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FINAL REPORT

THE DEVELOPMENT OF PERFORMANCE INDICATORS FOR UNIVERSITIES OF TECHNOLOGY (UoTs) AND UoT-RELATED PARTS OF COMPREHENSIVE UNIVERSITIES (CUs)

November 2008

FINAL REPORT ON THE PROJECT PERTAINING TO THE DEVELOPMENT OF PERFORMANCE INDICATORS FOR UNIVERSITIES OF TECHNOLOGY (UOTs) AND UOT-RELATED PARTS OF COMPREHENSIVE UNIVERSITIES (CUs)

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FOREWORD

Universities of Technology came into existence in South Africa on 1 January 2004. It was however recognised that the concept of a university of technology was not well-known in South Africa and steps had already been taken to inform South Africans of this new type of higher education institution in the South African higher education landscape. In 2001, the Committee of Technikon Principals (CTP) prepared a discussion document outlining a philosophy of a university of technology. Once the first technikons took on the new designation in January 2004, a more detailed document was prepared and disseminated to universities of technology, as well as the higher education, public and private sectors. The book. "Position, Role and Function of Universities of Technology in South Africa," was the first major effort to spell out what a university of technology was, and its place in the higher education landscape.

In 2006, representatives from the universities of technology in Finland visited South Africa and engaged with their South African counterparts regarding their experience of change from one institutional type to another. Out of this interaction in the last 3 years came the Finland/South Africa agreement with the national Department of Education which provided funding for identifying performance indicators for Universities of Technology (UoTs) and certain programmes of Comprehensive Universities (CUs). The South African Technology Network (SATN), a network of the universities of technology in South Africa, was tasked to manage the project. Fifty representatives from five UoTs and three CUs participated over an eight-month period in the project, resulting in this comprehensive report which was approved by the Board of the SATN.

Before the performance indicators could be identified, it was firstly necessary to characterise and typify UoTs, and secondly, to conceptualise a development trajectory for universities of technology. The characterisation and the development trajectory were the most important contributions of this project to the understanding of the nature of universities of technology.

In the transformation from a "Technikon" to a "University of Technology," the brand of these institutions was lost due to the name change. Consequently, UoTs are the unknown part of the "*the single co-ordinated higher education system which promotes co-operative governance and provides for programme-based higher education.*" This project provided the information to establish this new brand of career-oriented educational institutions which concentrate on problem-solving in their research and engagement with the community.

Obviously, not all the characteristics, attributes and criteria are unique to UoTs. However, it is the combination of technological competence, career-oriented programmes (with advisory boards), learning in the workplace (Cooperative Education and Work-integrated Learning), applied and multidisciplinary problem-solving research, partnerships with business and industry, entrepreneurship, enrolments mainly in SET (Science, Engineering and Technology), and widened access, which is the prominent feature distinguishing UoTs from other higher education institutions.

As the issues of differentiation and quality are of major importance, a set of sectoral performance indicators to monitor the development of UoTs will play a major role in the trajectory of this institutional type. The Finnish validation of the performance indicators proved to be invaluable as it confirmed the relevance of the outcomes.

The set objectives of the project have been attained and is complete. However, it is essential that the process of sectoral implementation of the Performance Indicators (PIs), together with its consequences, should receive urgent attention.

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EXECUTIVE SUMMARY

1 INTRODUCTION

This project emanated from a workshop for representatives of Universities of Technology and Comprehensive Universities organised by Mr Enver Motala as part of the SA/Finland Education Co-operation agreement. The workshop was held on 10 and 11 April 2008. At its conclusion it was decided that the South African Technology Network (SATN) would submit for funding a project proposal on developing performance indicators for Universities of Technology and Comprehensive Universities.

The project commenced with a budgeted plan and implementation strategy for the development of a set of performance indicators by which UoTs and UoT-related aspects of CUs want their performance in teaching/learning, research and innovation, and engagement with society to be measured. It also identified the unique contributions of UoTs in terms of these three functions and gave some pointers on the identity of UoTs in South Africa's differentiated HE system. A set of performance indicators acceptable to the sector, and a development trajectory for UoTs and UoT-related aspects of CUs, were then developed. The DoE and other relevant players, such as the CHE/HEQC, were engaged on these documents and their implications. Further co-operation between institutions in Finland and South Africa is envisaged.

2 METHODOLOGY

The design of a detailed project plan was paramount to the success of the project, and entailed the following seven phases:

Phase 1: Development of a Detailed Project Plan
Phase 2: Design of an Identity Map and a Sector Development Trajectory
Phase 3: Identification of an appropriate set of Institutional Performance Indicators
Phase 4: Discussion of a set of Identified Performance Indicators with the Finnish Experts and the DoE and HEQC to finalise the assessment framework
Phase 5: Testing and piloting of the calculations of Performance Indicators
Phase 6: Presentation of a set of tested Performance Indicators to the SATN Board
Phase 7: Presentation of a set of SATN approved Performance Indicators to the DoE, the CHE and the CEPD
Phase 8: Final Project Report

These phases were executed during various workshops and seven interim reports were produced and submitted to the VCs of all UoTs and CUs, as well as to the CEPD, in order to ensure transparency and co-operation.

The characteristics of UoTs were identified and the attributes of these characteristics described. The criteria underpinning the attributes were described, and the performance indicators for assessing the criteria then proposed. The proposed PIs were then internally and externally validated.

. In the final report specific recommendations have been inserted at key points to support ongoing discussions with the DoE and other role players on the position and development of UoTs as part of a differentiated HE system.

3 DEVELOPMENT TRAJECTORY

From their inception the distinctive *contributions of UoTs* lie in the way in which the typical university functions of teaching/learning, research and community engagement are performed. The paramount characteristic of UoTs in all three functions is technology.

With this strategic focus in mind, curricula are developed around a graduate profile defined collaboratively with industry and the professions. Curricula are aligned with the labour market needs and human resource development challenges facing our country.

The contribution of UoTs to research lies in the development of a new understanding of a problem through the application of new and/or existing knowledge to the problem. Research at UoTs straddles three issues:

- the application of knowledge to address business and industry related problems;
- the training of high-level technologists, and
- the inclusion of a multidisciplinary focus in research.

UoTs' contribution to new knowledge and technology transfer is evident in the recent published annual report of the Tshumisano Trust. It is clear that the sector has contributed extensively to the National System of Innovation.

The contribution of UoTs to the community goes beyond the disadvantaged 'societal' community as it also embraces the labour market and the professions. This is evidenced by the fields of study offered at UoTs, *inter alia* education, government sciences, arts, fashion and hospitality management. Thus, the community that UoTs engage with comprises of government, industry, business and the social community, addressing problems within the world of work and society.

Over the years the black student cohort of UoTs has increased substantially and represents a key contribution by these institutions to HE. Black students

currently form the majority of enrolled students at all UoTs, thereby enhancing economic development by addressing the skills shortages in South Africa.

As to the *current position of UoTs,* they are on a developmental trajectory and should be given a time period with the necessary facilitation and funding to develop, in order to fulfil their role in South African Higher Education. Their development has been impeded by issues such as policy directives (e.g. the HE Act and the HEQC, SAQA and DoE process for the approval of academic programmes), systemic drivers (planning, funding and quality) and the implications of the merger process. In order to support ongoing discussions on these issues, it is recommended that:

- a clear distinction be drawn between traditional universities, CUs and UoTs, and that UoTs be recognised and marketed as leading institutions of socioeconomic development in SA;
- a shorter process for the redesign and approval of academic programmes be developed in order to enable UoTs to respond to market needs and to deliver appropriately trained workers in time to satisfy employer requirements;
- all issues impacting on research and research outputs be addressed as part of the differentiation debate, in consultation with all role players;
- the backlog (infrastructure and staffing) at UoTs, especially in light of the prescribed enrolment shape of a particular institution, and the SET enrolment targets set by the Minister be investigated in order to determine what interventions are needed to ensure that all institutions are on the same footing when competing for HE funding allocations;
- institutional outputs, as well as the benchmarks thereof, be clearly defined in order to enable UoTs to achieve these outputs and to compete with other universities on an even footing for HE funding;
- avenues for development grants be part of the differentiation debate in order to enable UoTs to be funded and developed into fully fledged universities;
- the process leading to the final HEQF includes thorough consultation with all role players in order to address issues such as the NQF level of diplomas and the interpretation of the nested approach to qualifications design, and
- the negative consequences of the mergers on the development of UoTs be brought to the attention of the Minister of Education continuously.

. Shifting from the current position of UoTs to their ideal position, the *characteristics, attributes and criteria* of these institutions are described in preparation for the PIs to be proposed in the final part of the report.

Five characteristics have been identified, namely

- **Technology focused programmes**, with undergraduate career-oriented education and technological competence as attributes;
- **Research and innovation** in and through technology and technique in strategic areas, with the attributes of technology transfer and postgraduate programmes;
- **Entrepreneurial and innovative ethos**, with the creation of an enabling environment, commercial ventures and student entrepreneurship as attributes;
- **National and international impact and recognition**, with SET-enrolments and successful access as attributes;
- **Sustainability in engagement and practice**, focusing on regional collaboration, community involvement, school/post-school engagement and financial sustainability.

That these characteristics and attributes are not unique to the South African context is illustrated by references to the UK, Finland, Germany and the USA.

It also stands to reason that not all the characteristics, attributes and criteria identified in the report are unique to UoTs. There will always be differences of opinion, but the feedback from various institutions indicated that technological competence, career-oriented programmes (with advisory boards), learning in the workplace, applied and multidisciplinary research, partnerships with business and industry, entrepreneurship, SET enrolments and access are the more prominent ones distinguishing UoTs from other institutions.

It is recommended that UoTs be empowered to address the skills and economic needs of South Africa in terms of their distinctive characteristics and/or approach to teaching/learning, research and community service.

4 PERFORMANCE INDICATORS

. *Performance indicators* could be defined as empirical, quantitative and qualitative data that measure the effectiveness of a system and/or an institution in attaining its goals.

Although they could be used for various purposes, they are developed in this project to differentiate UoTs from other institutions, to assess and improve performance and to measure the development of this sector. In the process an attempt was made to validate the PIs against the five characteristics and to align them with the identified attributes.

A total of 508 measurable PIs have been proposed for discussion and validation. Feedback received from UoTs has been incorporated, while the PIs have also been classified in terms of input-output-process-developmental-institutional-uniqueness to UoTs and their applicability to the

HE sector as a whole. The proposed PIs were then finally subjected to a test case, answering the question as to how they "deliver" in practice.

While the number of PIs may need to be reduced, or consolidated and simplified, the original formulation has been inserted in this final report in order to support the work of the Data Sharing Project Committee. The process may require refining, rather than reducing, the PIs. It may be prudent to implement their findings as soon as possible in order to indicate to the SATN Board what the process of refining entails.

It is recommended that the process continue and that UoTs eventually be measured, funded and developed on the basis of the sector consulted and the internationally verified set of PIs identified in this report.

5 ASSESSMENT OF THE PROJECT BY FINNISH EXPERTS

Dr Aki Valkonen of the Laurea University of Technology (Finland) and Prof. Seppo Saari of the Finnish Council for Higher Education Evaluation produced a 29 page assessment of the project.

The project plan and progress so far (all reports) were tested against the acid test model. The authors' joint view is:

- That the project plan satisfies the acid test model requirements very well.
- That the progress, especially since April 2008, has been remarkable.
- That readiness to finish the project in time/at specifications exists.
- That understanding of the need to prepare for the next project with a broader funding base exists.
- As a minor remark, the logic of the project phase/action numbering might require a bit more linear logic.

6 CONCLUSION

The present project - that of identifying PIs - reached its conclusions through extracting data to populate the PIs. A range of issues requiring further action emerged from the project. The validators raised, *inter alia*, the following:

- Urgent attention is required with regard to assessing the readiness of institutions to implement the proposed PIs.

- Targets and benchmarks need to be developed. It would have to be determined how this would be facilitated - the data would have to be analysed before agreement could be reached on these aspects. A new project plan would have to be developed for this project in order to secure the necessary resources from possible funders. Once funds have been secured for the continuation of the project, based on evidence that the first phase has been concluded satisfactorily, the process can continue. The final assessment of the current project by the Finnish experts would be available to strengthen the funding request.

- An annual profile of UoTs, based on the PIs, could be produced once the PIs are accepted and implemented.

- The role and participation of CUs in the project needs to be ascertained. While there is informal acknowledgement of the work done to date, and definite applicability of the PIs in the CU context, the support and participation of CUs still has to be confirmed. It is important that CUs be kept informed about the project's progress.

- According to the Finnish experts, the project has been conducted in a logical and sensible manner, reflecting good professional practice. The system will however still be complex, although the main characteristics are justified. The momentum that has been attained should not be lost because of sectoral politics. There are useful and valuable ideas that could benefit individual institutions in their strategic planning and development, and also influence thinking about the HE system as a whole.

The set objectives of the project have been attained and it is complete. However, it is essential that the process of sectoral implementation of the PIs, together with its consequences, be considered.

SECTION 1: INTRODUCTION

1.1 Background and purpose of project

This project emanated from a workshop for representatives of Universities of Technology (UoTs) and Comprehensive Universities (CUs) organised by Mr Enver Motala as part of the SA/Finland Education Co-operation agreement. The workshop was held on 10 and 11 April 2008 and at its conclusion it was decided that the South African Technology Network (SATN) would submit for funding a project proposal on developing performance indicators for UoTs and CUs. A final proposal was submitted to Mr John Pampallis, Director of the Centre for Education Policy Development (CEPD) on 22 April 2008. The MoA contract was signed on 1 and 8 May 2008 by representatives of the SATN and CEPD respectively.

The work performed in terms of the MoA resulted in various workshops and seven interim reports, which were submitted to the VCs of all participating UoTs and CUs and the CEPD in order to ensure transparency and co-operation. The purpose of this final report is to present a sector consulted and approved, internationally verified and evidence based set of performance indicators (PIs) for differentiating and assessing UoTs as part of the higher education (HE) landscape in SA. The information presented could eventually be used for funding and developing this type of institution, thereby addressing the skills and economic needs of our country more effectively.

1.2 Project objectives and outcomes

The objectives of the project were:

- to develop a set of performance indicators by which UoTs and UoT- related aspects of CUs want their performance in teaching/learning, research and innovation, and engagement with society to be measured;
- to identify some unique contributions of UoTs to academe in terms of research, scholarship and innovation;
- to give some pointers on the identity of UoTs in South Africa's differentiated HE system, and
- to project a sub-sectoral development trajectory for UoTs, and to some extent, CUs.

Expected outputs and outcomes include:

- a set of evidence based performance indicators acceptable to the sector;
- a document that identifies the unique contributions of UoTs and identifies them as a sub-sector in a differentiated higher education system component;
- a documented sector development trajectory for UoTs and CUs;
- engagement with the DoE and other relevant players such as the CHE/HEQC on these documents and their implications, and
- further co-operation between institutions in Finland and South Africa.

1.3 Methodology

The design of a detailed project plan was paramount to the success of the project. The plan was finalised by a task team consisting of an expanded SATN UoT Typology Project Committee and the Chairpersons of the different SATN Project Committees. The following people were members of the task team:
Dr Marié Fowler (TUT)
Dr Prins Nevhutalu (TUT)
Dr Engela van Staden (TUT)
Mr Dhaya Naidoo (TUT)
Prof Heather Nel (NMMU)
Dr Cay van der Merwe (CUT)
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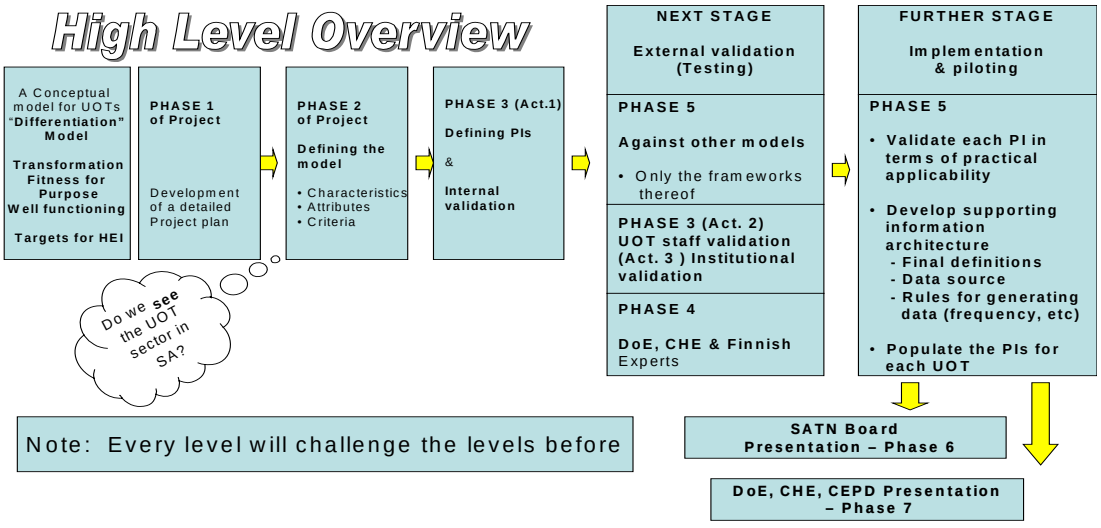
Prof Prakash Naidoo (VUT)
Mr Alpheus Maphosa (VUT)
Prof Chris Jansen van Rensburg: Project Leader
Ms Christelle Venter: SATN Co-ordinator

This project plan constituted the *First Phase* of the project and is represented schematically in *Figure 1*.



Phase 2 involved the design of an Identity Map and a Sector Development Trajectory. Performance indicators can never be developed in a vacuum. They must always be contextualised and related to structure and goals. In the case of performance indicators for universities of technology the current position, characteristics and future development of UoTs had to be taken into account.

The outcome of this phase was a comprehensive document featuring the characteristics, attributes and criteria of UoTs. The enablers and benchmarks for attaining these attributes were discussed, but not finalised. This will have to be done as a follow up to this project. The document formed the basis for the development of performance indicators for the sector. The latter introduced the initiation of Phase 3 of the project, which consisted of three distinctive but interrelated activities.

Phase 3 (Identifying an appropriate set of Performance Indicators for the sector) commenced with research into, and the identification of, acceptable performance indicators appropriate for the UoT and CU sectors and the preparation of a draft document on sectoral PIs. After a two day workshop on 27 and 28 May 2008, Activity 1 of Phase 3 resulted in a document wherein the identified/suggested PIs were presented by an expert team. Dr Nico Cloete assisted the team with the identification of these indicators in his capacity as a specialist consultant.

The outcome of activity 1 of phase 3 was an elaborate list of characteristics, attributes, criteria and performance indicators that not only endeavoured to differentiate between UoTs (and CUs) and traditional universities, but also strived to distinguish how these sectors act differently in delivering their joint task of teaching/learning, research, and community engagement in the South African HE landscape.

This document served as the basis of the second activity of Phase 3, namely to report back to UoTs and CUs and to familiarise a wider institutional representative forum of the UoTs and CUs with:

- the intrinsic characteristics and value of each PI
- the application and implementation of each PI in the institution.

For this purpose about 40 representatives of the UoTs and CUs attended a workshop on 12 and 13 June 2008. The institutions concerned were responsible for the selection of representatives. The outcome of this workshop was, as previously mentioned, a revised set of proposed performance indicators for UoTs and related parts of UoTs.

Activity 3 of Phase 3 entailed an institutional alignment of PIs, where the PIs that were agreed upon during the workshop of 12 and 13 June were debated in the individual institutions. For this purpose, delegates nominated institutional leaders who were responsible for organising and running institutional performance indicator alignment workshops. These institutional workshops were concluded by the end of July 2008.

In Phase 4 the set of identified PIs was discussed with Finnish experts and representatives from the DoE and CEPD for comment and input. This was done at a two day workshop on 20 and 21 August, with the outcome being an externally verified set of appropriate institutional PIs.

The fifth phase of the project entailed the testing and piloting of the calculations of PIs. This necessitated the preparation of data sets for institutional profiles according to the nominated PIs, and will result in an institutional profile for each of the participating institutions.

The sector consulted and approved, and internationally verified, set of institutional PIs was presented to the SATN Board (Phase 6) on 14 October 2008.

1.4 Structure of this report

The document begins with a section that considers the current position of UoTs in terms of their contributions to teaching/learning, research and community engagement, and discusses certain broad issues, projecting the developmental trajectory of UoTs. The next section moves to the specific characteristics, attributes and criteria of UoTs (at both national and international level), which serve to identify them within the HE system and to inform the proposed set of performance indicators. The fourth and main section tabulates the sector consulted and internationally verified set of PIs against which UoTs want to be measured for the purposes of differentiation, assessment and development.

Specific recommendations to support ongoing discussions with the DoE and other role players have been inserted at key points in the report.

The report is concluded by a selection of issues raised by the internal and external validators, some definitions, the literature consulted and certain addenda which informed and guided the project.

SECTION 2: THE CURRENT POSITION OF UNIVERSITIES OF TECHNOLOGY IN SOUTH AFRICA

2.1 Orientation

The National Plan for Higher Education (NPHE, 2001) gave effect to the vision for the transformation of the HE system outlined in the Education White Paper 3. Part of the suggested strategic intervention was the reconfiguration of the educational landscape by means of various mergers, and the conversion of technikons to Universities of Technology. The mergers and conversions resulted in three types of institutions, namely universities (traditional/academic), universities of technology and comprehensive universities (universities comprising of both the first two types of universities).

In light of this reconfiguration, the sections entitled “The current position of UoTs,” and “How can their development as universities be enhanced?” draw mainly from the SATN document “Universities of Technology in South Africa: Position, role and function” (2007). It is argued that UoTs are on a developmental trajectory and should be given a time period with the necessary facilitation and funding to develop. Issues addressed in the document include the specific contributions of UoTs, policy directives (like funding and the HEQF) and the impact of the mergers - all in the context of the differentiation debate. The specific characteristics of UoTs which differentiate them from traditional universities will be discussed at length in section 3 of this report. These characteristics pertain to the unique way in which UoTs perform the typical university functions of teaching/learning, research and community service, and pave the way for the PIs proposed in the final section of the report.

2.2 Contributions of UoTs

The strategic focus of the UoTs is manifested through their curriculum alignment with the labour market needs and human resource development challenges as indicated in initiatives such as the Accelerated Shared Growth Initiative for South Africa (ASGISA) and the Joint Initiative for Priority Skills Acquisition (JIPSA). The curriculum is therefore developed around the graduate profile as defined collaboratively with industry and the professions, and reacts to responsiveness as a policy directive.

However, historical socio-political distortions in the labour market have resulted in demands for access to HE beyond that which was planned by government. Furthermore, enhanced economic development in South Africa has contributed to the skills shortage in the country, thus highlighting the gap between economic planning and human resource development.

The UoTs are strategically positioned to narrow this gap by addressing these skills shortages through their widening of access to HE. Indeed, it may be argued that they have been doing this since their inception as Colleges of Advanced Technical Education! Certainly there can be no doubt as to the responsiveness of

the UoTs to the needs of the country in general, and industry and the professions in particular.

The approach of UoTs is focused on increasing technological capabilities and is primarily concerned with professional and career focused education. The contribution of UoTs to research, which is generally understood as the development of new knowledge, is the development of a new understanding of a problem through the application of new and/or existing knowledge to the problem. The application of research is thus technology-informed and directs calls for the management thereof. The management of technology as research focus is as important as research directed at applied problem solving. Given the position of UoT research it can be stated that research in this sub-sector of HE straddles three issues:

- The application of knowledge to address business and industry related problems (in the broadest sense referring to all sectors of society).
- The training of high-level technologists.
- The inclusion of a multidisciplinary focus to research.

The paramount characteristic of the nature of UoTs is technology. It should therefore be conceptualised in its broadest sense as referring to the effective and efficient application of the accumulated know-how, knowledge, skills and expertise that, when applied, will result in the output of value added products, processes and services. This wide interpretation of technology implies that the results of technology activities will be diverse. This also means that UoT graduates should be able to do/make things on the basis of their acquired knowledge.

UoTs' contribution to new knowledge and technology transfer is evident in the recently published annual report of the Tshumisano Trust, wherein it is stated that UoTs have contributed extensively to the National System of Innovation. Innovation refers to the application in practice of creative new ideas, which in many cases involves the introduction of inventions into the marketplace. Undergraduate and post-graduate students and technology staff members participated in SMME projects that require both basic and applied R&I. Fifteen major projects were registered Seventy (73) researchers were involved in R&I projects that were undertaken in the Technology Stations. These Technology Stations have designed and developed over one hundred (100) processes, registered eight (8) patents and developed or enhanced over eight hundred (800) products and ninety eight (98) prototypes. These types of research output are currently not recognised as part of existing research funding. Acknowledged outputs should therefore not be limited to the current DoE list only. Patents, prototypes, artistic works, etc. are evidence of basic and/or applied knowledge. UoTs are known for their close relationships with commerce and industry, and the work-integrated-learning (WIL) model makes this relationship almost compulsory.

Over the years the black student cohort of the UoTs has increased substantially, and represents the significant contribution of these institutions to HE. Black

students currently form the majority of enrolled students at all UoTs. The perceived intention of the DoE to remove research from UoTs will largely affect these black students and can be viewed as excluding and marginalising them from the knowledge economy. Furthermore this move can be regarded as an attempt to maintain the current knowledge hegemony where the white community continues to be the producer of knowledge, and thus to maintain the current *status quo* in the future. The result will be a setback to the economic future of many aspirant black students and as such cannot be politically defensible.

The contribution of UoTs to the community goes beyond the disadvantaged 'societal' community as it also embraces the labour market and the professions. This is evident by the fields of study offered by UoTs, *inter alia* education, government sciences, art, fashion and hospitality management. Thus, the community that UoTs engage with comprises government, industry, business and the social community. This close relationship with commerce and industry is one of the unique characteristics of UoTs. The scope of collaboration, as stated in the recent published annual report of the Tshumisano Trust, is also a focused approach addressing problems within the world of work and society. The work integrated learning (WIL) model of the UoTs further strengthens their relationship with commerce and industry, thereby ensuring that they are responsive to the communities they serve.

2.3 Policy directives

2.3.1 Legislation within the Higher Education Act

The Higher Education Act 101 of 1997 (as amended by the HE Amendment Acts 55 of 1999, 54 of 2000, 23 of 2001 and 38 of 2003) defines a Technikon as any Technikon established, deemed to be established or declared as a Technikon under this Act. This Act commenced on 2 November 2001.

In this Act the following acts were repealed:

- Technikons (Education and Training) Amendment Act, 1983 (Act 48 of 1983);
- Universities, National Education Policy and Technikons Amendment Act, 1984 (Act 75 of 1984);
- Technikons (Education and Training) Amendment Act, 1984 (Act 77 of 1984);
- Universities and Technikons for Blacks, Tertiary Education (Education and Training) and Education and
- Training Amendment Act, 1986 (Act 3 of 1986);
- Certification Council for Technikon Education Act, 1986 (Act 88 of 1986);
- Technikons (National Education) Amendment Act, 1986 (Act 89 of 1986);
- Technikons (National Education) Amendment Act (House of Assembly) Act, 1988 (Act 33 of 1988);
- Universities and Technikons (Education and Training) Amendment Act, 1990 (Act 41 of 1990);
- Universities and Technikons Advisory Council Amendment Act, 1991 (Act 24 of 1991);

- Certification Council for Technikon Education Amendment Act, 1993 (Act 185 of 1993);

The abolition of these acts eradicated the notion of a Technikon. However, the presence of a definition for a Technikon in this Act seems to be an inconsistency. In terms of legislation, technikons became universities when these acts were abolished. However the "non-existing technikons" were officially declared universities of technology in 2003.

In the preamble to the Act it is stated (amongst others) that it was drafted to "*establish a single co-coordinated higher education system which promotes co-operative governance and provides for programme-based higher education, and to restructure and transform programmes and institutions to respond better to the human resource, economic and development needs of the Republic.*" The Act defines a university as *"any university established, deemed to be established or declared as a university under this Act."* It is evident that the Act recognised only universities and did not differentiate between traditional universities, comprehensive universities and universities of technology. The Act, and specifically the preamble, created the opportunity for universities of technology to respond to the human resource, economic and development needs of the Republic in a specialised and particular way.

RECOMMENDATION 1
It is recommended that the difference between traditional univers comprehensive universities and universities of technology, appreciated and that UoTs be branded as leading institution socioeconomic development in South Africa.

2.3.2 The impact of HEQC, SAQA and DoE approval processes on responsiveness

One of the key characteristics of UoTs is their responsiveness to changes within the world of work. In the preamble to the HE Act it is stated that universities should respond to the needs of the Republic and of the communities served by these institutions.

The education and training offered by UoTs must be relevant for commerce, industry, government and the community at large. Students qualifying at UoTs must be employable and immediately productive. To ensure this, UoTs must be in constant contact with employers (e.g. through advisory committees) and the curricula of UoT programmes must prepare students for the world of work (e.g. work integrated learning). To deliver adequately educated workers, UoTs must be proactive to the changes in the workplace.

It is evident that UoTs must continuously adapt their educational programmes to the ever changing requirements of the labour market. However, the process from curriculum design to approval, registration and quality assurance takes 18 to 24 months.

Currently a new programme must be:

- Approved by the DoE for funding purposes and inclusion on the institutional PQM
- Registered by SAQA
- Quality assured by the HEQC

In a world where technology changes almost weekly an 18 month response time is not acceptable. The well intended DoE bureaucracy has created a good but impractical system that hamstrings the responsiveness of UoTs.

RECOMMENDATION 2
It is recommended that a shorter process for the redesign and approval of academic programmes be developed in order to enable UoTs to respond to market demands and to deliver appropriately trained workers in time to satisfy employer requirements.

2.4 Systemic drivers - planning, funding and quality

❖ Consultation and the differentiation debate

Following the release of the CHE "size and shape proposals" in June 2000 the Minister of Education committed the system to ongoing investigations and discussions to formulate the differentiation methodology proposals, so as to realise the differentiation recommended by the CHE. At that stage the general dimensions for a possible differentiation had already been announced in the White Paper, namely planning, funding and quality. It was therefore evident that the sector's responses to, and submissions on, the different stages of consultations around these issues would be important to differentiation determinations in the future. However, the paucity in the then existing leadership was apparent, as UoTs have individually and/or collectively not been adequately aware of, or failed to give more detailed attention to, the policy-framing stages that the HE system has undergone.

The following are examples of such arguments, in which we need to engage further:

- When the National Working Group (*25 May 2001 Government Gazette number 22329*) determined 0.5 units as the research output *per annum* per full-time academic employee the range of recognised subsidised outputs was determined in consultation with the UoTs. This consensus of what constitutes research outputs was not taken forward in the deliberations on the new funding framework, and at this stage no one has formally challenged the DoE on the changes proposed by the funding framework. During the policy consultation stage of the funding framework, individuals within the sector prepared a document setting forth the range of research outputs to be considered by the DoE, but no one took this forward as a submission that required a formal response.

- When the CHE published its proposals on quality management and the criteria to be used there was no collective sector voice on both matters, nor is there evidence that submissions made were seriously entertained by the Minister. Of importance in this consultation was the introduction of "research" as a special quality assurance feature. Again, no one really objected to this premature determination of the "shape" or differentiation debate.

It is important for the sector to contextualise the wider issues impacting on the differentiation debate and to advance their concerns within this context. The following are some contextual matters requiring researched positions. If planning and funding is to ensure greater public accountability, then what are the public accountability issues relevant to the Minister that are not informed by the "fruitful expenditure" criteria of the Public Finance Management Act?

In particular,

- Should the employability of graduates and improving economic competitiveness of individual businesses through innovation not considerably outweigh other considerations in light of poverty and sustained employment opportunities?

- Should considerable portions of public money be invested in research with doubtful public benefit?

- Are research citation indices a good social measure, especially when research that improves economic competitiveness and research used for enterprise incubation are not reported in most scientific publications?

It appears that research is being drawn into this debate on differentiation without clearly defining the differentiated functions or purposes. For example, UoTs should possibly play a bigger role in technological innovation, which is part of the R&I chain, while the research universities concentrate on basic research. HESA welcomes the establishment of the Innovation Agency to balance the FRC emphasis on excellence in basic research and to promote the commercialising of research, but the potential role of UoTs in the knowledge exchange and commercialisation challenge cannot be downplayed. This indicates that the differentiation debate is not just a straightforward exercise of reallocating money to any institution that is currently seen as producing "quality research".

RECOMMENDATION 3
It is recommended that the issues impacting on research and innovation outputs be addressed as part of the differentiation debate, in consultation with all role players.

❖ Differentiation impact of the funding framework

The new funding framework is to facilitate the transformation of the higher education system, as recorded in The Education White Paper 3: A Programme for Transformation of Higher Education (July 1997). In agreeing that the funding framework *"must be goal oriented and performance-related"* to achieve this transformation, the application of the new funding framework has disadvantaged UoTs. The funding framework, as well as its current application, assumes that all HE institutions are on par with each other. It did not take into account the many years of infrastructure, research culture and staff development advantage held by traditional universities. UoTs are expected to achieve benchmarks that have not even been achieved by some traditional universities that have been in existence for over 25 years. Whilst it is agreed that a reasonable international benchmark should be achieved, it is necessary to ensure that the capacities within UoTs are

brought to an even footing with institutions that would be drawing from the same relatively decreasing pool of HE funding.

The current funding framework makes provision for the following three funding categories (It also makes provision for an "institutional factor" which takes into consideration the institution's size):

- funded student places;
- institutional outputs, including student and research output;
- development grants as per agreement with the DoE.

The interrelatedness between student enrolment planning and input and output funding can be illustrated as follows:

The *first funding category* is student places. There is a problem with regard to the proportion of diploma, degree and postgraduate enrolments, as decided by the DoE. The higher order weighting assigned to postgraduate studies implies that more undergraduate student numbers are required to receive the same consideration than one postgraduate student. By implication, the resources, and the maintenance of those resources, of an institution with low prescribed postgraduate students are under considerably more pressure than those of an institution with a high postgraduate student cohort. It is therefore also important that the institutional factor takes into account the prescribed enrolment shape of an institution, so as to restructure this strain on resources to maintain and improve output levels.

The impact on UoTs is as illustrated:

As indicated by the enrolment targets UoTs will have a range of "*at least 74 % - 87 % of head count enrolments in undergraduate diplomas, and 10 % - 19 %" in undergraduate degrees.*" The proportion of enrolments in postgraduate qualifications must not exceed 7 %. What is clear here is that there is a strict upper limit to postgraduate enrolments and a flexible upper limit for undergraduate diplomas. This suggests that DoE prefers that UoTs concentrate more on diplomas and less on postgraduate students. If the argument above is followed, then it indicates that funding of UoTs will never reach adequate levels.

If UoTs have to be essentially diploma awarding institutions, let the DoE put that on the table for debate first. ***However, in the NPHE two strategic research objectives are formulated, namely an increase in the enrolment of postgraduate students and an increase in research outputs across the spectrum of enquiry into the various institutional disciplines (Objectives 13 and 14).*** These objectives are not reserved for one university type only. UoTs can make a meaningful contribution to both objectives. Therefore, the contribution of UoTs towards the need for an increase in delivery of post graduate students has to be acknowledged and funded, as stated in the NPHE. Additional research and innovation funding for UoTs should be seen as a strategic investment towards capacity development, upgrading of current staff

qualifications, eradicating the backlogs created by differentiated funding to research universities, and addressing infrastructure and equipment backlogs.

An important enrolment issue for funding is the percentage of Science, Engineering and Technology (SET) students expected from UoTs. At the time of drafting the new funding framework, UoTs did not exist. In making the decision to transform former technikons to UoTs, the understanding was that the Minister of Education aimed to create technological universities in line with other international technological universities. In approving enrolment plans for VUT, CPUT, DUT, CUT and TUT the minister expected Science Engineering and Technology enrolment to shift to 50 %, 50 %, 50 %, 45 % and 40 % respectively. These would be acceptable ratios in UoTs, but given the huge cost of SET offerings this further disadvantages UoTs, in that additional funding will be needed to provide a platform from which they will compete with traditional universities that already have these in place.

RECOMMENDATION 4
It is recommended that the backlog (infrastructure and staffing) at UoTs especially in light of the prescribed enrolment shape of an institution and the SET enrolment targets set by the Minister, be investigated in order to determine what interventions are needed to ensure that all institutions are on the same footing when competing for HE funding allocations.

The *second category* for which the current funding framework makes provision is institutional outputs: There is nothing principally flawed in awarding the same consideration for the same outputs. However, flaws emerge in two areas with regard to UoTs:

- The first flaw emerges with regard to what constitutes the same outputs, especially the historical context thereof. As previously mentioned, traditional outputs for these institutions are now disregarded.

  In a period of rapid intellectual change the specific research and innovation output modalities of UoTs, which flow from multidisciplinary research and the application of knowledge, should be recognised. It is important to underline that UoTs will not aspire to be “Research universities” as they have a different focus, namely the application of technological knowledge, to a given problem. However, the research enterprise in our country needs to raise its outputs. It needs to be recognised that there will be no shift in the research climate and output - unless there is a sustained and dramatic increase in research funding and acknowledgement of other existing modalities of outputs, especially technology-orientated outputs. Therefore, a broadening of the traditional understanding of research output is needed, as

UoTs' focus is toward the development and invention of new technologies and the transfer of technologies to commercialisation.

- The second flaw emerges with regard to the historical unevenness in the distribution of capacities to achieve the "same" outputs. In particular, within their historical context, UoTs recruited staff more for their industrial demand and their technological prowess than their ability to produce accredited research publications, or develop postgraduate programmes, or supervise postgraduate students. As a result, UoTs may not have the capacity to increase postgraduate enrolments at this point, but they should not be constrained in the future. UoTs cannot be given university status and at the same time be encouraged to only concentrate on diplomas and not research and postgraduate education. These apparent restrictions will not help to improve the research profile or the access to funding. The development of capacities within UoTs should be acknowledged as a strategic investment.

RECOMMENDATION 5
It is recommended that institutional outputs, as well as the benchmarks thereof, be clearly defined in order to enable UoTs to achieve these outputs and to compete with other Universities on an even footing for HE funding.

The *third funding category* which the framework makes provision for is development grants.

In terms of the funding framework, development grants are perhaps more ominous in respect of the institutional autonomy and academic freedom at UoTs. In particular, the state may award development grants if the intended development is consistent with its aims and desires for an institution. Thus the non-awarding of a development grant constitutes a state decision about the scope of academic engagement for a particular institution. It is important for UoTs that the conclusion of the differentiation debate will also include the avenues for development grants. In this respect, it is important for these institutions to develop alternative system development demands, as well as the accompanying performance metrics and measures to be funded under this category.

RECOMMENDATION 6
It is recommended that avenues for development grants be part of the differentiation debate in order to enable UoTs to be preferentially funded for their development.

❖ Higher Education Qualification Framework (HEQF)

In the more recent consultation on the HEQF there is no evidence that individual submissions from UoTs were considered before the Minister finalised her decision on the matter.

The newly released HEQF will impact far more on UoTs than on traditional universities. Diplomas, traditionally associated with technikons, are now on a lower NQF level than a bachelor's degree. Although having the option to redesign the curricula of the current diplomas, the following are only a few possible implications for UoTs:

- To move from a diploma (NQF level 6) to a master's level (NQF level 9) will require an additional year, unlike the current one year B.Tech. This will impact on the resources of UoTs, and diminish their opportunities to offer master's and doctorates.

- To design diplomas as degrees will result in a change in admission requirements, which will negatively impact on student numbers. The implications of qualification admission requirements on first year student intake should be considered, as the Minister has already gazetted the minimum entrance requirements.

- It appears that while the policy imperative is to make higher education accessible to more South African students, especially from previously disadvantaged backgrounds, the HEQF is putting a ceiling on how far these students could aspire. The current provisions - where the diploma is at level 6 - would hamper progression of these students from certificates to higher degrees. In addition, they would have to meet a set of minimum admission requirements for the qualification that most diploma students may not have, but could be assumed to have through RPL. Thus, access to higher education is being curtailed somehow, and official pronouncements on this matter are being unmasked as mere rhetoric.

- Institutions (UoTs) will have to decide on a suite of programmes that would be most appropriate for UoTs. The costing implications of this curriculation process are still unknown, but will definitely have a financial impact.

- The offering of these programmes will be affected by the funding or non-funding of the Work Integrated Learning (WIL) component. The funding of WIL is not addressed in the HEQF or in the latest ministerial statement on HE funding. Although WIL has always been associated with UoTs and recognised as one of the distinguishing factors of our qualifications it is excluded from subsidy, although the proper monitoring and assessment of WIL is costly.

Page 7 of the Government Notice of 5 October 2007 on the HEQF claims that *"the framework incorporates a nested approach to qualifications design."* This nested approach appears to be limited only to the technical aspects within a qualification - from generic to specific outcomes. This nested approach could therefore be interpreted as an intra-qualification nested approach. An inter-qualification nested approach should be considered where articulation from a diploma to bachelor's and to master's degree could be less limiting. Articulation mechanisms should be both intra-sectoral (within higher education, for example between UoTs and traditional universities) and inter-sectoral (between FET and HEI).

Page 13 contains a paragraph on "Award of qualifications". While it is agreed that a qualification should not be awarded for failure at a higher level, this statement needs to be qualified. While this view is shared, a more progressive and positivist view about this situation should also be allowed. In an inter-qualification nested approach to qualifications, there should always be a scaffolding of qualifications, from certificate to PhD. The Master's qualification in the U.S. system is an integral and developmental part of the PhD where some of the students with bachelor's degrees register for a PhD. For the first two years they are in virtually the same classes as the rest of the PhD students, except for individual choice. Those who are continuing towards a PhD write their qualifying exams and then the full thesis. Those who do not get past the qualifying examination stage have achieved all the requirements for, and could graduate with, a master's degree. Another good example is Ireland, were a progressive inter-qualification nested system from certificates to PhD is being followed.

Page 9 refers to "*In the interim, a maximum of 50% credits of a completed qualification may be transferred…"* How can UoTs design curricula by 1 January 2009 on the basis of an interim measure that could change just as the process is completed? This should not be made a general rule as this measure is restrictive and some diplomas could carry a substantial number of credits at the next NQF level - it should only refer to those diplomas carrying less than 50 % of the credits at higher levels.

RECOMMENDATION 7
It is recommended that the process leading to the final implementation of the HEQF includes thorough consultation with all role players in order to address issues such as the NQF level of diplomas and the interpretation of the nested approach to qualifications design. (Discussions with the CHE have commenced)

2.5 Consequences of the merger

It is clear that the transition of technikons to UoTs presents many challenges - and that the far reaching results of mergers have not yet been realised. The development trajectory of the UoT sector was severely hampered by the advent of mergers in HE. Many UoTs had new issues thrust upon them by these mergers while still in their infancy. Even the traditional universities that were involved in mergers struggled to come to terms with the consequences.

The evolution of certain UoTs was rooted in mergers of two or more technikons; one always being historically advantaged and the other(s) historically disadvantaged. This in itself created a disparity amongst the newly established multi campus institutions. Although funding allocations of R 3 578 million for infrastructure and efficiency have been provided in the MTEF, UoTs have only received a small percentage (20.8 %) of this funding because the multi-campus factor has yet to be realised. As stated in the Ministerial Statement on HE funding, the individual institutional allocations were based on a range of factors namely institutional needs, enrolment plans and performance targets relating to graduate outputs. The basis for these allocations is questioned as the allocations have not kept pace with the impacts of the merger process.

Although all merger partners of UoTs were regulated through common structures such as the Committee of Technikon Principles (CTP), Committee for Tutorial Matters (CTM), the accreditation body of the then Certification Council of South Africa (SERTEC) and the convenorship process which ensured commonality in similar academic programmes and credits, some distinct differences influenced the quality of educational provision. Some key differences were the approaches to, and the practices of, budgeting, resource allocation, academic structures, and development of staff, students and curriculum. The impact of mergers can only now be seen in the low success rates, staff turnover, decrease in student enrolments and leadership changes, and the void that is being created.

Among the more serious consequences that newly merged universities faced was the quest for a new institutional culture. The extent to which many of these institutions were successful in grappling with this unanticipated consequence was widely reported in the press. The transformation goals of the National Working Group became engulfed in reports of racism, corruption and mismanagement. With communication through the press becoming the order of the day, public and corporate interest in many of these merged universities waned. Disparate institutional cultures impacted on policy implementations, with the consequence being that procedures are still not uniform. The “interim” capacity of staff influenced loyalty, accountability and policy implementation within the multi-campus institutions also impacted on teaching and learning practices and procedures.

The brand of many (if not all) merged universities became more endangered as questions of academic credibility surfaced. The “brand” has had the advantages of attracting better third stream income to maintain the status quo of staff/FTE

ratios and attracting better students from schools and students from more affluent backgrounds who could settle their debts and contribute significantly to the sustainability of these universities.

The process of harmonisation of conditions of service and of combining the tuition fees of two or more merging partners further exacerbated the process of forging branded organisations with common institutional cultures.

The early years of the post-merger phase were dominated by concerns regarding the establishment of systems to enable the newly merged institution to function as normally as possible - as a single entity. This created a platform for quick decision making processes which have had long term consequences and are now difficult to unravel.

One final unintended consequence of the merger process has been the 'mass' exit of senior management of UoTs during the process. Apart from the unstable environment this high management turnover created on individual universities, it has had a detrimental impact on the collective political impact that UoT Vice-Chancellors had on HESA.

Although it may be argued that the negative impact of mergers affected traditional universities as well, the fact remains that the timing of the implementation of mergers (including the one that created HESA) has had a detrimental impact on the developmental trajectory of UoTs. Fewer UoTs exist in the HE landscape today, with the concomitant result that diminished influence on HESA and the high management turnover have affected the UoT sector detrimentally.

RECOMMENDATION 8
It is recommended that the negative consequences of mergers on the capacity of technikons to develop towards becoming UoTs be brought to the attention of the Minister of Education continuously.

2.6 Summary

In a 2001 position paper the then CTP argued for the establishment of UoTs and voiced the opinion that "*the diversity, quality and relevance of higher education qualifications are fast becoming the deciding factors*." It further argued for a "different type" of institution that would contribute to the diversity within South Africa's HE system and form the basis of its strength, as *"although a single, unitary system, the difference in focus and ethos between UoTs and traditional universities will not only bring much wider variety and diversity into the HE scene, but also contribute meaningfully to greater technology transfer and international competitiveness."* (Report of the CTP Task Team on "University of Technology".)

It is now clear that the differentiation of the HE institutions in South Africa is convoluted by the introduction of compulsory policy directives and mechanisms such as the HEQF, funding framework and other DoE policies. There is a perceived differentiation by stealth, and therefore the differentiation debate cannot continue in the current manner.

There is also clearly a lack of understanding of the position and character of UoTs and the representation of UoT representatives on many statutory bodies. There is a notion that HESA does not represent the full HE spectrum of institutions, but rather perpetuates the old SAUVCA bias.

For UoTs to "contribute to a new intellect for Africa", their role as a newly established institutional type needs to be recognised and its status accepted on the same level as that of other institutional types that have been in existence for a long time. All HE institutions are of equal importance, but have different purposes.

Government is obligated to provide funding as it cannot convert technikons into UoTs without supporting the development trajectory through additional funding and strategic investments. UoTs should also be given the necessary facilitation to develop to their full potential within a fixed time period.

RECOMMENDATION 9
It is therefore recommended that discussions with the Minister of Education be continued to facilitate the development of UoTs.

SECTION 3: CHARACTERISTICS, ATTRIBUTES AND CRITERIA OF UoTs

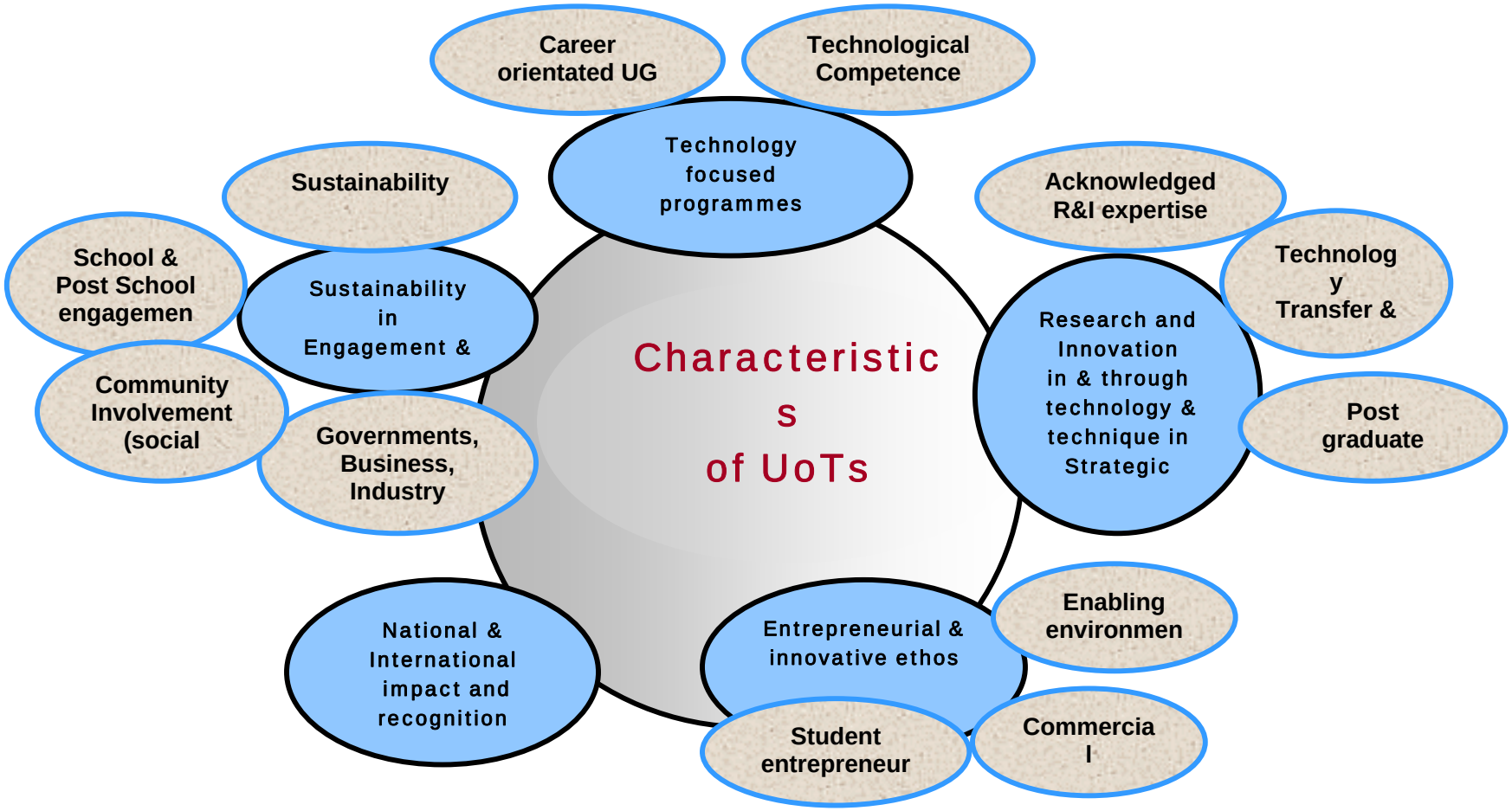
3.1 Orientation

The previous section highlighted certain key characteristics of the current position of UoTs and the UoT-related parts of CUs. In this section the focus shifts to the ideal position of UoTs, and their characteristics, attributes and criteria are described in more detail in preparation for the performance indicators to be proposed in the next section.

There are two main ways of viewing the *mission* of a UoT. The first takes its starting point from the 'university' part of the title, while the second advocates a more market driven view, focusing on the labour market and the type of student attracted by this type of institution. To our mind, both views are relevant in depicting the mission of a UoT. As universities, UoTs comply with the three functions of teaching/learning, research and community engagement expected from all universities. What mainly distinguishes them from traditional universities is *how these functions are performed.* The forces driving these functions are the type of student, the market niches and the needs of the related industries and professions. These factors then determine the unique programme and qualification mix (PQM) and combination of attributes, the type of research and innovation conducted, and the nature of engagement with the community.

The characteristics below are not unique to the South African context, but apply to UoTs worldwide - as will become clear in the discussion and literature referred to. These characteristics form the basis for a number of attributes which could, in a broad sense, be schematised as follows:

Figure 2:


Career orientated UG
Technological Competence
Technology focused programmes
Sustainability
Acknowledged R&I expertise
School & Post School engagemen
Sustainability in Engagement &
Technolog y Transfer &
Characteristic s of UoTs
Research and Innovation in & through technology & technique in Strategic
Community Involvement (social
Governments, Business, Industry
Post graduate
National & International impact and recognition
Entrepreneurial & innovative ethos
Enabling environmen
Student entrepreneur
Commercia l

3.2 Characteristics, attributes and criteria

3.2.1 Technology focused programmes

❖ Undergraduate career-oriented programmes

Degrees at a traditional university are expected to give students a grounding in, and an understanding of, the basic scientific principles underpinning their field of study. However, in practice UoT programmes focus on the application of scientific principles and only use basic scientific principles in those cases where such knowledge is deemed to be essential for the successful application of the scientific principle concerned.

It is important to note that practical work-related knowledge which draws from multiple disciplines can be segmented into subjects that have internal coherence, the mastery of which equips the student with actual skills. Additional subjects (many of which are multi-disciplinary) may be added to enhance the array of skills in the student's portfolio or increase the depth of understanding of scientific principles that form the basis of a specific career.

In career-oriented programmes, students must have some mastery of the fundamental concepts and theories of the cognate disciplines upon which their knowledge field draws, and a theoretical understanding of their application in practical contexts. Hence, both vertical expansion of complexity and horizontal expansion of skills are possible. The vertical expansion will however be specific, and may be spread over several disciplines. It is accepted that for each traditional academic discipline a so-called "body of knowledge" exists which needs to be mastered to a certain extent by the student. This “body of knowledge” can be associated with a specific career. It is fairly well defined and determined by factors such as the rate and level of technological development, the level of competitiveness of a specific vocational sector and the skills and competencies needed for the economic growth of that sector.

One of the more pronounced differences between the vocational body of knowledge and the traditional subject-type academic body of knowledge lies in the evaluation of its mastery. The mastery of traditional academic knowledge is mainly evaluated through 'traditional' forms of examination, while mastery of vocational knowledge is evaluated through a wide array of methods that vary from different forms of assessment and evaluation in the work situation to practical skills assessment, evaluation by experts from the world of work, etc. In this case, the ability to apply knowledge is seen as fundamental. Thus, evaluation of the mastery of vocational knowledge should, in principle, be simpler than evaluation of academic insight and ability.

❖ Technological competence

Technology driven PQM

The paramount characteristic of academic programmes at UoTs is technology, thus technological capabilities are as important as cognitive skills, not less important - as in the case of traditional universities (Brook 2000:29). In its broadest sense, technology refers to the effective application of knowledge and skills that will result in the output of value added products, processes and services.

Although the focus is on science and technology, UoTs are expected to offer programmes on business and the humanities in the ratio of 40:30:30. Thus, with their strong focus on technology development, innovation and transfer, all UoTs have programmes in place to promote a better understanding of these phenomena among their students. Topics relating to the management of technology, how it can be effectively used to create competitive advantage for the industry and how technology interacts with other key business areas all form part of the curricula of a UoT.

The relevance of the curricula and research programmes of a UoT also applies to the problems of the community and society at large. These real world problems are inherently complex in nature, cutting across a range of disciplines. Since it is the objective of UoTs to educate students who can engage effectively with such problems, they are not only equipped with technological competencies, but are also exposed to a range of disciplines in the humanities and social sciences. These disciplines ensure that the 'human framework' does not lag behind students' technological capabilities. To effectively develop and implement such programmes, human scientists should become better informed of developments in the natural sciences like engineering and technology, and should be able to co-operate with people from other disciplinary backgrounds in multi-disciplinary teams (Marais 2000:138; Frederiks 2000:154-155).

Technological development, particularly in the realm of biotechnology and genetics, has also raised a number of ethical questions. It is necessary for students at a UoT to be aware of the ethical and environmental implications of their technological choices, and to be able to determine the most appropriate solutions, given the societal context. For this reason, Smit (2000:151) and Lategan (1999:109) proposed that all UoTs should introduce courses in applied ethics, designed for the needs of the different professions.

In this way UoTs not only equip students with the high-level technical skills to effectively deal with real world issues, but also educate them for leadership in the important technological issues facing society. The result is graduates with an integrated technological competence.

❖ *Inputs of advisory boards and professional bodies*

The strategic focus of UoTs is manifested through its curriculum alignment with labour market needs and human resource development challenges, as indicated in initiatives such as ASGISA and JIPSA. The curriculum is thus developed around the graduate profile, as defined collaboratively with industry and the professions. Programmes are continually revised, and new ones introduced, due to the environmental dynamics.

Advisory boards or committees for new programmes ensure relevant and career-oriented programmes, while certain undergraduate qualifications need to be approved and/or accredited by professional bodies. UoTs should determine the job and employee needs of a particular industry, as well as their satisfaction with UoT students, on a continuous basis.

❖ *'Just in time' education*

In a world of constant change, career education cannot provide sufficient knowledge to suffice for a substantial portion of a lifelong career. UoTs should become specialists in 'just-in-time' education, i.e. experts in providing continuous upgrading of knowledge and skills:

This practical knowledge should be provided in a variety of modules and variations in contact- and distance-learning programmes to graduates as and when they are needed. Such 'just-in-time' education should become the trademark and strength of UoTs. Theoretically, both students and employers should know, and be able to accurately judge, the value of such programmes. They will be far more willing to pay for tuition at levels that reflect the true cost and value, and to associate in new and positive ways with the institution.

In a very real sense learning, working and living will become increasingly interwoven, inseparable in character and content. In this newly developing culture of learning, basic degree training as it now exists will be replaced by more instantaneous measures of knowledge and skill acquisition, and UoTs will have to provide leadership in this respect.' Re-skilling', 'up-skilling' and 'multi-skilling' activities will have to be creatively distributed over the careers and lifetimes of students, and in this process new and interactive relationships will have to be forged with local and international employers and knowledge providers. A greater sense of the 'public good' means that UoTs should lead the revolution by replacing the paradigm of mechanical professionals who have little sense of the ethos of the 'public good' with ethical professionalism

❖ *Learning in the Workplace*

Embedded in the nature of technology HE is compulsory learning in the workplace, which provides students with relevant work experience. Students are

required to undergo a period of on-the-job training as part of their degree studies. This period of work placement varies from a few weeks undertaken throughout the period of study, to six months or a year in some programmes - usually towards the end of their studies. The principal advantage is that students gain experience in a professional field during their formal studies and begin their working life with knowledge of the marketplace, organisational structures and employers' expectations. In this way, students are provided with creative scope, as well as potential for advancement and personal growth in their chosen field.

The private and public sectors have consistently singled out the former technikons for their career-focused, hands-on approach to education/training and the 'just in time' delivery of graduates with knowledge that is immediately relevant in the workplace. The added advantage of workplace learning for both students and employers is that students 'hit the ground running' when they enter the workplace and employers do not have to spend time and resources training employees who have only theoretical background knowledge. This practice becomes more important in times of economic decline. Furthermore, it should be highlighted that graduates who are job-ready are in high demand with small and medium enterprises, since they do not have the capacity or the money to invest in on-the-job training - and these types of enterprises are growing at a rapid rate in SA.

On an international level, the Laurea University of Applied Sciences in Finland recently reviewed its Learning by Developing (LbD) model and published the resulting report earlier this year. LbD is an innovative operating model based on partnership, experiential learning and research similar to the South African Service Learning model. It requires students to undertake projects rooted in the world of work, aims to produce new practices and requires collaboration between teachers, students and workplace experts. The model is comparable to the learning approach of UoTs. The principle underlying both models is to enable students to acquire competencies that make them more employable and socially responsible - not only in the workplace but also in the community. They learn to make sense of the world of work during their HE experience.

The review report on LbD concludes with five main recommendations, namely

- To institutionalise the model and make it more transparent;
- To train tutors/facilitators in the skills needed to successfully implement LbD;
- To let students carry out projects from their first to third year, the third year being company/external projects where they meet real life expectations;
- To change the assessment system in accordance with the educational objectives, and
- To improve the marketing of projects (Vyakarnam *et. al.* 2008:64-66).

Learner-centred educational approaches

The utilisation of Information and Communication Technology (ICT) for a variety of learning models and online learning has broadened access to the programmes of HE institutions in South Africa as part of a worldwide trend which covers the total spectrum of distance learning, as well as a variety of modes used on campus as part of a course. These modes of delivery are all learner-centred. The Virginia Polytechnic Institute and State University (Virginia Tech), for example, uses the Virginia State network to offer courses in engineering and business administration, while the UCLA's Extension/Onlinelearning.net also offers courses at graduate level (Van Eldik 2000:124).

Extension of delivery modes is an important method of addressing skills shortages and societal needs by focusing on adult learners, working adults and the unemployed. This worldwide trend also applies to a post 1994 SA. Universities here have in the past concentrated on school-leavers, but are now having to adapt their approach in order to meet societal priorities. Adult, employed workers are especially seen as a target group for which short courses and 'refresher' training could be offered. As the government sees skills as the answer to address the high levels of poverty and unemployment, publicly funded educational institutions are increasingly expected to provide graduates with the requisite skills to keep the economy going (Du Pré 2006:7-8, 17).

UoTs are geared to meet this expectation and have been offering short courses and 'refresher' training on and off campus for many years. Development programmes to assist staff in implementing the best modes of delivery should be in place at all UoTs.

Staff development

Relevant curricula entail a continual revision of programmes at under- and postgraduate levels to better address the needs of industry, business and communities. These include curriculum and course design linked to outcomes-based education.

In order to equip staff members to deal with these (and other) demands effectively, UoTs have staff development centres in place, where development programmes in areas like curriculum design, teaching/learning strategies and research skills are offered to existing and newly appointed staff. All permanent staff are expected to obtain at least a master's degree in their field of study.

UoTs usually adjust their appointment criteria to consider and recognise industrial experience, since exposure to, and experience in, industry is important for the offering of career-oriented programmes that focus on technology. In order to keep abreast of technological developments, all UoTs thus spend a certain

percentage of their annual budget on training. The affiliation of instructional and research staff to professional bodies also remains a priority for UoTs.

3.2.2 Research and Innovation in and through technology and technique in strategic areas

❖ Research and Innovation expertise

In the experience of the National Research Foundation (NRF), whose mandate is to promote and support research and research capacity building, the following issues are critical in creating a sustainable research effort at an HE institution:

- A long term perspective is required to build sustainable research capacity.
- Each institution needs to take responsibility and ownership of its research endeavour.
- A critical mass of no less than four active researchers working on a common theme is necessary to create a sustainable research programme.
- Staff development is an essential prerequisite for research capacity development and therefore research should not be an end by itself, but translate to further research development at levels beyond doctoral studies.
- There needs to be sustained pressure to produce appropriate quality research outputs.

The above issues receive serious attention from UoTs as they attempt to make a meaningful contribution to the national research effort. All UoTs have identified research as a defining characteristic of their missions and strive to excel in selected strategic areas of research. These niche areas are determined by, *inter alia*, the geographical environment of the institution and its capacity, capabilities and resources. This is in line with the approach of the NRF, which has identified a number of key focus areas for research, as well as the National Research and Development Strategy with its focus on technology. This focus on technology and technique in strategic areas should enable UoTs to become significant players in the national system of innovation.

❖ Technology transfer and innovation

Technological innovation is the process that transforms new knowledge into wealth. It covers the different steps of the innovation chain, from the creation of new ideas, the development of technology in the form of products, processes and services, to their ultimate successful commercialisation and/or implementation. Technology transfer is the formal transfer of new discoveries, innovations and technology, usually resulting from Research and Development (R&D) activities at universities, to the commercial and industrial sectors in the economy. Implicit in the term is the understanding that a tangible "intellectual asset" has been identified for transfer. The literature also refers to technology interchange,

emphasising the two streams for technology transfer - one from within the university and the other an external stream of opportunities being brought into the university for joint development and exploitation.

Within a UoT environment, these concepts incorporate the following:

- Enhancing R&I 'downstream' related activities such as patenting, licensing, commercialisation and marketing of intellectual property (IP) and R&I results in the form of products, processes or services;
- Promoting and marketing a corporate culture for technological innovation, entrepreneurship and technology transfer;
- Developing appropriate policies, strategies and models for technological innovation and technology transfer;
- Promoting and developing knowledge and technology intensive enterprises;
- Participation in the establishment of technology and business incubators and related support structures.

Research in Germany and the USA shows that many institutions are quick to react to politically-motivated programmes, and to create transfer units or technology licensing offices. However, successful transfer depends on the personal relationships among the participants and the entrepreneurial spirit of the lecturer or professor. The institutional culture of academic institutions does not easily relate to the institutional culture of private enterprise. UoTs must develop policies to provide for a sufficiently enabling environment.

❖ Postgraduate Studies

National and international Researchers and innovators

As a mechanism of accelerating research development and outputs, UoTs are increasingly engaged in collaborative research, with a reliance on team work rather than individual research efforts. Examples of collaborative research include staff exchanges, research projects, fellowships, joint professorships, research chairs and cross-institutional projects at both national and international level. These research partnerships, especially with traditional universities whose emphasis is on fundamental research, should produce the synergies derived from operationalising the National System of Innovation.

Co-operation and networking are not only confined to other HE institutions here and abroad, but are also developed with industry, mainly due to the emphasis on strategic and applied research. As previously mentioned, an important feature of this type of research is multidisciplinarity. Major outputs of such national and international collaboration include

- more multidisciplinary R&I projects;
- an increase of staff with doctorates, and

- nationally and internationally recognised leaders in R&I

Inter- and transdisciplinary R&I projects

Brook (2000:28-29) lists two characteristics of research done at a UoT and contrasts them with the type of research practised at traditional universities. The first characteristic is that a UoT is research informed, while a traditional university is research driven. The second is that UoTs focus on strategic research, applied research and research into professional practice. Traditional universities, on the other hand, focus (or at least used to) on pure or "blue skies" research.

While recognising the importance of the continuum from basic research to the commercialisation of research outputs, UoTs focus on research that is of a more applied nature in order to solve societal problems and implement practical solutions. They support needs-based research aimed at promoting interdisciplinary and intersectoral research with partners. As UoTs are committed to community engagement, some projects are also aimed at promoting research on practical community issues. Once again, this does not preclude involvement in basic research, as basic research provides the impetus for applied research. It remains a matter of focus.

Thus research at UoTs is multi-disciplinary in nature, linked to a general thematic approach with areas of specialisation directly linked to the needs of business and industry, and the participation of staff and students from various departments and faculties in one project. Activities include industrial consultancy, innovation, incubation, product development and the transfer of technology.

R&I Outputs

Outputs are not always reported in the traditional way through scientific journals - although UoTs are expected to have an average of 0.5 refereed articles *per annum* per full-time equivalent staff member. Research outputs at a UoT are, among others, reflected in reports to commercial sponsors, patents and licensing agreements. However, these modalities of outputs are currently not acknowledged and funded by the DoE.

In order to develop to their full potential and contribute to the much needed shift in research culture in HE, it is imperative for UoTs that the traditional understanding of research outputs be broadened to include their outputs, which focus on the invention of new technologies and the transfer of technologies towards commercialisation – as pointed out in Section 2.

M & D Students in R&I projects

An area of great concern reflected in the NPHE is that of low enrolments in postgraduate programmes. For this reason, UoTs pay particular attention to using research as an enabler for the increased participation of students at master's and doctoral levels - with emphasis on previously disadvantaged groups. Established researchers present research development and empowerment programmes to master's and doctoral students; emerging researchers are exposed to national and international experts; and institutions place greater emphasis on team research involving young researchers. Grassroots participation, as advocated by Muller (1996:111), has become an extremely important research paradigm at UoTs in order to increase the enrolment and throughput rates of postgraduate students, as well as their involvement in research projects.

Once institutions have developed adequate research expertise in specific niche areas - as required by the National Research and Development Strategy – these areas would serve as magnets to draw more students into research and research projects, thereby increasing outputs and the much needed delivery of postgraduate students.

Funding

The policy change from the "blind funding" approach to a new funding formula based on research and graduate outputs, puts enormous responsibility on HE institutions to ensure that the investment in the research endeavour is used effectively and efficiently, and that set objectives and outcomes are achieved. In the new dispensation the ability of institutions to assure the quality of research, as well as their ability to deliver research outputs, determine whether they will receive adequate financial support for this function.

Previously, technikons did not benefit from the 15 % "blind" subsidy given to universities for research and so had to access funds through the submission of project proposals. UoTs therefore have the experience of accessing funding through project proposals, which can be used to ensure sustainable inflows of (third stream) research funds. A variety of external funding sources (national and international) could be accessed and UoTs should make every effort to stay abreast of opportunities by being in regular contact with the primary funding agencies (NRF, THRIP, etc), as well as with various foundations, in order to be fully informed of the latest requirements and to increase their research income. Depending on where funds are obtained, researchers ought to be exact in reporting on how they have utilised such funds, when and as required.

However, the exclusion of UoTs from "blind" subsidy and the late entrance into the research realm resulted in enormous backlogs in research infrastructure and research culture, for which they did not receive adequate compensation. In order

to promote a pervasive research culture, UoTs should position themselves as institutions that excel in certain strategic niche areas of research and knowledge. This will result in institutions where a research culture with nationally rated researchers and innovators thrives, while others become increasingly aware of the need to nurture and expand such a culture

3.2.3 Entrepreneurial and innovative ethos

❖ Enabling environment

UoTs have to become leading HE institutions in technological innovation and technology transfer, and the various opportunities mentioned earlier have to be incorporated into the teaching/learning and R&D programmes of the University. It is also essential to have the buy-in of staff and students, and in particular the full support of top management. The following strategies will play an important role in achieving the stated objectives:

- The promotion and establishment of a culture of technological innovation and technology transfer among staff and students, to be measured by its incorporation into education and R&D programmes, number of patents, licenses, spinout companies and financial benefits;
- The establishment of appropriate technological innovation and technology transfer strategies, systems, incentive schemes, support services and infrastructure, to be measured by the optimal utilisation of tangible intellectual assets and client satisfaction;
- The development and implementation of specific models for establishing knowledge and technology intensive enterprises, incubators and SMME technology centres, to be measured by the outputs and the financial sustainability of these entities.

❖ Commercial ventures

Higher education institutions worldwide have realised the importance not only of generating new knowledge through research and development (R&I) programmes, but also of actively participating in applying and utilising such knowledge and technology for new products, processes and services.

Entrepreneurial institutions have formulated and implemented strategies to ensure that the 'flow through' of new technology into the marketplace actually takes place. The emergence of new modes of knowledge production geared more towards addressing the needs of government, industry and communities, and the need for higher education to stimulate economic growth, have led to revised strategies. In particular a number of universities have opted for:

- Developing a community of skilled graduates with relevant and specialised knowledge and skills;

- Contributing to a modernising economy through technological innovation and technology transfer, entrepreneurial development and the application of knowledge and technology;
- Stimulating economic growth and prosperity.

Both developed and developing countries are seeking to increase the contribution that University R&I makes to national economic growth. This has led governments to restructure the institutional environment, usually through establishing clear intellectual property ownership policy in favour of universities, and by providing support programmes for the commercialisation of technology. In countries where this approach has been followed, universities take technology transfer seriously and have clear policies in place governing the intellectual property rights of inventions developed by them. Furthermore, the necessary support structures have been created to facilitate the commercialisation of University R&I, usually in the form of technology transfer offices.

At international level, Burton Clark (1998) has identified five universities in Europe and England considered to be very successful innovative and entrepreneurial: the University of Warwick in England, the University of Twente in The Netherlands, the University of Strathclyde in Scotland, Chalmers UoT in Sweden and the University of Joensuu in Finland. Common characteristics of these institutions include:

- A strengthened steering core with central faculty involvement and an administrative backbone that fuses new managerial values with traditional academic ones;
- A strengthened managerial core of agents who work to find resources for the institution as a whole;
- A lesser dependency on and greater autonomy from government;
- An enhanced development periphery where outreach units promote contract research, contract education and consultancy.
- Involvement of academic departments in entrepreneurial change, although the shift was more difficult for social science departments (excluding economics and business);
- Successful entrepreneurial beliefs stressing a will to change, can, in time, spread to become a new culture;
- An organisational identity and focus to solve the problem of severe imbalances and to define anew their societal usefulness.

In order to instil entrepreneurship in students, UoTs should increase qualifications with exit level outcomes, while the establishment of business ventures (partnerships and joint ventures) should remain a priority in order to, amongst others, increase the institutions' third stream income.

3.2.4 National and international impact

❖ National impact

SET-enrolments

In 1996 the National Commission on Higher Education projected that the participation rate in HE would increase from 20 % in 1996 to 30 % in 2005. However, the rise in head counts grew by 3 % between 1996 and 1998 and subsequently declined by 4 % between 1998 and 2000. According to the HEMIS data for 2006, SET enrolments increased to 35.12 %.

A special concern at the time was enrolments in the broad field of information and communications technology. The shift in the balance of enrolments mentioned above, and the specific focus on information and communications technology, would be achieved through the allocation of funded student places and through identifying the institutions that have the capacity or potential to provide for the need (NPHE, 2.6).

UoTs were, and still are, in a favourable position to address these issues and focus on the enrolment of female (especially black) students in the fields of SET, business and commerce. They are also well-equipped to increase enrolments in information and communications technology, due to their focus on these types of programmes. Thus, UoTs should grasp all opportunities to make an even bigger impact on the envisioned "shape" of the HE system, and to provide an increasing number of graduates in national priority areas.

Access with success

Given the fact that many students come from a disadvantaged background, UoTs have the major challenge of improving access and success rates while, at the same time, maintaining quality. Their role in enhancing access has many dimensions, including the continual revision of admission policies and efforts to reach out to all communities and schools in their regions. A development which has had considerable impact on access is Recognition of Prior Learning (RPL), which could be defined as *"…the comparison of the previous learning and experience of a learner howsoever obtained against the learning outcomes required for a specified qualification, and the acceptance for purposes of qualification of that which meets the requirements.*" (National Standards Bodies Regulations, No 18787 of 28 March 1998).

UoTs embraced RPL and acknowledge that, in addition to facilitating access, the process is about:

- Promoting mobility and progression within education, training and career paths, and
- Accelerating redress of past unfair discrimination in education, training and employment opportunities.

Over the past few years a slow but steady decline in success rates and an increase in the time required to graduate, in the case of undergraduate students from historically disadvantaged groups in particular, has become a cause of concern for UoTs. In order to address this issue, UoTs have successfully implemented various programmes/courses and services in key areas of access, including introductory programmes for new students; foundation programmes, which assist students to become effective in processing and communicating facts; and career counselling services, especially for students who wish to change programmes. At their most basic level, these programmes deal with language development, numeric development, analytic development and writing and formulation skills. The overall objective is to improve the success rates of students, without lowering standards.

❖ Quality

The White Paper (1.21) defines quality as *"maintaining and applying academic and educational standards, both in the sense of specific expectations and requirements that should be complied with, and in the sense of ideals of excellence that should be aimed at."* UoTs have opted for the notions of "fitness for purpose" and "fitness of purpose" to define quality. The first deals with the question of whether the objectives are achieved, while "fitness of purpose" deals with the question of whether the right objectives have been chosen. Howsoever defined, the focus in quality assurance should be on the promotion of quality (Lategan 1997:99).

The NPHE (2.3.3) stresses that every HE institution should have its own internal quality assurance mechanisms in place. Not only academic programmes should be evaluated on a regular basis, but also the support systems that contribute to the standard of education in the programmes. Every process that contributes to the quality of the product to be rendered, every task to be performed in the process and every person involved have to be included in the system. UoTs are thus prepared for external quality audits performed by the HEQC, as outlined in the *Quality Audit Manual*, 1997.

The ultimate aim of quality assurance at UoTs is to produce a graduate that

- is equipped with coherent and extensive knowledge of the discipline, the appropriate ethical standards and defined professional skills;
- operates effectively with and upon a body of knowledge of sufficient depth to begin professional practice;

- has an understanding of information literacy and specific skills in acquiring, organising and presenting information, particularly through computer-based activities;
- is prepared for lifelong learning in the pursuit of personal development for excellence in professional practice;
- is an effective problem solver, capable of applying logical, critical and creative thinking to a range of problems, and is capable of conducting research;
- can work both autonomously and collaboratively as a professional;
- is committed to ethical action and social responsibility as a professional and a citizen;
- communicates effectively in professional practice and as a member of the community;
- demonstrates international perspectives as a professional and as a citizen;
- demonstrates competence in the application of computational quantitative skills;
- possesses a developed awareness of the dynamics of a culturally diverse society and an understanding and appreciation of cultures other than his/her own;
- is prepared to work as a team member in co-operatively identifying problems and solutions in the learning environment, the community and the workplace;
- has a desire to continually seek improved solutions and to initiate change.

❖ International impact

Internationalisation has a pervasive impact across many functions of a UoT. Particularly, the profile of a university, as perceived by individuals and organisations outside the country, is of crucial importance as it impacts on various aspects of the institution, notably students, research and scholarship. Research is a very important, but not exclusive, function of internationalisation and many UoTs have identified internationalisation as one of their strategic priorities - with Africa and especially the SADC countries as major foci. As a result, they have collaborative agreements and initiatives with leading African and other international universities. Such agreements should be encouraged, as they strengthen opportunities for staff and student exchanges, research projects, fellowships, presentations and joint professorships. (See 3.2.2 above).

3.2.5 Sustainable Engagement

❖ Regional collaboration and engagement

The value added by collaborative agreements and memoranda of understanding with other institutions (regional, national and with SADC countries) is illustrated by:

- A steady increase in enrolments from these institutions;
- Positive student feedback; and
- Increased research links and outputs.

By developing these collaborative partnerships, UoTs not only build their reputation, but also generate additional resources to support the achievement of their goals.

UoTs have been involved in the offering of short courses for many years, particularly as a response to training needs voiced by the public. Most of these courses are offered by faculties of Economic and Management Sciences, and three kinds of programmes are usually distinguished:

- Credit-bearing short courses, where the learner is assessed and the course carries automatic credits;
- Non-credit-bearing short courses, where the learner is assessed and the credits can be awarded in terms of RPL; and
- Attendance-based short courses, where no assessment takes place and no credits are awarded, but attendance certificates are issued.

Short courses are important for creating third stream income. However, in order to ensure quality, UoTs should capture all short courses on a central database for purposes of regular review and re-planning, if necessary.

❖ Partnerships with business and industry

The emerging knowledge society implies that universities have to accept the fact that they have lost their monopoly on knowledge development. In the current knowledge society, as much knowledge generation and learning take place outside of HE as within – as pointed out by Pratt (2000:49). For this reason, UoTs have strengthened their co-operation and partnerships with business and industry. Such co-operation ranges from research projects and formal education and training programmes to short courses. In strengthening these partnerships, UoTs should realise that business principles are not more important than academic paradigms. To be engaged with one's own environment and the world of business does not mean that one has lost one's own unique characteristics and taken on features that do not belong to one's kind of life experience, but rather to take on the unique characteristics of one's University, for example, and interact through these characteristics with other life experiences. In the process the fundamental principles or functions of the University are not changed, but the way in which they are practised is changed. As Lategan (2000:4) puts it: "*Although different forms of life mutually influence one another, the one cannot take over the functions of the other*."

Van Eldik (2000:125) lists several examples of such HE - industry partnerships, including the Warwick Science Park for nurturing high tech companies and the

Twente Business and Science Park, aimed at ensuring a vibrant economic development for the region.

❖ Community Engagement

The White Paper on HE (1997) refers to the role of community service within the context of transforming the HE system. Explicit reference to 'community engagement' is not apparent in national policy documents. It is, however, implicit in words such as 'social responsibility', 'common good' and 'community service'. In this regard, the White Paper makes reference to the role community engagement can play in transforming the HE system, and institutions are called on to "*demonstrate social responsibility […] and their commitment to the common good by making available expertise and infrastructure for community service programmes.*" (1997: 10). The White Paper further states that one of the goals of HE is "*to promote and develop social responsibility and awareness amongst students of the role of higher education in social and economic development through community service programmes*." (1997: 10)

Community engagement is the mutually beneficial interaction between the university and the community where the emphasis is on doing *with* the community - and not doing *to* the community. The outcome of this interaction improves the capacity of the community to address the needs that have been identified. The university's teaching, research, and community engagement nexus is strengthened, thereby contributing to academic staff capacity and scholarship.

An essential element of community engagement in HEIs is reflection by students on the learning outcomes that they have achieved. Students participate in the analysis of the needs of the community, and also in planning how they intend to contribute to addressing these needs.

In order to instil civic responsibility in students, the university should lead by example through establishing partnerships with communities and making its expertise and infrastructure available. The main objectives of community engagement are learning, service provision and promoting the development of civic responsibility in students. Community engagement should therefore be a strategic objective of every UoT in order to achieve these outcomes UoTs are increasingly integrating community engagement as a scholarly activity in HE through research, as well as community service learning activities for students.

❖ School and post school engagement

The difference in focus and ethos between UoTs and traditional universities brings much wider variety and diversity into the HE scene and contributes meaningfully to greater innovation, technology transfer and international competitiveness.

Diversity is fundamental to the ethos of a UoT. UoTs draw upon a broader breadth and depth of human knowledge and understanding, thereby generating the intellectual vitality needed to respond to a changing world. The complexity and increasing rate of change in our country forced UoTs to develop accordingly. The inclusion of under-represented groups allows UoTs to tap reservoirs of human talent and experiences from which traditional universities have not yet fully drawn.

This openness to new perspectives, experiences and talents allows UoTs to provide access to HE to the entry requirements for Further Education and Training (FET) students, to engage in co-curricular activities (vacation / weekend schools) and to offer capacity building programmes to FET college staff. In this way FET colleges are empowered to participate with UoTs in skills development programmes, short courses and lifelong learning.

3.3 Summary

UoTs distinguish themselves from traditional universities by the way in which they perform the typical university functions of teaching/learning, research and community engagement. The characteristics, attributes and criteria describe the way they operate and determine the PIs which could, in turn, be used for differentiation within the HE sector.

It stands to reason that not all these characteristics, attributes and criteria are unique to UoTs, and which of them are unique is still a subject of debate. According to feedback received from UoTs, it seems that technological competence, career-oriented programmes (with advisory boards), work integrated learning, applied and multidisciplinary research (mode 2 knowledge), partnerships with business and industry, entrepreneurship, SET enrolments and access are the more prominent ones that distinguish UoTs from other institutions. This section has endeavoured to focus on these characteristics, attributes and criteria, as they articulate the distinctive educational philosophy of UoTs.

RECOMMENDATION 10
It is recommended that UoTs be empowered to address the skills and economic needs of South Africa in terms of their distinctive characteristics and/or approach to teaching/learning, research and community service.

SECTION 4: PERFORMANCE INDICATORS FOR UoTs

4.1 Orientation

Performance indicators are empirical, quantitative or qualitative data that measure the effectiveness of a system and/or an institution in attaining its goals. PIs must therefore relate to specific goals or objectives, as identified in an institution's overall strategic plan.

PIs are only *indicators* of performance, intended to measure those goals which an institution has identified. An indicator, like the tip of an iceberg, is larger below the surface. Each indicator implies a network of activities or functions which should be in place to perform at a certain level. For example: the indicator "research outputs" implies that an institution has a proper research policy; that it has provided the necessary funding for research; that it has appointed able staff members; that it has a well-equipped infrastructure for research; and that it has made time available for researchers to do their work. Thus, a whole network of functions at financial, physical and human resource levels are implied (and implicitly measured) when dealing with a specific PI.

Literature on the subject (Taylor 2001; Higher Education Funding Council for England 2001, 2007; Bunting and Cloete 2004; HESA, ITS, CHET 2007) has indicated that PIs could be used for various purposes:

- to inform policy decisions;
- to assess the transformation of a HE system;
- to differentiate between types of institutions;
- for profiling institutions in a ranking system;
- to provide strategic information about a HE system.

Factual information about higher education and higher education institutions can increase confidence in their performance and account for funds provided by the state. At institutional level such information could be used as a lever to effect change, to produce more relevant and acceptable graduates, or to assess performance with a view to improvement in general. It could also be used for benchmarking, or for staff development in particular. In the project they are developed to differentiate UoTs from other institutions and to assess and improve performance. There are some generic indicators, and some are differentiating, but overall they are meant to be used as benchmarks relating to measurement within a common developmental trajectory. Since a specific UoT could not be limited in terms of how the proposed PIs are used, some of them would be useful as a mechanism to access funding, particularly strategic planning.

In developing these PIs an attempt was made to validate them against the characteristics identified in the previous section and to align them with the attributes and criteria listed. The development of these PIs was an iterative

process. The PIs were often changed, and are still being changed as the process continues. The aim is to reduce these changes to the minimum.

4.2 Criteria for PIs

When assessing the usefulness of PIs, it is essential to keep the following criteria in mind:

- Type of indicator – measure of input, output, productivity or final outcome.
- Relevance – how accurately does the PI measure true underlying performance, relative to objectives?
- Ambiguity – is it possible to identify a high or low value as unambiguously favourable or unfavourable?
- Manipulability – if it can be manipulated, the value is reduced.
- Cost of collection – some PIs can be readily calculated, while others require costly data collection processes.
- Level of aggregation – individual, discipline, faculty or institution?
- Relation to other indicators – consistency checks.
- Consistency – multiple indicators can measure a single activity – one indicator can measure several dimensions of activity.
- Quantitative – measurements can be on interval or ordinal scales.
- Content validity – indicator should measure the phenomenon it refers to.
- Face validity – keep it simple.
- Reliability – if the measurement is repeated, it should have the same result.
- Timeliness – time lags distort judgment and negatively affect follow up decisions.

4.3 Proposed PIs for UoTs

The identification of the performance indicators were preceded by extensive work by various SATN project committees that studied the role and position of universities of technology and assessed the current status of UoTs. Through these studies the characteristics of UoTs were identified and their attributes described. The criteria underpinning the attributes were described and the performance indicators for assessing the criteria then proposed. The proposed PIs were then internally and externally validated. Feedback received from institutions has been incorporated. To ensure that the PIs are properly balanced they have also been classified in terms of input-output-process-developmental-institutional-uniqueness to UoTs and applicability to the HE sector at large. Towards the end of this research four major conclusions were drawn from the feedback received and the proposed PIs were finally subjected to a test case, thus answering the question as to how they “deliver” in practice.

4.4 Finnish assessment of the indicator set

The UoT indicator set was tested against several tools, including itself. The authors' joint view is:

- the prototype is comprehensive and carefully drafted, but simplification may be in order to make the set more manageable in everyday practice. The validation information should also be published.
- When tested against the Finnish standard model, the SATN model shows five major classes as compared with the Finnish four. This is well justified by the identification of entrepreneurship, internationalisation and sustainable development as separate classes. The Finnish model seems to show a bit more emphasis on pedagogical issues.
- When tested against the TINFO system model, the input/ process/output-view is not self-evident in the SATN set and the dynamics of the system STR not explicitly shown.
- When tested against the balanced scorecard model, the biggest omission is the strategy map. Alternatively, the SATN set is in itself a modified BSC.
- When tested against another South African indicator set, a different ideology is seen. It might be beneficial to make an overlay of the different South African indicator sets (UoT, Cu and TRU) with a view to finding the national optimum.

OVERALL, THE AUTHORS CONSIDER THE SATN INDICATOR SET TO BE READY FOR THE NEXT STEPS OF DEVELOPMENT

A. Technology Focused Programmes				FINAL	
Attributes	**Criteria**	**No**	**Measurable performance indicators**	**Comments**	**Classi-fication**
KPI		A1	Percentage headcount / FTE distribution per major fields of study		
		A2	Percentage of curriculum requiring technological competency from learners	• 'Technology' – Not measurable • Does it refer to 'ICT'	
		A3	Actual expenditure on technology per FTE student in support of teaching and learning		
		A4	Percentage of undergraduate qualifications that contain learning in the workplace	• Learning in the workplace not measurable	
		A5	Percentage of students employed (including self-employment) in their field of study within one year after graduation	• Have no control over this	
UG **Career programmes**	• Technology driven PQM • Professional bodies approved • Employer satisfaction with graduates • Responsiveness "Just in time education" • Relevance to Market needs	1	Percentage headcount enrolments in fields of SET, Bus & Man, Education and other Humanities	• Indicator is institutionally specific and relates to the uniqueness of the individual institution's PQM • Measuring the "technology driven" with the emphasis on SET	- Institutional - Input
		2	Percentage of UG qualifications approved/accredited by professional bodies (where applicable)	• Why "approved"? • Statutory? • Professional/Statutory/Approved/ Accredited leads to explanation • Differentiation defined by universities offering a higher percentage of formative degrees	- Unique - Input
		3	Percentage of programmes where active advisory boards/committees are involved	• Involved? • Role of advisory boards should be measured i.t.o. Impact	- Unique - Input
		4	Ratio of new UG and PG programmes introduced per year	• To measure "responsiveness" • Tracking of Programmes should be more applicable	- HE - Input

	• Job readiness • Learning in the workplace & WIL • Learner centred • Innovative educational approaches • Industry exposure and experience of staff • Staff abreast of new developments and technology	5	Percentage of qualifications revised per year.	• Assuring the relevance to the labour market • Rather refer to programmes, as tracking changes within a programme is possible	- HE - Input
		6	Percentage of students employed (including self-employment) in their field of study within one year after graduation.	• Measuring the market relatedness of programmes • (No comment)	- HE - Output
		7	Percentage of employer satisfaction	• Measuring job readiness within specific careers • "Industry"?	- HE - Outcome
		8	Percentage of undergraduate qualifications that contain learning in the workplace (WIL, EL, etc).	• Credit weighting of the WIL component needs to be specified as a minimum standard. • Almost unique to UoTs – medicine at universities	- Unique - Process
		9	Ratio of FTE permanent instructional staff	• Measuring learner centeredness • (No comment)	- Institution - Process
		10	Ratio of staff development interventions to embed innovative teaching approaches	• Measuring innovative educational approaches. • Credit learning, counted into hours • Good teaching practice should be reflected.	- HE - Input
		11	Percentage of instructional/research staff affiliated to professional bodies/associations	• "Can this be qualified?"	- HE - Input
		12	Percentage of instructional/research staff with at least 3 years recent industry experience / *who have spent at least 1 week per year gaining industry experience to familiarise themselves with new developments in industry.*	• "Should reflect the level of qualification"	- Unique - Process

Technological competence	• UTILISING technology within the teaching methodology, including IT-integration and e-learning • Leading edge technology • Staff abreast with technology/ technological advances	13	Ratio of FTE students to computer workstations on campuses and in residences	• Can also be measured according to expenditure	- Input - HE
		14	Percentage of curriculum requiring ICT / technological competency from learners	• Define ICT / technological competency • Applied competence	- HE - Input
		15	Percentage expenditure on ICT in support of teaching and learning as proportion of total operational expenditure	• Too much emphasis on IT: Should be technology	- HE - Process
		16	Percentage of expenditure on CPD and skills training with regard to technological advances, per permanent instructional/research staff headcount		- HE - Input

B. Research and Innovation in and through technology and technique in strategic areas					
Attributes	**Criteria**	**No**	**Measurable performance indicators**	**Comments**	**Classi-fication**
KPI		B1	Ratio of total research and innovation output, relevant to a UoT to permanent instructional/ research staff/permanent staff with doctorates	• No comment	Develop-mental indicators
		B2	Percentage research income over total income	• No comment	
		B3	Percentage of postgraduate headcount enrolment by race and gender	• SET categories to be addressed	
Research and Innovation expertise	• R&I staff with doctorates • Nationally related researchers and innovators • Internationally recognised R&I leaders • Recent regular R&I outputs • International exchange • Research chairs	1	Number of <u>international</u> collaborations (staff exchanges, research projects, fellowships, joint professorships, cross-institutional projects, research chairs, NRF rated personnel)	• External assessments and reviews to be added	- HE - Process
		2	Number of <u>national</u> collaborations (research projects, fellowships, joint professorships, cross-institutional projects, research chairs)	• (No comment)	- HE - Process
		3	Ratio of total research and innovation output relevant to a UoT, to permanent instructional/research staff / and permanent staff with a doctorate	• (No comment) • Fields of discipline dealt with by each University will promote diversity, and therefore create uniqueness	- Institutional - Output
		4	Ratio of external funding attracted for R&I projects to total research funding.	• (No comment)	- HE - Process
		N	Percentage of staff with a doctoral qualification	New	Development
Technology Transfer	• Inter & trans disciplinary R&I projects • New inventions • Partnerships • Specialisation in application	5	Number of prototypes, patents, processes, artistic outputs and products registered as IP (Part of the "Innovation" output)	• (No comment)	- HE - Output
		6	Number of completed and sustainable community problem-solving research projects	• "Implication of the tabled IP Bill need to be factored in"	- HE - Output
		N	Percentage increase of inter/trans disciplinary R&I projects	New	Development

Postgraduate studies	• M & D students in relevant R&I projects	7	Percentage of postgraduate enrolments per total headcount	• Will reflect uniqueness for institutions in the chosen discipline fields	- Institutional - Input
		8	Percentage of postgraduate qualifications awarded	• No comment	- HE - Output
		9	Percentage of postgraduate students participating in contract research	• No comment	- HE - Process

C. Entrepreneurial and innovative ethos					
Attributes	**Criteria**	**No**	**Measurable performance indicators**	**Comments**	**Classification**
KPI		C1	Number of registered IP outputs turned into commercial ventures divided by the total number of IP outputs (products, prototypes, processes, patents, artefacts and designs)	• No comments	- Output
		C2	Number of SMMEs, incubators, and technology stations established		
		C3	Percentage of third stream income, related to commercial ventures, as part of overall income		
Enabling Environment	• Support and control structures • Seed funding/ Diversified funding base • Enhanced developmental periphery	1	Number of established business ventures (partnerships, joint ventures and contracts)	• "Ventures should include social and community based organisations."	- HE - Output
Commercial Ventures	• Registered patents and artefacts • Established business ventures, Partnerships, contracts • SMME support • 3rd stream income	2	Number of SMMEs, incubators and technology stations established	• Sustainable? • Supported SMMEs	- HE - Output
		3	Number of registered IP outputs turned into commercial, (business) ventures divided by the total number of IP outputs (products, prototypes, processes, patents, artefacts and designs)	• No comment	- HE - Output
		4	Number of SMMEs supported (count incidences rather than volume)	• No comment	- HE - Output
		5	Percentage of third stream income, related to commercial ventures, as part of overall income	• No comment	- HE - Output
Student Entrepreneur-ship	Programmes with entrepreneurship content and projects	6	Percentage of qualifications with entrepreneurship as an exit level outcome to the total number of UG qualifications	• No comments	- HE - Output

D. National and International impact and recognition					
Attributes	**Criteria**	**No**	**Measurable performance indicators**	**Comments**	**Classification**
KPI		D1	Percentage of annual growth in student headcount in fields of specialisation	No comments	
		D2	Percentage of annual growth in graduates in SET		
		D3	Percentage of undergraduate headcount enrolments in foundation provision		
		D4	Number of international collaborations (staff and student exchanges, research projects, fellowships, joint professorships, cross-institutional projects, research Chairs, key-note addresses, presentations, post-doctorates)		
National Impact (Service to the Industry, community, society)	• Widening access to HE (alternative routes of access) • Throughput • Nationally prioritised skills and development • Job creators	1	Percentage of South African learners, with SC/NSC/FET qualifications enrolled at UoTs as first time entering students.	Success rate should be included	- HE - Input
		2	Percentage of undergraduate headcount enrolments in foundation provision	Extended curriculum is only one of the models for Foundation provision	- HE - Input
		3	Percentage females and percentage by race of student headcount per field of specialisation namely SET, Business & Management, Education and other Humanities	"Uniqueness" relates to each individual institution's strategic choice.	- Institutional - Input
		4	Percentage of undergraduate students admitted on the basis of RPL	Should include the tracking of students	- Unique - Input
		5	Percentage of first time entering undergraduate students who graduate in minimum time plus 1 year	Minimum time plus 1, 2 and 3 years	- HE - Output
		6	Percentage of annual growth in student numbers and in graduates in national priority areas	Should be measured against a baseline	- HE - Process
		7	Number of jobs created through SMMEs	This is an indicator that is not reliable, comparable or feasible	- HE - Out-come

International recognition and exposure	• International collaboration (SADC and other international)	8	Percentage of SADC and other international students	Success rate should also be considered	- HE - Input
		9	Number of international collaborations (staff and student exchanges, research projects, fellowships, joint professorships, cross-institutional projects, research Chairs, key-note addresses, presentations, post-doctorates)	Should distinguish SADC students, also focusing on PG students	- HE - Process

E. Sustainability in Engagement and Practice					
Attributes	**Criteria**	**No**	**Measurable performance indicators**	**Comments**	**Classification**
KPI		E1	Ratio of third stream income versus number of engagements		- Outcomes
		E2	Ratio of third stream income as a proportion of total income		
Government, Business and Industry Engagement	• Regional collaboration and embedment	1	Number of regional, national and SADC collaborative partnerships	• Not measurable, realistic and available • Ratio of G, B, I engagement projects to FTE staff?	- HE - Process
		2	Ratio of credit bearing short courses (CPD programmes) to staff FTEs	• Not measurable, realistic and available • Ratio of G, B, I engagement projects to FTE staff?	- HE - Input
Community Involvement (Social Responsibility)	• Mutually beneficial partnerships for sustainable development	3	Ratio of projects (including community and service learning) to FTE staff	• Percentage budget allocated to Community Engagement? • Define CE • (n) Percentage of staff involvement	- HE - Process
School and post school engagement	• Technology and knowledge transfer	4	Number of learners from school participating in co-curricular (vacation/weekend schools) activities	No comment	- HE - Output
		5	Number of capacity building/upgrading programmes offered to FTE college staff and other teaching professionals	No comment	- HE - Input
		6	Participation rate of FET learners	No comment	- HE - Process
Sustainability	• Financially sustainable	7	Total direct cost per FTE student	Very generic	- A - Generic
		8	(Subsidy / block grants + tuition fees = income) per FTE student	Bottom line issue important to all HEI	- A - Generic

General conclusions from feedback

Conclusion 1:

The characteristics, attributes and PIs do not holistically differentiate UoTs from other institutional types but do provide differentiation / uniqueness to some extent.

- The proposed PIs do not successfully differentiate UoTs from other institutional types
- Although the proposed PIs are effective in distinguishing UoTs from traditional institutions to some extent, they fail to address this distinction adequately
- Uniqueness of the PIs was calculated by one UoT to be 4.16 % and by UJ to be 10.4 %

The following reasons could account for this:

- The general perception is that since UoTs now have university status, there is little to differentiate them from traditional universities in terms of the core functions of teaching and learning, research and community engagement
- Although differentiation was based on the 'how' rather than the 'what', the general feeling seems to be that neither the attributes, criteria or PIs for the stated characteristics succeed in making UoTs explicitly unique from traditional universities.
- Differentiation will be evident through the setting of targets and benchmarks for the development trajectory of UoTs.

Conclusion 2:

The criteria appear to be generic, which results in PIs also being generic and shared across the HE system (75 %)

The following reasons could account for this:

- The restructuring of the HE landscape has resulted in a unitary system
- Academic drift is taking place
- Career-focused offerings of traditional universities are closely aligned to the model employed by UoTs
- UoTs plan to train technologists through 3-year degree programmes

Conclusion 3:

There is nothing 'lower grade' about UoTs

UoTs are characterised by:

1. Relevance of programmes – technology focused PQM
    - Professional bodies and advisory committees
    - Producing students that can start work upon graduation.
    - Entrepreneurial focus – job creators.
    - Primarily concerned with the development of vocational/ career/ professional education.
    - Integrating work and learning (WIL).
    - Technological competencies and capabilities - as important as cognitive skills.
    - Curriculum developed around the graduate profile defined by industry/ professions (market relatedness).

2. Responsiveness to, and fulfilment of, the needs of industry, community and society
    - Programmes relate to the problems of industry/community/society.
    - Service to industry and the community.

3. Research informed by niche areas
    - Enriched by industrial and business experience and partnerships**.**

4. Technology transfer
    - Applied Competence
    - Application of the know-how, knowledge and skills and expertise towards improved products, processes and technologies.
    - Emphasis on scholarship/innovation and R&D to develop new technologies

5. Appointment of experts acknowledged by industry

6. Strong attention to niche areas

Conclusion 4:

Some PIs are generic although they provide a developmental trajectory for UoTs - especially as linked to R&I.

Conclusion 5:

PIs' uniqueness and diversity are tied into the institution's strategies and strategic plans (4.2%)

PIs provide measurable leverage to manage the University according to a strategic plan

Test case

HOW DO PERFORMANCE INDICATORS "DELIVER" IN PRACTICE?

	AREA	PQM	RESEARCH TECHNOLOGY TRANSFER	INNOVATION AND ENTREPRE-NEURSHIP	IMPACT	SUSTAIN-ABILITY
1	Percentage of headcount enrolments in the fields of SET, Bus & Man, Education and other Humanities	X				
2	Percentage of UG qualifications approved/accredited by professional bodies (where applicable)	X	X	X		
3	Percentage of programmes where active advisory boards/committees are involved	X	X	X		
4	Ratio of new UG and PG programmes introduced per year	X				
5	Percentage of qualifications revised per year.	X				
6	Percentage of students employed (including self-employment) in their field of study within one year after graduation.	X				
7	Percentage of employer satisfaction	X	X	X	X	
8	Percentage of undergraduate qualifications that contain learning in the workplace (WIL, EL, etc).	X				
9	Ratio of FTE students to FTE permanent instructional staff	X				
10	Ratio of staff development interventions to embed innovative teaching approaches	X				
11	Percentage of instructional/research staff affiliated to professional bodies/associations	X	X	X		
12	Percentage of instructional/research staff with at least 3 years recent industry experience/ who have spent at least 1 week per year gaining industry experience to familiarise themselves with new development in industry.	X	X	X		
13	Ratio of FTE students to computer work stations on campuses and in residences	X				
14	Percentage of curriculum requiring ICT/ technological competency from learners	X				
15	Percentage expenditure on ICT in support of teaching and learning as proportion of total operational expenditure	X				
16	Percentage of expenditure on CPD and skills training with regard to technological advances, as per permanent instructional/research staff headcount	X				
17	Number of international collaborations (staff exchanges, research projects, fellowships, joint professorships, cross-institutional projects, research chairs, NRF rated personnel)		X	X	X	
18	Number of national collaborations (research projects, fellowships, joint professorships, cross-institutional projects, research Chairs)		X	X	X	
19	Ratio of total research and innovation output relevant to a UoT to permanent instructional/ research staff / and permanent staff with a doctorate		X	X	X	
20	Ratio of external funding attracted for R&I projects to total research funding		X	X		
N	Percentage of staff with a doctoral qualification		X	X	X	
21	Number of prototypes, patents, processes, artistic outputs and products registered as IP (part of the "Innovation" output)		X	X	X	
22	Number of completed and sustainable community problem-solving research projects		X			
N	Percentage increase of inter/trans disciplinary R&I projects		X	X		

	AREA	PQM	RESEARCH TECHNOLOGY TRANSFER	INNOVATION AND ENTREPRE-NEURSHIP	IMPACT	SUSTAIN-ABILITY
23	Percentage of postgraduate enrolments per total headcount		X			
24	Percentage of postgraduate qualifications awarded		X			
25	Percentage of postgraduate students participating in contract research		X			
26	Number of established business ventures (partnerships, joint ventures and contracts)			X	X	
27	Number of SMMEs, incubators, and technology stations established			X	X	
28	Number of registered IP outputs turned into commercial, (business) ventures divided by the total number of IP outputs (products, prototypes, processes, patents, artefacts and designs)			X	X	
29	Number of SMMEs supported (count incidences rather than volume)			X	X	
30	Percentage of third stream income, related to commercial ventures, as part of overall income			X	X	
31	Percentage of qualifications with entrepreneurship as an exit level outcome to the total number of UG qualifications	X		X	X	
32	Percentage of South African learners, with SC/NSC/FET qualifications and enrolled at UoTs as first time entering students.	X			X	
33	Percentage of undergraduate headcount enrolments in foundation provision	X			X	
34	Percentage of females and percentage by race of student headcount per field of specialisation, namely SET, Business & Management, Education and other Humanities.	X			X	
35	Percentage of undergraduate students admitted on the basis of RPL	X			X	
36	Percentage of first time entering undergraduate students who graduate in minimum time plus 1 year	X			X	
37	Percentage of annual growth in student numbers and in graduates in national priority areas	X			X	
38	Number of jobs created through SMMEs.			X	X	
39	Percentage of SADC and other international students	X			X	
40	Number of international collaborations (staff and student exchanges, research projects, fellowships, joint professorships, cross-institutional projects, research Chairs, key-note addresses, presentations, post-doctorates)		X	X	X	X
41	Number of regional, national and SADC collaborative partnerships		X	X	X	
42	Ratio of credit bearing short courses (CPD programmes) to staff FTEs				X	X
43	Ratio of projects (including community and service learning) to FTE staff				X	X
44	Number of learners participating in co-curricular (vacation/weekend schools) activities					X
45	Number of capacity building/upgrading programmes offered to FET college staff and other teaching professionals					X
46	Participation rate of FET learners					X
47	Total direct cost per FTE student					X
48	(Subsidy / block grants + tuition fees = income) per FTE student.					X

4.5 Testing and piloting the calculations of PIs

For testing and piloting of performance indicators to be conducted the concepts of testing, piloting and calculation need to be explained and understood - at least as far as this project is concerned.

A key point of departure on the explanation of testing and piloting was based on the underlying definition of a performance indicator itself. A performance indicator is collectively described by three elements, namely:

- Meaning (**What** do you want to measure)
- Definition (**How** will you measure)
- Calculation (**Methodology** – Data elements, data definitions, data sources, sourcing method)

From this collective description it is evident that the elements of meaning and definition play an important role in testing and piloting the calculation. Calculation is largely influenced by meaning and definition

In this project, the first step in testing and piloting the calculation of performance indicators was to design a process to continuously enhance the meaning and definition of each PI. The project team decided to define a validation process that, if followed, will continuously enhance each PI's meaning and definition. This validation process focused on two forms of validation, namely internal and external validation

Internal validation signified that each PI was validated against a set of predetermined criteria. External validation meant that the SATN's differentiation model was compared with other performance measurement models. UoT expert staff were asked to critique the PIs, UoTs were asked to provide input on the PIs on an institutional basis, and feedback was requested from the DoE and the Finnish project sponsors. During each of these engagements, where relevant and applicable, the meaning and definition of each PI was improved,

At a point where the meaning and definition of each PI was fairly stable, the project team of phase 5 could then start to define an information architecture in detail. The purpose of an information architecture is to uphold the validity of the data in the performance measurement system, hence it entails that for each PI the following is defined: a specific calculation method, data elements, data definitions, data sources and method. The following is an example for a specific PI:

Performance indicator	Calculation	Data element	Data definition	Data source	Method
Headcount / FTE distribution per major fields of study	Student headcount or FTE per major field of study – expressed as a percentage of the total number of students (headcount & FTE)	Headcount FTE Major fields of study; CESM groups	HEMIS headcount HEMIS FTE SET, Business & Management; Education, other Humanities	HEMIS (Audited final) HEMIS (Audited final) HEMIS (Audited final)	Data query Data query Data query

The process of completing the information architecture for all PIs stretched over a two month period and involved 5 workgroup sessions and various inputs at individual level. A key learning issue was that the modellers (involved with the design and populating of the information architecture) and the builders (involved in the designing and building of the database architecture) jointly participated in these workgroup sessions.

PROPOSED PERFORMANCE INDICATORS FOR UoTs
Draft 7 August 2008

All measures / measurements are per reporting year (NFC = Not for comparison for 1st time of measurement)

A. Technology Focused Programmes

No.	Measurable performance indicators	Calculation	Data element	Data definition	Data source	Method
A1	Percentage headcount / FTE distribution per major fields of study	Student headcount or FTE per major field of study – expressed as a percentage of the total number of students (headcount & FTE)	Headcount FTE Major fields of study; CESM groups	HEMIS headcount Full-time equivalent SET, Business & Management; Education, other Humanities	HEMIS (Audited final) HEMIS (Audited final) HEMIS (Audited final)	Data query Data query Data query
A2 (NFC)	Percentage of curriculum requiring technological competency from learners	The number of subjects **requiring** technological competence / total number of subjects	Subject/course code	Count subjects by Specialised software; Technology in subject name; Specialised equipment used	ITS Faculty	Data query Questionnaire
A3	Actual expenditure on technology per FTE student in support of teaching and learning	Expenditure on technology (only related to teaching and learning)/ total number of FTE's	Expenditure in Rand FTE Teaching and learning	All technology in support of teaching and learning programmes (OPEX and CAPEX included) (Cost centres and specific accounts in faculties)	ITS HEMIS (Audited final) ITS	Data query Data query Data query
A4	Percentage of undergraduate qualifications that contain learning in the workplace (WIL, EL, etc).	Number of undergraduate qualifications containing WIL / total number of undergraduate qualifications	Undergraduate qualifications WIL (experiential/ practical /similar)	HEMIS definition for undergraduate qualifications Work Integrated Learning (includes experiential subjects; some practicals; community service learning, etc)	HEMIS (audited final) HEMIS + faculty survey (once off exercise)	Data query Data query & Survey

No.	Measurable performance indicators	Calculation	Data element	Data definition	Data source	Method
A5	Percentage of students (a) employed and (b) employed in their field of study within one year of fulfilling qualification requirements	(a) Estimated proportion of graduates employed (respondents indicating employed / total no of respondents) (b) Estimated proportion of employed graduates employed in their field of study (respondents employed in field of study / respondents employed)	Graduates Employed students	Graduates include under- + post graduate Any graduate that is employed - self, temporary & full-time (only employment related to their field of study)	Survey Survey	Questionnaire Questionnaire
1	Percentage headcount / FTE distribution per major fields of study	**See A1**				
2	Percentage of UG qualifications approved/accredited/recognised by professional bodies (where applicable)	Number of undergraduate qualifications approved/accredited/recognised as a percentage of total number of undergraduate qualifications	Undergraduate qualifications Accredited/ approved/recognised	HEMIS definition Formally accepted by relevant bodies	HEMIS Faculties	Data query Questionnaire (to include a list of professional bodies)
3	Percentage of programmes where active advisory boards/committees are involved	Programmes wherein advisory bodies are actively involved / total number of programmes	Programme Advisory committee	Programme is a range of qualifications from the same functional discipline (e.g. education, electrical engineering, clinical technology, etc.) Meeting at least twice a year; minutes and inputs available	HEMIS Faculty	Data query Questionnaire
4	Number of new, approved UG and PG Qualifications introduced	Number of new qualifications introduced in reporting year - indicated separately for undergraduate and post-graduate levels	Undergraduate qualification Post-graduate qualification New qualification	HEMIS definition HEMIS definition Qualification offered for the 1st time in the reporting year with students enrolled	ITS ITS ITS	Data query Data query Data query
5	Percentage of all qualifications with curricular revision	Number of qualifications revised / total number of qualifications	Qualification	HEMIS definition Curricular revision with regard to content and course combinations	Faculty (Senate where applicable)	Questionnaire

No.	Measurable performance indicators	Calculation	Data element	Data definition	Data source	Method
6	Percentage of students (a) employed and (b) employed in their field of study in their field of study within one ~~year~~ quarter after fulfilling qualification requirements	**SEE A5**				
7	Percentage - employer satisfaction	Rate of satisfaction by scale	Employer satisfaction response by scale	Satisfaction with graduate skills; attitudes; work ethics; etc.	Employer	Questionnaire / Survey (need standardised questionnaire)
8	Percentage of undergraduate qualifications that contain learning in the workplace (WIL, EL, etc).	**SEE A4**				
9	Ratio of FTE students to FTE ~~permanent~~ instructional/research staff	Total FTE students / Total FTE ~~permanent~~ instructional/research staff	FTE students FTE instructional/research staff	HEMIS definition HEMIS definition	HEMIS HEMIS	Data query Data query
10	Number of staff development interventions to embed innovative teaching approaches	Number of staff development days (training days) in T&L development / total T&L working days	Training days in 8 hour units Total T&L working days	Formal skills training and development for teaching and learning or research staff FTE instructional research staff * T&L working days T&L working days = XXX (To be defined)		
11	Percentage of full-time instructional/research staff affiliated to professional bodies/associations	Number of full-time instructional/research staff affiliated to professional bodies / Total number of full-time instructional/research staff	Full-time Instructional/research staff Affiliation to professional bodies/associations	Permanent and contract, 40 hour week Upholding membership criteria & being a paid-up member	ITS ITS (HR system)	Data query Data query (to include a list of professional bodies & associations as registered on ITS)

No.	Measurable performance indicators	Calculation	Data element	Data definition	Data source	Method
12	(a) Percentage of full-time instructional/research staff appointed with industry experience (b) Percentage of full-time instructional/research staff exposed to industry	(a) Number of full-time instructional/research staff with at least two years recent (within last 5 years) industry experience / Total number of full-time lecturing/ research staff appointed (b) Number of full-time instructional/research staff exposed to industry experience of at least 10 working days / total number of full-time instructional/research staff	Full-time Instructional/ research staff Industry experience - Having worked in/for industry (programme related)	Permanent and contract, 40 hour week	ITS (a) ITS (HR system) (b) Faculty	Data query (a) Direct query to faculty (b) Questionnaire
13	Ratio of computer workstations to FTE students	Total number of PC workstations / Total number of FTE students	PC workstations FTE students	All the PCs to which students have access on campus Full-time equivalent	IT - Support services HEMIS	Questionnaire (Direct) Data query
14	Percentage of curriculum requiring technological competency from learners	**See A2**				
15	Percentage actual expenditure on ICT in support of teaching and learning / total expenditure	ICT expenditure for T&L divided by the total expenditure	ICT in support of teaching and learning Total expenditure	All ICT in support of teaching and learning programmes by Cost centres and specific accounts in faculties (OPEX and CAPEX) Institutional OPEX and CAPEX	ITS Finance ITS Finance	Data query Data query
16	Expenditure on CPD and skills training ~~with regard to technological advances~~, per full-time instructional/research staff headcount	Expenditure on CPD and skills training ~~(only related to technological advances)~~ / full-time instructional/research staff (headcount)	Expenditure on CPD and skills training Full-time instructional/ research staff	CPD and skills training linked to field of expertise Permanent and contract, 40 hour week	Academic development office, skills records HEMIS	Direct query (Structured query sent to office)
17	Library	Info literacy contact hours; Resources available	Elmar Research and get latest info			

B. Research and Innovation in and through technology and technique in strategic areas

All measures /measurements are per year

No.	Measurable performance indicators	Calculation	Data element	Data definition	Data source	Method
B1	Ratio of a) total research and b) innovation output, relevant to a UoT, to permanent instructional/ research staff **Note:** Composite index can be formed	a) Total number of research outputs / permanent instructional/research staff b) Total number of innovation outputs) / permanent instructional/research staff	research output innovation output Permanent instructional/research staff	DoE NFF Patents, Cumulative no of Tech. Stations; SMEs/SMMEs established (weighted) HEMIS definition	HEMIS Research Office & Technology transfer section HEMIS	Data query Direct query (Questionnaire) Data query
B2	Ratio of a) total research and b) innovation output, to all permanent staff with doctorates, respectively **Note:** Composite index can be formed	c) Total number of research outputs / all permanent staff with doctorates d) Total number of innovation outputs / all permanent staff with doctorates	research output innovation output Permanent staff with doctorates	DoE NFF Patents, Cumulative no of Tech. Stations; SMEs/SMMEs established (weighted) HEMIS	HEMIS Research Office & Technology transfer section HEMIS	Data query Direct query (Questionnaire) Data query
B3	Percentage research income over total income	Research income / Total income	Research income Total income	Income from research subsidy (block & dev), contract research, patents sold, NRF, DST funds, etc Total income as in institutional income statement	ITS Finance ITS Finance	Data query Data query
B4	Percentage of postgraduate headcount enrolment by race and by gender		Postgraduates Race Gender	HEMIS definition HEMIS definition HEMIS definition	HEMIS HEMIS HEMIS	Data query Data query Data query

No.	Measurable performance indicators	Calculation	Data element	Data definition	Data source	Method
1	Number of international collaborations	Total number of international collaborations	International collaborations	International staff exchanges, research projects, fellowships, joint professorships, cross-institutional projects, research chairs, NRF A or B rated personnel	Faculty, research office and international office	Direct query (Questionnaire)
2	Number of national collaborations	Total number of national collaborations	National collaborations	National staff exchanges, research projects, fellowships, joint professorships, cross-institutional projects, research chairs	Faculty and research office	Direct query (Questionnaire)
3	Ratio of total research and innovation output relevant to a UoT to permanent instructional/ research staff	**See B1**				
4	Ratio of external funding attracted for R&I projects to total research income	External funding for R&I projects / research income	External funding for R&I projects Research income	Funding received from business and industry (private funding) Income from research subsidy (block & dev), contract research, patents sold, NRF, DST funds, etc.	ITS Finance (cross check with research office) ITS Finance	Data query Data query
5	Number of prototypes, patents, processes, artistic outputs and products registered as IP (part of the "Innovation" output)	Total number of registered IP	Registered IP	Number of prototypes, patents, processes, artistic outputs and products – registered as IP	Technology stations and research office	Questionnaire
6	Number of completed and sustainable community problem-solving research projects	Count	Projects on community-expressed needs (health, infra-structure, etc.)	Projects with research /expertise /physical help rendered that show continued benefit and remain community-sustained	Faculty Research Office	Data query Questionnaire
7	Percentage of postgraduate headcount enrolment by race and by gender	**See B4**			HEMIS/MIS/ITS	
8	Percentage of postgraduate qualifications awarded	Number of postgraduates / total number of graduates	Postgraduates Total graduates	HEMIS definition HEMIS definition	HEMIS HEMIS	Data query Data query

No.	Measurable performance indicators	Calculation	Data element	Data definition	Data source	Method
9	Percentage of postgraduate students participating in contract research	Number of postgraduate students participating in contract research / all postgraduates	Postgraduate enrolments Contract research	HEMIS definition Externally funded research projects	HEMIS Faculty/research office	Data query Direct query (questionnaire)

C. Entrepreneurial and innovative ethos

All measures /measurements are per year

No.	Measurable performance indicators	Calculation	Data element	Data definition	Data source	Method
C1	Number of IP outputs turned into commercial ventures divided by the total number of IP outputs (products, prototypes, processes, patents, artefacts and designs) (Commercial throughput)	Number of IP outputs turned into commercial ventures / the total number of IP outputs	IP outputs Commercial ventures	Number of prototypes, patents, processes, artistic outputs and products – registered as IP Ventures generating income	Technology stations and research office Technology stations, research office, commercial units	Questionnaire Questionnaire
C2	Number of SMMEs, incubators, and technology stations established	Count	SMMEs, incubators and TSs	All SMMEs and incubators and Technology stations	Technology stations, research office, commercial units	Questionnaire
C3	Total third stream income, related to commercial ventures, as part of total income	Total third stream income, related to commercial ventures / total income (%)	Third stream income related to commercial ventures Total income	All income other than grants/subsidy and class fees, generated by commercial ventures only Total income as in institutional income statement	ITS – Finance ITS - Finance	Data query Data query
1	a) Number of established commercial ventures b) Number of established commercial ventures arising from partnerships and joint ventures	Count	Established commercial ventures	a) Income generating entities established by the institution b) Income generating entities established by the institution through partnerships and joint ventures	Technology stations, faculty, commercial units cross referenced with ITS – Finance Technology stations, faculty, commercial units cross referenced with ITS – Finance. Legal Services	Direct query (questionnaire) Direct query (questionnaire)
2	Number of SMMEs, incubators, and technology stations established	**See C2**				
3	Number of IP outputs turned into commercial ventures divided by the total	**See C1**				

No.	Measurable performance indicators	Calculation	Data element	Data definition	Data source	Method
	Number of IP outputs (products, prototypes, processes, patents, artefacts and designs) (Commercial throughput)					
4	Number of supportive engagements with SMMEs	Count	Supportive engagements	Number of engagements providing advice	Technology stations, research office, commercial units	Questionnaire
5	Total third stream income, related to commercial ventures, as part of total income	**See C3**				
6	Percentage of UG qualifications with entrepreneurship as an exit level outcome	Number of UG qualifications with entrepreneurship as an exit level outcome / the total number of UG qualifications	Undergraduate qualifications Entrepreneurship as an exit level outcome	HEMIS definition for undergraduate qualifications Entrepreneurship explicit in curriculum of a formal subject (course) or module	HEMIS (audited final) ITS & Faculty	Data query Data query

D. National and international impact and recognition

All measures /measurements are per year

No.	Measurable performance indicators	Calculation	Data element	Data definition	Data source	Method
D1	Percentage of annual growth in student headcount in major fields of study	(Year – (Year – 1)) / Year -1 = % for student headcount	Student headcount Major fields of study	HEMIS definition SET, Business & Management; Education, other Humanities	HEMIS HEMIS	Data query Data query
D2	Percentage of annual growth in graduates in SET	(Year – (Year – 1)) / Year -1 = % for total graduates	Graduates SET	HEMIS definition HEMIS definition	HEMIS HEMIS	Data query Data query
D3	Percentage of undergraduate headcount enrolments in Extended Curricula programmes	Total headcount enrolments for undergraduates in ECP / Total headcount enrolments for undergraduates	Undergraduate student headcount Foundation courses EC Programmes	HEMIS definition HEMIS definition (funded)	HEMIS ITS	Data query Data query
D4	Number of international collaborations	**See nr 1 under B**				
1	Percentage of South African learners with SC/NSC/FET qualifications acquired within the previous 3 years and enrolled at UoTs as first time entering students	Total SC/NSC/FET First time entering student enrolment headcount / Total first-time entering student headcount enrolment	SC – Senior certificate NSC – National senior certificate FET – Further education and training First time entering	DoE definition DoE definition DoE definition HEMIS definition	DoE DoE DoE HEMIS	
2	Percentage of undergraduate headcount enrolments in foundation provision	**See D3**		Headcount in ECP , other foundation		
3	Percentage females and percentage by race of student headcount per major fields of study	a) Female headcount / total headcount per major fields of study b) race headcount / total headcount per major fields of study	Race Gender (females) Major fields of study; CESM groups Total headcount	HEMIS definition HEMIS definition HEMIS definition HEMIS definition	HEMIS HEMIS HEMIS HEMIS	Data query Data query Data query Data query

No.	Measurable performance indicators	Calculation	Data element	Data definition	Data source	Method
4	Percentage of undergraduate students enrolled on the basis of RPL	Number of RPL enrolled students at undergraduate level / Total number of undergraduate students	Undergraduate students RPL enrolled students	HEMIS definition As approved by Senate	HEMIS Faculty	Data query Questionnaire (direct)
5	Percentage of first time entering undergraduate students who graduate within minimum time plus one year	(First time entering undergraduate students) graduating in minimum time plus 1 year / (first time entering undergraduate students) = %	First time entering student Undergraduate Minimum time	HEMIS definition HEMIS definition Per qualification - as per approved PQM	HEMIS HEMIS ITS	Data query Data query Data query
6	Percentage of annual growth in student headcount and in graduates in national priority areas	a) (Year – (Year – 1)) / Year -1 = % for total student headcount per priority area b) Difference in graduates between reporting year and previous year/Graduates in previous year. Express as % growth or decline; per priority area (Both for national priority areas)	Student headcount Graduates DoE list (SET) HRDS (Educ. Management, for now; update annually) National priority areas	HEMIS definition HEMIS definition List to be provided	HEMIS HEMIS HEMIS	Data query Data query Data query
7	Number of jobs created through SMMEs	Count	Number of jobs created	All the jobs created by SMMEs (established with UoT assistance) over last 3 years	SMMEs database (Technology transfer office or similar)	Questionnaire
8	Percentage of SADC and other international students	a) Total number of SADC student / total number of students b) Total number of international students (incl. SADC) / total number of students Usually exclude SADC in b)	SADC International	ITS definition ITS definition	ITS ITS	Data query Data query
9	Number of international collaborations	**See nr 1 under B**				

E. Sustainability in Engagement and Practice

All measures /measurements are per year

No.	Measurable performance indicators	Calculation	Data element	Data definition	Data source	Method
E1	Ratio of third stream income versus number of engagements/commercial ventures (implies average income per venture)	Third stream income / the number of ventures having generated the third stream income , in Rand	Third stream income Commercial ventures	All income other than grants/subsidy and class fees, generated by commercial ventures only Ventures generating income	ITS Finance ITS Finance – Commercial units	Data query Data query - Questionnaire
E2	Third stream income as a proportion of total income	Third stream income / total income as percentage	Third stream income Total income	All income other than grants/subsidy and class fees, generated by commercial ventures only Total income as in institutional income statement	ITS Finance ITS Finance	Data query Data query
1	Number of collaborative partnerships	Count	Collaborative partnerships	Regional, national and SADC	International office, Marketing, research office	Questionnaire
2	Ratio of credit bearing short courses (incl. CPD programmes) to instructional/research FTE staff	Credit bearing short courses / Instructional/research FTE staff	Credit bearing short courses Instructional/research staff FTE's	Each short course that has a formal credit status (credit not necessarily HEMIS-funded, but NQF or similar value) HEMIS definition	ITS HEMIS	Data query Data query
3	Ratio of projects (including community and service learning) to all instructional/research FTE staff	Duplication of other separate indicators (**B no 6, A4)**				

4	Number of learners participating in co-curricular activities	Count	Number of learners Co-curricular activities	School learners (e.g. vacation/weekend schools)	Paid - ITS, Non-paid – Faculty	Data query & questionnaire
5	Number of capacity building/upgrading programmes offered to FET college staff and other teaching professionals	Count	Capacity building/upgrading instructional offerings to FET college staff and other teaching professionals	Capacity building programmes offered by the institution to teaching staff in other teaching sectors (FET, other HEIs)	Faculty	Questionnaire
6	Participation rate of FET learners See D no 1 (same)	Number of FET learners enrolled / total headcount enrolment Or : stick to first time entrants as denominator	FET learners Total headcount enrolment	All students coming from the FET sector HEMIS definition	ITS HEMIS	Data query Data query
7	Operational cost per FTE student	OPEX / Total FTE students	OPEX Total FTE students	Total operating expenditure (audited financial statements) HEMIS definition	ITS Finance HEMIS	Data query Data query
8	(Subsidy / block grants + tuition fees = income) per FTE student	Subsidy and class fee income / total number of FTE students	Subsidy and class fee income Total FTE students	Income as per audited financial statements HEMIS definition	ITS Finance HEMIS	Data query Data query

4.6 The way forward

Critical issues with regard to using the defined information architecture to compile the UoT sectoral profile are as follows:

- Finalise the methodology, looking specifically at the sourcing method
- Sectoral profile – piloting before year end, using 2007 data, following the methodology
  - 1st complete exercise by March 2009
  - What will be possible; percentage of PIs?; changes in institutional practice?
  - National benchmarking of UoTs
- Long-term implementation
  - International benchmarking - would it be viable to build this into the sectoral developmental trajectory
  - Target setting - sectoral and institutional goals and objectives built into the developmental trajectory
  - Sectoral measurement cycle, when would be the ideal time of year to conduct such an exercise
  - At institutional level, the project team felt that the sectoral approach could lead to a stronger focus on measurement within institutions. It is important to understand that specific strategic focus areas should be excluded from the sectoral measurement.
- Implementation methodology
  - Performance measurement readiness is a multi-million Dollar industry
  - 70 % of implementations fail, due to:
  - System issues (databases, IT, measures, etc.)
  - Systemic issues (culture, management commitment and support). If institutional culture, support or information architecture is inadequate, the process cannot work.
  - There is an increasing awareness of the importance of readiness assessment as part of an implementation methodology
  - Readiness assessment is part of the implementation process, but it has to occur PRIOR to implementation
- Frequency and periods of assessment

Institutional level - Developing an implementation methodology that is designed around the issue of **determining performance measurement readiness prior to implementation**

4.7 Assessment of the project by Finnish experts

Dr Aki Valkonen of the Laurea University of Technology (Finland) and Prof. Seppo Saari of the Finnish Council for Higher Education Evaluation produced a 29 page assessment of the project.

The project plan and progress so far (all reports) were tested against the acid test model. The authors' joint view is:

- The project plan satisfies the acid test model requirements very well.
- The progress, especially since April 2008, has been remarkable.
- Readiness to finish the project in time/at specifications exists.
- Understanding of the need to prepare for the next project with a broader funding base exists.
- As a minor remark, the logic of the project phase/action numbering might require a bit more linear logic.

4.8 Summary

There is concern that the proposed PIs do not successfully differentiate UoTs from other institutional types. Differentiation is evident to some extent, but the main contribution of the PIs seems to be their developmental value. In this regard they "deliver" with regard to all five characteristics identified in section 3.

While the number of PIs may need to be reduced or simplified, it may be prudent to share them with the SATN Board in their current form. The process may also require refining, rather than reducing, the PIs. Board members would have valuable inputs to make in consolidating the PIs, which would be optimised by giving them access to the original data. In order to indicate to the Board what the process of refining entails, the work should start as soon as possible.

The current project of identifying the PIs has reached its conclusion with the extraction of data to populate the PIs.

It is recommended that the process continue and UoTs eventually be measured, funded and developed on the basis of the sector consulted and the internationally verified set of PIs identified in this report.

SECTION 5: CONCLUSION

The desired outcomes of this project have been; (1) to identify the unique contributions of UoTs, (2) to give some pointers as to the identity of UoTs in South Africa's differentiated HE system and (3) to develop - on the basis of this identity - a set of PIs by which UoTs want their performance in teaching/learning, research and community engagement to be measured. The fourth outcome was to table a documented sector development trajectory for UoTs. This final report could also serve this purpose. Section 2 (the current position of UoTs in SA) dealt with certain broad issues which impede the development of UoTs, while section 3 (characteristics, attributes and criteria for UoTs) described the ideal position of these institutions. The PIs in section 4 determine how UoTs should perform in order to be HE institutions of repute. For this purpose, clear benchmarks and/or targets need to be agreed upon by individual institutions, or by the sector as a whole.

It is therefore recommended that this final report serves as a sub-sectoral development trajectory for UoTs and to some extent CUs.

The report is hereby submitted to the relevant authorities. That the project was necessary, and in good time, is clear from the British experience on technological universities, as summarised by Pratt (2000:50) in the conclusion of his article: "*If there is one lesson from the British experience, it is of the need for the articulation of a distinctive educational philosophy, which underpins the institutions' development… The other, less encouraging lesson from Britain is that, as universities, they have found it harder to maintain their distinctive contribution to higher education than as polytechnics."*

These remarks also apply to UoTs in SA, as they adapt from technikons to universities of technology. This project and its outcomes could thus play a significant role in improving their position and enable them to make their rightful contribution to the socioeconomic development of our country.

Institutional level - Developing an implementation methodology that is designed around the issue of **determining performance measurement readiness prior to implementation**

SOME ISSUES RAISED BY VALIDATORS

1. The role and participation of CUs in this project has to be ascertained. While there is informal acknowledgement of the good work done to date, and definite applicability of the PIs in the CU context, the support and participation of the CUs still has to be confirmed. This remains a difficult political question to answer. The most prudent strategy to follow may be to wait for the conclusion of the project before a commitment is made. In the interim, the CUs will contribute and learn from the process. Much will depend on the mechanisms contained in the outcomes to address the differences between UoTs and CUs. If the outcomes are such that it would be difficult for CUs to apply the PIs in their contexts, it might be necessary to institute a separate project to develop PIs for CUs. SATN will continue to keep CUs informed about the project's progress.

2. The PIs could also be applied to traditional universities, all of which are increasingly focused on producing graduates that are employable. Universities are also increasingly focusing on technology innovation, which is another strong focus area of UoTs. Academic drift is probably taking place in all universities and needs the attention of HE institutions.

3. UoTs should be clear about the market that they serve, bearing in mind that 80 % of school leavers do not have matriculation exemption. One type of institution need not be better than the other; there is a specific niche for every type of education offered. While the need for UoTs to embrace their University status must be acknowledged, market needs also have to be met. How this is achieved will need to be unpacked, and would have to be communicated to the DoE.

4. In terms of widening access, it might be important to track and reflect the economic status of new enrolments. This could help to explain low graduation and throughput rates. Many students drop out of institutions because they cannot pay the fees - and it may be valuable to show that despite these issues, UoTs are managing to increase throughput and success rates. The data may be useful to convince the DoE that despite the economic disadvantage of students, UoTs are managing to graduate students. It might be useful to consider this issue as a performance indicator. NSFAS data could also be tracked until a proper economic indicator could be developed.

5. UoTs may not want to limit their scope to the training of technicians and technologists, but if they do not take on this responsibility, where will this training occur? There is a need to ensure ongoing training of technicians and technologists, but also to ensure constant innovation through research. How this is to be achieved - especially in the light of the PIs for research and innovation - needs further discussion.

6. The application of entrepreneurship should be integrated into the curriculum and the overall way that the UoT approaches teaching. Curriculum and teaching approaches should incorporate entrepreneurship as a way of life, considering the importance of entrepreneurship as a transformational PI. However, systems for measuring this PI are archaic and if South Africa is to move from the poverty stranglehold it will be necessary to find new ways of measuring this important PI.

7. The way research is done by UoTs needs to be re-conceptualised, since it is not always possible for UoT students to articulate into a master's programme offered by a traditional university. While students may not operate at the same level upon entry, they are all required to operate at the same level upon graduation. The target is important, but different approaches or methods need to be devised in order to arrive at that target.

8. UoTs need to increase their research visibility through establishing their own refereed publications. In addition, research career development should be strengthened, and combined with the postgraduate school system to enhance research capacity. The establishment of a recognised, accredited journal takes time. It could be useful to establish a research profile for UoTs focusing on areas of strength. Partnerships with reputable institutions Outside South Africa could also have some value. In the Finnish experience, the panels meant to accredit research papers are all from traditional universities, making the situation there difficult as well.

9. While the notion of cutting edge research is an accepted part of the UoT profile, it is necessary to ask whether the facilities required to do so are adequate. Is it possible for all UoT students to go into a laboratory or facility and start doing work? The DoE has attempted to find a way to respond to this need - in the next financial cycle significant investment will be earmarked to strengthen and modernise infrastructural requirements, and ensure relevance in the world of work. If UoTs say that they provide just-in-time education, they should be able to match industry. The commitment is at two levels - (1) at the level of this project, and (2) in a commitment to resources entering the system to optimise teaching through enhanced facilities.

10. Summarised student and staff data submitted by Higher Education institutions to the Department of Education under HEMIS (the Higher Education Management Information System) is publicly available on the Department's website, at:
http://www.education.gov.za/dynamic/dynamic.aspx?pageid=326&dirid=14

    This is a useful resource, but the data is generally presented in a sequence of separate tables, with a system-wide summary followed by a separate table for each institution. There is also a lag in the publication of the

information: at the end of 2008 the most recent available data related to 2006.

A Peer Data Sharing (PDS) tool has recently been developed, which makes the HEMIS data more easily available in tables that include summary data for all institutions in a single table. This makes comparisons across institutions much easier. For example, a user can see at a glance the comparative numbers of student enrolments across a number of years for all institutions. Data up to 2007, the latest complete HEMIS submission, is currently available.

The PDS application was developed by IDSC, a company specialising in the development of data analysis tools for Higher Education, in conjunction with the University of Johannesburg. The application is accessible at the website:
http://www.heda.co.za/pds/

While the PDS application, in its current state of development, makes HEMIS data available in a more user-friendly format and provides the basis for benchmarking and comparisons across institutions, the SATN task team working on Performance Indicators encountered practical difficulties in comparing a group of institutions (e.g. the SATN institutions) with other groupings of institutions.

Subsequently, IDSC has been contracted by SATN to enhance the PDS tool in such a way that the end user can easily set up different groupings of institutions and extract summarised data for the selected groups. More detailed information for the institutions within each group will also be accessible.

The application will produce a graph to show the change in data over time, both for the groups selected and for the constituent institutions. The user will be able to set a benchmark figure, to indicate the performance of the groups or individual institutions relative to the benchmark.

It is envisaged that the enhanced PDS application will make it feasible for the SATN Performance Indicators project to readily extract the necessary data to populate those performance indicators for which HEMIS data is available.

11. The project provides an opportunity to advocate the importance of measurement, and the benefits to be derived from the process. The next step would be to measure the readiness of institutions, to alert management to such readiness and to ensure that they address readiness aspects. While none of the South African UoTs may be fully ready for performance measurement, the process will have value in engaging institutions in the debate about performance measurement. It was confirmed that all UoTs,

having gone through mergers, have problems in terms of institutional cultures and systems that still have not settled. This is a risk area - institutions have been merging systems and addressing institutional culture, but no measurement has yet taken place.

12. It seems to be a law of nature that institutions want to use more indicators than the public requires. Finnish institutions are free to follow their own systems, but they are required to furnish certain data that satisfies public requirements. The present system, which is different for traditional universities and universities of Applied Science, has its deficiencies. It is hoped that the process being put in place in South Africa would highlight some best practices that could be used in Finland.

13. HE institutions would not have to measure all 48 PIs, of which 30 % are applicable to all HEIs. Where institutions are unable to respond to PIs, the pilot study would be used to inform this aspect - no predetermined decision will be taken in this regard. The project will use the data that is available within the system, and the process will assist institutions where data is lacking.

14. When the project was launched, concerns were raised about institutions that might be unable to respond to any of the PIs. A decision was taken to start the process regardless, as the intention was to establish a developmental trajectory which could guide institutions in terms of starting to measure their performance. The level of preparedness of individual institutions would be uneven as a matter of course. A universal methodology needs to be negotiated and agreed upon within the sector, so that institutions do not feel that they are being press-ganged into a process for which they are not ready.

15. The DoE's benchmarks and criteria for universities, which were issued in 2001/2, were probably unattainable for most universities in SA. It did set the baseline for performance, however, which institutions have attained. The PIs should not be seen as a ranking mechanism or as a punitive mechanism - the pioneering effort should be seen in the right light. This project would be invaluable in creating self-awareness within the system, which could eventually also lead to stronger self-confidence. The project may be daunting in its magnitude, but should be embraced to effect positive change.

16. The approach taken to planning was that conversation around planning would be individual, taking each institution's uniqueness into account. This process allows a richer debate between the DoE and institutions, and also offers an opportunity to look at the system collectively in order to address the national HR Development agenda. It will be necessary to look at the full spectrum to see how a coherent planning system can be put in place. In essence the process started with the basic shape and size of the system, which could be further fleshed out by the information this project has

brought to the table. Funding has increased considerably over the past number of years - so how we unlock the value, capacity and resources that are becoming available to the system needs to be debated.

17. The need was not only for this project to emphasise the differences, but also to acknowledge and highlight the balance between diversity and commonality. It is impossible to interpret diversity without also acknowledging that there are commonalities. This perspective should be incorporated into the final report - the two sides of the coin should be acknowledged. The National Plan for Higher Education highlights some of these aspects, but there are others that might probably have to be emphasised by HESA. What do universities need to do to take society forward, as a broad, core university sector strategy?

18. The momentum that has been attained should not be lost because of sectoral politics. There are useful and valuable ideas that could benefit individual institutions, but that could also influence thinking about the system as a whole.

19. The commitment of HESA to the SATN project is of paramount importance. The SATN and HESA Boards could use the project to strengthen requests for infrastructural and financial support from the DoE. The information will be shared widely during the implementation phase. Much more work will be needed before this stage is reached. The process has value because ideas emerged within each UoT at institutional level which increased the value of the engagement with the DoE. The DoE is committed to the project, since it will take the university system forward.

20. The project could assist in determining targets that could be used to negotiate with the DoE on elements necessary to deliver on each institution's mission. The sector should also identify issues that would help to address current challenges - for example, staff qualifications. The things that distinguish each institution, but that could also affect the whole system, could be used to build the base for attaining objectives over the long term. PIs should be used as management tools to steer the system.

21. When the project is completed, targets and benchmarks need to be developed. It would have to be determined how this would be facilitated - the data would have to be analysed before agreement could be reached on these aspects. A new project plan would have to be developed for this project in order to secure the necessary resources from possible funders. Once funds have been secured for the second phase of the project, based on evidence that the first phase has been concluded satisfactorily, the process can continue. The final assessment of the project by the Finnish experts would be available to strengthen the funding request.

22. The current project should not be overextended. The process should continue, but there should be clear distinction between the various phases.

DEFINITIONS

Academic development
A field of research and practice that aims to enhance the quality and effectiveness of teaching and learning in HE, and to enable institutions and the HE system to meet key educational goals, particularly in relation to equity of access and outcomes. Academic development encompasses four interlinked areas of work: student development (particularly foundational and skills-oriented provision), staff development, curriculum development and institutional development.

Accreditation
Recognition status granted to a programme for a stipulated period of time after an HEQC evaluation indicates that it meets minimum standards of quality.

Benchmarking
A process by which an institution, programme, faculty, school, or any other relevant unit evaluates and compares itself in chosen areas against internal and external, national and international reference points, for the purposes of monitoring and improvement.

Community engagement (service)
Initiatives and processes through which the teaching and research expertise of the institution is applied to address issues relevant to its community. Community engagement typically finds expression in a variety of forms, ranging from informal and relatively unstructured activities to formal and structured academic programmes addressed at particular community needs (service learning programmes).

Innovation
Refers to the application in practice of creative new ideas, which in many cases involves the introduction of inventions into the marketplace Technological innovation is the process that transforms new knowledge into wealth. It covers the different steps of the innovation chain, from the creation of new ideas and the development of technology in the form of products, processes and services to their ultimate successful commercialisation and/or implementation.

Institutional quality management system
Institutional policies, systems, strategies and resources for assuring, developing and monitoring the quality of teaching and learning, research and community engagement.

Minimum standards
Requirements for a specific level of provision that a programme has to meet in order to be accredited by the HEQC.

New programme
A programme which has not been offered before or a programme whose purpose, outcomes, field of study, mode or site of delivery has been considerably changed.

Partnerships
A collaborative effort between two or more parties sharing a similar vision, aimed at reaching a common goal by devising and implementing a co-operative *modus operandi* while maintaining their respective identities and agendas. A partnership entails pooling and sharing skills and resources, as well as risks and benefits, thus enabling such partnerships to accomplish goals beyond the capability of the individual parties.

Professional programme
A programme that has to meet the licensure and other professional and work-based requirements of statutory councils.

Programme
A purposeful and structured set of learning experiences that leads to a qualification.

Programme evaluation
The external quality assurance processes which are undertaken

Programme review
An institutional quality assurance process undertaken to make an evaluation of a programme's development, management and outcomes and, where external, to validate the findings of an internal programme review.

Qualification
Formal recognition and certification of learning achievement awarded by an accredited institution.

Quality assurance
Processes of ensuring that specified standards or requirements have been achieved.

Recognition of prior learning
Formal identification, assessment and acknowledgement of the full range of a person's knowledge, skills and capabilities acquired through formal, informal or non-formal training or on the job or life experience.

Service learning
Applied learning which is directed at specific community needs and is integrated into an academic programme and curriculum. It could be credit-bearing and assessed, and may or may not take place in a work environment.

Technology
Refers to the effective and efficient application of the accumulated know-how, knowledge, skills and expertise that, when applied, will result in the output of value-added products, processes and services.

Technology transfer
Is the formal transfer of new discoveries, innovations and technology usually resulting from R&D activities at universities to the commercial and industrial sectors of the economy. Implicit in the term is the understanding that a tangible "intellectual asset" has been identified for transfer.

The literature also refers to technology interchange, emphasising the two streams for technology transfer - one from within the University and the other an external stream of opportunities being brought into the University for joint development and exploitation.

Work-based (experiential) learning
A component of a learning programme that focuses on the application of theory in an authentic, work-based context. It addresses specific competencies identified for the acquisition of a qualification which relates to the development of skills that will make the learner employable and will assist in developing his/her personal skills. Employer and professional bodies are involved in the assessment of experiential learning, together with academic staff.

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