures.

As the keeper of knowledge and rules—the one who selects, filters, classifies, and maintains information within the networked team and from project to project – the Producer is the maintainer of standards and quality assurance and builder of a community of interest around the project.

Shared Creative Spaces, Opportunities and a Win-Win

Shared creative space is where Producers assemble members of the temporary alliance – or just interested persons who may provide valuable contributions. It is a safe place to test ideas, receive counsel, obtain validation, establish the network, lobby for finance etc.

Key to our approach was the creative use of existing facilities in which to conduct our facilitated Conversations and to create momentum around the facilitation. The shared creative spaces were both physical (the Café's) and virtual (online).

Shared knowledge, insights, uncovering opportunities and letting go of good ideas in a spirit of collaborative design contributed to the success of the Conversations. A diverse set of perspectives were sought from stakeholders in big business, academia, the creative and film industries, software engineers, interaction designers and information architects as well as social entrepreneurs.

What we set out to demonstrate too was that collaboration creates the opportunities for more win-win success stories than an environment of pure competition.