



SOUTH AFRICAN TECHNOLOGY NETWORK

8TH ANNUAL INTERNATIONAL CONFERENCE ENTREPRENEURSHIP EDUCATION FOR ECONOMIC RENEWAL HOSTED BY THE VAAL UNIVERSITY OF TECHNOLOGY

DAY 1 – 19 OCTOBER 2015

PLENARY SESSION

INTRODUCTION AND CONFERENCE IN CONTEXT

Prof. Chris Landsberg, Programme Director
Dr Anshu Padayachee, CEO: SATN

Prof. Landsberg opened the conference and extended a word of welcome to all delegates, local dignitaries and international guests.

STORY TELLER

Dr Gcina Mhlope

Dr Mhlope recounted a story about the fears that the young and uninitiated may experience when they encounter unfamiliar experiences. Education provides a way to open up new knowledge and foster a sense of belonging, helping to integrate young and old into a group of nation builders. She also highlighted the importance of expanding the concept of Ubuntu – the sense of humanity – to beyond the African continent.

This conference, with its focus on entrepreneurship, provides a valuable mechanism for the UoT sector to turn ideas that could benefit the whole nation into action.

WELCOME

Prof. Mashupye Kgaphola, Chairperson of the SATN and Vice-Chancellor of the Mangosuthu University of Technology

Prof. Kgaphola welcomed all delegates, dignitaries and international visitors to the conference. He thanked the SATN Board for laying the conceptual foundations for the conference, the SATN Secretariat for making the arrangements, and the various UoTs who have rallied to the call for assistance. The International Journal of Science and Technology was thanked for agreeing to publish selected papers in a special edition of the journal, and VUT and all other sponsors who made the conference possible were thanked for their generosity.

This conference will simultaneously host a student entrepreneurship workshop, a priority area identified by the SATN Board, to address the issue of youth unemployment by fostering a focus on entrepreneurship.

Prof. Kgaphola expressed the hope that all delegates would make the most of the opportunities presented by this conference to engage, share their experiences and learn from each other.

WELCOME

Prof. Irene Moutlana, Vice-Chancellor of the Vaal University of Technology

Prof. Moutlana welcomed all delegates and attendees to the 8th SATN International Conference, which is a particularly appropriate way for the University to start building up excitement for its 50th birthday celebrations in 2016.

The decision to host the conference on the VUT Southern Gauteng Science and Technology Park, and its focus on entrepreneurship, signals the response of all UoTs to empower students with the entrepreneurial skills and expertise they need to start their own businesses. The aim is to instil in students a culture of creating employment and independent work, and an understanding that life should not be about seeking jobs, but creating jobs. UoTs should create entrepreneurs who will be successful in devising creative solutions that could result in more jobs.

The Vaal Triangle region played a critical role in shaping the landscape of the country – the first was the peace treaty of Vereeniging, signifying the end of the Second Anglo Boer War. The site also saw the Sharpeville uprising in 1976, and the signing of one of the most progressive constitutions in the world in 2002. It signalled South Africa's break from a past characterised by betrayal, to start a new chapter intent on moving the country forward. Sharpeville was therefore named the 'cradle of human rights'.

VUT was established on a barren piece of land, and progressed from a technical college to a Technikon to a University of Technology. The site where the conference is held, the Science Park, is conveniently located close to a number of townships, which was considered the best possible location for a science park where ideas from the community surrounding the institution can be converted to viable commercial ideas. Being home to a number of great industries, the location also helps to shape the ethos of VUT. The surrounding townships rely on VUT to help realise their aspirations by offering a curriculum which would translate into economic upliftment. In a world beset by economic challenges, a focus on entrepreneurship remains absolutely important. Science parks contribute to the national growth of small and medium enterprises at local and regional levels. The precinct includes a foundry and metal innovation centre; a shoe innovation centre; an idea-to-product lab; and various other institutes and centres. Numerous young students, entrepreneurs, cooperatives and engineers were invited to display their products and ideas, to open up new ideas and collaborations.

VUT's motto - 'Your world to a better future' - could be adapted to serve the needs of the broader world out there. UoTs should ask how they can collaborate to free up the youth, and how they can lead the land towards a brighter future. The soundest investment a nation can make is in the education of its people. A deep sense of knowing how to do things is the central thinking behind this conference, and will enable all of us to navigate our environments to benefit our country as a whole.

CONFERENCE GUEST SPEAKER
Minister Lindiwe Zulu , Minister of Small Business Development

Minister Lindiwe Zulu was unable to attend the conference. The Acting Head of Entrepreneurship in the Department of Small Business Development, Mr Memane, was welcomed to the conference.

SATN was thanked for inviting the Department of Small Business Development, which was established in 2014 with the mandate to coordinate and provide leadership to all stakeholders associated with small businesses, to speak at the conference.

Five elements guide the Department's work, the first of which is public sector procurement from small businesses, for which 30% of the public sector's overall budget has been set aside. The Department is currently in a process of negotiating with all other public departments to open up opportunities in energy, communication and tourism (among others), and to create enabling environments for small businesses. Opening up private sector value chains through symbiotic relationships with small businesses, is another important principle. The current G20 summit identified inclusive business as a priority to be addressed around the globe. The VUT Science Park's professed intention to turn business ideas into action is particularly laudable.

Reducing bureaucracy and red tape, which hinder business growth, is another priority for the Small Business Development Department. A programme intent on simplifying processes which would make it much easier for small businesses to access the services they need, has been put in place. The Department also identified the need to open up access to finance for small business owners, and to develop incentives to stimulate small businesses. The Department is also keen to look at alternative mechanisms for funding, such as crowd funding.

Township and rural settlement development is particularly important in South Africa. Townships were traditionally dormitories from which labour was sourced, and lacked the facilities needed to make them hospitable and nurturing environments. The Department received numerous requests to help develop small businesses in townships and in rural locations, and will work to liaise with other Departments to help grow these businesses.

The Department works closely with the public and private sectors, and with universities. It has rolled out a project to establish Centres for Entrepreneurship in partnership with DUT and VUT. The aim of the programme is to teach students about entrepreneurship, to allow them to pitch their ideas and get some assistance to take their ideas to market.

THEME 1 POLICY, GOVERNANCE AND LEADERSHIP FRAMEWORKS FOR PROMOTING AND SUSTAINING ENTREPRENEURSHIP

Chairperson: Prof. Irene Moutlana, Vice-Chancellor: Vaal University of Technology

1.1 KEYNOTE ADDRESS: ENTREPRENEURSHIP FOR DEVELOPMENT: CULTIVATING ENABLING AND SUSTAINING CONDITIONS

Prof. Narend Baijnath, CEO: CHE

1.1.1 The watershed of two decades of democracy in South Africa has triggered introspection on the progress we made, the choices we made, and the challenges we experience. The NDP provided a window on both remaining challenges as well as newly emerging one. In the past week, the DHET convened the Transformation Summit in Durban, which infers that while we have made

progress in transformation, much remains to be done about the challenges continuing to disrupt our assumptions, understandings and goals.

The South African economy has not overcome its skewed legacy, despite reforms to build a transformed society. We remain a dual economy which continues to perpetuate inequality and exclusion. The situation is exacerbated by the fact that economic growth has slowed over the past number of years, rendering growth as a redistributive strategy ineffective. Unemployment, poverty and inequality remain our biggest challenges. We have the third-highest unemployment rate in the world for young South Africans. In 2014, the IMF revised its economic growth forecast for South Africa to 2.3% for 2015, suggesting that our economic sustainability is under severe pressure. Our economy does not benefit from the strains presented by our energy supply problems. What questions should we think about in the fields of knowledge production, and what can we do to reduce unemployment and grow our economy? This conference, and its focus on entrepreneurship is therefore highly relevant.

For developing economies entrepreneurship and opening up new ideas to increase economic activity and job creation are critical. In a climate of massive unemployment, our system is still producing graduates that will leave and seek jobs. Although we claim to focus on entrepreneurship, a lot remains to be done to make this a reality. The percentage of South Africans in entrepreneurial activity dropped over the years, and our country performs worse in this respect than other BRICS countries. Social factors also do not promote entrepreneurship, which is complicated by a lack of finance, a difficult regulatory environment, and other obstacles. Entrepreneurship requires a creative approach to development, focused on new methods, ideas and business models to unlock business value. We need to rethink how we view entrepreneurship, to create change agents who will find solutions to change society for the better. Of course there are risks, but social entrepreneurs combine good ideas in business with changes in the community to benefit all.

Universities, policy makers and government should work together to create the conditions which will stimulate business creation. We must stimulate new SMMEs to start up, and create a healthy environment for business to flourish. Four integrated and interconnected factors are necessary to stimulate this desirable environment. They can be summarised as: entrepreneurial education; a supporting infrastructure or ecosystem to support and coordinate solutions; building a holistic international export strategy to deepen and develop trade relationships; and creating awareness to stimulate energy and enthusiasm for entrepreneurship. This multi-pronged approach must involve government, business and higher education institutions.

Higher education, and UoTs in particular, are viewed as the custodians of knowledge in society. In the context of a developing knowledge economy higher education has a particularly important role to play, for which applied and broad-based research is essential. In order to become more entrepreneurial, universities must incorporate entrepreneurship in every aspect of the curriculum. In becoming agents of innovation, universities must foster greater awareness of the need to think creatively about entrepreneurship. What role can and should HEIs play to make these possibilities reality? One is to be catalysts of entrepreneurship as a career option. The second is a supportive role, providing needed skills through innovative education programmes. The third is knowledge production through research, programme development and the dissemination of information. Last, reflective practice should enable a process of refining the processes and harnessing entrepreneurship for social change. Entrepreneurship often relies on funding and systems, and not so much on the availability of good ideas. In order to develop an entrepreneurial culture, strong leadership and governance is crucial, and this must be clear in

the strategy of the institution and how it goes about its business, strengthening cooperation between all stakeholders and driving development.

Whatever policy or funding arrangements are in place, partnerships between various stakeholders should draw on and leverage the expertise and strengths of all partners. Partnerships should develop and grow in a conducive policy environment to allow cross-fertilization of knowledge and ideas. Entrepreneurship requires creativity, tenacity and a willingness to take risks. Exposure to relevant curricula is vital, and there should be a shift from transmission learning to practical learning to allow students to acquire the skills which would enable them to apply their knowledge. WIL facilitates the transition between preparing for and operating in a highly skilled environment. The wisdom of housing entrepreneurship in one department in a university must also be revisited, because it should be a broad-based activity. The ability to see opportunities and order in chaos has helped to transform economies and nations. If we marshal our collective efforts we will be able to design programmes which will allow people to become job creators and will empower them to transform business, markets, communities, and ultimately our economy. Only then will we have met our objectives as higher education institutions.

1.2

RESPONDENTS:

Dr Diane Parker, DHET (Apology);

Dr Raymond Patel, CEO: merSETA;

Ms Mpume Langa, KZN Chair of Business Women's Association;

Dr Angel Kwolek-Folland, Vice-President of the University of Florida

1.2.1

Ms Langa: I am not an academic. I was born in KZN, and still live there. I am employed in the corporate world, and also own two businesses. I was born in the 70s in the heart of the Apartheid era. I was educated in the 80s, when the education system was also plagued by protests. I have been employed for 18 years now. I have two kids, aged 6 and 8.

I agree that we have to change the way we educate people in our institutions. Our economy is not growing, we close businesses every day because they are not making money. We lose jobs every day. How do we create a shift from being employees to being employers? I have a question to ask – in theory, we have great modules and we do well in teaching these modules, but how practical are we in creating employers in our courses? Who are the people responsible for teaching our students to be entrepreneurs? The baby boomer generation were raised to be employees. The same goes for Generation X-ers, while Generation Y represents the greatest proportion of unemployed people in our country. We are never taught how to be entrepreneurs. There is very little life experience informing what we are taught. In Asia people are taught from an early age how to make things, and how to sell them. We cannot only start teaching people after matric – we say it is important to think how we should encourage entrepreneurs but the question is whether we have the knowledge to teach them.

1.2.2

Mr Patel: One of the concerns we face as a country is the high unemployment rate of people between the ages of 15 to 24, and how we should grow entrepreneurship skills in this group. In the BRICS countries a lot of work is being done to develop skills; we are about 20 years behind these schemes. Especially Russia and China have managed to increase their effectiveness systemically by about 14%.

Prof. Baijnath's paper highlighted what should be done to increase entrepreneurship, but our challenge in South Africa is to understand the challenges which the bottom decile experiences on a daily basis. In the past we had labour reserve legislation and social practices which worked

against historically excluded groups and have not yet been reversed, particularly for people living in townships and in rural areas. There is no discussion of the state of entrepreneurial education in South Africa, or an understanding of what constitutes entrepreneurship in South Africa. In this country we must stop thinking narrowly about entrepreneurship, because it is also context specific. Universities have to interrogate their practices with regard to problem solving, team building, critical thinking and collaborative practices. For the formation of an effective agency to develop an innovative culture of entrepreneurship in South Africa, we should realise that entrepreneurship should start at school, and not at university. The duality highlighted in Prof. Baijnath's paper must be addressed. The huge inequalities our country inherited from the past must be addressed through policies, leadership and practices to help the bottom half of the population.

At higher education institutions and colleges, the majority of students experience an inter-generational gap to be addressed urgently. There is a large section of the South African society who will experience difficulties in accessing higher education, which must be addressed. The national government's stated policy to develop small businesses have been supported by the development of legislation and various other initiatives. The policy proposing the development of a 1 000 black industrialists is a case in point.

We need to create an environment that will reduce the disparities between urban and rural businesses. We need to increase the number and variety of enterprises in the formal economy. We should increase the competitiveness of the various industries, and promote greater participation of black persons in business, but especially women, youth and people with disabilities. We need to adopt legislation to grow entrepreneurship, and should give support to those intent in helping disadvantaged groups. We should commence to teach entrepreneurship at school level. We cannot have an entrepreneurship culture if we continue with the tender system; we need to foster entrepreneurs and get mentors to help develop our young entrepreneurs.

1.2.3

Dr Kwolek-Folland: I have studied women's entrepreneurship for a number of years, and I thank CPUT for the invitation to be here.

I want to comment on three things that are worth keeping in mind from the paper. The first is that universities must practice what they preach – the idea that you can train an entrepreneur by sending him or her to a class to memorise facts will not work. Universities must be more entrepreneurial, even though by their very nature they move slowly and are neither flexible nor responsive. We need to be what we tell our students to do.

Your universities are relatively young, and should make the most of the opportunity to spread their wings. Secondly, the idea of creating reflective practitioners who will have a role in social change must be kept in mind, because there are limits to what people can do. We need to keep in mind that throughout history most entrepreneurs have been tiny businesses – the women I have studied have had small businesses, which generally only enabled them to keep their families alive. I was struck by how many people are making a living on small businesses, which is a very important part of an economy. Those people should not be shut out, and should have sustained opportunities. I was also struck this morning by Dr Mhlope's presentation, which emphasised the value of learning from failure. Students should understand that it is alright to fail, and that they must learn from their failures.

1.2.4

DISCUSSION:

India: Universities all over the world have gone through three revolutions, in terms of teaching, research, and now innovation. In India we are seeing the same thing, and the same questions come up – we have nearly 400 million people in the informal sector who need to be given entrepreneurial training. If we do not build a research base, there will be no innovation or entrepreneurial development. Universities are accused of being ivory tower institutions, so how do they get involved in developing poor communities? This interaction can be facilitated by intermediary organisations, such as NGOs, to bring the universities and the communities which could benefit from their work together.

VUT: An entrepreneurial culture, entrenched through our society and our families, is probably more important than the education our institutions must provide. I asked my students at the start of the semester how many of them have engaged with businesses, and very few of them had. When I asked how many of my students wanted to start a business after their course was completed, only about two said they would. I think we need to deal with the cultural aspects, to ensure that people will take action to start a business for themselves.

Question: I do not understand why South Africa is so slow to adapt to new concepts. Social franchising has been on the map internationally for longer than ten years, yet it has not yet caught on in South Africa.

Prof. Moutlana: I think one of our panellists said our universities are very slow to adapt and change.

Ms Langa: As a country we have to harness family and society to change the way we think about issues like entrepreneurship – our culture is not aligned with creating our own businesses. People want the security of a job and a salary every month. We cannot start instilling this culture after matric – we must start earlier so that by the time people get to this level they will already be entrepreneurs. About the fact that South Africa is still lagging behind the world, we should avoid looking backwards to blame and point fingers. Instead we should free up our minds and hearts to adopt global trends and start looking forward. We should draw from international experience and see what can be made to work in our context.

Dr Kwolek-Folland: The University of Florida has had some success in taking an idea and turning it into a product, but it also does not happen every day. It is difficult for large institutions to make this kind of thing happen over the short term. We must have a broader understanding that we need to make changes that will benefit the nation as a whole.

Mr Patel: Entrepreneurial culture should not be overlooked – most of us grew up in an environment where somebody in our family had little businesses. Students at school start off with good potential, but very often our education system is guilty of closing off our perspective on risk taking. The one problem that universities can be blamed for is that we become risk averse, while entrepreneurs must take risks to win. We must guard against boxing our children into this narrow thinking. The second issue is social franchising – the problem is that we think about ‘my zone’, and not ‘our zone’. The abolishment of apartheid has meant that we became a selfish society, whereas we need cooperation to grow businesses. All the great South African companies started off as cooperatives. Why is social franchising not working yet? Because we do not have a mind-set that favours the collective.

Fountain of Beauty: I have a business around here, in the township, and thank you for the opportunity to exhibit here. Entrepreneurs must take the opportunities that are presented to them. I started a beauty business that I recently expanded into the manufacturing cleaning materials, and we are looking for people who are keen to develop a new business. My concern is that small businesses need the support of the very people who tend to think that those small businesses’ products are inferior. How many people have been out there to visit our stalls? We need your support to make a success of our businesses.

Community newspaper: We sell advertising space in a community newspaper, and we find that most large companies do not wish to advertise in small publications. I agree with my colleague

there that small community businesses must be supported. Universities have a role to play in supporting us and making big businesses understand that we have a valuable and important role to play.

Prof. Moutlana: Curriculum has the power to empower the student, through interfaces like WIL, cooperative education, and other initiatives. As UoTs, what could we do in addition to these initiatives to ensure that students would be entrepreneurially capacitated? Our central mantra is that we will produce students that are employable, and closing the gap between theory and practice.

THEME 2 CURRICULUM INITIATIVES AND INNOVATIONS FOR ENTREPRENEURSHIP EDUCATION **Chairperson: Prof. Chris Landsberg**

2. KEYNOTE ADDRESS: ENTREPRENEURSHIP EDUCATION FOR UNIVERSITIES OF TECHNOLOGY: A CUT CASE STUDY – CREATING AN ECOSYSTEM OF CITY AND REGIONAL DEVELOPMENT

Prof. Thandwa Mthembu, Vice-Chancellor: Central University of Technology, Free State, Prof. Henk de Jager, and Jaana Puukka

2.1 Prof. Mthembu acknowledged the work done by his co-authors.

The thesis of this presentation is that we need to create an ecosystem for city and regional development. If we as universities look at entrepreneurship education as an internal mechanism, we will never achieve our objectives. We need to look at the issue from a broader perspective.

In terms of global economic competitiveness and entrepreneurship challenges, South Africa is below the 50% mark, neither does it fare well when compared to other countries in Sub-Saharan Africa. However, South Africa performs well in terms of the quality of its institutions, intellectual property protection, property rights, the efficiency of its legal framework, and accountability of private institutions. South Africa's financial market development is also impressive, at 7th position. These gains that have been made must be protected.

Only 15% of South Africa's youth aim to establish their own businesses, compared to the Sub-Saharan average of 56%. Early-stage entrepreneurial activity has also dropped in the past number of years.

Which South African crisis should higher education tackle? The triple crisis of poverty, unemployment and inequality are often held forth by our politicians, but the bigger problem is the country's lacklustre economic growth and the crisis around competitiveness and entrepreneurship, two of the main drivers of economic growth. The educational problem is that there is a lack of innovation and entrepreneurship education to spur on competitiveness and entrepreneurship.

In 2010, CUT adopted Vision 2020, which focuses on social and technological innovation, engagement, and socio-economic development. These strategic drivers embodied a process of moving from an internal focus towards a deeper external focus that could be felt in regional socio-economic development (the 'charity begins at home' principle). There are numerous challenges to growing engagement between the university and the environment in which it operates. This kind of relationship tends to swing between isolationism and superciliousness and a half-hearted 'us/them' engagement, with very few of them in a steady state of spatial fixedness or readiness to embed the relationship.

A model for city and regional collaboration and the steady state should always keep the triple bottom line of equity, the economy and the environment in mind. While the most basic elements of the model should always be front of mind, it would also be necessary to revisit the educational philosophy to take note of ideological and philosophical considerations, as well as the practical implementation of the model. Therefore the triple bottom line could be expanded to become the quad-helix model, which will rely on cooperation between the government, industry, university and broader society.

This three-element sustainable quad-helix model requires a focus on various aspects, including shared platforms and transactional spaces such as this Science Park where the conference is being held. It is also necessary to consider the important role of governance and management, which is often circumvented by other events taking precedence. Lastly, innovation and entrepreneurship education should receive attention, where numerous international benchmarks could be helpful in the South African system.

Curriculum approaches should be demand driven and economically responsive. While there has been a radical explosion in curriculum initiatives over the years, there are still too many traditional elements embedded in our educational approach. The question should also be asked whether we can turn every student into an entrepreneur. Even if the answer were no, we could at least make them intrapreneurs in their workplaces. But if only some could be developed to become fully functioning entrepreneurs, what do we need to do to develop them methodically and by design? CUT has adopted the dream of converting just 0.1% of students per year into entrepreneurs who are ready to run businesses for at least 3 years, and identified that however modest this figure might appear, it would already achieve a lot of positive change in the city and region. Consider what the outcomes and impact of such an achievement would be for the city and region if it could be sustained and expanded.

Some basic conditions that distinguish entrepreneurship education include:

- a. Spirit, state of mind, attitude and lifestyle;
- b. Self-regulated and constructive learning (e.g. PBL);
- c. Self-discovery of knowledge through errors and reflection (e.g. DTM);
- d. Integration of the practical and the theoretical (in reverse order);
- e. Learning-by-doing (LBD).

All of these entrepreneurship-orientated techniques and approaches are still being explored by CUT.

2.2

RESPONDENTS:

Prof. Jonathan Blackledge, DVC: Research, UKZN;

Mr Trevor Gordon, DDG: Chemicals and Waste Management, Department of Environmental Affairs;

Ms Tsholofelo Mokotedi, EWSETA

2.2.1

Blackledge: British universities were first established in the 12th century by monks, who also set up fabric mills to keep themselves clothed and fed. They did so well that Henry VIII wanted to get his hands on all that money they generated.

After having read the paper, my contribution is in four parts. First, we heard that students learnt best through self-discovery, making mistakes and learning by doing. I completed a degree in the 70s in Mathematics, but I was not fit for purpose. Everybody that I spoke to made the problem much more difficult than it needed to be. I did not learn what I now know about being an

entrepreneur at university. In fact, with my first academic salary I bought a cheap computer, and by doing so, the person who developed that computer allowed me to learn through trial and error, through self-reflection and by doing things and making mistakes.

Secondly, a WEF paper stated that higher education is crucial for economies that wish to move up the value chain. We need pools of well-educated workers who can adapt to changing environments. It also says that technology is essential for firms to develop and prosper. All these statements are true. There is a global crisis in education because our universities are no longer providing fit for purpose education.

I was involved in a recent solution at the National College for Digital Solutions, which was necessary because they identified a major skills shortage in ICT and computer science. In South Africa, we apparently have around 12 000 vacant jobs that cannot be filled. It is telling that the UK did not put money into existing universities, but chose to found a new institution. They also identified the need to limit the cost of education, considering that learners are not employable. The lack of parity of esteem between vocational and higher education must be addressed through a refreshed model. Students need a vocational approach to education and training – learning while earning is the new motto. The City and Guilds model was originally established to respond to the industrial competition that arose in the 1870s. UK universities have to think along the lines of the current approach in Germany and other parts of Europe. Nowadays there are many universities offering a significant online offering.

The issue is the growing incompatibility between traditional academics and their backgrounds and knowledge, and those who need to develop industry-responsive approaches. We should address the question how universities will transform from teaching students to get jobs, to teaching students to create their own jobs.

2.2.2 Landsberg: I guess the question is how we should train job creators, and not job seekers. It has recently been announced that Nigeria overtook South Africa as the largest economy on the continent, which was propelled by small and medium enterprises.

2.2.3 Gordon: The quad-helix that Prof. Mthembu presented highlighted the importance of the triple bottom line. I have always been fascinated by the notion of sustainable development, and I engage with many CEOs in the line of our work in the Department. My personal view is that sustainable development is some kind of red herring, and that the triple bottom line is a myth – there is only one bottom line for business, and that is profit. This term has been imposed by the developed world onto the developing world, and we have our own views on how we have grown and developed. There are examples of how rural populations have practiced sustainability and survived using it as their guiding principle for hundreds of years.

About 10 years ago a handful of us started activism around renewable energy. In 2010 we presented the integrated resource plan for South Africa, and at that time they told us that wind or solar would never be commercialised in South Africa. We imposed carbon constraints, which helped to push these two mechanisms throughout the country. We also introduced and coined a new term, named dispersed weight load, and we continue to do work in chemicals and waste management and pollution. Waste is more than an environmental term, it is also an economic term. We pulled it into the policy sphere, into what we call the 'polluter-pays' principle which must apply to the primary and secondary economies. We are trying to bridge that gap and decouple pollution from economic growth, addressing the question whether a country can grow without polluting the environment, which Denmark has been able to prove. The issue around market

failure and the pricing of waste have to be addressed. We are working on radical reforms on waste and how it is governed.

In terms of the value proposition, two years ago we introduced an industry waste management plan for waste tires. South Africa produces over 11 million tons of waste tires per year, making a new policy to create value and a number of jobs from waste tires an absolutely essential requirement. There are various other waste streams that we could also beneficiate, such as paper, plastics, industrial chemicals, etc. We put forward a recycling and waste economy in South Africa, and our focus is on unblocking the policy and legislative environment.

A recent summit on chemical and waste management identified that there is a gap between the policy and the research and innovation capacity in our universities. Prof Moutlana made a very provocative speech about what needs to happen in our universities. One of the challenges is the lack of good science-based policy. Because there is no sound policy base from which to depart, we think that government and institutions will have a particularly important role to play in this regard. You as the thinkers and experts must consider how we can move forward as a country.

We also need to create partnerships with other like-minded organisations. We need platforms for engagement, because there seems to be a fundamental failure in how we engage. We need viable proposals to present to donors and partners, to get their support for our projects. Lastly, we need business plans that are well articulated and would take us forward.

The Department of Environmental Affairs will establish the first electronic waste dismantling plant at VUT. South Africa's first mine and chemicals beneficiation unit will also be set up at VUT, next to the recycling centre. The Department will work with a number of other departments to engage students and the surrounding community in the recycling space. Government intends to establish 18 recycling centres, two in each province, which must function as major players to create many jobs and partner with institutions like VUT and other UoTs to help scale up our plans. Take note that there are 40 waste streams from which we can generate income.

2.2.4 Mokotedi: Thank you for inviting the EWSETA to participate in this event.

It is important for South Africa to have credible institutional mechanisms for skills planning. It is also necessary to stimulate entrepreneurial activity, because not enough has been done in that space. The research that our institutions does should inform the sector skills plans that SETAs are responsible for. Learning takes place in various forms, and we should cater for all the learners who need to be capacitated. As a country we have not been good at doing tracer studies – we had lots of students trained in new venture creation, but we do not know how many of them are still active. We should adopt a system of providing ongoing support to our learners. Another issue relates to the curriculum – as a country we have a problem in terms of articulation and progression. The quad-helix model that Prof. Mthembu referred to could help to limit the proliferation of qualifications. The NQF review proposed the establishment of three quality councils, to ensure that the pipeline would be streamlined. We hope that the three quality councils that are now in place will ensure that we will start with entrepreneurship training from basic education through all the levels of the system.

Another point to emphasise is the role of the informal sector. We heard about the role of co-operative arrangements originating in our communities, which can be transformed into SMMEs. The QCTO model has changed the way that qualifications are developed, and it will enable even those in small businesses to contribute knowledge about the practical components.

Last, when we talk about curriculum, the capacity of educators must also be considered. Educators in universities seldom had business exposure and might themselves lack entrepreneurial skills. The EWSETA works with community colleges, and also requested the University of Stellenbosch to identify all FET Colleges offering qualifications focused on water. Even if we wanted to train educators, there is not yet a curriculum for them to use.

2.2.5 DISCUSSION

Motsepe Foundation: We have just entered into a partnership with VUT focused on entrepreneurship training. The panellists have highlighted a number of challenges that we must address. We need measurement tools to evaluate and monitor our progress, and we need to do work on research and design. We are also keen to showcase partnerships – as the Foundation we partnered with the municipality and regional government, which referred us to the university. This relationship has also extended to the DTI, so that we could set up a one-stop shop.

Ms Mthembu: A lot was said about the CUT's 20:20 vision and the need to engage society. A lot of the time the universities' alumni forget that they are on a lifetime journey to upskill themselves, and that as entrepreneurs they would also need ongoing development. How about involving alumni in developing their skills, but also making use of them to develop younger learners.

Question/Comment: The issues around the university curriculum have been raised. To what extent is the university prepared to invest more in curriculum research? Curriculum design is as much a political game that favours those who are in positions of power. How do we reset the balance and ensure that we create human beings that are equipped and empowered to respond to society's needs?

VUT: My issue relates to the need for universities to practice what they preach. A university cannot preach entrepreneurialism if it does not itself practice entrepreneurship – we should not look only at the curriculum, but should consider holistic implementation that addresses theory and practice equally. Universities in the rest of Africa are quite entrepreneurial, and have a range of businesses that also generate an income, but which also provides students an opportunity to work, gain skills and generate an income.

Question: While it is valid that we should learn from international benchmarks, we should also acknowledge that often they are not the paragons that we think them to be. The issue of technical rationality should also not discard the importance of the human input – we must at all costs balance technical rationality and a sense of humanity.

Gordon: It has been useful to try and understand some of the complexities facing higher education institutions. In our drive to beneficiate waste and develop technologies the universities of technology have an important role to play, and I invite these institutions to raise any other issues on which we should focus and where they can contribute. A number of schemes have been developed, but we do not always know how to do it, so we would need your help to reverse our unemployment figures and will require a multi-disciplinary, cross-sectoral approach. We need new industries in South Africa, and our first post-apartheid city is being built in Lephalale as part of the post-industrial development of South Africa. There is a new green growth agenda that was recently presented to the UN, and we should take note of what we must do in that regard to harness the opportunities.

Mokotedi: The SETAs have partnerships in place with most of the universities in the country and we are in the process of signing a partnership with SATN, about which we are very excited.

Blackledge: I think it is important that there should be a balance between technology and other disciplines. Some of the best entrepreneurial results throughout history have emerged from the Arts faculties. We should not assume that entrepreneurship is strictly limited to technology. The second point that I want to address is that academics are not adequately equipped to be entrepreneurial, and I want to state that it is not their fault. It is a problem that our university authorities need to rethink the policies governing the kind of people that we are allowed to

appoint – the focus on research and a strong academic track record precludes other kind of skills.

Mthembu: What Prof. Blackledge said about the establishment of some of our better schools and universities is true; some of our most respected entities in South Africa were also established because of the intervention of private organisations and business.

What Steve Jobs did with Apple was all inspired by his exposure to the Humanities. On the issue of the incompatibility of our current core of lecturers and professors, there have been suggestions in the past that UoTs should foster academic entrepreneurs – we as UoTs must identify industry role players who could impart valuable knowledge to our curricula. There are also entrepreneurial academics that we should give the space to interact with entrepreneurs to enrich the curriculum. We need younger people to engage with our students.

We also need to tap into the various types of knowledge that academic entrepreneurs and entrepreneurial academics represent.

THEME 3 RESEARCH AND INNOVATION PLATFORMS AND PROGRAMMES FOR PROMOTING ENTREPRENEURSHIP

Chairperson: Dr Prins Nevhutalu, Vice-Chancellor: Cape Peninsula University of Technology

3. PANEL DISCUSSION

3.1 Dr Petra Gibcus, Senior Researcher, Business and Policy Research, Panteia, The Netherlands

Panteia is a private research company in the Netherlands, supporting decision makers through quantitative and qualitative research in economics, social issues and transport. In the past, Panteia managed a programme on entrepreneurship and SMMEs funded by the Dutch government. The company is also involved in joint ventures in Turkey, China and Kazakhstan.

A comparison of entrepreneurship throughout the EU between Italy, Germany and the Netherlands showed that Italy led the field at around 15%, followed by Germany which did good work in supporting their youth to become entrepreneurs, and the Netherlands lagging considerably behind their counterparts. In response to a question whether young people wished to become self-employed, Italy also led the field at 63%.

Programmes to stimulate entrepreneurship in the Netherlands started before 2000, but 2000 represented a watershed when the Dutch government decided to start fostering the characteristics of successful entrepreneurs. A programme called ‘Learning entrepreneurship’ was launched in 2005, starting at primary school level to create an entrepreneurial mind-set. An entrepreneurship and education subsidy scheme was launched in 2007, concentrating on centres of entrepreneurship. Over the years 2008 to 2013 the programme was further intensified, but in 2013, due to the economic slump, budget cuts were introduced. Two programmes are still running, the first a Young Enterprise Foundation which will run until 2016, and the second is a valorisation programme combining entrepreneurial education with skills transfer, which is run through various consortia. This project helps start-ups to access funding and introduce their projects to the market. One of the projects designed a web tool for entrepreneurial skills and behaviour.

The research results identified that Dutch HEIS increasingly offer entrepreneurship education, and that entrepreneurship features increasingly in the curriculum. It also identified that while entrepreneurship is more prevalent in the curriculum, institutions have applied it through different modalities ranging from minor subjects to majors, extra-curricular activities, master classes and summer schools, and that it took a long time to integrate entrepreneurship in the curricula. More students have started to participate in these studies.

Students were asked to indicate what they associate with the word 'entrepreneur', and the majority of responses highlighted aspects such as initiative, be alert to opportunities, planning and organising, own a business, being your own boss, and lastly, selling something. Because of entrepreneurship education, students had increasing awareness of what it meant to be an entrepreneur, and viewed it in a more positive light. About half of students were more inclined to be an entrepreneur and displayed entrepreneurial behaviour.

3.2 Mr Patrick Klappe, Technology Innovation Agency (TIA)

TIA funds technology innovation which emerges from research innovations within universities, which are considered primary partners in this initiative.

Having listened to the presentation on the Dutch system, we noted the role of education in developing entrepreneurship in the Netherlands. I will take my point of departure as the policy environment that we need to grow entrepreneurship in South Africa, with a bias towards technology developments.

Although there is a number of programmes in support of entrepreneurship in South Africa, they are often not as coordinated as they should be. TIA is also of the opinion that not enough is done to promote technology entrepreneurship. A range of things can still be done to improve throughput in this area. We need deliberate promotion of entrepreneurship, which does not necessarily entail building companies, but rather building businesses. Last year we conducted a study of incubators in the country, and we found that most incubators focus on building companies, rather than businesses. If you are a true entrepreneur, all you need is access to the market. If people need training or capacity building, they will identify their needs and see that they get assistance if they are truly entrepreneurial.

To build businesses, we must address market access. When we talk about market access, particularly in the space of technology entrepreneurship, the focus is generally more on putting the project on show. It is necessary to develop markets to make people understand that they might want the product. Technologies tend to have a better chance of success if there is government endorsement, although in our country it takes a little longer to get government support. In many other countries the first opportunity to be taken up is government support.

Government should also be convinced that we need a technology entrepreneurship scorecard, almost like the BBB-EE scorecard. The government could provide some kind of tax incentive for any entity supporting technology entrepreneurs. If we argue these points in a rational way, we stand to win a lot. We also have to develop specific interventions like the SBIR in Netherlands, to get small businesses to develop solutions for specific problems. In South Africa a recent document prepared by the DST found that the government spent billions annually on innovation and research, but that these initiatives are not coordinated and that there might be duplication of effort. UoTs should highlight that they have the capacity and willingness to play a role.

Apart from incubator programmes, it is also necessary to consider the value of mentors to help entrepreneurs focus their activities. People also lack information on what is happening in a

particular market. Where possible, we should learn from international benchmarks. University researchers must be alerted of the various government incentives that are available, and make use of TIA's support to the various departments to simplify accessibility and integrate their offerings.

3.3

DISCUSSION

India: Venture capital is necessary for entrepreneurs to start their initiatives. For small businesses the financial impact may not be as large, but for a commercialisation idea at an incubation company it would be necessary to think of the best possible solution. In India tax holidays or low interest rates are provided, and professors are incentivised through joint ownership and shared licenses of the intellectual property associated with a new idea. In terms of Panteia, students often have romantic ideas that be far from what they actually end up doing, which we also have to come to terms with.

Motsepe Foundation: Setting up the Science and Technology Centre at VUT will address all these aspects that we heard about, but it would be important to focus on incubation and see what lessons we can learn from other contexts. We are in discussions with the private sector about how we fund projects, because the private sector is often reticent to come to the party. We need to think of all stakeholders that must be involved to ensure that our available funding is well spent.

VUT: On the issue of research and innovation platforms, we look at UoTs versus traditional universities, and we understand that there are different types of research. We should focus on applied research to solve societal problems to generate income for UoTs. Third stream income from entrepreneurial activities is an issue that we must focus on through the quad-helix model.

VUT: I feel very empowered by this conference, but every time I hear a new idea I wonder whether that idea will reach my fellow students. I think the major issue that must be addressed is communication between students and their lecturers, so that they would be able to impart knowledge that would benefit us. We want opportunities to interact with people who have wisdom so that we can learn from them.

Question: I was involved in policy review in the ICT sector over the past two years. We found that while government supports entrepreneurship, we need to coordinate all these activities into a coherent ecosystem. There is also a lot of innovation in the informal sector outside university research centres, which must be kick-started and supported.

Gibcus: The contradiction between what students say and do is well understood. We also know from research that only 8% actually become entrepreneurs, despite more than 60% expressing the desire. One of the conditions to stimulate entrepreneurship is that there should be an ecosystem. Business and universities should cooperate on the creation of an eco-system.

TIA: One issue that might not have been addressed is the need for research and innovation platforms involving all role players and addressing all the social and economic challenges. We have multiple definitions of what this means, meaning that our initiatives might not be targeted. UoTs could guide this conversation, for which we should develop a common knowledge management system. Government and foreign investors will only be interested once we are able to demonstrate that we are serious and have valid programmes for them in which to invest.

4.

CLOSURE



SOUTH AFRICAN TECHNOLOGY NETWORK
8TH ANNUAL INTERNATIONAL CONFERENCE
ENTREPRENEURSHIP EDUCATION FOR ECONOMIC RENEWAL
HOSTED BY THE VAAL UNIVERSITY OF TECHNOLOGY

DAY 2 – 20 OCTOBER 2015

Plenary Session

Chairperson: Prof. Tjama Tjivikua, Rector: Namibia University of Science and Technology

CONFERENCE GUEST SPEAKER

Dr Engela van Staden, Department of Higher Education and Training

Dr van Staden apologised for the Deputy Minister, Mr Manana, who could not attend the workshop.

Entrepreneurship education is a new development, which the DHET has advocated for some time now, and about which we have learnt valuable lessons from across the world. South Africa is faced with severe levels of poverty, health issues, dysfunctional service delivery, poor education, and other social problems. South Africa continues to be one of the most unequal countries in the world, with one of the highest unemployment rates. The role that entrepreneurship education can play in growing the economy of the country, through alleviating unemployment and poverty by stimulating job creation, is evident. UoTs can train job creators, a fact that has been echoed for many years, despite the many challenges facing the higher education sector.

The recent Higher Education Summit focused on transformation, where it became clear that the financing of higher education institutions is particularly pertinent. A new way of thinking has to be developed. The low entrepreneurial rate and the low conversion of good ideas into small business start-ups must be addressed. 73% of all businesses consist of small businesses who employ fewer than 50 people. We need to create an environment where entrepreneurs can grow and thrive, and our universities have to address this.

Skills development in entrepreneurship will lead to skills development, job creation and inclusive growth. The success of entrepreneurship relies on support in terms of training, funding, legal, tax, financial and other advice. All these components should be identified and integrated into university education. Not only academics, but all these other support structures will have a role to play. Training and education on its own do not stand the same chances of success if these other components that are needed to produce true entrepreneurs are not addressed.

Many international companies are supporting entrepreneurship education throughout the world. There is an immediate need to develop and expand the focus on entrepreneurship training in the country, an issue that the DBE has already addressed in both primary and secondary school

programmes. Vocational and professional pathways should be reviewed to integrate entrepreneurship in curricula that would meet our needs. The role of SATN in promoting academic quality and increasing the employability of graduates is particularly important.

The Department of Social Development is calling for the training of social workers as a special, scarce skill, which is another area that the UoTs might address. Current entrepreneurship training interventions lack coordination, effectiveness and impact. We need a platform to expand entrepreneurial education and incorporate this aspect in the curriculum, and will provide increased funding and support for it. There have been a number of government initiatives focused on entrepreneurship. The HRDC was established to develop an integrated human resource strategy for the country, while also addressing individual, regional and national skills needs and integrating all these aims in a national framework. The roles played by different sectors of society in supporting entrepreneurship would also be strengthened, and involve a number of other departments such as Small Business Development. The critical success factors for building an entrepreneurial society were identified, and it was stated that entrepreneurship should be given due importance at the highest level within our universities, so that best practices are shared, partnerships and events and interaction with the broader business community are all given due status. VUT's establishment of this Science Park in this particular location is a move in the right direction.

Entrepreneurship must be tracked to assess the success of all these activities. It became clear that entrepreneurship champions face a lack of understanding and funding from within institutions, ranging from lack of management support, no funding, no support for extra-curricular activity, and no integration into the formal curriculum. In 2011, higher education institutions and the DHET met to discuss the integration of entrepreneurship in the curricula of higher education institutions. This was why the Forum for Entrepreneurship (FETSE) was established to drive the establishment of a more enterprising culture in South Africa through the universities, enlisting active participation from all universities and to create a forum where entrepreneurship activities in the country could be discussed.

The sharing of best practices in our teaching and research, both nationally and internationally, are also seen as major drivers. Many papers have been written on this topic. A portfolio of all the research on entrepreneurship was compiled. We have done research on entrepreneurship and have access to all this knowledge, but it is uncertain whether there has been a change in our graduates' performance. UJ was asked to be the convenor of this forum, and to serve as the hub of this initiative for the next 5 years. UJ will facilitate initiatives entailing research, teaching and learning, innovation and technology transfer that should and would lead to entrepreneurship in the curriculum.

Why was UJ chosen? UJ has established a strong entrepreneurial character and is a locus for ground-breaking activity, which could help other institutions to replicate their best practices. One of these businesses focuses on creating space for students in electrical engineering to gain valuable WIL exposure, and also exposes them to patent development. Each student is required to generate and register a patent.

The focus is not only on the university graduate, but on the character of the university programme, which must follow the entire value chain and must assist the university to generate third-stream income.

Curriculum change was also at the core of the discussions at the recent higher education summit. The summit discussed the role and nature of public universities in South Africa, and highlighted

that it is necessary to rethink what a transformed university in South Africa should look like. The University of Twente in the Netherlands has established an entrepreneurial character that attracted unprecedented investment from business to the university and the surrounding town.

The launch of a National Entrepreneurship Week is another initiative to showcase entrepreneurship as a national initiative. The aim is to train educators on entrepreneurship, and to provide practical workshops and inspirational talks on entrepreneurship. The DHET is also working on a policy for innovation and artistic outputs which has long been called for.

The UoT fraternity was congratulated on convening this discussion.

DISCUSSION:

Question: The speaker emphasised the role of UoTs as training institutions. Are we really training students, and if we are in the business of training, what makes us universities? Are we not supposed to open opportunities for students to choose their own lives, rather than training them? If we are really serious about the notion of transformation, how does the concept of skilling people align with the notion of transformation and human emancipation?

Media: Is the DHET thinking of thinking of establishing a dedicated, standalone university of entrepreneurship, like we have universities of technology?

VUT: If one listens to the logic behind the choice to locate this entrepreneurship hub at UJ, it seems to be linked to the output. This logic is worrisome, because if we constantly look at the logic of output, we will always perpetuate the historic disadvantages and will not transform the system. Where we are now in the country we have to disrupt ourselves, like the students are doing. It is better to locate an entrepreneurship programme in the UoTs, rather than in a traditional university, because they are in the game of rankings and competitive research, while UoTs operate in a different space. It is important that we start taking worthy, calculated risks, and this would mean that UoTs should be given the opportunity to host anything to do with entrepreneurship.

Panteia: What we saw in the Netherlands is that we develop policy, but we are not good at setting a baseline, or good at monitoring and evaluation. Is this something that you will address in South Africa?

Dr van Staden: Starting with the role of the DHET – we focus on higher education and training, which for the first time combines the two aspects. Talking about training is not meant to diminish the role of UoTs, because this aspect is what distinguishes these institutions. UoTs are becoming increasingly known for the impact and the reach of the research that they conduct, but their particular strength remains training. The important point is that entrepreneurship should be embedded in the epistemology.

We are not proposing a new university of entrepreneurship. The point is rather how any university, regardless of its typology, can start playing a role in encouraging graduates to be more entrepreneurial, and there is a lot of learning that can be provided for people that might not be as entrepreneurial as a born entrepreneur might be. UoTs are the only universities that have identified entrepreneurial education as part of their mandate.

Why was UJ identified as the hub for this initiative? We actually started with UKZN, but for two years nothing happened. Whether UJ was the best and most logical choice for the next five years, only time will tell. The problem was that while UoTs identified the importance of entrepreneurship in their programmes, the evidence was in favour of UJ. We will continue to test the way in which entrepreneurship has been embedded in the curriculum, and if a UoT can prove their case, there is no reason why they should not also play an important role in this regard.

The importance of monitoring and evaluation is critical, and this is probably an area where we will have to learn from international precedents. We should conduct tracer studies and measure the impact of our education interventions.

Question/Comment: How would you work with provincial government as well as national government agencies to embed entrepreneurship?

Question/Comment: Could you provide clarity on the issue of UJ – was there a call to all universities? Did the DHET identify them because of where they are located, in Gauteng? Five years might be too long for one university to have a monopoly on how entrepreneurship should be expanded in the country, and other universities should play a role in driving the agenda. I would request that the DHET reconsider this thing very seriously.

Prof. Mthembu: We welcome all the initiatives that the DHET developed to further entrepreneurship. UoTs are always grappling with the notion that we are viewed as afterthoughts. The thinking behind choosing UJ seems to be related to patents produced – the purpose and outcomes of entrepreneurship education should not only be patents. I think that the DHET might have focused on the wrong aspect in this case, while the ultimate objective is to identify how many people are equipped to run businesses, which should be the primary focus.

India: Entrepreneurship education is an international focus. My perspective takes a broader look at the national innovation system – if one takes a look at the low to medium level of research, and consider that innovation and commercialisation should be closely linked to entrepreneurship. Why is there no link, and are the DHET and DST working together to create this dynamic in the innovation process?

Dr van Staden: UJ is not going to drive the agenda for entrepreneurship in the country. They will be the facilitator of a process that will be driven by the DHET, and will involve all the UoTs. We are creating partnerships with several universities, such as the Maritime Institute located at NMMU, but as the coordinator of the initiative. The DHET remains the driver; UJ was chosen for the creative solutions that they created to provide space for their students to get workplace-based learning opportunities. UoTs are not viewed as an afterthought – we want to stimulate energetic engagements with all UoTs and various other partners to meet national imperatives. All useful proposals, suggestions, solutions, and resolutions from this conference would be used by the DHET when we kick-start the process next year.

We are working with both DTI and DST to develop a collective proposal detailing what the higher education system should be thinking about. We are now also working with the Department of Small Business Development, and our Minister made a commitment that the DHET would continue to work with all departments to address all aspects of education and training. Cooperation with all these entities remains pivotal for the DHET.

THEME 4 INTERNATIONAL CASE STUDIES AND EXPERIENCES ON ENTREPRENEURSHIP IN EDUCATION

4.1 STUDENT INNOVATION AND ENTREPRENEURSHIP AT THE UNIVERSITY OF FLORIDA Dr Angel Kwolek-Folland, Vice-President of University of Florida

4.1.1 The University of Florida is interested in developing undergraduate student success in a variety of ways. Some of what we learnt may be of use to you. I thought I would start by providing a profile of the university.

UF is one of the ten largest in the US, with over 4 000 academic staff and over 33 375 undergraduate students, 15 929 graduate and professional students, and over 6 700 international students. The UF is a public institution, which in the US means that it gets between 20 – 40% of its income from the state. The rest of our money is generated from research grants and industry contracts and other sources, meaning we are constantly looking at other sources of income. We have a very large endowment of \$1.5 billion.

In addition to the national and state-wide mission, we play a role in the local environment. We are not located in Miami, but in North-Central Florida and is one of the biggest employers in Northern Florida. We are an important economic driver, and continue to try and establish economic ties with the surrounding area.

Because we are a public institution with a long history of research, we naturally have a long history of turning research into products and inventions. The most well-known is still Gatorade, which was turned into a product through a business partnership. It was the first of that type of technology transfers from a university into the public arena. The university has earned over US\$ 80 million from royalties and other sources of income associated with Gatorade. We had lots of other products go to market, but not everything was as successful. We do a lot of work in terms of plant cultivars, and we also do a lot of medical research. There is an ongoing debate about teaching creativity and entrepreneurship, and we try to create programmes that include basic research and problem solving of which students can take advantage.

The first project is an outreach programme called STEAM, a collaboration between the College of Engineering and the College of the Arts to explore the invention of new technologies. Students live on campus and interact with faculty and each other to work on some kind of project which they present at the end. The idea is that young people would be interested in studying in the field and come to college. There are similar programmes with other schools from disadvantaged areas around the US.

We have university research programmes aiming to involve scholars in hands-on research across the campus. The idea is that students might be interested in graduate school and the process of research, how to formulate a question, how to search for an answer, and how to communicate their findings. In our university scholars programme students work directly with scholars in one-on-one programmes, for which staff receive a small stipend. This has been going on for many years now.

We also have an undergraduate research symposium, where students present their findings at the end of the year and interact with other students and faculty on their research. The university honours programme is open to freshman undergraduates, which includes special courses with very small enrolments, since they are focused on the elite student. Students live with other

students so they can engage with people involved in the same process, and they have to defend their theses at the end of the process. They are also required to do in-depth reading.

The Innovation Academy admits students who matriculate in the spring and summer during the fall term on internships and study-abroad projects. The special curriculum includes courses in creativity, innovation and entrepreneurship along with regular major courses. Courses are built around teams and cohorts, and they are generally very small and team-centred. The students focus on new approaches to growing businesses, trying to think of the issues that one faces when you start a new business.

Our Entrepreneurship Curriculum is decentralised and offered in various colleges, at various different levels, and may incorporate coursework, lectures, seminars, and meetings with industry leaders. The College of the Arts offers courses in business skills to musicians, artists and singers, to provide training on marketing their work and managing their businesses. Students are spurred on to think more entrepreneurially.

To try to make it easier for both staff and students to take ideas and inventions to the market place, the university partnered with the City of Gainesville to provide services to people wanting to start up companies. If you are an academic staff member with an idea, you can approach this entity for support and advice. There is currently about 30 companies in residence, and they have already launched about 30 small businesses. They have created about 780 local jobs and created about \$ 50 million in income for the region.

Infinity Hall is the first living and learning space for students, with space and facilities for start-ups to take student ideas into business production. The aim is to create jobs and generate dollars for the entrepreneurs and the community. By the time these undergraduate students leave the university they will either have a business idea to develop, or will have started a small business to take further. Hopefully some of these ideas will spark your creativity.

4.2 TOWARD AN ENTREPRENEURIAL UNIVERSITY AND MINDSET

Mr Juha Hatanen, Senior Lecturer, Entrepreneurship & Innovations, JAMK University of Applied Sciences, Finland

- 4.2.1** Although Finland is a large country, it has a population of only about 5 million people. The JAMK University of Applied Sciences covers 8 fields of study, and has 8 500 students and 700 staff. The university focuses on applied research, development and innovation, with the intention to support regional development. The focus areas include business, culture, ICT, natural resources and the environment, social services and health, technology, tourism and catering services, and a teacher education college. The university has an annual turnover of € 61 million, and all education is provided completely free.

The Department of Entrepreneurship (JAMK Generator) exists separately from the Schools of Technology Business, Health and Social Studies and the Teacher Education College, but serves all of these schools. The Generator supports new start-ups and spin-offs, and also focuses on university business cooperation. In 2014 it helped 30 new start-ups get off the ground. However, after 5 years only 20% of these companies still exist, but despite this fact the importance of entrepreneurship training remains important. Why is this the case?

There has been a change in the business world, with large companies employing fewer people. SMMEs are becoming increasingly important throughout the world, and play an increasingly

relevant role. Entrepreneurs must be action-oriented, and must identify and grasp opportunities that come their way. The learning process should be similarly action-oriented.

Entrepreneurship is an attitude that must be slowly 'marinated' into students; it cannot be implanted through 'micro-wave' action. It is important that students should be taught how to think, behave and act entrepreneurially. It requires creativity, co-creation and courage, and a passion to do. Finding this sweet spot may require an intersection between what you love, what you are good at, and what serves the world. If all three these aspects are not served, the endeavour will probably not be sustainable. Apart from Nokia, the game Angry Birds, which is completely free, was also developed in Finland. How is it possible for a game to be completely free yet generate a large income? By spin-offs such as toys, clothing, and apps. This intersection can also be defined as that area where passion, knowledge and opportunities combine.

Similar to young babies learning to walk, people should realise that young start-up businesses should be given opportunities to try, but that they might fail and would require continued support. The principle of 'try fast, fail fast' should be embraced, so that lessons can be learnt and taken forward. Another important consideration is to think big, but prototype small, in case the project does fail. The Minimum Viable Product (MVP) should be identified and explored, trying on small things and getting feedback before exploring further. For entrepreneurs to be successful, they should be granted an official licence to act differently, which means that they are not afraid to take risks.

The framework of an entrepreneurial university incorporates a number of aspects, ranging from:

- a. An entrepreneurial curriculum;
- b. Student activities;
- c. Start-ups and spin-outs;
- d. Supporting environments;
- e. Partnerships and alumni networks;
- f. Funding;
- g. A regional development eco-system;
- h. All of these combining to serve and support faculty and students engaged in entrepreneurial studies and activities at the centre.

4.3 Mr Reinaldo Pamponet, Founder, Electrocooperativa and Itsnoon.net (via Skype)

4.3.1 VUT: You championed the Istnoon programme, and you are a social entrepreneur. What made your programme so successful?

Pamponet: I think it is important to know what social issue you are trying to address. Itsnoon focuses on two or three main issues – the first regards the future of work; how can we work better by using digital networks, allowing people to work from where they are located using phones or computers. This relates to power distribution, if you can allow people to use their digital devices. The second critical issue is how you can shift the economic model that was based on the production of stuff, based on the availability of fossil fuels, to focus on something more intangible like creativity. It also relates to climate change, which is a survival issue – if we have more people relying on their creativity and human potential for survival, we will rely less on fossil fuels. Youth employment is an issue worldwide, and there is a misconnection between the way our organisations and work is organised, and the expectations of the youth. Itsnoon therefore tried to stay focused on these problems that must be solved – most of the time one tends to lose focus on the main issues that made you start your venture in the first place. Challenge yourself by setting high standards and goals – the more you address the strictures of the system, the more work you will have, and the more fun it will be.

TUT: I have a question around creativity – can you become an entrepreneur without being a creative person?

Pamponet: I think we need to define creativity. It is problem solving, but also a methodology that reinforces the notion that people should try and do the best they can with what they have, which is probably very relevant to both Brazil and South Africa, and other parts of the world. Often the lack of resources raises our creativity, and we should focus rather on what we have than on what we do not have. This is where creativity starts.

Istnoon does not like to criticise what people do, because we realise that to increase the cognitive capital of people you have to incentivise people rather than criticise them. If you criticise people, they will stop doing. In the industrialised era most of us were encouraged to work in patterns that focused on efficiency, and in a creative world we must focus on stimulating new thinking.

VUT: Your analysis of the structural and systemic issues are globally relevant. We are in a particular moment in South Africa where transformation is being challenged throughout the system – there is a missing piece in the transformation agenda that we have neglected, and that is community engagement. The location of entrepreneurship is interesting, because it means that we overlook where the solution lies – within ourselves, and not out there in the system. I have heard different ways in which we approach the notion of entrepreneurship – there is a business focus, a social focus, and there might also be political and social entrepreneurship. The activism in South Africa has been increasingly entrepreneurial – is this a phenomenon that occurs in other parts of the world?

Universities are massive structures that take a long time to change. Entrepreneurship requires a completely different conception of organisation – how should universities approach change in the universities?

Pamponet: You are basically asking how we view centralised power in the world, and by this I mean universities, business, and governments - all the structures that run the world and that want to protect that power. We are seeing this shift all over the world, in Spain, in Tunisia, in Occupy Wall Street, in Egypt.

Most of the design that we have today tends to go towards a more distributed model – let us look at Facebook, which is a way to distribute the power. We also see that the economic model has to shift, to redistribute the wealth of the world. Some of these tools that we have increase the participation of people – we need to change the shift from participation to commitment, we should have contracts between people to actually do things that will bring about change. It is all too simple for people to ‘like’ a cause on Facebook, but this does not entail any commitment. Our Istnoon platform requires people to make a small financial commitment, instead of just clicking the ‘like’ button. It creates different platforms for people to interact with one another, because people ask ‘if I support you, what do I get back’. This can be in the form of feedback or other engagement. The main issue is that the society and market is going in different directions – society wants to decentralise the power, and business and money is trying to go in the opposite direction. The way we redesign our institutions will be critical.

The Santander Bank in Latin America is a good example; they have figured out that to increase financial literacy in the community, it did not work to try and teach all people using the same programme, because their contexts might be completely different. They built up a platform and invited customers and societies to produce their own financial literacy content. People are now teaching each other how they work with their money, and they are getting paid for it. The bank is not putting the money outside of the value chain, but is generating content and paying people for it. People who did not traditionally have a relationship with the bank are now interacting with

the bank and are actually serving the community. I think that a distributed way of looking at business is probably a wise first step to decentralise power and increase value.

Question/Comment: There are similarities between South Africa and Brazil. We understand that there are huge gaps between the rich and the poor; in South Africa 15 million people are receiving government grants, which has had a negative effect on entrepreneurship. What can we do to instil an entrepreneurial spirit among poor people?

Pamponet: Most of our culture in Brazil originated in Africa. There is a different aspect to entrepreneurship; African culture is about a connection to the land and natural resources, which is a natural and important aspect. Most of the time when we think of entrepreneurship, we think of Silicon Valley and IT, but we could also think about reconnecting to the land and generating food, taking care of water. Sometimes we miss this agenda when we think of entrepreneurship.

Let us think about the way we do things. Let us try to generate our own answers, without allowing our thoughts to be colonised by the way we grew accustomed to doing things. We should try to find our own way in being entrepreneurs in a different way. We should build an entrepreneurial spirit, which means thinking about employment differently, while acknowledging that people need to make a living. If you need a job, create a job. We need to unleash this new way of thinking, in terms of which Africa and Brazil could lead the way. We need to trust who we are, and stop over-valuing the things that come from outside, which is a colonised model of thinking.

4.4 EFFECTS AND IMPACTS OF ENTREPRENEURSHIP PROGRAMMES IN HIGHER EDUCATION

Dr Jacqueline Snijders, Executive Director of Panteia's International Business and Economic Network, the European Network for Social and Economic Research (ENSR), Netherlands

- 4.4.1** Panteia was set up in the 1930s to study the middle class and entrepreneurship, and was subsidised until the mid-90s. At that time, the government required the organisation to start working independently, given the global financial crisis, which meant that the organisation started doing more applied research. It also did policy research and worked with stakeholders to transform research into action. This shift meant that the organisation started doing more focused business on entrepreneurship and SMMEs.

I am also involved in a network of research organisations in the European Union to collect and share information on best practices in entrepreneurship. I will share the findings of this study with you.

Entrepreneurship concerns an individual's ability to turn ideas into action. It relates to the improvement of entrepreneurship mind-sets among young people, enabling them to be more creative and self-confident in whatever they undertake and to improve their attractiveness for employers. It is also meant to encourage innovative business start-ups, and improve the role of young people in society and the economy. The majority of small businesses in the EU are very small – the average SMME employs only 4 people or less. To be innovative and compete with all other companies, innovation is important.

Entrepreneurship education should focus on personal attitudes and skills, raising awareness about possible career options, and using practice-based methods. To get a baseline of information, a survey was conducted targeting students that have graduated from universities that offered entrepreneurial training. The alumni networks of these universities were used, provided the alumni graduated more than 5 years previously. Three groups were invited to participate in the survey, namely alumni that have participated in entrepreneurship programmes;

alumni that participated in the European Confederation of Junior Enterprises, an umbrella organisation; and university alumni that have not participated in an entrepreneurial programme.

The following aspects were tested:

- a. Knowledge of entrepreneurship;
- b. Skills – learn how to become an entrepreneur;
- c. Attitudes – develop attitudes that help to take action, take responsibility for own learning, career and life.

The survey identified that more than 55% of the two groups that had entrepreneurship training preferred to be self-employed, for reasons of personal independence, freedom to choose the time and place of work, and realisation of business opportunities. 42% of the control group, who did not have entrepreneurial training, expressed the same views.

Those who preferred to be employees, mentioned reasons such as guaranteed income, stability of employment, fixed working hours, and protection by social security and insurance as good reasons to be employed.

The survey also identified that people who had entrepreneurship training found employment quicker after graduation, and that they were the least likely group to have experienced periods of unemployment. The groups that had entrepreneurship training also had more creative jobs than the control group.

In assessing the impact of entrepreneurship on society, participants were asked whether they initiated and participated in voluntary work. Entrepreneurs tended to take on more of these projects outside the workplace, and are generally more eager to take on such initiatives.

The likelihood that entrepreneurs will participate in a business start-up and the frequency with which they set up businesses were found to be higher. They become self-employed earlier in their careers, their enterprises are more innovative and their expectations about employment growth and turnover growth are also higher.

The survey identified that only 8% of the alumni and 3% of the control group (people who did not have any entrepreneurship training) were in fact entrepreneurs. The majority of the control group entrepreneurs had liberal professions, e.g. lawyers, medical practitioners, accountants or architects, or worked as freelancers. Entrepreneurship alumni have established more businesses in a shorter period of time, and the number of years between graduation and starting their first business differed among the respondents, with the control group starting on average two years later.

The key messages from this study were:

- a. Entrepreneurship education improves entrepreneurship as a key competence;
- b. Participants in entrepreneurship education have more knowledge and scored higher on 10 of the 12 characteristics of key entrepreneurial competencies;
- c. Entrepreneurship education helps people to have a stronger desire to transition towards entrepreneurship and look for opportunities to start their own businesses;
- d. Entrepreneurship education generally has a positive impact on the economy and community.

4.5

DISCUSSION:

VUT: The model is clear and adaptable. Given the South African situation, there is an internal contradiction in the work space, particularly considering that we want to inspire people to be entrepreneurial and creative. Seldom do we think of the fact that our predecessors crafted power relations that we were not party to, which continues to stifle creativity and which we see in people jumping jobs. Perhaps we should focus on good citizenship that evokes some kind of political or moral ethic, which could be expanded to include entrepreneurship.

Universities South Africa: Did you test what happened to people who failed, and how they recovered from their failures? We find that people become more risk averse as they become older because they have more to lose. How does one deal with this without stifling entrepreneurial creativity?

Olsson: Your definition of entrepreneurship in one of the first slides is relevant – what is the intention with the focus on entrepreneurship? Is the intention to create more small businesses, or what is the intention in the broader European context? The other question relates to the fact that the survey was conducted across Europe, in a variety of economies – does culture and the type of economy not affect the view of entrepreneurship?

India: We have heard of experiences from various contexts ranging from the US to Finland and throughout the EU. The important commonalities appear to be the connection with the community, which will be determined by social context. In India we found that creativity occurs at the intersection between different disciplines within our universities. The structural versus systemic aspects were also mentioned – universities should have enough autonomy to reach communities in terms of social entrepreneurship. We also heard that there is somehow a need to create a level playing field between the market and society.

Kwolek-Folland: The idea of failure is something that is particularly relevant in entrepreneurial education. It should form part of the curriculum that graceful failure is an important and valuable learning opportunity. In the US people who start successful technology companies are between the ages of 38 and 45, which indicates that they underwent a lot of learning before reaching success. Students must understand that life is cyclical.

Hautanen: We try to make our students understand that they could fail, and that failure in one area does not have to affect their entire life. I agree that the most successful entrepreneurs are around 40 and have previous experience. Vocational schools and high schools in Finland already start with the focus on societal interaction.

Snijders: 10 to 15 years ago going bankrupt was still a major disgrace in Holland. We are working very hard to change these perceptions, and have set up a number of support structures to change people's views in this regard. Entrepreneurial training campaigns highlight that failure is part of the process, and that it is not an issue. Failure is part of the game, and is also part of our economy.

Responding to the question why Europe wants to stimulate entrepreneurship, the first point is that we need to stimulate the economy, but also to develop new and innovative services and ideas. Small enterprises stimulate the dynamics of the economy and creates a more competitive environment. It is also a way to be more inclusive of people that might not be able to enter formal employment. It is true that the study focused on more developed countries, but we are trying to stimulate entrepreneurial activity in a variety of contexts and types of institutions.

5. PARALLEL SESSION 1: PAPERS PRESENTED

5.1 PROMOTING ENTREPRENEURIAL THINKING: PURPOSEFULLY EMBEDDING GRADUATE ATTRIBUTES IN THE UNDERGRADUATE CURRICULUM

Presenter/s: Prof. Anthony Staak and members of the SATN Project on Graduate Attributes

Chair: Dr Chris Nhlapo

Rapporteur: Ms Kogie Moodley

5.1.1

The paper addressed the question of how entrepreneurial attributes might be achieved and highlights the challenges faced by Universities of Technology in becoming entrepreneurial and in creating environments in which entrepreneurial thinking; being and doing might be developed.

The promotion of entrepreneurship in higher education has been recognised as an appropriate response to declining graduate employment in turbulent and unpredictable economic environments. There is significant pressure on higher education to produce graduates who have the necessary attributes for creating their own economic opportunities. One of ways that South African Universities of Technology have responded to these challenges is by placing more emphasis on entrepreneurship education, including the development of attributes associated with enterprise, both to support students who are interested in establishing their own businesses as well as to transfer entrepreneurial thinking into other areas of work.

To achieve specific graduate attributes, the student must master disciplinary knowledge, must develop a critical understanding of the knowledge field, must develop a commitment to ethical practices and social responsibilities and must have a capacity for employment or entrepreneurship and for life long and life-wide learning.

By examining the structuring principles of flagship programmes, we have made explicit how entrepreneurial thinking, doing and being might emerge from strong academic programmes. Understanding the structural principles of entrepreneurial emergence will also help academic staff and heads of programmes to understand how programmes that have not yet achieved valued distinctiveness might be assisted to move towards this. This offers the basis for an enhanced understanding of how entrepreneurial attributes might be achieved in other qualifications.

The main aim of this research was to develop an understanding of how specific features of university programmes might lead to the attainment of entrepreneurial attributes. Karl Maton's Legitimation Code Theory (LCT) was used to analyse the organising principles and underlying practices across flagship programmes chosen at the six universities of technology. The analysis of the flagship programmes based on the theoretical framework of LCT Dimensions i.e. decision-making, resources, temporality, knowledge type and specialisation has led to an understanding of the contextual issues and meaningful engagement to proceed to phases 2 and 3 of the project including the attainment of graduate attributes through strategic teaching.

5.2 **PROMOTING ENTREPRENEURSHIP THROUGH EDUCATIONAL GAMES: A THEORETICAL AND PRACTICAL OVERVIEW** **Prof. Ulrich Holzbaaur, Prof. Tony Agbobli and Prof. Albert Strydom, CUT and Aalen University**

5.2.1 This paper focuses on how one can use educational games to convey entrepreneurial skills to students, who can in turn go out into the community to train people in business or unemployed people.

South Africa needs new job creators, given our youth unemployment rate which is estimated to be at 48%. Research has identified that sustainable jobs are not created by money *per se*, but by people who are innovative and entrepreneurial. The traditional mission of universities has been to educate people for employment by others, rather than to be employers, while UoTs focus on creating people that are ready for the work place. CUT seeks to transform its entrepreneurship education activities to become a robust agent for innovation in central South Africa. International good practice and case studies were interrogated, which brought Aalen University into the equation.

Games are well-known methods for training, relating to earlier games such as chess and monopoly. Games are used in military and management education. Educational games are efficient mechanisms to teach real world problem solving, based on real world models, and because they are decision oriented. Risks can be taken and new ways of problem solving can be developed and tested. Educational games can be the topic of a special course, or they can be embedded in special subjects, or a short course approach can be applied in all learning programmes.

The game that was developed had the goal of introducing learners to the fundamentals of economics. It is a basic board game covering the concepts of procurement, production, sales, cash and basic accounting. It also includes external functions such as product marketing and the availability of raw materials, variable and fixed costs.

The second level game is an accounting board-based game, which introduces basic concepts of accounting, book-keeping and controlling. It addresses ways of accessing funding, and accounting principles and aspects like rent and salaries.

Level three focuses on marketing, and is also board-based. It introduces the market, product, pricing, promotion, and publicity. It introduces concepts like the interactions between finances needed to create a business, media and advertising, providers, and the customer.

Level four introduces two games focused on planning and managerial skills. Lego Tower focuses on components of the project triangle (quality, cost and time), as well as profit versus competitive position. Leonardo looks at bridge construction, allowing learners to cooperate and plan without verbal communication – this is an action game where various steps have to be taken to teach people management skills while having fun.

Level five addresses strategy and sustainability, and is a role-based game. It addresses presentation and negotiation skills, as well as the theoretical knowledge of sustainability. Fish Pond is a game on environmental management, looking at the balance between common good resources and profit.

The last level addresses business management, and is a role-based game aiming to integrate all the other levels. Participants are required to run their own businesses, and learn how to develop and implement their own business plan. Components include financial planning, organisational management, operation and production, etc.

The aim of the project was to provide target groups with basic knowledge and competencies to develop and manage small businesses. It is applicable to both students and the community, with the long-term result of improving the economic situation in the region, province and the country. Principal tasks of the project involve:

- a. concept development and needs analysis with partners;
- b. development of games and instruction materials;
- c. training the trainers;
- d. developing and training;
- e. including evaluation; and
- f. evaluation and scientific publication.

The target group includes students, unemployed people, active entrepreneurs, potential entrepreneurs with business ideas, and learners in secondary education. The first step would be to train the trainers, through groups like ENACTUS and through mentors for junior students.

25 participants can play at one time, with 5 members in a team that have specifically assigned functions. 2 members are assigned administrative positions. The five teams are able to compete with each other in playing the game.

The board games are based on simple didactical considerations, such as 'where do we start, and where do we want to go'. The game can also be played in a variety of formats, either board-based, on paper, or online.

The CUT trained the ENACTUS group and a group of mentors, who were given the responsibility to train others. Three community projects were also identified – the one is a day-care centre in the Rocklands township in the greater Bloemfontein area. The business, which aims to provide affordable and quality meals to poor children from the surrounding area, is run by a group of unemployed parents who were given R 1 500 seed funding. Level 1 has been completed, and the other levels will follow soon.

In Welkom, two projects were rolled out where Level 1 of the game has been completed. Although the project is in its initial stages, it is evident to see that the trainers are learning valuable skills, and that they are able to apply these skills in other contexts. Apart from positive feedback from students and the community, lots of enquiries have been received from outside the province.

A training manual is currently being compiled, and would be used to train students in all learning programmes at CUT and beyond. To secure additional funding and exposure, Chambers of Commerce and SETAs would be approached, and a funding proposal is being drafted.

5.2.2

DISCUSSION

Question/Comment: The introductory part of the slide mentioned training of students – was this deliberate? Is a board game not more effective as a means that will emphasise learning, perhaps through self-discovery which would also increase retention?

Prof. Strydom: You are correct – the learning does happen through doing.

Question/Comment: From the presentation we see that you identified a wide range of skills that students must acquire, linked to the process flow. Is this going to be effective versus focusing on a very particular skill?

Prof. Strydom: You are correct. We did the level 1 training with the day-care centre more than six months ago, because we want to give them time to internalise that knowledge. We think that a phased approach will ensure that the necessary knowledge is firmly embedded before we move on.

Question/Comment: Entrepreneurs in the making need critical thinking skills, and the skill to critically reflect on their practice. Has this been considered as an outcome in the game?

Prof. Strydom: I assume that Level 4 would include critical thinking, but I think the comment is valid and I will ask Prof. Holzbaur to think how it can be incorporated in the game.

VUT: I am a lecturer in visual art and design at VUT. You talked about unemployed people and informal vendors as part of the target market – do you envisage any age limit for the target audience? You referred to a number of games, most of which are board games – somebody talked about the different generations, like X and Y, and it might be a good idea to have different formats for different generations. We need more of this kind of project. From a visual art and design perspective, I think this could be an interdisciplinary kind of project that could involve people who have knowledge on the design principles.

In tourism there is a point where museums end up competing with public art spaces to attract visitors. It would be good to consider the role of technology and games to attract people to these spaces, and also to teach the younger generation about the history and cultural heritage of our country.

Prof. Strydom: No, age does not play a role. The Tshwaranang group are of different ages, people that brought their children to school every day and identified the need for basic food for the kids. I think the game can be played by people regardless of age or schooling level, if only to sell something as basic as sweets on the street corner, but to have the basic skills to make a living.

It is true that we should take an inter-disciplinary approach, and at this stage the Design students at CUT are developing the look and feel of the game.

Kwolek-Folland: How are you going to fund and market the game?

Prof. Strydom: The original intention was not to develop the game to generate an income. Obviously it could lead to that, but we will approach a funder first of all. As time goes by and we generate funding, we could plough that funding into the project.

5.3 THE FREE STATE REGIONAL INNOVATION FORUM (RIFFS): TOWARD A CATALYST FOR REGIONAL INNOVATION ENGAGEMENT

Presenter/s: Prof. Ryk Lues, CUT

Chair: Dr P Gibcus

Rapporteur: Ms Å Olsson

5.3.1 The Free State's economic growth over the past 10 years has been lower than the country average. Key challenges include an average unemployment rate of 30%, a large population of unskilled or semi-skilled people, poor quality basic education, and challenges for women and young people to find employment. The largest contributor to the Free State economy is Mangaung, another large actor is the tertiary education sector itself.

The Free State's Vision 2020 is focused on becoming an innovation hub. The approach is to link academic, research and skills development programmes to social and technological innovation. The focus is to measure impact and outcomes in terms of socio-economic development, rather

than looking at systems and processes as end results. The guiding principles for the work are quality and excellence, and the approach is to leverage the comparative advantages of the region, including its location and resources.

To address social and economic challenges, the Free State has established an independent *Regional Innovation Forum*. It is a structured platform for engagement and collaboration comprising government, university, community and industry stakeholders. The objective is to promote an enabling environment for innovation that will include and promote engagement, building trust between the various stakeholders, promote balanced risk taking and creative thinking.

The Central University of Technology will play a key role and has positioned itself to respond to the needs of the region. Plans to further this work through the establishment of a Scientific and Innovation Park located in Fuama Village are under way.

5.4 WHAT SCHOOLS CAN DO TO RAISE FUNDS

Presenter/s: Dr Duduzile Mzindle

Chair: Mr J Hautanen

Rapporteur: Dr B Johnson

- 5.4.1** Schools should reach out to communities. Students and educators can be challenged to come up with innovative ideas, in terms of which universities can play a facilitative ‘partnering’ role to expand.

The idea of “Positive Living” emerged among students at DUT. High School learners were invited and taught about drugs. Students worked across disciplines. They raised funds and reached out to industries. Students in this process came up with new ideas. This requires the curriculum to be more dynamic and flexible to allow for greater community engagement.

A culture of entrepreneurship needs to be cultivated much earlier in the learners’ lives, for which teachers should also be better capacitated. Top management should lead by example, by investing in the university’s own businesses and new entrepreneurial ventures, using these mechanisms to change attitudes and mindsets of students. Universities must work together to focus not only on fundraising, but to achieve better learning outcomes and empower all citizens.

6. PARALLEL SESSION 2: PAPERS PRESENTED

6.1 “WHERE THERE IS A WIL THERE IS A WAY FOR ENTREPRENEURSHIP” – THE UOT EXPERIENCE

Presenter/s: Prof. Joyce Nduna and members of the SATN WIL Task Team

Chair: Dr C Nhlapo

Rapporteur: Ms K Moodley

- 6.1.1** The purpose of this paper was to:
- a. examine the pedagogical aspects of the increasing interaction and collaboration that is taking place between higher education and the workplace in the context of entrepreneurship education,

- b. present the research findings that demonstrate the extent to which the universities of technology have played a role in responding to the challenge of developing pedagogical and educational thinking and practices in relation to entrepreneurship education, and
- c. outline the challenges for research in HE posed by the increasing interaction and collaboration between higher education and the workplace

The paper emphasizes that from the pedagogical viewpoint integration between theory and practice in workplace-based learning is essential for entrepreneurship education and that there is a need to redefine the aims, goals and ethics of research and instruction from a new perspective that is rooted in the relationship between society, business enterprises and the academic world.

The general conclusion was that work integrated learning (WIL) in general and workplace-based learning in particular have great potential to contribute to socio-economic development, and therefore should be an integral part of entrepreneurial education, and that the relationship between higher education and the workplace in the context of entrepreneurship education should be examined from at least four different perspectives, namely:

- a. student learning and the development of expertise
- b. educational institutions and staff
- c. working organizations and employers and
- d. society and the system of education

The challenge is to encourage all stakeholders to form partnerships, support work-integrated learning and participate in the co-operative generation of new knowledge for entrepreneurship education and job creation.

Recommendations:

- a. From a pedagogical viewpoint WIL is an essential vehicle for successful EE programmes, if planned properly and implemented effectively;
- b. WIL should be appropriate to the type and level of the programme of study;
- c. SMMEs should be involved as mentors for students and all stakeholders - including established entrepreneurs - should be encouraged to participate in partnerships. WIL should be supported through participation in the co-operative generation of new knowledge for entrepreneurship education.
- d. WIL research should be guided by the principles that underpin multi-stakeholder partnerships.

6.2 LAUNCHLAB'S ROLE IN UNLOCKING AND SUPPORTING STUDENT ENTREPRENEURSHIP: A PRACTICAL PERSPECTIVE
Ms Maruchane Macauley and Mr Philip Marais

6.2.1 The conceptual framework covers South Africa's challenges, the knowledge region opportunity, and the LaunchLab solution to address these challenges. The role of tertiary education institutions in fostering an entrepreneurial culture is important, considering the challenges we face in South Africa:

- a. Lack of education – figures for 2012 showed that in South Africa higher education levels correspond directly with the level of entrepreneurial activity. Given that the country experiences educational challenges, it is understandable that there is low entrepreneurial activity. There is also a low employment rate of people that have graduated.

- b. Lack of finance – only about 3% of South African entrepreneurs are able to access finance to start a small business. South Africa rates 80th out of 144 countries in terms of the number of days to start a new business.
- c. Government policies are not facilitative and supportive, particularly around labour, tax incentives, and unnecessary legislative burdens.
- d. Commercial infrastructure is also often not available – these kinds of support include access to consultants and advisors, services that are generally prohibitively expensive.
- e. Physical infrastructure is often lacking and means that good opportunities cannot be harnessed.
- f. Ease of access into new markets, and anti-competitive behaviour by established and large businesses, monopolies and cartels.
- g. Lack of government programmes to enable and support small businesses, and no accountability or measurement in SMME support agencies. Often government ends up running incubators rather than playing a supportive role.
- h. The legacy of apartheid and how this impacted on people's ability to engage in entrepreneurial activities.

Where do we want to be? The role of universities has changed from institutions that generated graduates to a more research focused approach, where innovation and the development of IP stimulated by the knowledge economy started gaining traction. Some examples of other knowledge regions throughout the world include MIT on the East Coast of the US, Silicon Valley, Cambridge in the UK, and Leuven in Belgium.

Factors that helped create these knowledge regions included quality of life, technology transfer, critical mass of high quality research outputs, infrastructure, supportive legal frameworks, clear incentives and policies, professional networks, adequate funding, and a favourable entrepreneurial climate and culture.

Taking the example of Leuven, there was a critical mass of spinout companies coming out of the university. Apart from the high quality research produced, quality of life in the region and professional networks attracted a critical mass of the right people, meaning that government support and the resultant structures like a supporting legal framework and other incentives and policies soon followed.

An entrepreneurial culture requires the right people, which consists of a combination of nerds or smart people, and rich investors to provide the two critical elements of education and finance. A knowledge region is not only dependent on the availability of a university, but the right combination of all these elements. Investment in education on its own will not establish an entrepreneurial culture, it is also necessary to connect knowledge and talent in the right environment with the necessary resources.

Entrepreneurs have been identified to share the following five traits:

- a. Openness (higher);
- b. Conscientiousness (higher);
- c. Extraversion (higher);
- d. Agreeableness (lower);
- e. Neuroticism (lower).

The study on entrepreneurial culture also identified a correlation between an individual's education and earning ability and their entrepreneurial activity. The flow of ideas are stimulated by a willingness to be open to new ideas.

LaunchLab's vision is to make a positive impact on the lives of people in South Africa by establishing a network of incubators to stimulate entrepreneurial activity and projects. This will be achieved by LaunchLab Talks, LaunchLab Ideas (workshops, pitching platforms, and seed funding); LaunchLab Lift-off (coaching, mentorship, internship, acceleration programmes, and business mixers); and LaunchLab Building, which focuses on refurbishment, furniture and equipment.

Particular focus areas are aligned to universities' outputs as well as the needs of industry, facilitating interaction in particular streams. Programmes focus on education, finance, and affordable access to business services. In Stellenbosch, existing knowledge centres are identified to help new businesses to commercialise new business ideas.

In South Africa the development of knowledge regions will help develop an entrepreneurial culture and aid the commercialisation of new knowledge across the country.

6.2.2

DISCUSSION

Question/Comment: From the set-up phase, what is the funding model, to what extent is the university involved and what is the extent of external funding?

Marais: The facility started in 2010 as an idea with little funding, and over time we expanded the argument and convinced the university's management of the need for an incubator hub. They provided a facility, and we tried to access outside funding. The DTI agreed to fund us in principle, provided we could secure a private partner to give funding and a market. Nedbank and the university agreed to be our partner, so this helped us to expand.

VUT: Is LaunchLab run by students, or staff?

Marais: No, it is not run by students. We have a technology transfer office, but we also support student ventures and external entrepreneurs. We have outside service providers and mentors involved, but students are not involved in any of the programmes. LaunchLab was not started by students but we do involve students in the structure of the programmes.

Question/Comment: Can you elaborate on the importance of using a conceptual framework and the research model? What data analysis did you use to arrive at the results?

Marais: The results that were mentioned were from a paper that we referenced on entrepreneurial culture. We looked at the literature and applied our research model on top of that.

Question/Comment: The understanding is that the conceptual framework precedes the research framework.

Question/Comment: Could you expand on the notion of quality of life?

Marais: Yes, that study identified that you need a combination of all the desirable elements to create the ideal situation, including quality of life, the right mix of people, the right kind of research, and the right kind of projects that will attract investors.

6.3

SOCIAL ENTREPRENEURSHIP: INNOVATION, COLLABORATION AND ECONOMIC ACTION FOR ECONOMIC RENEWAL

Presenter/s: Dr Gnanam Pillay, DUT

Chair: Dr J Snijders

Rapporteur: Ms Å Olsson

6.3.1

The South African National Development Plan Vision for 2030 identifies high levels of unemployment, inequality and poverty as key challenges for social and economic development. The paper argues that the rate of entrepreneurial activity in South Africa needs to be increased to address these challenges, and that higher education institutions have the potential to

transform both the economy and broader society through the establishment of social entrepreneurs programmes.

The authors argue that social entrepreneurship is a relatively new concept in South Africa, although it is a well-known model for addressing social issues around the world. The main advantage of social entrepreneurship is that it combines a social agenda with business principles, in order to add social value to marginalised communities through innovative, practical solutions. Social entrepreneurship has the potential to create impact as it allows small enterprises to become sustainable in the long run. This is achieved by engaging communities in their own growth and development through the provision of particular services or products. It has the potential to increase self-reliance and self-esteem among marginalised communities while reducing dependency on government hand-outs.

South African institutions that offer social entrepreneurship courses include GIBS, the Bertha Centre for Social Innovation at the University of Cape Town, the University of Johannesburg, and most recently the Durban University of Technology. A common factor of all these courses are that they are short, aimed at non-profit organisations and social enterprises with a minimum requirement of NQF Level 4 or Master Level students who have completed an undergraduate course. Hence these courses exclude social entrepreneurs with low levels of formal education. That said; all universities engage in community activities as a part of their outreach programmes. The question is to what extent these programmes are sustainable as they are dependent on external funding.

The paper concludes that it is critical to gain more knowledge about the design and implementation of support mechanisms for entrepreneurship on a national level. In this process, universities should take a leading role. Through the involvement of various stakeholders universities have the potential to ensure sustainable approaches that encourage more entrepreneurial activities in South Africa.

6.4 OPERATIONALISING THE CAPABILITY APPROACH FOR ENTREPRENEURIAL EDUCATION: A COMPARATIVE LOOK AT THREE HIGHER EDUCATION INSTITUTIONS
Presenter/s: Mr Leon Grobbelaar and Mr Casper Wessels
Chair: Mr J Hautanen
Rapporteur: Dr B Johnson

- 6.4.1** This presentation allowed the audience to see that the capabilities of individuals can be enhanced through Entrepreneurial Education, focusing on the teaching of real skills and competencies. Skills and competencies have to be operationalized and effectively implemented and realized in a systemic and realistic manner, and should bring about measurable changes in mindset and behaviour.

7. PARALLEL SESSION 3: PAPERS PRESENTED

7.1 THE INFLUENCE OF ENTREPRENEURIAL RELATED PROGRAMMES ON STUDENTS' INTENTIONS TO VENTURE INTO NEW BUSINESS CREATION

Presenter/s: Ms Onica Matseke, Dr M Dhurup and Dr P Joubert

Chair: Dr C Nhlapo

Rapporteur: Ms Kogie Moodley

- 7.1.1** This study is located within a quantitative descriptive research paradigm, which permits the testing of relationships among the various constructs through a structured questionnaire. The sample was drawn from final year students from the Faculty of Management studying various business-related programmes with compulsory modules on entrepreneurship. Variables that were included in the study focused on the entrepreneurial content of the curriculum, attitude towards entrepreneurship, general self-efficacy and intentions towards entrepreneurship. Data was analysed from 263 students using correlations and regression analysis.

The major challenge in entrepreneurship programmes is the appropriateness of the content of the curriculum in developing student's attitude towards entrepreneurship. Students who have not been exposed to the content of the curriculum that allowed the commercial use of entrepreneurial knowledge, showed weaker attitudes towards entrepreneurship. The entrepreneurial content of the curriculum should be enhanced with improved teaching delivery modes that enable students to gain hands-on experience by seeing, touching and 'feeling' the business world. Curriculum content should be developed to include learning outcomes for entrepreneurship rather than about entrepreneurship. Curriculum content developed for entrepreneurship deals with real entrepreneurial activity and produces students who have a positive attitude towards entrepreneurship.

In order to enhance the status of entrepreneurship, curriculum developers should include various aspects of entrepreneurship from first year to third year. In order for entrepreneurship to be given 'life', provision should be made to support incubation start-ups at university level with practical training. The feasibility of offering a practical, hands-on entrepreneurship programme should be explored.

The results showed that the entrepreneurial content of the programme did not correlate with students' attitudes to new business creation. Students' attitude towards entrepreneurship were also not a clear predictor of their eventual intention to become entrepreneurs. Students' entrepreneurial self-efficacy does not seem to influence their attitude towards entrepreneurship. A lack of inter-disciplinary and inter-departmental engagement was noted and it was agreed that collaboration was important and should be stimulated as an ongoing initiative.

7.2 EDUCATING ENTREPRENEURIAL MINDSETS: CURRICULUM ENABLES AND CONSTRAINTS OF UNDERGRADUATE CURRICULA AT A UNIVERSITY OF TECHNOLOGY **Ms Marianne Bester, CPUT**

- 7.2.1** I have been working on the alignment of our qualifications at CPUT to the HEQSF over the past five years. For the purpose of this paper, I focused on entrepreneurship and how this aspect is either enabled or constrained in our programmes.

There has been pressure for change from outside higher education for several years. Five broad trends have been identified that affect higher education, namely:

- a. Democratisation of knowledge and access;

- b. Contestability of markets and funding, with greater competition for access from students;
- c. Digital technologies changed the way that education is delivered and accessed;
- d. Global mobility;
- e. Integration with industry, which is particularly relevant for UoTs as drivers of innovation and growth.

In this super complex age, higher education has to respond to economic needs by stimulating employment and national and economic growth. Entrepreneurship education should be strengthened to develop entrepreneurial capabilities and mind-sets through experimental, collaborative and reflexive learning.

In this context, an 'entrepreneurial' pedagogic approach to curriculum design aimed at achieving some of the following objectives were identified:

Raising students' awareness of self-employment and entrepreneurship as possible career options;

Providing specific business skills and knowledge of how to start an enterprise and run it successfully;

Working on concrete enterprise projects and activities;

Developing personal attributes and skills that form the basis of an entrepreneurial mind-set (e.g. creativity, risk-taking, autonomy, self-confidence, leadership, team-spirit, etc.)

Six strategic imperatives were identified to instil entrepreneurial mind-sets through engagement in multi-disciplinary problem-solving learning experiences, WIL and applied research, which also implies that entrepreneurship education forms an integral part of entrepreneurial education.

Recent graduate destination surveys identified that the majority of students expressed satisfaction with the education they received, but a high percentage (36% in 2015) were not employed, and studied further. Only 4.2% (2014) and 3.1% (2015) of graduates were self-employed. It was therefore deemed necessary to identify enablers and constraints in conceptualising and operationalizing entrepreneurship education at the institution.

The argument is that despite the presence of entrepreneurship in the curriculum, the traditional model is in fact the inherent potential of entrepreneurship component. This component is not an enabling mechanism that enhances innovative thinking. The research questions looked at the definitions and concepts associated with entrepreneurship, how these are operationalised, and what the enablers and constraints are.

Four HEQSF-aligned Diplomas were identified in Business, Science, Technology and Design, and their curriculum data were analysed based on aspects of the conceptual model and findings were benchmarked against criteria for developing an entrepreneurial mind-set.

Entrepreneurship relies on a number of meta-concepts for dynamic interaction, namely knowledge building and creation, innovation, technology transfer, and entrepreneurship. There are also two models of entrepreneurship education, namely the traditional model (used in business schools worldwide) which compartmentalises business and management knowledge focusing on marketing, finance, operations, and human resources among others. Curriculum and pedagogy are based on the corporate model, and there is limited stakeholder involvement.

Gibbs proposes an alternative model that allows for the complexities, uncertainties and messiness of entrepreneurial activity, based on the notion of balancing cognitive, conative and affective aspects of learning and maximises opportunities for experiential learning.

The definition of entrepreneurial education that would develop more successful entrepreneurial graduates should allow them the chance to experiment, discover new ways of thinking, and meet successful entrepreneurs. Often entrepreneurship education and enterprise education are confused, with the latter focusing on the elements that we want to grow and instil in students.

Education for enterprise prepares aspiring entrepreneurs for a career in self-employment, imparting the practical skills of setting up and running a small business, and preparing a business plan. This is probably what should be taught at the undergraduate level.

Institutions have not really considered how effective their programmes are. Traditional considerations considered the rationale and purpose of the programme, programme and curriculum design, the teaching and learning methods and assessment practices, and the profiles of students at which the programme is aimed. All programmes were occupationally oriented, and they are inter- and multi-disciplinary in nature. They integrated theory and practice, and are aligned to the needs of local industry and often involved stakeholders from a broad spectrum. They often had access to Technology Stations or Research Centres.

The purpose of the programmes was generally to impart the skills to work in the fields of design, production, retail and quality assurance, and while the academic departments claimed that students would be exposed to business and management knowledge, this was not always the case. There was limited evidence that entrepreneurship and other innovative practices were part of the programme. Entrepreneurship was often just an add-on to the programme. In terms of teaching and learning, there was a reliance on textbooks and teaching methods were limited. Assessment was also limited in its effectiveness.

Overall, the programmes that were assessed ranged from poor to good, and most were found to be average. Most were rated good in terms of the process of setting up a business – indicating that students understood the theory of setting up a business, but implementation was not adequately imparted in the programme.

Enablers:

- a. Adopt a broader definition of entrepreneurship – alternative model;
- b. Integral part of the curriculum;
- c. Use a 'learning by doing' approach;
- d. Collective, strategic effort by the institution;
- e. Enhance academic credibility of entrepreneurship as a field of study;
- f. Recognition of entrepreneurial achievements of academic staff;
- g. Change teaching and assessment practices to accommodate the tacit and procedural knowledge of a real entrepreneur;
- h. Enhance interaction with existing structures at the institutions, such as technology stations;
- i. Evaluate the effectiveness of current entrepreneurship components in the curriculum and use self-assessment instruments to enhance effectiveness.

Entrepreneurship education should not be an isolated component, but should be a more dynamic enabling mechanism. Pedagogic practice should be transformed to engage with innovation, technology transfer and entrepreneurship to develop an innovative and entrepreneurial mindset. Assessment should improve, and more research is needed.

7.2.2 DISCUSSION

Question/Comment: Perhaps you could consider community engagement in your recommendations. Are you talking about SMMEs separate from the community at large?

Bester: I see community engagement as an integral part of the process – I do not view community engagement and entrepreneurship as separate. The engagement in our programme would be with members of the community, and the small businesses that we establish would serve people in the community who would sometimes come up with a need that we could address, which again circles out into the community where the individuals in the community would benefit from those projects.

Question/Comment: You appeared to separate innovation and entrepreneurship in the model. Were the people who presented the entrepreneurial module from within the department, or from the Management faculty or industry?

Bester: Often entrepreneurship and innovation were viewed as separate issues in the curricula that we interrogated. The argument that I present is that this division is artificial, and that the innovative thinking and technology transfer and the business skills should be integrated in one project. The people who tended to teach the entrepreneurship module came from a variety of backgrounds, and in many cases this was a part-time staff member who came only to assess that module. These are generally people that the Head of Department would think is suitably qualified to offer the course.

7.3 RESEARCH, INNOVATION AND ENTREPRENEURSHIP: AN INTERSECTING PERSPECTIVE

Presenter/s: Prof. Laetus Lategan and members of the SATN Committee on Research, innovation and Technology Transfer

Chair: Dr P Gibcus

Rapporteur: Ms Å Olsson

7.3.1 What is the role of the university in addressing contemporary challenges in South Africa? From a political perspective, employability and research that is relevant to the real world have been promoted as the guiding principles for university policy and strategy over the past two decades. The dominant approach to achieve these policy objectives have been through the promotion of collaboration between the state, universities and industry, the so called Triple Helix Model. More recently the push to nurture a new generation of entrepreneurs has gained attention, but this agenda is often separated from the research agenda and now has a life of its own.

Scholars and policymakers have over the past three decades stressed the importance of universities to transform, to become more entrepreneurial and smarter in what they are doing. Attention has focused particularly on curriculum renewal to reflect the needs of society; commercialisation of research; and establishment of new careers and opportunities outside the formal corporate environment.

These policy focuses have led to some disappointments in the South African context. Three of the biggest challenges include that universities seem to educate for unemployment, the costs associated with the commercialisation of academic research which consistently outstrips revenue, and new career pathways are not established at the speed needed to sustain social and economic development.

Despite these challenges, South Africa has some opportunities to position itself as a key contributor in the global research landscape. Enabling factors include that the research priorities in South Africa is closely aligned to global research priorities. That provides opportunities to identify niche areas of excellent research that are relevant to a broader scholarship outside

South Africa's borders. The question is how South Africa can position itself in an increasingly competitive global landscape?

The paper aims to provide a few pointers: Firstly it would be important to promote scholarship that includes original research that advances knowledge relevant to the South African context.

Furthermore, it is critical to apply and then integrate new knowledge across disciplines and topics within a discipline. As a next step the knowledge should be applied through a rigorous evaluation process by peers and disciplinary experts inside and outside universities. Finally a systemic approach to teaching and learning should be applied that would allow public sharing and the opportunity for application and evaluation.

It is suggested that this approach would promote an entrepreneurial mind-set and orientation of research and education, and that Universities of Technology, by adopting these approaches, would be able to embed entrepreneurship in the epistemology of science, technology and mathematics.

7.4 AN EXPLORATORY STUDY OF ENTREPRENEURSHIP IN PROGRAMMES CURRICULUM: CASE STUDY OF SELECTED HIGHER EDUCATION INSTITUTIONS IN SOUTH AFRICA
Presenter/s: Mr Olutoye Oluwatimilehin Ayodeji and Ms Titilola Olusola Okusolubo
Chair: Mr J Hautanen
Rapporteur: Dr B Johnson

7.4.1 This exploratory study was largely based on a literature review and shared data from two universities in South Africa, looking at the incorporation of entrepreneurship in curricula. Early indications are that some programmes incorporating entrepreneurial aspects are offered, but that there is scope to enhance these programmes further.

The presentation also focused on the contribution entrepreneurship can make to the social and economic development needs of South Africa and the broader continent. The point that entrepreneurship needs to become part of people's socialization from very early on was emphasised. Entrepreneurship should be embedded in the home, and should become part of an African mindset. The approach should be to start small and think big.

8. PARALLEL SESSION 4: PAPERS PRESENTED

8.1 A CHALLENGE-BASED APPROACH TO PROMOTE ENTREPRENEURSHIP AMONG YOUTH IN AN INFORMAL SETTLEMENT OF WINDHOEK
Mr Daniel Cabrero, Polytechnic of Namibia
Chair: Dr C Nhlapo
Rapporteur: Ms K Moodley

8.1.1 As part of a two-year funded community outreach research and development project, the authors investigated participatory approaches to engage marginalized youth into conceptualizing their own entrepreneurial activities, imparting skills and deriving new career paths. In this paper, the authors report and reflect on the interventions concluded with a group of youth in Havana, an informal settlement on the outskirts of Windhoek.

Considering the high unemployment rate among Namibian youth and a lack of job opportunities, the promotion of entrepreneurship has gained wider attention.

The reasons for high unemployment rates and lack of job opportunities are:

- a. Unequal wealth distribution;

- b. Postcolonial legacy and limited use of land;
- c. Rural-urban migration leading to skewed ratios of job opportunities versus job seekers.

A number of initiatives such as entrepreneurship training, workshops and business idea competitions were initiated to encourage young people to think of alternative income sources. The authors initiated the “The Havana Entrepreneur”, a series of interactions based on the model of the American reality game show “The Apprentice”. Over a number of weeks, two youth groups were given certain challenges and competed against each other. The challenges included:

- a. Developing a business plan for their community center;
- b. Selling second-hand clothes in the vicinity;
- c. Manufacturing products out of recycled material;
- d. Taking tourists on a tour through Havana.

After completion of each challenge, the groups were rated by a number of judges on skills such as marketing, presentation, reflection, creativity, etc.

The authors observed an increase in skills as well as a deepening of knowledge after each challenge. The youths who participated in this project are currently engaged in additional activities beyond the initial entrepreneurial interactions.

8.2 GUIDELINES FOR THE INTEGRATION OF ENTREPRENEURIAL SKILLS IN AN EXIT-LEVEL INFORMATION TECHNOLOGY MODULE

Dr Bertram Haskins and Mr Leon Grobbelaar, NMMU and CUT

8.2.1 The paper was not delivered.

8.3 CONCEPTUALISATION OF ENTREPRENEURSHIP EDUCATION THROUGH PROBLEM-BASED LEARNING AT UNIVERSITIES OF TECHNOLOGY

Ms Elvina Smith, CUT

Chair: Dr J Snijders

Rapporteur: Ms Å Olsson

8.3.1 One of the key challenges in South Africa is to integrate the black working class into the labour market. Currently large groups of students who finish high school and continue to tertiary education institutions are not employable due to poor literacy and numerical skills.

To address these issues, this paper suggests that Universities of Technology should establish a platform for entrepreneurship in the curriculum, using problem-based learning (PBL) as the choice of instructional methodology. The advantage of this approach is that PBL is student-centred and should enable students to learn things that are relevant to them through identification of a problem they would like to solve. Typical problem scenarios in PBL follow the case-study model, where a narrative of complex, real-world challenges related to the discipline is studied. The solution is therefore partly dependent on the acquisition and comprehension of facts, but also based on the ability to think critically. It is suggested that PBL in entrepreneurship education will bring about a better understanding of the importance of innovation for social and economic development. The students will improve their ability to recognise opportunities and will improve their managerial skills, which will enable them to take initiative and start their own businesses.

The paper argues that National Programmes should be aligned with UoT policies to facilitate PBL and entrepreneurship education. Critical elements include collaboration between the UoTs and

the private sector. Entrepreneurship education should be embedded in education and training, which could be achieved through curriculum development and the ongoing professional development of lecturers.

An expected result of this approach is that the integration of PBL in entrepreneurship education paves the way towards building a new generation of talented entrepreneurs that contribute to a healthy economy in South Africa.

- 8.4 THE THREE MUSKETEERS: ENTREPRENEURSHIP, E-LEARNING AND MOOCs**
Prof. Louis Fourie and Mr Sakkie Smit, members of the SATN Teaching, Learning and Technology Committee
Chair: Mr J Hautanen
Rapporteur: Dr B Johnson

- 8.4.1** The presentation focused on the on-line Entrepreneurship Module offered at CPUT. The presentation detailed the module delivery, nature and the module content. The module is offered through Blackboard and is self-paced.

CPUT is keen to offer this module to the entire UOT sector as part of rolling out Entrepreneurial Education among UoTs. This was received extremely positively and was discussed as a means not only to arrest declining student enrolment patterns but also to increase future enrolments in the niche area of Entrepreneurial Education.

CLOSURE



SOUTH AFRICAN TECHNOLOGY NETWORK

8TH ANNUAL INTERNATIONAL CONFERENCE ENTREPRENEURSHIP EDUCATION FOR ECONOMIC RENEWAL HOSTED BY THE VAAL UNIVERSITY OF TECHNOLOGY

DAY 3 – 21 OCTOBER 2015

Plenary Session

Chairperson: Prof. Chris Landsberg, University of Johannesburg

- 1. KEYNOTE ADDRESS: A NEW DIRECTION IN SOUTH AFRICAN HIGHER EDUCATION: PROMOTING INNOVATION AND ENTREPRENEURSHIP**
Prof. Deresh Ramjugernauth, Pro Vice-Chancellor: Innovation, Commercialisation and Entrepreneurship, University of KwaZulu-Natal

- 1.1** Innovation and entrepreneurship is important for a developing country. Higher education institutions have lost their perspective over the years about what it means to be a university and building a nation, being too focused on subsidies, rankings and research performance.

We are in a continuous state of change. The rate of evolution appears to be changing rapidly, if one considers that our smart phones today has more computational power than NASA had to put a man on the moon. Technology, particularly as a facilitator and enabler of communication, has progressed from cave painting to immediate communication able to reach millions, such as Twitter. UoTs are the drivers of innovation and the technology evolution. As such, UoTs must evolve in terms of how knowledge is transferred.

Some of the oldest universities in the world are about 900 years old, established to provide education for privileged intellectuals. 'A university exists for the purpose of laying open to each succeeding generation... the accumulated treasures of the thoughts of mankind... universities are not intended to teach the knowledge required to fit men for some specific mode of gaining their livelihood' (John Stuart Mill, Rector of University of St Andrews, 1865).

The concept of a modern university, about 100 to 120 years old, is the training of skilled individuals for the workforce. Then came the concept of research-led universities, going back about 20 to 30 years. Universities continue to produce graduates, but there is a concern that UoTs are training students to be good employees, and not employers. There has to be a shift to innovative and entrepreneurial universities that produce relevant, applicable research and technology.

South African universities should also take note of the innovation lifecycle, and what is required to remain relevant. The three strands of the effective triple helix structure, which are closely linked and interwoven, involve academia, industry and government. Universities of technology have to understand that they need to work closely with business and government to address socio-economic challenges affecting the country.

It is a known fact that a large proportion of young people between the ages of 18 to 25 is unemployed. This is a crisis because we invest heavily in higher education as a country, but the output is not employable. Universities should actually train and educate people to create employment, and not merely to be employees. Universities therefore have to change the way they see themselves and go about their work.

Looking at the national context, we have the NDP, the National Development Research Strategy 2002, and the Ten Year Innovation Plan 2007, all of which emphasise the need to do research and focus on innovation in science and technology to transform the country economically.

The question is whether our South African universities are directly addressing the socio-economic challenges facing the country. These are problems like unemployment, poverty, low economic growth, and massive inequality, problems which we are not currently addressing effectively. Instead we produce graduates through our focus on teaching and learning, we do some research, and we do some community outreach, but we are not really focused on innovation and entrepreneurship.

Six elements should be addressed by entrepreneurial universities:

- a. Leadership and governance: Universities in South Africa should locate innovation and entrepreneurship in an executive portfolio to coordinate and integrate entrepreneurship across all levels of the institution, right down to faculties, schools and units.
- b. Organisational and human capacity and incentives: sustainable funding and resources for entrepreneurship must be provided to break down silos and build interdisciplinary, multidisciplinary, and transdisciplinary engagement. It would be necessary to recruit and engage with entrepreneurs, and accord external partners the necessary status and recognition. There should be a focus on staff development. Incentives and rewards should be provided for entrepreneurial behaviour among staff and students.
- c. Development of entrepreneurship in teaching and learning: An entrepreneurial mind-set and skills, as well as an innovative approach to teaching and learning must be supported by the institution. Universities should validate entrepreneurial outcomes, and teaching staff must be encouraged to collaborate and engage with external stakeholders. Research results must be integrated into entrepreneurship training.
- d. Culture of entrepreneurship: Individuals must be actively encouraged to become entrepreneurs. Universities must provide opportunities and space to be entrepreneurial, and there must be support to move from ideas to action/implementation. This means facilitating access to finance, and providing business incubation facilities. Every one of the UoTs in the country should have a science and technology park to bridge the gap between research and economic development.
- e. Stakeholder relationships and strategic partnerships: strong and seamless linkages with supporting innovation and entrepreneurship must be established, and staff and student mobility must be stimulated throughout the entire knowledge ecosystem.
- f. Internationalisation: internationalisation is a key aspect of entrepreneurship. Staff and students should be allowed to be internationally mobile and participate in international networks to fast track innovation and entrepreneurship.

Proposed initiatives:

- a. Considering the issues that higher education faces in South Africa, it is important to consider how we could generate additional funding for students. Universities could rethink their tender processes and procurement policies to prioritise suppliers that might employ students on a part-time basis, to achieve student economic empowerment. If student economic empowerment is done right, the country could leverage considerable resources to support students and address the challenges the country is facing at this time.
- b. Student co-operative arrangements and social entrepreneurship might be considered to allow students to grow vegetables to supplement their nutrition, for example. Creative solutions could enhance innovation and entrepreneurship.
- c. HEIs need to evolve from simply focusing on teaching and learning, research and community engagement to drive innovation and entrepreneurship. To achieve this, they need to work with all stakeholders in the innovation and entrepreneurship ecosystem.

1.2

DISCUSSANTS:

Dr Prins Nevhutalu, Vice-Chancellor, CPUT

Adv. Pria Hassan, Executive Director, Women of Africa Fuels and Oils

Dr Jacqueline Snijders

1.2.1

Dr Nevhutalu:

The emphasis on the key role of universities as drivers of innovation and entrepreneurship is particularly relevant. Universities alone cannot be centres of innovation, they need partners – there was a time when universities were the dominant knowledge hubs, but this understanding has changed and there is acknowledgement that other sources of innovation and technology development exist. The key role of universities could be to facilitate and fast track the development of innovations.

If universities have to become centres of innovation, they need to consider mechanisms beyond teaching and learning and research. However, you need good research and technology developers to focus on innovation. Our reward modalities should include all these aspects, to uplift entrepreneurial and research capacity.

The triple-helix which involved universities, government and business was mentioned in this presentation, but we heard earlier in the conference that society is as important a resource for technological innovations. We have to constantly remind ourselves that knowledge may emerge from other sources.

The presentation also highlighted the attributes of an entrepreneurial university – entrepreneurship must be embedded in leadership and governance, human capacity and its organisation, the curriculum and the culture of the institution. It was also argued that perhaps universities should be more directly involved in the solving of poverty and unemployment, focusing on solutions for low economic growth and inequality. Many examples given are typical of UoTs.

The need to locate the responsibility for an entrepreneurial approach at a suitably high level within the university, and that it should be driven with a multi-disciplinary focus, was emphasised. Practical solutions, such as using the procurement system of the university and the concept of social entrepreneurship, were highlighted. Some of these are already being implemented in some institutions, and might be fruitfully expanded to other UoTs, but bigger and more courageous steps would need to be taken.

1.2.2 **Adv. Hassan:**

I started with a legal degree, and it was my choice to shift out of my comfort zone and set out on my own. It takes courage, and it needs a commitment to get up and start earning an income. Everything that we heard now is great, but from a practical point of view, it is necessary to be willing to fail.

You have to try, and you will fail numerous times before you might succeed. With that risk comes huge reward. We have developed a number of women entrepreneurs in Women in Energy in South Africa, and although we moved from a position of disadvantage, we continue to fight those perceptions every day.

It is important as an entrepreneur to get to know your bank, and you need a strong business case to convince them that you have a workable plan. It needs to be something that you understand and you are willing to act upon.

Entrepreneurs live a few years of their life like most people cannot. You wake up every day and you have to make sacrifices, which means you have to actually do some work that may require you to sweat. Apart from education and a strong network, entrepreneurs need to ensure that they focus on strong spiritual and physical health.

Once you make it, share it, or the universe will make you lose it.

1.2.3 **Dr Snijders:**

We have the same problems in Europe. The presentation was insightful, and I think you can be proud of your achievements. There are some universities in Europe that have focused on entrepreneurship, but not all of them have made the same level of progress.

It is a good idea that all levels of the university should be encouraged to be entrepreneurial. It is also particularly important to focus on internationalisation and setting up international networks, and you are encouraged as a country to make contact with the JADE network in Europe. It is true that it would help to start with small, simple projects that can be scaled up.

Another issue that must be considered is how entrepreneurship can be stimulated at primary and secondary school level. Research has shown that students who underwent entrepreneurial education retained that knowledge as they grew older.

It is interesting that you say that you are doing it all – my question is whether you have a good plan, and whether you are monitoring your objectives and learning from your mistakes? It might be true that you are doing it all but you should also reflect on your current practices to improve.

1.3 **DISCUSSION:**

VUT: Knowledge creation permeated the discussions throughout the conference. When we talk about collaborations, we seem to be forgetting that knowledge is a perishable commodity that needs to constantly adapt and refresh. We need to make a policy recommendation for a smart interface between traditional universities and UoTs – it is painful with every graduation to see students graduating at 19 with a degree in Philosophy, who have to wait years to be employed.

Could there not be a mechanism to provide our graduate alternative career paths? I think we should interface with traditional universities to redirect students who cannot find employment or create a career for themselves.

VUT: I think that we must acknowledge that creativity is an essential component of entrepreneurship. There is a lot of creativity in the community that we overlook. There are various elements of creativity that could create intellectual property. It is easy for African countries to overlook their own counterparts in African universities, tending to focus on Europe or the US. There are many initiatives and lessons from African universities that could be expanded to the local context. The missions of universities should shift from creating employable graduates to creating entrepreneurial graduates – universities should do some introspection and should not continue to churn out people for the world of work.

Question/Comment: It is important to consider that internationalisation would also require localisation of those ideas that we want to incorporate. Children should be taught values such as entrepreneurship and integrity in a playful manner and they will take these ideas along with them into adulthood.

India: There are other actors, such as business, civil society, R&D developers and policy developers that should be involved in addressing the socio-economic structure of South Africa and the issues of poverty and unemployment. There is room for innovation and entrepreneurship outside the university structure as well, which does not mean that there should not be collaboration. The industrial and manufacturing sector is where one should start to create the demand for the students produced by universities. Research in universities is crucial to stimulating innovation – take the example of hardware, software and bio-medical research as produced by India, China and Singapore. The trans-disciplinary nature of innovation and entrepreneurship is important to keep in mind, but one should also guard against internal brain-drain.

Snijders: The point about keeping in mind that the creative industries are responsible for innovation is very relevant. Africa is definitely an important gateway to the rest of the world, and there is a great amount of money to be generated there. Partnerships are important, and I think we need a better platform for engagement between universities and business – the structure that has been set up recently will play a valuable role to grow the engagement between us.

Nevhuthalu: The importance of industry has been highlighted in the Higher Education Summit recently, and it was as strongly emphasised here. What is missing is that industry was not part of the discussion. We must bring successful innovators into the discussion. The second issue relates to our partnerships with the rest of Africa. It is correct that many of our internationalisation partnerships are actually dictated by our partners in Europe. We need to explore and start to appreciate what we can learn and share with the rest of Africa.

Governments past and present must realise that they need to support rural universities, such as University of Fort Hare, by investing in infrastructure there. At this point, Alice, where the university is located, is dying. The role of the university in a proper ecosystem must be debated. Ramjugernauth: Universities must constantly evolve, but also have to maintain their focus on teaching and learning and research. I am not advocating doing away with these elements despite growing capacity in innovation and entrepreneurship.

One should understand that universities would have to work closely with the various important stakeholders, even though this might not have been highlighted in particular. Universities should also not be expected to do things on their own – they have to work with government, industry and the community. It appears sometimes as if university management and leadership think they have the answers to everything, and this mind-set has to change. People should understand their strengths and weaknesses and that they should work with different stakeholder groupings

to bring about positive change. We have the personnel and the intellect, and we should stick to what we do best.

People also tend to think, mistakenly, that we exclude the Humanities and the Social Sciences when we talk about innovation and entrepreneurship. That is where the greatest sources of social entrepreneurship have emerged, and where the greatest opportunities for spin-offs are located. Another point is that we need to break the silo mentality – as long as we work only in our own disciplines and ignore the opportunities that may be found in other disciplines, we will not generate the large scale innovations that we need.

Lastly, creativity is an important driver for entrepreneurship and innovation, and it is true that it comes out of various different environments.

1. REPORT BACK FROM STUDENT REPRESENTATIVES ON THEIR WORKSHOP

- 1.1** Ms Moonsamy reported on the Entrepreneurship Innovation Workshop that involved students, industry experts and mentors. TIA helped to facilitate the workshop, which involved 10 teams of 5 students each who were requested to develop a pitch for a project. Three winning projects were identified, but the two second positions tied, each winning a prize of R 5 000.

The winning entry immediately captured the attention of the judging panel, and addresses a particular need in the market. The winning idea was named Eco-Wrap. Eco-Wrap is made of chitosan, which is derived from shrimp shells, and is an edible, bio-degradable component. In South Africa, there are 60 possible suppliers of shrimp shells. Argentina produces a similar product using maize. Food packaging businesses could be approached for exclusive distribution, which could be expanded to international partners. A proposal will be developed, and business concepts will be fine-tuned. The winning project was asked to consider the medical and environmental impacts of their project.

Mr Mkhize, one of the MUT students present at the conference, highlighted that the conference was an important learning opportunity for all students. They learnt that it is important for students to equip themselves to be future employers, and not merely employees. The sponsors and facilitators of the conference were thanked for making it possible to attend the conference. The presenters and mentors that have shared their knowledge selflessly throughout the three days were also thanked in particular.

TIA was congratulated for rolling out similar projects at all UoTs.

2. POLICY IMPLICATIONS FOR ENTREPRENEURSHIP EDUCATION **Prof. Ahmed Bawa, Vice-Chancellor of DUT**

- 2.1** Around 1991 one of Africa's great political scientists and economists, Claude Ake, visited the University of Durban Westville to get an understanding of South Africa. He came for three weeks, and for two and a half weeks drove around the province and talked to people. He was accompanied by a team of three post-graduate students to facilitate his interactions and translate when necessary. This was followed by two lectures. During one of these lectures, he indicated that he had seen greater poverty in other parts of the world, but what distinguished South Africa was that there was no local economy in the many villages that he drove through. This was a consequence of the migrant labour system in South Africa which resulted in people depending on remittances from relatives in the city. In other countries on the continent, the extent of entrepreneurship is astounding. When one drives from the airport into the nearest city in many

African countries, you see people engaging in entrepreneurial activity. While innovation and research and high-level knowledge production is critical, entrepreneurship does not happen only in universities, but in communities to create higher levels of self-sustainability. One of the challenges that UoTs face is how they should interact in this space.

A couple of weeks ago Thomas Piketty was in South Africa and presented a number of ideas, some of which met with criticism. It is important to note that wealth is located in certain sections of society and tends to circulate there, never spreading to the other strata of society. There has been enormous growth in social grants in South Africa, which is not sustainable. There has also been growth in the public service, which is also not sustainable. This is why entrepreneurship at the broadest possible level is required.

The first level at which policy must be addressed is at the level of government. The fact that there are all sorts of departments such as the DTI, DST and Department of Small Business Development indicates a recognition that the future of the economy does depend on the SMME sector. This does not mean that larger businesses are not important, but greater mechanisation and numerous other changes will result in job losses. In New York at the moment, a two-year project is underway to license cars without drivers, for example. The emphasis therefore has to be on micro and small enterprises.

The challenge with this shift in focus is not about money, but about new ways of engaging people and social culture, and the psychology of people understanding that their fate is in their own hands. Getting people who have never been entrepreneurial to make the shift is a major challenge.

The big question is what kind of policy would help to bring about these changes. A short while ago there was a shift in the licensing arrangements for small enterprises, which on the surface looks promising, but would need to be evaluated to ascertain that they are facilitative and not debilitating. The rollout of renewable energy projects presently relies on massive investment, which means that communities are not yet able to think about how they could participate since there is no framework in place.

Shifting to the role of the Science Councils, TIA and the NRF, a lot of good work is being done to reach out and create new initiatives. It is however necessary to scale the small, initial projects up to communities to sustain themselves. It is necessary to identify best practices, imperfect as they may be, and scale them up to establish an entrepreneurial framework. The CSIR and HSRC should also be involved in this endeavour.

The power of small grants must not be overlooked, because their scale and the scope for corruption is different. The moment projects become too big and complex, a range of negative aspects come into being.

The DHET, NRF and DST have consistently emphasised and supported the production of research and PhDs. While these goals are laudable, what we have learnt in the past 20 years is that the production of research and PhDs does not necessarily automatically translate to the production of entrepreneurs. While these inputs are vital, they are not sufficient, and there is a chasm between the spaces where entrepreneurship should be taking place and universities. The universities and the DHET should all take note of this chasm; what is necessary to stimulate innovation and entrepreneurship, and how these developments can be taken to scale. To some extent innovation is covered by the patent system, but innovation is not only about patents and

fantastic new products; it is also about little companies that can provide useful and necessary services in the community.

Turning to universities, each university has its own dimensions, policy environment and context, but there are some generic suggestions that could benefit the sector as a whole. At DUT every curriculum contains a general education component, including Engineering. General education exposes students to ideas on applied philosophy and ethics, for example. Often the employers of graduates will complain about issues like communication skills, writing skills, work ethic, etc. – and these issues must be addressed. It might also be important to focus on literature; of a group of 7 000 students asked whether they had read Zakes Mda in 2011, very few answered in the affirmative.

It is also necessary when teaching people about entrepreneurship to tell them about the world's best entrepreneurs, but – more importantly - also make them understand that entrepreneurship is about failure. There has to be a better connection between universities and the context in which they operate: the community, NGOs, municipalities, other partners. The only way to shape a community is by engaging with the community's specific needs. Ideas about entrepreneurship must emanate from partnerships between the university and communities. To ensure that there is integration between different disciplines, it would be necessary to establish a coordinating structure. This kind of engagement opens up other avenues, such as joint appointments, joint teaching, and mentorship for students.

Students must be given opportunities in the university to engage in entrepreneurial activity. The idea is to get students, academics and external partners to work on an actual, real problem, which could count towards their qualification. UoTs must also be more astute in identifying the most suitable places of employment when they negotiate WIL placements.

The terrain known as the second curriculum must similarly emphasise the importance of entrepreneurialism, through which an income can be generated. The university must be engaged in this terrain not only through formal education, but all aspects of their engagement with students. All students have ideas, and must be supported to develop these ideas. Universities should have IP Offices in place to play a supportive role without being overly prescriptive.

If universities appoint staff, they should look out for people with an entrepreneurial mind-set. This does not apply only to SET, but also to the Humanities and Social Sciences. Lastly, there is the issue around community engagement. Every single university in the US has engagement built into their DNA – the notion that universities should focus only on high-level knowledge production is a fallacy. Universities must understand that they should open themselves up and become permeable to all kinds of influences, being social institutions. They have to relate to the contexts in which they are located. This is the reason why they receive public funding from the state. If they fail to address unemployment, poverty and inequality, they fail in their reason for being.

DISCUSSION

Question/Comment: The notion of a general education is a good idea, and should be welcomed by all institutions. Yesterday we heard that if we provide entrepreneurship education and stimulated awareness of entrepreneurship, that knowledge would hopefully lead to people operating in an entrepreneurial manner. Similarly it would be important to provide general education.

Question/Comment: Universities should encourage academics to do case studies on entrepreneurs in their own communities, and not only on high flying players who operate on the JSE.

Question/Comment: When we talk about Stanford and MIT, we must remember that they have very different mentalities. To aspire to be like these universities we could lose our own identity – it is crucial that we retain our individual differences.

Prof. Bawa: It is critical that we expose students to as broad an education as possible. Our schooling system is failing our students, so the need to focus on general education is crucial to provide them with a rounding off for academic engagement.

Partnership with business schools is probably a good idea, but the problem is that most of them tend to favour engagement with big business. It is true that one needs a different kind of mentality and a willingness to live on the edge to be an entrepreneur.

In response to the last comment – I did not for one second propose that we must become MIT or Stanford. We have 26 universities, but I am not sure how many of those are truly South African universities. I think we should engage with our communities to shape our identities.

3. ENTREPRENEURIAL SUCCESSES

3.1 CELING IN A CAN

Mr Dave Pons, Mangosuthu University of Technology

The Mangosuthu University of Technology is surrounded by a community that live in shacks, and we view them as an asset. We are looking at converting real problems into real opportunities. One has to find the ‘pain point’, the areas that need to be improved. Once one has found the problem you can start developing a solution, which need not necessarily always be technical in nature.

The question should always be who your invention will help. It is true that people now live in different environments from what they grew up with, a consequence of urbanisation. To address the need for water provision, solar energy and some protection from the elements, an invention called Solar Veranda was developed. This product still has to be developed further.

A new technology polymer was developed, called Ceiling in a Can. It comes in two tins that are mixed, poured on site, allowed to dry in 20 minutes and screwed in place. It can be painted, and will insulate and waterproof a home. This is a highly scalable product; is a by-product of the petroleum industry, and costs R 14 a square meter, making it much cheaper than other competitors. It will also be possible to train people to install these ceilings, which will create jobs. The MUT has a patent on this project, which will have a remarkable social impact. There are no health risks, and it can create employment for somebody who can access a screwdriver.

A business plan was developed, and any money that was brought in was ploughed back into the project. The project has been promoted through social media, which continues to be a great way to reach the market. Media is extremely important, because feedback is absolutely essential. The product won several awards and gained considerable international recognition.

4. CLOSING REMARKS

Prof. Mashupye Kgaphola, Chairperson of the SATN and Vice-Chancellor of Mangosuthu University of Technology

SATN broke new ground with this conference. Students and academics participated in the conference, and the student delegates were reminded that they were here because they have to be the pioneers in their respective communities and campuses – they have to grow and share the knowledge that they gained at this conference, and they have to embrace the spirit of giving back.

The conference was the first step in a journey of a thousand miles, which must be undertaken with purpose, speed and dedication. We do not have the time to wait for deliverance from other sources; as the African continent, we need great institutions that will take the lead and create legacies that will outlive us. All attendees were thanked for taking the time to attend the conference, to share thoughts, and to learn together. The need for the SATN to link up with its peers on the continent was highlighted, and will be taken to heart for the next SATN conference.

The task before South Africa as a country is clear – that is to create a new generation of leaders that will realise that they need to be entrepreneurial if the challenges of unemployment, poverty and inequality are to be addressed.

The SATN Board appreciates all the contributors who made the conference a success. VUT was thanked for hosting the conference, and the various donors who made generous contributions were acknowledged with gratitude.

The global coverage that the University World News agreed to provide for the conference will be invaluable. A brief media statement will be released on the conference, and all media partners who sent representatives to cover the conference were thanked for their sustained participation.

The 2016 SATN Conference will occur back-to-back with the International Association of University Presidents (IAUP) Conference, which should greatly enhance the conference's exposure and reach.

Dr Padayachee, the SATN Secretariat, Prof. Landsberg who facilitated the conference, and all the speakers, both local and international, were thanked for contributing to a stimulating and thought provoking conference.

Prof. Moutlana expressed a gratitude to all the VUT staff and students who worked together to make the conference a success.