

**SECOND ANNUAL SATN CONFERENCE  
CPUT, BELLVILLE, CAPE TOWN  
DAY ONE – 16 JULY 2009  
NATURE AND CHARACTERISTICS OF SA UoTs**

	<p><b>Welcome</b> <b>Prof. Vuyisa Mazwi-Tanga</b> <b>VC, CPUT</b></p>
	<p>Prof. Vuyisa Mazwi-Tanga extended a word of welcome to all delegates present at the conference.</p> <p>When SATN was established, the purpose of encouraging academic engagement through seminars and conferences, to ensure discussion of issues that affect policy and policy development, was a primary focus. The aim of allowing UoTs to take their rightful place in the South African higher education sector is coming to fruition.</p> <p>There are positive gains to be celebrated, such as the groundbreaking work done in terms of performance indicators for UoTs, helping them to ensure quality and benchmarking.</p>
	<p><b>Conference opening</b> <b>Prof. Roy Du Pré, Chairperson of SATN and VC, DUT</b></p>
	<p>When the SATN was officially constituted in 2007, the question was asked what the purpose of this organisation would be. There have been many changes in South Africa over the last number of years. There used to be a binary higher education system, with Technikons educating graduates for the world of work. Since 2004, after the mergers to reconfigure the higher education landscape, we have 23 universities (11 traditional universities, 6 comprehensive universities, and 6 UoTs). One of the things that became clear is that UoTs are not re-treaded Technikons, which prompted the need for this sector to be nurtured, encouraged and supported through the SATN. While all institutions are part of HESA, which lobbies government and industry on behalf of the broader higher education sector, SATN looks after the particular interests of UoTs. The philosophy of ‘partner or perish’ was adopted to make this sub-sector’s contribution to the country as a whole as valuable as it can be.</p> <p>One of the things that have to be clarified about UoTs is that they are a worldwide phenomenon – UoTs are to be found in Australia, Malaysia, Singapore, China, Japan, India, Switzerland, Germany, Netherlands, Belgium and the UK. These institutions have a particular focus on solving skills</p>

	<p>shortages in the areas of technology and science – prime examples of countries where this has been hugely successful are Japan and Germany, among others.</p> <p>The nomenclature associated with these institutions may differ, ranging from Universities of Technology to Universities of Cooperative Education, yet they all deliver graduates suitable to the world of work.</p> <p>South African UoTs have always felt that it would be helpful to be linked to the Department of Science and Technology, and is looking forward to working closely with the Department in future.</p> <p>The DHET’s benchmark is set at 50% of programmes in SET, which UoTs are working towards attaining. Links with industry will be strengthened, to respond by providing graduates relevant to the world of work. UoTs are not competing with traditional universities in areas where they specialise, but will apply research in relevant areas. This does not mean that excellence in teaching and learning is not an important focus for UoTs – the aim is always to produce students that are able to provide solutions to societal problems, to create a better life for all citizens of the country.</p> <p>The programme for the conference clearly illustrates that UoTs have a place in the higher education sector, and in partnership with other universities, government departments and industry will address the country’s education needs. SA has to prioritise technological innovations and research if it wants to achieve social and economic progress.</p>
	<p><b>POLICY ENVIRONMENT FOR TECHNOLOGICAL AND INDUSTRIAL INNOVATION</b>  <b>Chair: Prof. Thandwa Mthembu</b>  <b>SATN Deputy Chairperson and VC, CUT</b></p>
	<p><b>Minister Naledi Pandor</b>  <b>Minister of Science and Technology, National Department of Science and Technology</b></p>
	<p>The Minister of Science and Technology, Minister Naledi Pandor started her address by congratulating UoTs on realising that it has a role and place in higher education, expressing the hope that these institutions would come into their own and thus have real impact on advancing human resource capacity building in science and technology.</p> <p>The key to success in Science and Technology is dependent on a vibrant and successful national system of innovation. SA is very fortunate to be well endowed in terms of innovation and technological opportunities. These opportunities have to be used to good effect – there are policies, funding bodies, and universities, all able to play a role in growing innovation. These</p>

have not yet been adequately coordinated, and this aspect needs to be given prime focus to optimise their value.

There is a close relationship between the Departments of Higher Education and Science and Technology to expand the levels of innovation. There are various initiatives in support of innovation, research and development, yet there is no coordinating body in Government to make the most of the investments being made – a joint national structure of senior officials and ministers is being foreseen to coordinate these initiatives.

There are areas of policy inaction to address in order to grow the number of researchers and skilled technologists. More should be done to inform Government about plans to address human resource needs – without skilled resources the desired outcomes embedded in those plans will not be realised.

Some focused deliberation with the NRF and the CSIR, for example, is essential. Universities are good places from which to launch focused skills strategies, since they have the people that would help achieve accelerated skills development. A high level of technological and research skills development is necessary, and can be achieved through the universities.

Several strategies, such as the Research Strategy and Human Capital Development Strategy among others, are apposite to the theme of this conference. The Technology Innovation Agency is also critical to the work done by UoTs. In addition to institutional review, an assessment of the national system of innovation is having the desired impact – a 2007 OECD report on this system provided useful insight on where strengths and gaps lie.

The report indicated that the innovation system evolved over the past 15 years, but also showed that outputs are not optimal as yet – areas where performance could be improved remain. Our innovation system has a substantial repository of local knowledge which could have a more sustained impact on the real economy. Due to various impediments to productivity and technological innovation, these real improvements in the economic environment cannot be realised. Inadequate levels of support for innovation also have to be addressed. These features have contributed to the loss of a number of technologies to the developed world, such as the SA developed lithium battery for vehicles. We should not be giving up technologies to other countries if we could develop these products here. Our business incubators and technologies have to be harnessed to full effect, from innovation to commercialisation and management.

UoTs must capitalise on agency initiatives, and keep track of these programmes to remain at the forefront of development. Policy should be used to provide for the efficient use of intellectual property. The establishment of the

National Intellectual Property Management Office (NIPMO) will be responsible for technology transfer in higher education institutions, and need to be staffed with people with the required expertise and skills. Government intends to encourage South Africans to look at how products could be used to optimise their industrial potential, without detracting from the research and innovative aspects.

Government is keen to see UoTs developing research profiles and capacity. There is a notion of a differentiated system, but this was never the intention of Government – the plan meant that each university should determine its own mission and vision to serve its geographic context, but also the larger South African society. Each university should be as great as it can possibly be.

It is useful sometimes to remember that in the US and the UK less than 5% of universities are research intensive. This does not mean that they do not undertake any research; they are just focused clearly on their own niches and areas of strength. Technology universities have built partnerships in high technology industry areas, while others focus on rural and urban development. We need to establish our own focus areas, and should make the most of these.

Government has given funds to institutions to address their needs in areas of teaching and learning and research. The impact of this investment needs to be reviewed, to see what more needs to be done to support innovation. Infrastructure is not the only component to improve capacity – linkages between universities and business, and improving the qualifications of staff, should be addressed. The low number of university staff with inadequate qualifications is a problem throughout the sector. Alongside building partnerships with industry and improving the pool of technologists, staff should be encouraged to aspire to higher qualifications to advance the research agenda. UoTs should take advantage of initiatives such as the SA Research Chairs initiative, and the Centres of Competence that have been established – it seems that traditional universities are benefiting more from these initiatives. New areas of excellence need to be built and expanded throughout the country. This is an area that will receive particular attention from the Department of Science and Technology.

UoTs should also find ways to cooperate more closely with the DHET and the DST. We all need to harness our energy and expertise to make SA a better country. I wish you well in building the technology and innovation culture in South Africa.

**Prof. Yitai Ma**  
**Director: Thermal Energy Research Institute, Tianjin University, China**

**The Importance of Technological and Industrial Innovation to Universities in China**

Technological and industrial innovation is important worldwide. China's higher education history starts in 1895 when the Tianjin University was founded. China resumed higher education in 1977, with an enrolment of 270 000. From 1998 to now higher education expanded on a large scale, with enrolments reaching close to 6 000 000 in 2008.

China's national innovation system began to take shape in the 1950's, based on the model from the Soviet union which emphasised central management and planning, with government playing a major role.

The socio-economic basis for innovation is based on the notion that during the first few years when PRC was founded the guiding ideology of planned economy suppressed reasonable competition. China has been introducing advanced foreign technology to support high speed economic growth since the Chinese economic reform in 1978, but technological innovation and independent intellectual property rights were ignored.

Starting in 1978, China's National Innovation System entered into a new area. A series of institutional reforms were carried out, and universities were placed at the centre for teaching and scientific research. Diversification of China's national innovation system has generated much needed vitality in the system.

Financial support has been set aside for particularly engineering programmes, and an initiative to attract persons with ability from the whole world was adopted.

Key laboratories have been set up to create opportunities for innovative research projects for university students, focusing on energy-saving and emission reduction. China has also established a National Natural Science Foundation to fund research projects, and there is growing cooperation between companies and universities.

To enhance innovation of engineering technology at universities, a decision was taken to reform the teaching system and change from exam-oriented education to quality education. Teaching of students occurs in accordance with their aptitude, and focuses on the creative ability of the student. The creative ability of students is optimised by policy, management, resources and intervention of aspects like tutors, encouragement, evaluation systems, and financial support.

	<p>Innovation often occurs in urgent situations. China has to ensure that 1.3 billion people live with all modern conveniences, but on the other hand should keep energy consumption as low as possible. Despite these efforts, annual energy consumption grows by 6% per year, making China the second largest energy consumer in the world. China's energy efficiency is low compared to those of developed countries, making innovations in this area particularly important for the country.</p> <p>China will continue to focus on innovations in terms of the following sources of renewable energy:</p> <ul style="list-style-type: none"> <li>• Solar energy</li> <li>• Geothermal energy</li> <li>• Wind energy</li> <li>• Biomass energy</li> <li>• Heat pump system for heating</li> <li>• Low energy consumption building</li> </ul>
Discussion	<p><b>Q: How can UoTs transform the end-user assembly role of those innovations that the Minister of Science and Technology indicated – within the context of assembly, there is still a long lead time? How can the UoT transform that role?</b></p>
	<p>R: Liaison between industry and laboratories is essential.</p>
	<p><b>Q: My question is on the nature of a national system of innovation – China having so many institutions, how do you ensure that the national system of innovation is coherent and functional?</b></p>
	<p>R: Universities get together to cooperate on projects – while there may be one leader for a project, the project can be divided into smaller components that is given to various universities to work on.</p>
	<p><b>C: The SATN takes the role of a facilitator to ensure that the various UoTs have a coherent approach to innovation – renewable energy is also a focus area in SA, and a group of researchers is being put together to mount a project in this area.</b></p>
	<p><b>THE PLACE AND ROLE OF UNIVERSITIES OF TECHNOLOGY IN THE HIGHER EDUCATION SECTOR</b>  <b>Chair: Prof. Vuyisa Mazwi-Tanga</b>  <b>VC, CPUT</b></p>
	<p><b>Ms Judy Backhouse</b>  <b>Director: Monitoring and Advice, Council on Higher Education</b></p>
	<p>I'm responsible for Monitoring and Advice at the CHE, a little-known part of the CHE's functions. While I'm going to talk about the place and role of UoTs in higher education, I will also intersperse my talk with some of the work we do.</p> <p>The CHE advises on and quality assures higher education in South Africa, but also has the function of stimulating debate on the state of higher education.</p>

The Monitoring and Advice Directorate plays a role in terms of the latter.

We came up with an analogy of an organic system for the higher education system – the higher education system might be thought of as an ecology where different HEIs have their own niches and ways of operating. Students have more choice; diversity allows more room for experimentation. If we frame the higher education system this way, what is the role of UoTs?

The role of UoTs: what do they do, and where do they fit in?

There are three aspects to UoTs mandated: they are expected to be knowledge organisations, deliver learning programmes and doing research. The name ‘University of Technology’ carries the mandate to focus on technology. It might be useful to define technology – the discovery of scientific knowledge may be too narrow, and UoTs may want to expand on this. The work of UoTs should also be in the public interest, however this is interpreted.

Beyond these three conditions, and in the spirit of academic freedom, it is up to academic institutions to see how they fulfil these mandates. From what I’ve seen of the performance indicator project, UoTs are well on their way to defining their role as career-orientated training and research institutions.

I expect that there will be diversity within the membership of SATN. Some institutions may need to adapt, for approaches that are innovative and will suit their own goals. As organisations within an ecology of higher education, it makes sense to focus on strengths.

One of these is to produce diplomates and graduates that are work ready. There is a demand for technicians and technologists. The strong tradition of work integrated learning could lead to partnerships with industry role players.

A review of the higher education sector shows that UoTs are doing something right as far as learning goes. The number of graduates increased steadily over the past five years despite declining enrolments, and although UoTs attract what are perceived as the weaker students from the schooling system. If UoTs are doing something right, it should be shared with other institutions.

I was struck by a gap between what is being practiced in higher education, and what educational research is showing. There is a need for learning programmes driven by what students already know, varied forms of assessment, and focus on practical application. Another area where UoTs may have an advantage is the established relationships with industry partners. The CHE has been investigating Community Engagement, of which there are many different interpretations, but it often includes both elements of teaching and research. Many projects begin around a learning programme and develop into a research programme, and vice versa. UoTs could work on developing

more innovative programmes in this regard.

Ongoing professional development of staff remains a problem. Ongoing staff development is a key part of the learning and adapting that is needed in terms of teaching and learning and research to create better UoTs and other universities.

The place of UoTs seems to suggest phrases like 'put in your place', or 'know your place', a very hierarchical connotation. I'm also constructing a framework for universities in SA, but this will not be a ranking of universities. For students to select a university, the ranking system may not be useful. Far more students will rather look for institutions offering a good learning experience. Rankings are one dimensional – some institutions may excel in one area, and not another. Ranking may obscure these facts; a linear ranking system makes little sense.

From the monitoring perspective, the question is whether the system is meeting the national needs – and needs are broadly seen. How is the system faring? I'm less interested in what is happening at the level of individual institutions, but more interested in identifying where systemic problems lie.

There are some principles that will inform this monitoring framework – indicators and qualitative research should be drawn from a wide range of sources, preferably without having to undertake primary research. The Performance Indicators project will be helpful in this regard.

The third principle is that we should allow the data and research to be interpreted in a variety of ways, and rather to encourage debate about possible interpretations.

The question of differentiation in the SA higher education sector led to some discomfort, because of the hierarchical format. It is more appropriate to think of a diversified system, with different focus areas to match the strengths of each institution. This model is more dynamic.

There is a trend of increasing self-differentiation, which started with the establishment of the SATN. But it is happening in other places too - a group of rural universities approached the CHE to find their own identity and value proposition. There is also a similar discussion occurring among comprehensive universities. The same process is evident in private higher education institutions, to create their own identities while learning from each other. Institutions are also becoming more assertive, which is healthy in any higher education system.

We are going to need more nuanced steering mechanisms than those we have currently, and the CHE is facilitating discussions on this topic with other bodies.

	<p>Cynics will say there is still an implied hierarchy, placing research institutions at the top. But given the society we live in, there is definitely a place for practical knowledge. Different kinds of knowledge all have their place.</p> <p>I think the question of place is less important – there should be debate about different kinds of knowledge, and I support these. The CHE produces two series of publications, focusing on monitoring and also on debates in the sector. As such, an upcoming issue of the CHE journal will focus on the work being done by UoTs.</p> <p>The role of UoTs is the same as that of any university – generating knowledge through research, and teaching students to address problems for the public good. The place of UoTs is really up to you, as members of SATN, to decide. Strong career-focused programmes, innovative teaching and research will help you to become strong contributors to the South African higher education sector. The shift to being UoTs became an opportunity to redefine your contributions to the country – and impressive progress has been made in defining this new identity.</p>
	<p><b>Dr Engela van Staden</b>  <b>Director: Strategic Management Support, TUT</b></p> <p><b>Assessing the Unique Contribution and Development of UoTs through the use of Performance Indicators</b></p>
	<p>I have the honour to be the spokesperson of a group of UoT staff members who started in 1999 to think what would make UoTs unique, and identified the following aspects:</p> <ul style="list-style-type: none"> <li>• Collegial collaboration and cooperation</li> <li>• Defined the role and function of UoTs</li> <li>• Identified evidence based performance indicators to measure their performance and development</li> </ul> <p>The outcome of the debate is that ‘university’ is the common denominator that responds to the ‘unitary’ system. Differentiation lies in the purpose, approach and focus of each university type. Being unique, UoTs can measure their performance. UoTs are new in the South African context. Universities are not static, they are organic entities, and while there are universal characteristics they are shaped by trends, challenges and forces in their environments.</p> <p>A university is seen as an academic institution where research is conducted, and teaching and learning is offered. The focus and interrelationship between technology and the nature of a university make UoTs unique.</p> <p>Technology is seen as the effective and efficient application of the accumulated know how, knowledge, skills and expertise that will result in the output of value-</p>

	<p>added products, processes and services. Understanding the nature of a university of technology means that the following characteristics and attributes apply:</p> <ul style="list-style-type: none"> <li>• Technology programmes – technology driven PQM and career orientated, undergraduate programmes. Curricula should be relevant and responsive. Career focus can be measured through WIL and the exposure and experience of staff in the industry or world of work. SET enrolments will provide a mechanism to measure this characteristic.</li> <li>• Research and innovation in certain areas – research and innovation expertise acknowledged and part of UoT function, part of developmental trajectory and directed by real problems from industry. Increasing staff research competence is a development area for UoTs, and one where additional resources and focus is needed.</li> <li>• Entrepreneurial and innovative ethos – this is a generic focus, but UoTs are unique in that they foster an entrepreneurial spirit in their graduates. Output can be measured through patents, products, prototypes, artefacts, designs, etc. Uniqueness lies in programme content.</li> <li>• National and international impact and recognition – access with success (particularly in SET) and provision of alternative access routes. Contributions to nationally prioritised skills can also be measured.</li> <li>• Sustainability in engagement and practice can be measured through partnerships, community involvement, and school and post school engagement. Sustainability is a generic policy goal that can be measured through cost and income per FTE student.</li> </ul> <p>UoTs have identified PQM as a driver of their unique contribution to the higher education landscape. A core collection of 26 performance indicators have been identified. A pilot study will be completed by the end of 2009.</p>
	<p><b>Dr Tamara Wanker (MA)</b>  <b>Senior Policy Advisor: International Affairs, Netherlands Association for Universities of Applied Sciences (HBO Council), The Hague</b></p> <p><b>Networking in the Modern Knowledge Society: Experiences from the European Network for Universities of Applied Sciences (UASNET)</b></p>
	<p>UASNET is an informal grouping established at the end of 2004, and consists of 8 partners with a wish to clarify professionally oriented higher education within Europe. As such, a ‘bachelor for the labour market’ was identified as a first project. In depth country reports were developed and led to the production of a brochure. A shared profile and a set of general descriptors were compiled, and led to the establishment of the network.</p> <p>11 partners form part of UASNET, which is an informal network for Universities of Applied Sciences. It focuses on peer learning activities and investigations facilitating an international exchange of national developments, but also acts as a lobbying task force. It provides a platform for university experts and partners</p>

from the world of work to interact.

The current project is known as 'educating the new European professional in the knowledge society'. This project aims to focus on the core elements of professional education, integrating education and applied research. It will also invite other associations of UAS and member institutions as well as stakeholders to act as sounding boards.

The aim is to align education in the best possible way to professional practice, and assist the world of work (SMEs, business, public sector) with concrete innovation demands, while retaining a focus on applied research.

The collaboration through UASNET makes it possible to mirror regional and national experiences of individual institutions and stakeholders to a higher, European level. Expected outcomes are quality applied research, sharing of best practices and growing networking opportunities

Applied research will be boosted through recognition and funding to create:

- More visibility
- Better understanding
- More and better funding and preconditions
- Adjusted European programmes for applied research

Content of the project:

- Research project
- International conference to present results
- Expert meetings
- Study visits
- Detailed benchmarks
- Closure event
- Website: [www.uasnet.eu](http://www.uasnet.eu)
- Brochure
- Position paper towards Bologna 2020 – “Higher education should be based at all levels of state of the art research and development, thus fostering innovation and creativity in society. We recognise the potential of higher education programmes, including those based on applied science, to foster innovation.”
- A ‘task force’ was established to continue lobbying on the need for innovation throughout the EU. Ongoing developments, new thoughts and other aligned activities are also incorporated.
- Internal commitment was crucial, and occurred through close cooperation between national associations. The management of the network is dependent on the distribution of workload aligned to capacity and know how. It is also essential to grasp any spin-off opportunities as soon as they occur.

	<p>Thoughts for further consideration:</p> <ul style="list-style-type: none"> <li>• Which societal themes need to be addressed?</li> <li>• How can we harness our collective efforts to increase our reach, quality and benchmarks? Future research opportunities could be identified.</li> </ul>
	<p><b>Mr Hans Hoving</b>  <b>Senior Advisor to the Hogeschool Utrecht University of Applied Sciences, and Secretary of the Board at Technocentrum Utrecht (Speaking on behalf of the HBO Council)</b></p> <p><b>Classification and Ranking of Universities in Europe</b></p>
	<p>HEIs are taking rankings very seriously, and 58% of respondents are unhappy with their current rank, while 93% and 82% of the respondents want to improve their national or international ranking, while 70% want to be in the top 10% nationally, and 71% want to be in the top 25% internationally.</p> <p>Myths:</p> <ul style="list-style-type: none"> <li>• Ranking provides useful comparative information about the performance of different HEIs, facilitating student choice and benchmarking;</li> <li>• Indicators are plausible, meaningful, measurements of research and knowledge creation;</li> <li>• High ranked HEIs are better than lower ranked or non-ranked institutions;</li> <li>• Concentrating research in a few areas helps to improve overall quality.</li> </ul> <p>Classification must contribute to the needs of different stakeholders, ensuring transparency for students, business and industry, and other organisations. It must also ensure transparency for policy makers and researchers, and must help to act as a profiling instrument for higher education institutions.</p> <p>The OECD said that the impact of international rankings is biased in favour of research; there is a need for alternatives to capture learning outcomes. Educating as well as researching classifies what makes up different types of HEIs.</p> <p>The Shanghai Jiao Tong ranking was created to upgrade its universities to world class status, which now looks at the following aspects:</p> <ul style="list-style-type: none"> <li>• Nobel laureates, Fields Medals, highly cited researchers;</li> <li>• Major universities of every country with significant papers indexed by Thomson;</li> <li>• The result was that approximately 1000 of 2000 universities scanned corresponded. No arts or humanities universities are included in the list of ranked universities.</li> </ul> <p>Other classifications include the Carnegie Classification of Institutions of Higher Education, which only applies to the US. There is also The Times university</p>

	<p>ranking and other ranking systems.</p> <p>Europe gets ready for alternative rankings, and has established the Consortium for Higher Education and Research Performance Assessment (CHERPA) network, which will endeavour to classify the EU higher education sector. It consists of a number of participating countries, among them Germany, the Netherlands, Belgium and France. This system will be a design for a global ranking of HEIs which avoids the flaws and deficits of existing international rankings which should provide a valid, fair comparison of institutions.</p> <p>In Holland a product called Studychoice was developed, which is an easy-to-use application that guides you step by step through more than 2 500 bachelors and masters degree programmes in the Netherlands. The result is a clearly presented personal comparison of study programmes, looking at the location of the university and factors that influence the student experience, among others.</p>
<b>Discussion:</b>	<p><b>Q: As much as we appreciate the role and place of UoTs in SA, we understand the challenges and opportunities that the HEQF presents. Could you comment on how UoTs will be funded to drive the HEQF transitional process?</b></p>
	<p>R: I realise that there are implications associated with the implementation of the new HEQF. The CHE is also not the source of money. It is something that might be best referred to the CHE.</p>
	<p><b>Q: The more I listened to the aspirations and ambitions of UoTs and the more I see of the vivid Chinese example, the more I wonder how this is incorporated into the curriculum of a UoT? Are you thinking as a sector about more general education components? How are you dealing with an explosion of energy consumption to ensure that your students will know what is happening?</b></p>
	<p>R: We see in our universities that various elements make up the knowledge triangle. The focus is on both research and internationalisation in the curriculum in Holland, so there are various ways of achieving the desired changes. We also want universities to become clear in their own mission about what they want to focus on, so that if a student wants they can rather go to another institution. Research could be more focused, and students can be shown how to be a reflective member of society – in German it is called 'bildung' to become good citizens. It is up to the university to be clear about its own contribution to society. There is a challenge for universities to be clear about what their role is.</p>
	<p>R: SATN started out looking at the type of students that we want to graduate, which are linked to exit level outcomes. Our fear is that we might lose this concept if we don't keep it at the forefront when we re-curriculate as part of the HEQF process. It is also important to have a strong relationship with industry.</p>

	<b>C: I want to commend the organisers on the panel members selected. You all touched on transformation, change and diversity, which is what we should be talking about.</b>
	<b>C: Across the world all higher education systems are looking for increased investment from their governments. The expectation is there, and it is legitimate – but here at home it is useful for us to reflect that since 2004 the higher education budget increased in nominal terms by over 50%, which shows a significant commitment to the higher education system. Going forward we will have to look at innovative ways to augment that investment, but there will also need to be some introspection on how those resources are used, and prioritisation of issues that should be funded.</b>
	<b>INDUSTRIAL AND SOCIO-ECONOMIC DEVELOPMENT</b> <b>Chair: Prof. Irene Moutlana</b> <b>VC, VUT</b>
	<b>Prof. Dr Ulrich Holzbour</b> <b>Aalen University of Applied Sciences, Head: Steinbeis Transfer Centre for Applied Management</b>
	<b>The Role and Position of Universities of Applied Science in Industrial and Socio-Economic Development – German perspective</b>
	<p>In Germany, each state has its own laws governing universities. In Baden-Württemberg a variety of universities, including traditional, applied science, and arts universities can be found.</p> <p>When we talk about the roles of universities, we talk about society, development, good citizenship, research and education. Talking about sustainable development – it was defined in 1987 as ‘development that meets the needs of the present without compromising the ability of future generations to meet their own needs’.</p> <p>Education for sustainability was implemented by UNESCO in 2006, and in Baden-Württemberg a network was set up. Development also deals with different aspects of humanity – society and economy, industry, organisations, universities themselves, and individual development.</p> <p>It is necessary to grow towards a limited resource consumption society, which can be achieved through innovation. It is important to link technology and sustainable development. The tasks of a university depends on the university type – in Germany they all need to do research, but also education and what is known as transfer.</p>

Measuring these outputs is possible. Transfer can be measured at the input level, through the resources that are allocated, but the real societal impact is not that easy.

Knowledge is the basis for education, research, transfer and business. 260 000 students are enrolled in all 68 universities in Baden-Wurtemberg.

Technology transfer can occur in a variety of ways, it is not only about transferring knowledge but also about teaching. The range includes basic research, applied research, direct support, consultancy and development. Researchers must be allowed to bridge the gap between pure and applied research.

The Steinbeis Foundation works across various technology transfer projects, including consultancy, project development, analysis, research and development, evaluation and reports, and training and employee development on site. The organisation has a number of transfer centres, some located at universities. A transfer centre can be characterised according to the extent of its knowledge – ranging from locally focused with broad knowledge bases, to some with specialist focus areas, specific sector focus areas, to specialised global players. Variable mechanisms are used to make these projects cost effective.

Success factors include:

- Flexible organisation
- Standardisation
- Steinbeis is a strong brand

University projects could be joint projects between the university, the student, and an external stakeholder, like a company that may have a problem that needs solving.

At the Institute of Applied Research, about 30 – 50 professors are engaged in projects involving third party funding. Projects involve technical consulting, applied management, polymer technology and engineering, metals foundry, image processes and production planning.

Student projects take place across the spectrum. One example includes an environmental management system. Industry and community projects have to be linked to technology projects.

**Dr David Phaho**  
**Tshumisano Trust**

**Universities of Technology as Conduits for Innovation and Regional Economic Development in South Africa**

Key elements for sustained economic growth include human capital, information and communication technology, innovation (diffusion and exploitation of science and technology outputs) and a vibrant entrepreneurial culture (namely high growth and innovative SMEs). UoTs are playing an increasing role in making these a reality.

SMEs are central to economic growth and employment creation in OECD and Brazil, Russia, India and China (BRIC) countries. Small companies have the benefit of economies of scope rather than economies of scale – making them nimble and shielded from external shocks. They are also more likely to create steadier and flexible levels of employment, even during economic downturn.

South Africa's growth challenges could be managed better if there was a focus on innovative practice and knowledge. Highly innovative professionals have to be brought on board.

Regional economic development has to be informed by the development of niche areas. Universities and UoTs have to look how the needs of the regional economy would best be served.

In the case of UoTs, there are many ways for them to cooperate with industry. UoTs should also focus on postgraduate students and their research projects, linked to real, industry-related problems. There is a critical argument for sector specific research programmes, and contract research.

The SA Government response has been to establish the Tshumisano Trust, with the mandate to strengthen technology transfer to support SMMEs. Technology stations are funded by Government, and improve the SMEs in areas of priority. Envisaged outcomes include improved competitive needs, and improved and enriched research and development, as well as teaching and learning.

Two technology stations exist in the Agro-processing industry, responsible for testing and analysis. There are also primary manufacturing clusters focusing on product development and prototyping, which involves textiles and reverse engineering.

Secondary manufacturing clusters look at automation and processing of materials, material compositions and casting (foundry) solutions. With a further

	<p>grant from the DST, Institutes for Advanced Tooling have been set up, to counter the large amounts of money spent on importing tools annually.</p> <p>Over the past six years, Tshumisano has assisted over 1 200 SMEs. One of the issues remains skills development. There has been some positive impact as a result of UoTs.</p> <p>The question is: Are we doing enough? The importance of techno parks or other incubators cannot be overlooked. The Chinese government has been making use of SMEs to increase employment opportunities, through various supportive and creative strategies. There should be a conversation between UoTs, local, provincial and national government to see how incubators can be established and optimised. Work needs to be done to retain the competitive edge.</p> <p>How do UoTs position themselves to assist in SME development and regional economic challenges? The Exemplary Strategies for Regional Economic development – the RALIS initiative in the SA Clothing and Textile industry is a prime example. This transfer centre is housed at the CPUT in the Western Cape, and aims to provide solutions to current job losses. There is a lack of innovative solutions to face the myriad of problems facing the sector, such as illegal importation of products. The low output per employee in SA firms, the low level of technology investment and the emergence of world class skills levels in competitor countries all have to be factored into the equation.</p> <p>Role players in this area include stakeholders that focus on the product and process, others look at trade matters and legislative changes, while some look at funding of training. A system to measure the practical activities that will strengthen innovation is being put in place. This system is not informed by a top down approach, but by adequate participation from stakeholders. A value chain for the whole industry was developed. Simple principle proposals in this regard were identified, and linked to key champions. Of the 15 initiatives identified, 80% succeeded. RALIS led to a plethora of collaborative activities among key industry stakeholders. These models can be duplicated in a range of contexts.</p> <p>UoTs can and do play a critical role in regional economies in terms of innovation upgrade and skills development. There is a need to expand the work of Government entities such as Tshumisano to enhance local, regional and national development.</p>
Discussion	<p><b>Q: You mentioned an innovation centre in China – I’m interested in what we can learn in terms of funding mechanisms, legislative frameworks and reporting structures.</b></p>
	<p>R: We get our grant from the DST, which we disperse to particular institutions. What works is that Tshumisano operates independently, but we also ensure that the grant agreement between us and the institution encapsulates exactly</p>

	<p>what we want, so there is no micro-management of issues. We want to give the experts freedom to do what they do best. There may be more efficient ways of reporting.</p>
	<p><b>LAUNCH OF THE WORKING GROUP FOR TEACHING, LEARNING AND TECHNOLOGY</b>  <b>Chair: Prof. Herman van der Merwe</b>  <b>TUT</b></p>
	<p>I've been involved with technology for some time, and feel that it can really change our lives. With the establishment of the TLT group, this is what we want to do: we want to contribute towards doing things better in UoTs.</p> <p>The TLT Committee will achieve this through partnerships, benchmarking and sharing practice, developing models and strategies, software group licences, etc. All are welcome to participate.</p>
	<p><b>Dr Steve Ehrmann</b>  <b>Vice President, the TLT Group, Washington DC</b></p> <p><b>Collaboration among Academic Institutions: How Technology is Opening New Options</b></p>
	<p>130+ institutions subscribe to the TLT group services. Some of the founding sponsors of TLT include Compaq, Microsoft.</p> <p>The needs, old and new:</p> <ul style="list-style-type: none"> <li>• 'Old' needs: problems with education in the US (<a href="http://www.learner.org">www.learner.org</a> – 'A private universe' and 'Minds of our own')</li> <li>• 'New' needs: <ul style="list-style-type: none"> <li>○ Global recession, poverty and inequality across and within nations;</li> <li>○ Climate change.</li> </ul> </li> <li>• Business as usual? Not today.</li> </ul> <p>iCampus: a 7 year project run by MIT with Microsoft funding</p> <ul style="list-style-type: none"> <li>• Over 7 years awards were made to MIT faculties to use technology to improve their teaching. 10% was used for outreach projects, mostly in terms of software, services and ideas being given away. In the final year, we were asked to study factors affecting wide use of iCampus ideas and products.</li> </ul> <p>Five iCampus projects (ranging from remote laboratories to projects that assess writing) were studied to identify factors that inhibited and fostered adoption of technology. Recommendations included how to accelerate the development and spread of innovations like these.</p> <p>At MIT research is quite strongly capacitated, because of the need to prepare</p>

students for postdoctoral study, enabling the sharing of ideas and techniques. In teaching, practice is carried out largely in isolation, and there is little formal preparation to teach. We needed to understand how technology could be used to share good practice in terms of using technology. The importance of habits of communication and trust was identified. The availability of free xMas software gradually spread.

Multi-section courses were being taught at MIT in the Department of Electrical Engineering by a slowly changing group of teachers, and there was a culture of fairly frank discussions about what occurred the past week. It was important to improve education widely so that it became more authentic, and to create a demand for the adoption of these new ideas in terms of teaching. We nurtured coalitions for instructional improvement within and across institutions in order to create better channels for sharing and improving innovations. Faculty innovators were supplied with central services in educational design, software development, assessment methods, etc. See the report at [www.tltgroup.org/icampus/](http://www.tltgroup.org/icampus/) and read the case studies before reading the recommendations. No easy answers are to be found.

The role of IT in enabling collaboration:

- Contrast the traditional library with the world wide web;
- Networks of live reference support for libraries;
- Matrix surveys: online surveys that send different questions to different people (ePortfolio prototype). A survey of students across SATN member institutions could pose different questions to students at different institutions.
- Chat rooms for students in different parts of the country, as part of a strategy for teaching persuasive writing;
- OneMBA.org is a one-year executive MBA in global management, compiled by 5 institutions on 4 continents. Half the courses are shared online with the team teaching, and students study in virtual teams. Four research trips are undertaken for students and faculty to do work on site, together. They go to where the students need to go to do the work.
- Programme design: desirable, but virtually impossible without IT... or without collaboration;
- Collaboration and IT used only as necessary;
- Innovations like this are hard to create, but leads like this are hard to overtake.

Web 2.0:

- More often free, easy to use, and multi-purpose;
- Example: University of Queensland workshop on ePortfolios;
- Importance of ePortfolios for assessment, improvement of learning, performance and flexibility;
- Challenge: failure of the old paradigm: find the platform, buy it and train academic staff to use it;

- Task: organise a half-day workshop to accelerate institutional progress;
- A 6 person planning team, half from the University of Queensland and half from outside held weekly planning meetings using Skype;
- Speakers were online, while the audience were local;
- Using a Google spreadsheet to facilitate small group work quickly.

The TLT Group specialises in ‘frugal innovation’:

- Using flip video cameras to film poster presentations on teaching, and post online;
- Using web based conferencing systems in an interactive way (polling module, microphones, chat windows);
- Pausing events to allow participants to e-mail, post and Twitter about what they’ve learnt.

Priorities for SATN’s TLT working group:

- How to achieve the goal of accelerating the importation, creation and sharing of TLT improvements?
- Big changes in TLT outcomes for programmes and universities are NOT usually caused by hot new technologies or temporary injections of funds;
- Changing a programme’s outcomes takes many years;
- Select patterns of activity that needs changing: just in time teaching, learning communities, portfolios, cooperative learning, etc.
- Harvest ‘low threshold’ incremental advances in those activities from everyone;
- Increase incentives and support for improving the selected activities and their outcomes;
- Nurture routine sharing of materials, experiences, problems, ideas among staff who teach similar courses (e.g. meeting scheduling, Twitter filters, etc.)
- Choose open technologies that will last, for painless upgrades;
- Establish open communication so no one needs to be an ‘outsider’;
- Educate and equip staff to use feedback to troubleshoot and improve their initiatives.

Remember:

- The stakes are high, and
- Your problems are your assets.

**CLOSURE**

The first day of the conference was concluded at 16:45.



**SECOND ANNUAL SATN CONFERENCE  
CPUT, BELLVILLE, CAPE TOWN  
DAY TWO - 17 JULY 2009**

	<p><b>TECHNOLOGICAL INNOVATION IN BUSINESS AND INDUSTRY</b>  <b>Chair: Prof. Errol Tyobeka</b>  <b>VC, TUT</b></p>
	<p><b>Dr Kjelt van Rijswijk</b>  <b>Head of Advanced Composites, Aerosud Innovation and Training Centre,</b>  <b>South Africa</b></p> <p><b>Innovation and Training at Aerosud</b></p>
	<p>The catch phrase ‘publish or perish’, often heard, should be abolished. In the Technology field, you should rather focus on patenting your innovations. Paper is not technology. We should rather adopt the catch phrase: ‘Demo or die’.</p> <p>Aerosud Innovation and Training Centre is a company making parts for Boeing and Airbus. We have three companies; one focusing on military upgrades, one focusing on design and manufacture of aircraft structures, and one focusing on innovation and research.</p> <p>We need to innovate to stay competitive. We recently started risk-sharing partnerships. To achieve this, you must be able to show that you’re able to innovate and come up with solutions. We need to be innovative to maintain or increase market share.</p> <p>Continuous quality is one of the most important aspects of aeronautical engineering. There are various rules and regulations, certified processes, materials and staff – we have people looking over our shoulders all the time. Production needs a stable environment, but there should always be innovation. Imagine your customer’s needs before they know what they want. You need a dynamic, continuously changing environment, fostering improvement and innovation, while maintaining an environment for stable production. Communication is key.</p> <p>At the Aerosud Innovation and Training Centre, we focus on the development of new material applications and manufacturing technologies – saving time and costs, and always looking to minimise weight. We look at developing applications to maximise the benefit of these technologies. We also train people to implement new technologies in the workshops.</p>

	<p>Ingredients for innovation:</p> <ul style="list-style-type: none"> <li>• Broad knowledge base,</li> <li>• Customers (for whom..?),</li> <li>• A network of experts (co-operation),</li> <li>• Funding,</li> <li>• Infrastructure,</li> <li>• Implementation strategy,</li> <li>• Adventurous mind-set.</li> </ul> <p>Innovations do not need to be complicated; they just need to meet the requirements specified.</p> <p>On a more critical note: Students are not always able to participate in actual innovation, not offering ideas, suggestions, thoughts or opinions. Also, not enough proper communication skills to solve multi-disciplinary problems. Students are unable to express themselves in discussions, often find it difficult to master English grammar, terminology and formulation.</p> <p>Communication is essential to solving problems; in order to access information, communication is crucial. At present, UoT students excel at implementing solutions, but they are not problem solvers.</p> <p>UoTs are probably ahead of traditional universities in terms of technological innovation.</p> <p>Future ambitions:</p> <ul style="list-style-type: none"> <li>• In order for UoTs to become more engineering focused we need to actively embed problem solving and innovation in the curriculum. Knowing what football is does not automatically make you a football player.</li> <li>• We need to improve communication skills.</li> <li>• There is a trap, however: If UoT students move up to the engineering level, who will become our technicians?</li> </ul>
	<p><b>Mr Alphons du Toit</b>  <b>Director: Technimark, South Africa</b></p> <p><b>Technology Transfer impact on SMME Development – Perspectives from a small/micro enterprise point of view</b></p>
	<p>My history in rapid proto-typing began in 1995 with the CSIR. We implemented and introduced the technology to smaller companies, and developed new products, and a rapid proto-typing centre was established in Bloemfontein shortly thereafter.</p> <p>Some products we developed included a prepaid electricity meter, designed over two years. We developed prototypes, but in order to have a product to sell</p>

	<p>we needed to speed up the process. While injection moulded tooling was in development, we started looking at silicone moulds. The entire project cost R 1.3 m before final approval was given.</p> <p>We were also working on Isuzu tail lights, where we used scanning technology and reverse-engineering. Another project was known as Wizcam. We need to look at high-quality, high-profit low-volume products – in these instances how you develop the product is critical.</p> <p>A further product that we developed is a lawn trimmer, for which we had a very tight deadline dictated by the coming summer season.</p> <p>A product known as Body IQ was developed by Technimark/CUT to measure blood pressure and body fat for use in gymnasiums.</p> <p>In the architectural industry, we're able to simulate buildings to give a client a clear idea what a house would look like on-screen.</p> <p>In most cases it is necessary to have a functional product on the table before a tender can be applied for. It is often necessary to produce parts in as simple and cost-effective a manner as possible.</p> <p>Technimark's involvement with CUT has made it necessary to also develop exhibition products, enabling us to create an exhibition structure using existing products.</p> <p>Using rapid tooling we are able to render a cutting-edge tooling service.</p> <p>Assistance from the support programmes provided by the NRF, THRIP and Tshumisano SMMEs can help small companies achieve great success. Support from CUT's teams at CRPM and PDTS have also been invaluable.</p>
	<p><b>Prof. Laetus Lategan</b>  <b>Dean: Research and Development, CUT</b></p> <p><b>Scientific Incubation: The "Interim" as a case study in science writing</b></p>
	<p>The public often views science as highly complex. We need to find a way to take the complexity away, and get scientific results into the public sphere.</p> <p>UoTs should be mindful of policy developments. Research has been in the spotlight until now; there is a need for increased research outputs, and an increase in the number of PhDs produced at UoTs. Technikons only became degree-awarding institutions in 1994, a mere 15 years ago. It is important for UoTs to develop their own research culture, tailor made for their own purposes.</p> <p>In particular UoTs, there is low participation in the 'article' culture. In 2002, CUT</p>

	<p>started an initiative to increase publications – the ‘Interim’, a peer-reviewed journal. ‘Interim’ has two focus areas, namely novel as well as senior researchers.</p> <p>It has an editorial board to oversee liaison, review and development. It serves not only as a developmental tool for staff and students, but also for those involved in the journal. There is a continuous process of interaction to foster development.</p> <p>It is not important only to boost staff and students, but a model was also developed to increase research skills. 14 editions of the journal have been published to date. 260 authors contributed to 153 articles of which 33 were students, and 30 were external authors. 30% of these articles were published in accredited journals. This represents an institutional improvement in accredited outputs of more than 300%.</p> <p>It remains a challenge to sustain this good track record. Research is conducted into areas that crop up in order to further the developmental aspect. Some of these observations include:</p> <ul style="list-style-type: none"> <li>• Title – is it suited to the content?</li> <li>• Abstract – summary of what the article is about</li> <li>• Introduction – what can the reader expect?</li> <li>• Problem, aim and objective of article</li> <li>• Literature – latest, and not only supportive of your line of argument</li> <li>• Explain methodology</li> <li>• Explain data sample and models</li> <li>• Interpretation – discussion and analysis of data</li> <li>• Discussion of research results – no contribution to solving problem</li> <li>• References</li> <li>• Self-assessment: why this article? Structural, critical and value-adding review.</li> <li>• Article language – matters such as study, assignment, report, and first person references, etc.</li> <li>• Technical requirements</li> </ul> <p>Institutional lessons learnt from ‘Interim’:</p> <ul style="list-style-type: none"> <li>• Interim contributed to the academic profile of an emerging university, and as a valuable marketing tool.</li> <li>• It serves all the academic disciplines and faculties;</li> <li>• Academic development, capacity-building and critical mass;</li> <li>• Whatever is done should be put in the public domain;</li> <li>• External interest in the model;</li> <li>• Time consuming, but rewarding.</li> </ul>
Discussion	<p><b>Q: I take particular note of the observation that there are issues around problem solving and communication. I think the CCFOs that were</b></p>

	<p>promulgated in 1997 highlighted problem solving and critical thinking and communication, which are meant to be embedded in the SA education system across all levels. I wonder if there is a way to communicate this concern to the education system, and use the tools we have properly to address this problem.</p>
	<p>R: Regarding communication, apart from the inability to communicate clearly in scientific language, we have a challenge not just communicating across language barriers, but there are also constraints between different paradigms.</p>
	<p><b>C: I was under the impression that there are various platforms of curricula - if you use pedagogy as practice, the CCFOs are built into the curriculum. They cannot be separated or taught in isolation.</b></p>
	<p><b>Q: Dr van Rijswijk, you indicated that the right person is not necessarily an expert – could you expand on that?</b></p>
	<p>R: Innovation is a skill – you don't necessary need to have a degree or diploma to be innovative. It is more about attitude and vision, perhaps more related to the softer skills of engineering, a way of seeing things. When you have a PhD, people think you're an expert and therefore you must be able to innovate – that is not necessarily the case.</p>
	<p><b>C: What are the implications for disciplines and specialisations in multi-, inter- and trans-disciplinary research? Are we looking at training people with an understanding of engineering, but not necessarily as a discipline <i>per se</i>? Don't we need to think differently about our programmes and degrees, and what constitutes outputs?</b></p>
	<p>R: In a company, you have a guy in charge and a board of directors, a line of project managers, engineers, technicians – it is a pyramid. We must not all become project managers, or innovators. We need people to come up with ideas, and people to make them work. Yes, innovation is important, but everyone need not be an innovator, then we might not have experts to do the work.</p> <p>In answering the question about what degrees should look like – at Delft, they have groups researching innovations in communication. They look at how to write publications, at the same time they give classes on how to do this – they also look at the visual technologies needed to communicate. I don't see the need to change the system – there might just be some ingredients added.</p>
	<p><b>C: If we did a comparison of UoT and university graduates, which would you employ as technicians? Problem solving and thinking skills depend on certain subjects – we don't do philosophy anymore, which helps people think in different ways. What would you suggest in terms of curriculum to enable students to make contributions to discussions?</b></p>
	<p><b>C: How do you transfer technology among institutions, and between institutions and industry – are there guidelines for transfer of material agreements? Are there IP transactions to be managed?</b></p>
	<p>R: As a company we need employees from all the ranks, and we need more artisans, technicians and engineers. I understand there might be some changes required, but if everybody started producing engineers, where would</p>

	<p>we get technicians? Moving towards a new goal might leave a gap somewhere else.</p> <p>Changes in curriculum would depend on your output. If you want to produce technicians, don't change, just improve what you have. At engineering level, focus on communication and problem solving skills. This is a general type of problem.</p> <p>Perhaps an example could be when universities and UoTs cooperate with industry to start developing technologies – there will always be a clause regarding IP and how the partners in the consortium will deal with it. It is important to agree on things before starting the research. It also depends on who is funding the research.</p>
	<p>R: It depends on the structure and purpose of the company. In our case we had a specific focus, so we had particular challenges. We had to find ways to respond to the market quicker. I don't think there is a specific policy regarding that.</p>
	<p><b>RESEARCH, INNOVATION AND TECHNOLOGY TRANSFER</b>  <b>Chair: Prof. Thandwa Mthembu</b>  <b>Deputy-Chairperson SATN and VC, CUT</b></p>
	<p><b>Prof. Dr Thomas Dobbelstein</b>  <b>Academic Head: Market Research Institute Customer Research 42, Baden Württemberg Cooperative State University, Ravensburg, Germany</b></p>
	<p>Technology transfer should always be based on a dialogue. My presentation will deal with the organisational and legal structures needed for mutual transfer, as well as some examples.</p> <p>The central question is – how does Baden-Württemberg Cooperative State University generally stimulate the mutual transfer of innovation and technology.</p> <p>The university was established in 1974, an initiative of Bosch, SEL and Daimler Benz, which identified the need for a different type of training that included practical experience. They approached the federal State of Baden Württemberg to establish such a university. There was close cooperation between the university and industry. We are State run – the State provides the buildings and salaries for staff, while the companies pay for corporate training and students' wages. You are not allowed to study at our university if you are not employed by a company. Governing bodies are composed of representatives from both partners.</p> <p>How does it work? Students stay at the university for three months, and spend three months at the company, on a rotational basis. This way, they get both theoretical and practical knowledge. Our university has roughly 800 industry partners.</p>

	<p>How does the university stimulate knowledge transfer? We don't do basic research, which we're not allowed to do by law. We only do applied research, referring to real problems identified by the companies. We must know about the problems that the companies have, so we need a very close link between the university and the company. This is achieved through the local management of the campus, the President and Provost, the Deans, Heads of Departments and lecturers. Roughly 40% of teaching is done by academic staff of the university, and 60% of teaching is done by people employed in the company, who must have some academic background. The Local Board of Governors of a university site will consist of 50% company representatives and 50% of university representatives. On the level of the lecturers and faculty, there is an advisory board, also consist of members of the two partners.</p> <p>How do you encourage academic staff to transfer knowledge? We have a few ways to do this:</p> <ul style="list-style-type: none"> <li>• Third-party funds within the university;</li> <li>• University associated with institutes;</li> <li>• Private research and transfer institutes;</li> <li>• Academic staff members are given the freedom to develop semi-private transfer initiatives.</li> </ul> <p>Examples of transfer:</p> <ul style="list-style-type: none"> <li>• IBM is one of the biggest partners of Baden-Württemberg. Students worked on a method to shorten the functionality check for new PCs.</li> <li>• Formula Student – students developed their own racing car, allowing students to take part in motor-racing. A part of the car must be a new invention. Management students are also involved in this process.</li> <li>• EABS, a company involved in airline manufacture, asked the university to develop a mechanism to manage traffic flow, for which a zeppelin with a GPS system and camera was developed.</li> </ul> <p>Measuring the success of transfer projects:</p> <ul style="list-style-type: none"> <li>• Funding received;</li> <li>• Patents registered;</li> <li>• Success of student careers – 84.8% of students are employed before writing their final exams. IBM analysed the careers of the students they employed, and determined that DHBW students make more rapid career progress than other students.</li> </ul>
Discussion	<p><b>Q: I have an ethical question. Your university has very interesting origins, being closely linked to business. Universities are supposed to be the cradles of the moral tapestry of society, how do you protect yourself from the big business offensive?</b></p>
	<p>R: At the end of the day our goal is different to that of the traditional universities. We only have two faculties, Engineering and Management – we focus on these disciplines because they serve the companies' needs. If the big</p>

	companies say we are no longer interested, we will have a problem. That academic freedom of developing thoughts and new things that relate to humanity do not apply to us. I personally say sometimes it would be nice to have that, but at the end of the day he who pays the piper calls the tune.
	<b>Q: If students register patents, who do they belong to – the student or the employer?</b>
	R: It is the same as with any employee – if a company employee invents something and patent it, their patents will be handled in the same way.
	<b>Q: How do you manage the tension between profit and knowledge production? How do you develop the educational/lecturing capacity of the lecturing staff in companies?</b>
	R: Generally speaking they should have an academic degree, a Masters degree. This does not mean that they are necessarily brilliant teachers – we have centres for personal development to provide these lecturing staff with one-week courses on how to teach. We are interested in them because they work in the companies, so teaching is something that they do to benefit society – the money paid is ridiculously low. We advise them to take one of these one-week courses to get some basic knowledge, but not all of them do it because they might not have the time.
	<b>Q: Do you think that companies that partner with you might be ready to duplicate the model of cooperation with you elsewhere in the world?</b>
	R: If we do an analysis of our students and where they come from – we have a few students from other countries. Whether this model can be transposed to other countries – I sometimes have students working at companies elsewhere in the world, so it depends on the labour market and what is in it for the companies. We have had talks with SA companies in the past, and in some areas they might be interested in that model.
	<b>PANEL DISCUSSION ON INNOVATION AND TECHNOLOGY TRANSFER</b>
	<b>Dr David Phaho:</b>  I tried to find a good description of ‘innovation’ – it is new thinking that benefits and enhances society. This thinking can also benefit the UoTs but also government entities.  Every year it is said that African countries use about 9kg of fertiliser per hectare per year, where countries like China use about 170kg per hectare per year. We have huge resources of phosphate rock in SA, so imagine if a UoT could set up seasonal offices to advise subsistence farmers in SA on what kinds of fertilisers they may need that season – they could increase their yields and make a better living. We would be using our resources more effectively and enhance people’s lives. We also need to think about the effects on the environment – we need to harness the spin offs of these processes. Innovative thinking can be used to turn existing processes around, like using gypsum from the creation of phosphoric acid to create housing, for example.

	<p>Our UoTs have a role to play in helping governments meet social imperatives, to find solutions to social issues. Innovation is not necessarily about the advanced stuff, like rapid prototyping, but also to address simple, grassroots problems like crop yields, housing and environmental issues.</p>
	<p><b>Dr Steven Ehrmann</b></p> <p>I'm most interested in teaching innovation. I heard from Geology professors that they asked their students on the first day of class how they preferred to study, alone or with a friend. In each case the students were split about fifty-fifty. The faculty member in the Geology class asked students to think about how they study. He asked them to stick to the way indicated, and if they wanted to change, to tell him. What they would do with the information was that they would work out an average grade for those studying together and those who study alone.</p> <p>How many of you have done this, as teachers. How many would like to try that? There is no way you could tell when someone has already started doing that.</p> <p>What can you come up with that might be worth telling other people about? What do your institutions do that others should know? Perhaps we need to find ways to talk about how we do our work, because others might benefit from it.</p>
	<p><b>Prof. Alwyn Louw</b></p> <p>'Sometimes all you need to invent something is a good imagination and a pile of junk', Thomas Edison</p> <p>We can talk about ideas, but there is more to innovation than the quote above. What else is needed? Innovation is like a dishwasher – it requires energy and someone to use it. It does make life easier, but it needs input, process, legitimacy and willingness to use it.</p> <p>There is no way that our institutions will become innovative if there is no creative and conducive environment to do so. The leadership in an organisation must create such an environment and processes to generate ideas. It is necessary to think creatively about how the UoT environment can be adapted to serve these needs. Research has to be allowed to mature, outcomes need to be harvested, and ideas must be given time to reach fruition and be optimised. The university has to ensure that research also translates back to the curriculum.</p> <p>In a specific environment systematic discipline to facilitate the process is needed. The requirements of the initiative have to be conceptualised and</p>

	<p>specified before the design phase is initiated. Look at the inputs needed to facilitate the process. To what extent can the cost of input be reduced while ensuring that the value of the output increases? These ideas have to inform thinking around innovation.</p> <p>A stimulus is often needed, and should ideally be at the hub, surrounded by smaller focus areas, which would result in transfer of knowledge and skill in a two-way exchange. The same facility can be used in various environments to facilitate output.</p>
Discussion	<p><b>Q: I have a very happy business relationship with UoTs – I found out about this conference by chance. I think there is a great opportunity for business and UoTs to interact and discuss mutually beneficial relationships.</b></p>
	<p>R: The Board of SATN will take your recommendation in consideration, thank you.</p>
	<p><b>Q: We heard of the traditional approach of having an idea and developing it through the various processes – can this be turned around? Is the key to technology transfer about pushing things down people’s throats – would we not make quicker progress by identifying a problem and working backwards? It would be helpful not to have to find a market later.</b></p>
	<p>R: I think the important issue is that we must not become dogmatic about processes. If there is a certain level of knowledge and information available, and you want to introduce it into an environment, it is a matter of interpreting the environment and understanding the context, and finding a logical stage at which you can start the process. If there is low-level understanding, you need to adapt. We talk about internal and external capacity and expertise – we need to see where the logical position of expertise in the relationship should be. We need to know what knowledge and capacity we need in a given context.</p>
	<p><b>C: The question that keeps coming up is the place of the humanities in UoTs, if innovation is about serving humanity?</b></p>
	<p>R: When people hear ‘technology’ they see a computer on the table. In the end, to start to understand that technology is a multi-dimensional issue, that could involve a range of applications. The acceptance of new ideas is a social process – if people do not accept new ideas, it does not become a technology, it remains an idea. We need to understand things like the marketing plan and business skills to market technology. Why is this not happening? Because we think only of the product we develop, and not the person that needs to use that product. We need to think about the human interaction with our products to use technology more effectively.</p>
	<p>R: It is true – my example of using gypsum to build homes is good in theory, but people need to understand the value proposition for them to accept those alternatives.</p>
	<p><b>C: I’ve been listening to how much wastage we have and what we can do to reverse the situation. One thing we need to keep in mind is that our national priorities are championed by a Minister who might not have</b></p>

	<b>reached the level of understanding that we may desire. We need to find ways to help this country move forward by turning the response time for delivery up. Is it not possible for us to come to a point where we adopt a Minister?</b>
	R: We had a project where we got money from a benefactor. The way things evolved meant that we were selling video materials for college courses, and we used the income to pay salaries and do marketing, so we could use the funding exclusively to develop the product. This led to a different mentality – our attention was more focused on the product and the people who used it. It helps if the focus can be shifted towards the people that would use the product.
	R: In Australia they succeeded in closing the loop. In other words, the identification of need, the allocation of resources and so forth was defined in the national context – this meant that planning throughout is defined by a clear perspective throughout the system. The idea of adopting a minister has merit, but we would have to define the relationship clearly. We need to position the SATN as a facilitating body to get agreement on a national agenda, which could incorporate innovation. We need to formalise this type of interaction as soon as possible. If there is a better understanding of the agenda, resources can be better harnessed.
	<b>Q: We heard about the relationship between UoTs and traditional universities – I heard the word ‘training’ only once in this conference. We need to look at articulation in the system. The HEQF has been gazetted, but it is almost as if the UoTs are not quite ready to engage the schools and colleges and see how we can interact with these institutions. It is perhaps a plea that the next SATN conference should put colleges in a position of priority.</b>
	R: On the 15 <sup>th</sup> there was a meeting between the CEOs of FET Colleges and VCs of UoTs to set up a plan of action to interact and achieve articulation between the FET sector and UoTs. Indeed, this conference may not have concentrated on the issue of articulation, but it does not mean that we have not given the issue thought.
	<b>BOOK LAUNCH:</b> <b>‘The Place and Role of Universities of Technology in South Africa’, Prof. Roy du Pré</b> <b>‘Managing Applied Research: Theories, Cases and Perspectives’, Prof. Dr Ulrich Holzbaur and Prof. Laetus Lategan</b>
	Since 2000, when the notion of Universities of Technologies was first mooted, a document to clarify the role and position of UoTs was compiled by a task team. In 2004, a definitive book was published to clarify the position, role and function of UoTs. A follow up on this book, ‘The Place and Role of Universities of Technology in South Africa’ was created with sector-wide input from a range of stakeholders, published by SATN.  A special SATN issue of the Kagisano journal will also be devoted to the work of UoTs, and will be published in the foreseeable future.

	<p>A book titled 'Managing Applied Research: Theories, Cases and Perspectives', by Prof. Dr Ulrich Holzbaaur and Prof. Laetus Lategan was also launched. The book contains a collection of reflections on the management of applied sciences.</p>
	<p><b>CONFERENCE CLOSE</b>  <b>Prof. Roy du Pré</b>  <b>SATN Chairperson and VC, DUT</b></p>
	<p>Prof. Roy du Pré expressed a word of thanks to all the individuals who contributed to making the conference a success. The host for the conference, Prof. Tanga, the VC of CPUT, and the staff of the institution were thanked for making their facilities available.</p> <p>Prof. van Rensburg and Christelle Venter of SATN, as well as their team of helpers, were thanked for making the conference a success. Prof. du Pré stated that the conference has been groundbreaking, and that UoTs should know exactly where they are going in future. All universities in SA are equal, they just have different focus areas, and UoTs will make sure that they work together to make South Africa a success, and the world a better place to live in. When we talk about 'partner or perish', we are serious – we can't make the world a better place on our own.</p> <p>UoTs need to go out and spread the world about what goes on in higher education. A further challenge is to spread the word in our own institutions, so that our own staff can make the shift, and embrace the changes that are needed. Unless we keep up with changes in the rest of the world, we will become extinct – we have a massive job to do both inside our own institutions to change attitudes, but also in the world out there. The world will not wait for us.</p> <p>The last challenge is to change the mindset of university Councils – many of the Councils do not understand what higher education is about. VCs need the support of their Council members to become universities of excellence.</p> <p>Thank you for coming to the conference, go back and do a great job back home.</p>