UNIVERSITY OF KWAZULU-NATAL

SCHOOL OF ENGINEERING

STRATEGIC PLAN 2013 - 2019

EXECUTIVE SUMMARY

A strategic plan has been drawn up for the School of Engineering with three broad objectives, namely:

- To ensure that UKZN continues to be a major contributor of high-level Engineering, Land Surveying, Construction Management and Quantity Surveying skills to South Africa and;
- To progressively shift towards the University objective of being a research-led institution;
- To provide a guide to the initiatives that need to be implemented to achieve the School's vision.

The intention of this document is to delineate a path of strategic interventions, in the form of a plan, which will reinforce the school's position as a centre of excellence in engineering education in South Africa and guide it to become a centre of excellence globally.

The School of Engineering produces an average of 350 Engineering, Land Surveying, Construction Management and Quantity Surveying graduates each year. In Engineering, the largest qualification in the School, this represents approximately 15% of the national output in this profession. Land Surveying is only offered by one other university in the country, while the other two programmes are only available at two other universities. There is clearly a national imperative to produce more skilled professionals and researchers in the fields of engineering, construction and land surveying.

The School currently has an academic staff complement of 64 out of an approved establishment of 83. The School has thus had to make use of part time academic staff in order to meet the teaching requirements, and academics were forced to dedicate more time to teaching than research. Staffing levels are a critical criteria in the accreditation of the degree programmes. It is crucial that the staff levels are significantly improved to avoid the risk of losing accreditation.

For example, the seven engineering degree programmes were last assessed for accreditation by the Engineering Council of South Africa (ECSA) in August 2008. A shortage of staff was raised as a concern during that accreditation visit. The next accreditation visit is scheduled for 2013. A loss of accreditation would have a devastating impact on the reputation of the School, the College and the University, and would make it very difficult to retain quality staff or to attract good students. Addressing staffing shortage is therefore one of the key imperatives in this strategic plan. Among the non Engineering Programmes in the School, the Land Surveying Programme received five-year accreditation (until 2014) by PLATO, while the Property Development Programme has conditional accreditation by SACQSP and RICS until 2013.

This plan is based on four main drivers: Accreditation, Quality, Transformation and, Globalisation, which are directly aligned to the strategic intentions and goals of the university and college and will be executed within the School's Transformation Plan, submitted previously to the College (attached as appendix 1).

Our financial planning is informed by the UKZN's Resource Allocation Model (RAM) and its main drivers: student FTEs, research outputs and third-stream income. In addition, planning is informed by UKZN's set parameters. Set parameters include the following: the Student Enrolment Plan 2013-2017, the organisational structure of the University and, institutional indicators of success (such as student numbers, postgraduate/undergraduate ratios and, research productivity requirements).

Broadly, the core strategic objectives of the School of Engineering are:

1. To progressively increase undergraduate and postgraduate student enrolment. To increase FTE's, student throughput rates, postgraduate to undergraduate ratios and doctoral to masters ratios in line with the University objectives and enrolment plan.
2. To sustain the above by attending to the structure of the School, and by progressively improving overall staffing numbers and qualification levels, recruiting academic staff in such a manner as to achieve a balanced distribution of seniority, areas of specialisation and gender.
3. To rationalise curricula, where necessary, to ensure that all programmes are viable and that the academic standards maintain the required level for accreditation by the respective professional bodies.
4. To progressively increase the research productivity of academics to both comply with Senate requirements, and in order to build the reputation of the school as pre-eminent in its areas of focus.
5. To forge and maintain strong links with industry, NGO's and government. This will ensure relevance in curricula, sources of funding for research and student programmes, and will provide opportunities for continuing professional development via extended learning courses.
6. To optimise efficiencies throughout the school, but particularly in the area of technical support, workshop and laboratory facilities and, postgraduate administration.

These objectives are detailed, along with the initiatives required to achieve them. The plan is contextualised within the institution and the country and both the threats and opportunities are acknowledged. An estimate is also made of the financial implications and gains. For example, it is recognised that the cost of delivering professional four-year degrees, given the accreditation requirements and practical-application equipment, is high. This cost is not covered by the University's RAM model, with the result that the school must make every effort to source supporting funds from its stakeholders.

The strategic objectives are converted into initiatives grouped under the following eight category headings:

- Organisational structure: to make additions and changes in order to optimise its efficiency as the vehicle required to deliver as the School of Engineering;
- Enrolment plan: to seek ways to meet the targets set down by the enrolment plan;
- Key undergraduate initiatives;
- Key postgraduate initiatives;
- Industry relevance: to increase and improve the responsiveness of the School to the industrial and state sectors;
- Increased research output;
- Infrastructural and safety improvement;
- Third-stream income and capital campaign.

This Strategic Plan aims to be a "living document" and a road map into the future for the School of Engineering. It will firstly provide a broad context and rationale. A description of the *status quo*, along with a situational analysis, follows. On this foundation, the School defines its objectives against the University's strategic framework. Resources required for full implementation are then investigated, with an onus on issues around staffing. Finally, the measure of success, against the RAM drivers (research, undergraduate FTEs, 3rd stream income), are brought into play.

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1. CONTEXT AND RATIONALE

1.1 STRUCTURE OF SCHOOL

The School of Engineering is one of the five Schools in the newly reconfigured College of Agriculture, Engineering and Science (AES). It is made up of four Discipline-groups encompassing nine programmes. Each discipline-group is managed by an Academic Leader and each programme by a Programme Coordinator. The discipline groups are as follows:

- Agricultural and Civil Engineering, Surveying and Construction(ACESC) with programmes in Agricultural Engineering, Civil Engineering, Land Surveying, Construction Management and Property Development,
- Chemical Engineering with a programme in Chemical Engineering,
- Electrical, Electronic and Computer Engineering (EE&CE) with programmes in Electrical, Electronic and Computer Engineering,
- Mechanical Engineering with a programme in Mechanical Engineering.

An overview of the School of Engineering reveals a long-established part of the University of KwaZulu-Natal that has had as its primary focus, the undergraduate education and training of professional engineers, land surveyors, construction managers and quantity surveyors. Postgraduate degree programmes have always formed a small, yet important, part of the work of the School.

Alongside its educational role, some academic members of staff work on research, and a number of centres of excellence in research have been created through their efforts. And finally, in order to undertake the tasks of the School, administrative and technical support staff members are required, and large, equipped laboratories and workshops were built and developed.

No School of Engineering could function without its industrial partners. Many academic members of staff are themselves registered with their professional bodies and are members of their professional associations. Academics involve themselves in consultancy work, laboratory testing projects and research and development projects for industry and state facilities. This work is often undertaken with colleagues from other disciplines and other universities both within South Africa and internationally.

1.2 THE MAIN DRIVERS OF THE STRATEGIC PLAN

The drivers that underpin the School of Engineering's Strategic Plan are congruent with, and supportive of, both College and University goals (College Goals are listed under item 1.3 below). The main drivers of the Strategic Plan are as follows:

- **Accreditation (Relates to College goals 1 and 3):** the need to ensure full accreditation of our professional degrees, by the relevant national accrediting bodies (ECSA, SACQSP, SACMPC and PLATO) as well as by international quality certification and accreditation councils;

- **Quality (Related to all College goals):** The need to strive towards increasing the quality and impact of academic and research endeavours both nationally and internationally. The focus will be on strategies aimed at improving teaching and learning, by developing

academic staff, ensuring the relevance of curricula, investing in young and emerging academics, building excellence in research and by strengthening our ties with industry and the community at large.

- **Transformation (Relates to College goals 1, 2, 3, 6 and 9):** The need to make transformation part of daily business and, to align with the transformation agenda of the College and Institution.

- **Globalisation (Relates to College goal 8):** The need to build excellence in every aspect of our endeavour, by being relevant in the local context, while having a strong impact globally.

1.3 INSTITUTIONAL CONTEXT

The School's Plan responds to the College's guideline that, to quote: "*Schools will not have individual strategies, but will identify how they can contribute most strongly to the collective College strategy*" (College AES, Strategic Planning Framework, Nov. 2011).

1.3.1 Strategic Goals of the College of Agriculture, Engineering and Science

The School's Plan was drafted within the context of the College's Strategic Planning Framework that presents nine goals, namely:

- To increase our throughput of students by being learner-centred, and providing access for under-represented groups across all levels of qualification.
- To support the strategic continuous professional development of staff.
- To transform our curricula and produce graduates who are fit-for-purpose, and so serve the needs of broader society.
- To improve our research in terms of output, quality and impact so as to place us within the top 200 institutions globally for our disciplines.
- To produce more PhD graduates, including staff.
- To ensure that all teaching is research-led, includes innovative effective learning strategies, and articulates with the module and programme level learning outcomes. (Teaching Philosophy/excellence in teaching and learning).
- To partner with government, NGOs, and industry on projects that positively impact on livelihoods and sustainable development.
- To improve our global reputation and status through increased international students, and collaboration with international scientists.
- To take a reflective, evidence-based approach to on going improvements in implementation of teaching, learning, and research.

1.4 CHALLENGES

The situational analysis has highlighted a number of challenges that the School will have to overcome in order to carry the vision forward. The key challenges, arising from the national and institutional imperatives, which confront the School are:

- Pressure to increase the output of engineering, construction and land surveying professionals (national priority);
- The administrative burden of fulfilling accrediting body requirements with limited resources;
- The cost of offering professional four-year Bachelors degrees in relation to the University's resource allocation model (RAM);

- Attracting and retaining academic staff with scarce skills in a highly competitive environment;
- The financial constraints of the University sector with their impact on the level of resources in terms of staff, facilities and student support.
- Undergraduate student educational preparedness, and admission policies;
- The hurdles to attracting and retaining postgraduate students in the numbers required by the enrolment targets;
- A weak historical culture of academic research in a number of sectors of the professional degree programmes;
- A gender imbalance towards the masculine in engineering, land surveying and construction;
- The financial viability of degree programmes with low student numbers;
- The financial cost of access and remedial programmes for students, and the lack government subsidy;
- The hurdles - that are externally-determined - to achieving the approved student throughput targets
- Bursaries and financial aid funding shortages that should be part of the strategy to attract students.

2. SITUATIONAL ANALYSIS

2.1 ORGANISATIONAL STRUCTURE OF THE SCHOOL

The organisational structure of the School of Engineering was approved as part of the reorganisation and is reflected in the organograms below:

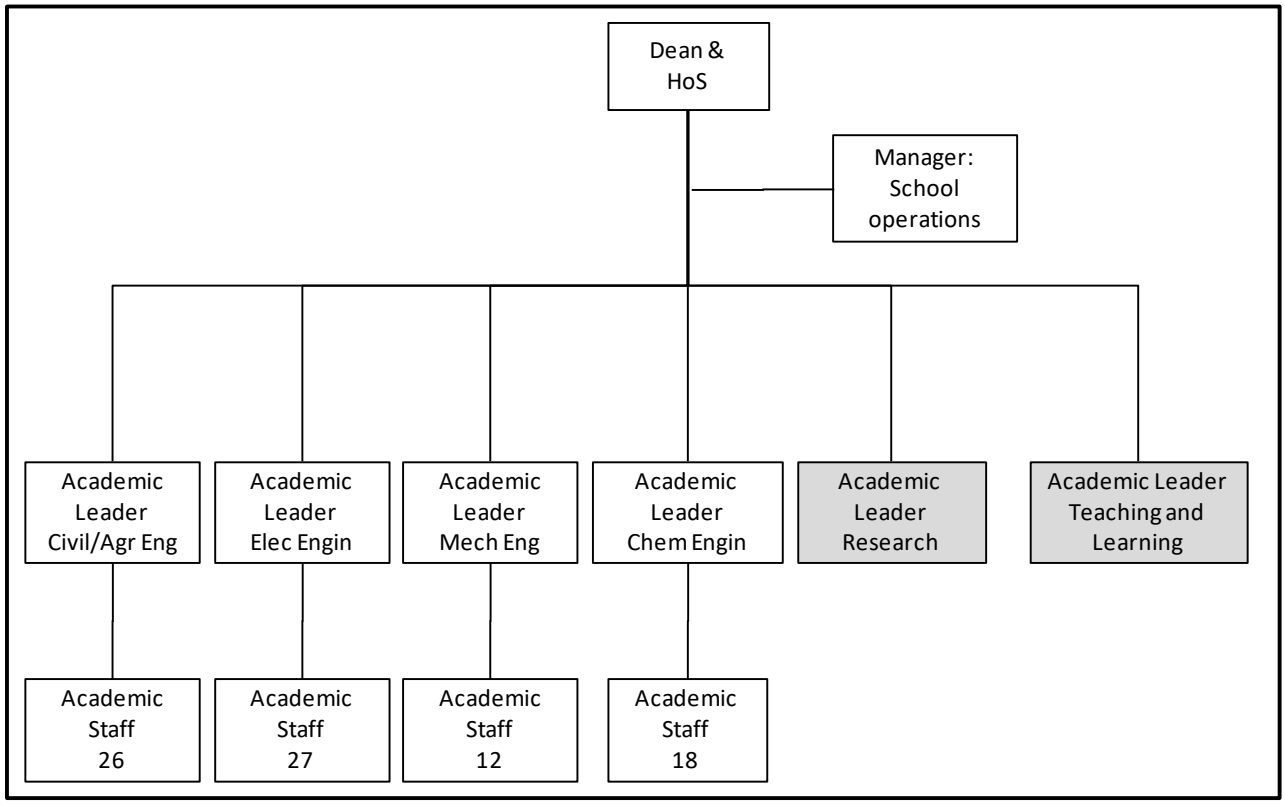


Figure 1 : School Leadership organogram

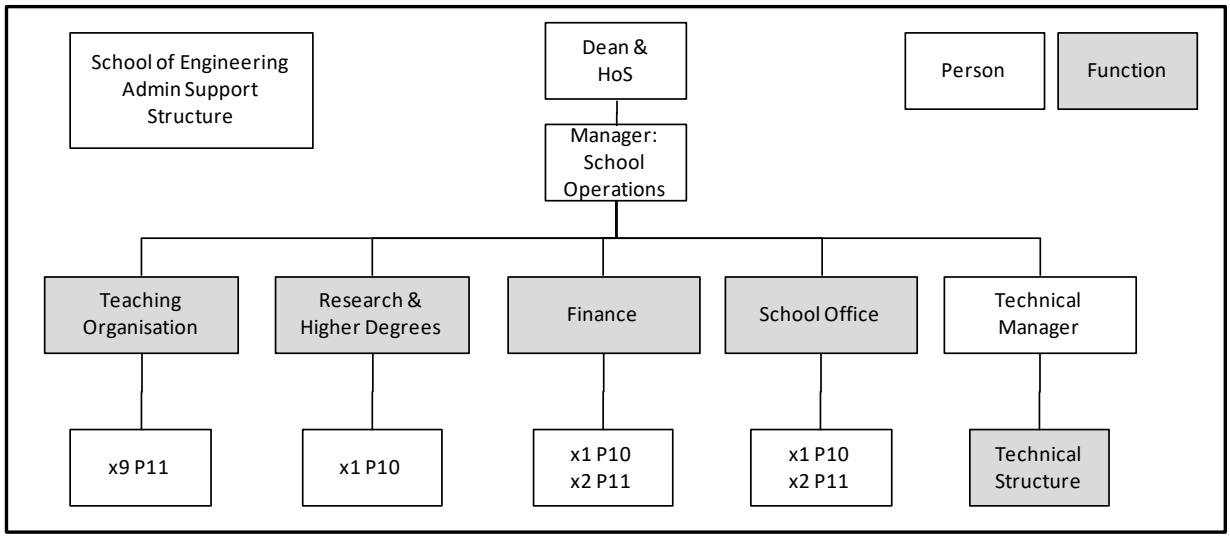


Figure 2 : School Administrative Support Structure

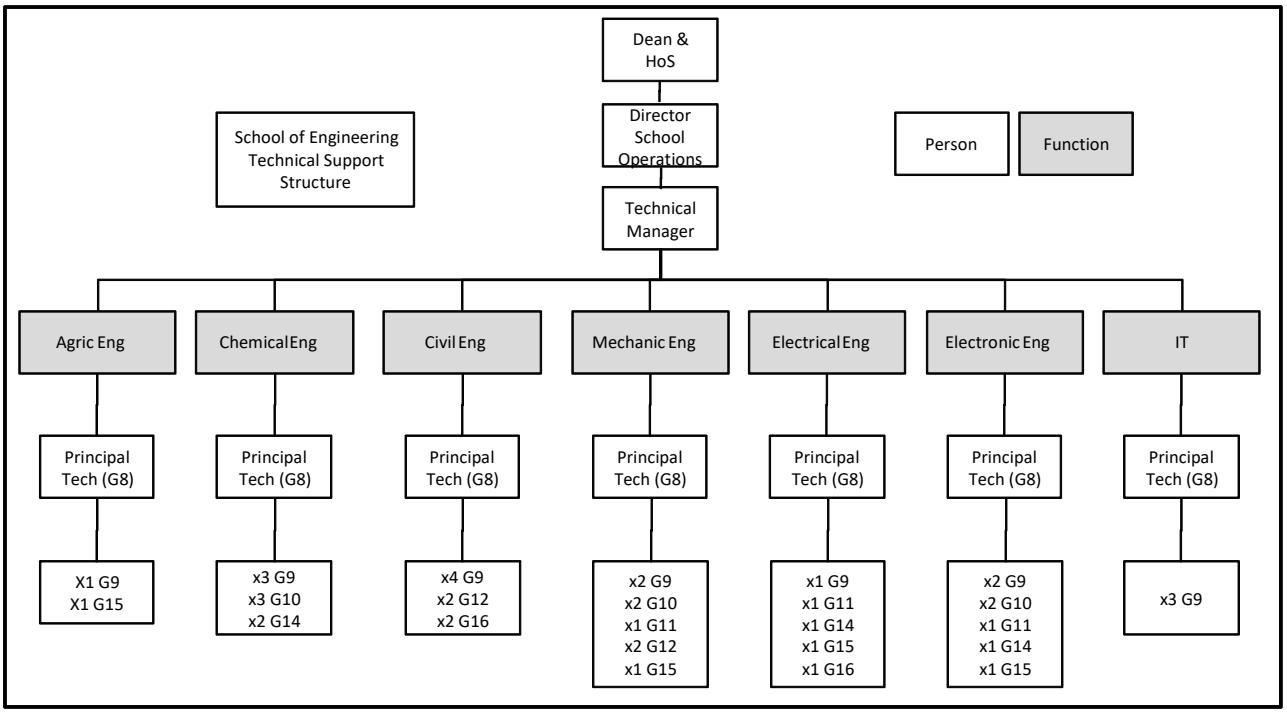


Figure 3 : Technical Support Structure

2.2 STAFFING

2.2.1 Staff Complement

The School has an approved staff establishment of 83 academic staff, 49 Technical staff and 17 Administrative staff. However, not all the posts are funded. Currently, only 64 (77%) of the academic, 42(85%) of the technical staff posts and 16 (94%) of the admin staff posts are filled.

The following table shows the current position with respect to the filling of posts:

Table 1: Academic staff situation in 2012/13

School	Approved Staffing	Current Staffing Dec 2012	Staffing agreed for 2013
Bioresources Eng & Env Hydro	5	5	5
Chemical Engineering	17	12	15
Civil Eng, Survey & Construction	21	15	19
Electrical, Electronic and Computer Eng	27	20	23
Mechanical Engineering	13	12	12
Totals	**83**	**64**	**74**

The College has currently funded 90 % of the academic posts (74), and 95 % of the support staff posts. The low occupancy in the academic sector, is due to the scarcity of suitably qualified people and the competitive nature of the employment environment.

The shortage of academic staff is most critical in the Programmes of Civil Engineering, Surveying & Construction, Electrical Engineering and Mechanical Engineering. It is the biggest threat to the sustainability and hence the accreditation of our programmes.

The current FTE to staff ratio is 21:1, based on permanent and fixed long-term contract staff. However, it 'improves' to 18:1 if the contribution of the part time staff is taken into account. Both ratios are significantly higher than the DOHET recommended norm of 12:1 (full time staff members) for Science, Engineering and Technology.

2.2.2 Staff Allocation in the School of Engineering

The following table details the Council-approved staffing structure for the School of Engineering.

Table 2: Academic Staff Structure

	CHEM	CIVIL/AGR		MECH	EECE	TOTAL	2012	2013	% Actual	% Norm*
Professor	3	4	1	2	4	14	10	10	15	15
Assoc. Professor	2	3	1	1	5	12	3	3	4	20
Senior Lecturer	4	5	2	2	6	20	13	13	19	30
Lecturer	9	9	1	7	12	37	36	42	62	35
Senior Tutor	0	0	0	0	0	0	0	0	0	0
Tutor	0	0	0	0	0	0	0	0	0	0
Total	**18**	**26**		**12**	**27**	**83**	**62**	**68**	**-**	**-**

* These 5 norms refer to ideal College/Senate's requirements

Table 3: Support Staff Structure

Admin	Grade	6	7	8	9	10	11	12	13	14	15	16
	Manager	1										
	Teaching Organisation						9					
	Postgrads					1						
	Finance					1	2					
	School Office					1	2					
Technical	Grade	6	7	8	9	10	11	12	13	14	15	16
	Technical Manager	1										
	Technicians			7	16	7	3	4		4	4	3

Table 4: Total number of Staff in the School Structure

Current			Re-organised			
Academic	Admin	Technical	Academic	Admin	Technical	Technical Devolved
83	18.5	54	83	17	49	0

2.2.3 Staff Educational Levels

Of the 64 staff members that are currently employed,29do not have a PhD (44%), 20 of whom are registered (69% of the 29), four are close to retirement and the remaining five are not yet registered. Six of those registered are planning to complete in 2013 (21%) and the remainder should be able to complete in 2014-16 (79%). The School appointed five new lecturers in 2012, one of whom is registered for a PhD.

The current interventions seem adequate for the candidates to complete their PhDs in the stipulated time and continuous assessment and monitoring is being done and should any special case arise which needs a specific intervention, the School will be able respond in liaison with College Office.

2.3 UNDERGRADUATE DEGREES IN THE SCHOOL

2.3.1 Importance of Undergraduate Professional Bachelors Programmes

The School of Engineering produces an average of 350 Engineering, Land Surveying, Construction Management and Quantity Surveying graduates each year. In Engineering, the largest qualification in the School, this represents approximately 15% of the national output in this profession. Agricultural Engineering is only offered at UKZN, while Land Surveying is only offered by one other university in the country, and the other two programmes are only available at two other universities. There is clearly a national imperative to produce more skilled professionals and researchers in the fields of engineering, construction and land surveying.

2.3.2 Recent History of Academic Programmes: Academic Enrolment

In 2005, the total undergraduate enrolment in the then-Faculty of Engineering was 2927 students, compared to the 2009 enrolment of 2253. The decrease in enrolment is mainly due to a decision to cut down on intake to match the available physical facilities and human resources. The 2009 headcount enrolment matched the DOHET targets.

A number of students drop out from the degree programmes. From 2004 to 2007 the average loss rate was 15.5% with a maximum of 18.4% in 2005. The average loss from 2006 to 2012 has been 13%. Table 5 shows the undergraduate enrolment from 2008 to 2012. The values in the Table show an increase in the graduation rate between 2008 and 2010. This is mainly a legacy of the increased student numbers at the merger of programmes in 2005. Since 2010, the graduation rate has fallen slightly to the current level of 14-15%. The School has dedicated staff members, who, with the Academic Support and Advancement Programme (ASAP), support students with their studies, thereby increasing the throughput rate to meet the national requirements. The preparedness of school-leavers remains a major concern.

It has been noted that the average, overall loss rate for the last three years is of the order of 8,5% whilst academic exclusion, as a reason for the loss of students, has been reduced from 4,7% in 2009 to 3.5% in 2010 and 2.8 % in 2011, averaging 3.8 % over the last three years.

An analysis of this trend has highlighted that the overall loss rate is primarily linked to financial difficulties and not to academic performance.

Table 5 : Undergraduate Enrolment: 2008-2012

		2008	2009	2010	2011	2012
UG Students	Graduated	328	361	370	348	330
	Enrolled	2353	2253	2240	2313	2291
	Graduation rate	**3.9%**	**6.0%**	**6.5%**	**5.0%**	**4.4%**

2.3.3 Attraction, Retention and Throughput of Undergraduate Students

The following details the status quo, as well as initiatives and interventions that the School has implemented to achieve College Goal 1, with respect to Attraction, Retention and Throughput of undergraduate students.

- **Attraction**
  - The School has met 97.5% of the DoHET approved target (2338) enrolling 2279 UG students in 2012;
  - Since 2011 we increased the UNITE Access Programme from 35 to 75 students;
  - Since 2010 we lost, on average, 100 new students due to the phasing-out of the Property Development Programme;
  - We are addressing the financial viability of all Programmes, concentrating on Agricultural Engineering, Land Surveying and Computer Engineering;
  - From 2013 onwards, at least 15% of the new UG intake must come from Quintile 1 and 2 high schools, dependent upon the students accepting offers;
  - Our degrees enjoy high marketability and there is great demand for our graduates;
  - We also aim to target school-leavers, who are high-achievers, early in their decision-making process, with respect to their institution of choice.

- **Retention**
  - Despite the establishment of the ASAP Programme since 2008/9, the dropout rate including exclusion is still between 10 – 13%. An analysis of this phenomenon suggests that financial constraints and not necessarily poor academic performance are the main reason for students' dropout;
  - An important intervention, aimed at retaining students and ensuring a healthy and stable throughput is the Academic Support Advancement Programme (ASAP) in Engineering, which offers extra tuitions and academic support to students in their lower years of study;
  - The Institutional reputation and state-of-the-art teaching and research facilities have ensured a constant attraction and retention of students in the School.

- **Throughput**
  - The current throughput rate in 2012 is 13 -14 % (the ideal norm for a 4-year professional Bachelors degree is 25%).

2.4 UNDERGRADUATE ACADEMIC SUPPORT PROGRAMMES

2.4.1 Academic Support Advancement Programme (ASAP)

Between 2008 and 2010 ASAP ran successfully with five ADOs (Academic Development Officers) associated with each former school in the Faculty of Engineering. In 2012, the former ASAP has become part of the College's academic support system under the Dean of Teaching and Learning. With the restructuring in 2011, ASAP has experienced financial constraints, reducing its staff to one ADC (Coordinator) and only three part-time ADOs.

2.4.2 UNITE Programme

The programme provides an alternative route into the School for students with potential but not meeting the entry requirements. Students qualifying to enter into the School programme after one year carry credits for mathematics, physics, communications, drawing and first level design and materials. The programme takes in about 75 students per year and approximately 50% of them qualify to enrol for first year Engineering Programmes. On the average, 60% of ex-UNITE students entering mainstream graduate in 4 to 6 years and some of them have become top performers in their classes. Nearly all the students enrolled in UNITE are African and come from Quintile 1 and 2 schools only. Each UNITE student costs about R50 000 and funding is provided by industry. It is intended that the UNITE function becomes fully integrated into the school programme. The performance of UNITE students both in the programme and the main stream remains of concern, and requires addressing.

2.5 UNDERGRADUATE PROGRAMME ACCREDITATION

The seven engineering degree programmes were last assessed for accreditation by the Engineering Council of South Africa (ECSA) in August 2008. The next accreditation visit is scheduled for 2013. Accreditation of Engineering programmes by the Engineering Council of South Africa is seen as confirmation of the standing of the qualifications through the internationally recognised Washington Accord.

A key element of our restructure involved the retention of a programme co-ordinator position, which is specific to ECSA requirements. It is imperative that the status and contribution of this role is fully recognised.

The Land Surveying Programme received five-year accreditation until 2014 by PLATO, while the Property Development Programmes has accreditation by SACQSP and RICS until 2013.

2.6 POSTGRADUATE DEGREE PROGRAMMES: ENROLMENT AND THROUGHPUT

All the disciplines in the School offer masters and doctoral postgraduate research programmes. In addition, Civil Engineering, Surveying & Construction and Electrical, Electronic & Computer Engineering offer coursework masters programmes. The School also offers an Honours programme in Property Development and graduates averaging approximately 30 graduates per year).

Table 6: Honours Enrolment 2008 - 2012

		2009	2010	2011	2012
Honours Students	Graduates	32	31	34	39
	Enrolled	33	36	45	50
	Graduation Rate	**97%**	**86%**	**76%**	**78%**

The School met 97% of the targeted enrolment of postgraduate students in 2012

The Masters and PhD enrolments and graduations from 2009 to 2012 are shown in Tables 7 and 8. The graduation rates are unacceptably low. The completion times of the Masters and PhD degrees are longer than the minimum required time . The interventions to improve these are described in this plan.

Table 7: Masters Enrolment 2009 - 2012

		2009	2010	2011	2012
MScEng students	Graduates	35	36	29	32
	Enrolled	175	181	190	191
	Graduation Rate	**20%**	**20%**	**15%**	**17%**

Table 8: PhD Enrolment 2009-2012

		2009	2010	2011	2012
PhD students	Graduates	8	7	8	8
	Enrolled	66	67	77	81
	Graduation Rate	**12%**	**10%**	**10%**	**10%**

2.7 RESEARCH

2.7.1 Research Productivity

The Table below provides a summary of the total productivity units (PU's) produced in the School of Engineering for the period 2008 to 2011.

Table 9: Total PUs for Engineering 2008-2011

Year	2008	2009	2010	2011
Total Pus	2711	3846	3874	5331
% Increase		42.0	7.3	37.6

The total productivity in the School has improved significantly year-on-year between 2008 and 2011. This is the trend that we should endeavour to continue. A worrying aspect of the outputs though is that almost 40% of the PU's are from Emeritus and Honorary affiliations, as well as from a limited number of academic staff members. The number of productive researchers, which includes a significant number of Emeritus and Honorary staff has also decreased significantly between 2009 and 2010, even though total PU's have increased. It is becoming more and more the case that approximately 10% of the academic staff are producing 80 to 90 % of the total productivity in the School.

This is not sustainable and all full-time academic staff members need to become research productive. This goal is also hindered by the large number of staff members, who are currently engaging with PhD studies and are not yet research active at the required level.

Although in 2010 the School ranked 4th in the University in terms of research output, the output was significantly below that of the top three Schools at that time. Less than 50% of the academic

staff members are active in research. Of the 68 permanent academic staff members in 2012, only 12 are National Research Foundation (NRF) rated researchers.

Ideally, each staff member should spend 40% of time on research, 45% on teaching and 15% on administrative duties. However, due to the critical staff shortage situation, staff members are spending more time on teaching and administration, thus compromising on research. This could be one of the main reasons for the School's low research productivity. The School research capacity is also hampered by the fact that only 50% of the members of academic staff have a PhD qualification compared to the University expectation of 70%.

2.7.2 Research Focus Areas

The School is active in many areas of research with significant focus in six areas, only in the first 5 we have national and/or international status, while the last focus area is in the developmental stage.

2.7.2.1 Water and Environmental Engineering Focus Area

This focus area is aligned with the College and University Research Focus Areas, as well as with the Department of Science and Technology's Ten-year Innovation Plan for South Africa (Innovation towards a Knowledge-based Economy 2008-2018).

Water and Environmental Engineering in numbers:

- Centre of Excellence – CRECHE Centre for Research in Environmental, Coastal and Hydrological Engineering comprising of the following research groups:
  - Environmental Fluid-dynamics and Coastal engineering
  - Environmental Engineering
  - Environmental Hydrology
- PRG Pollution Research Group in Chemical Engineering
- Energy, Food and Water Engineering Research Group in Bioresources Engineering focussing on irrigation and water use efficiency in agricultural production systems and design/engineering hydrology

- 2 Chairs:
  - Umgeni Chair in Water Resources Management
  - eThekwini Chair in Urban Infrastructure (Coastal/Water Engineering)
  - eThekwini Chair/Professor in Water/Wastewater Treatment/Sanitation

- Resources:
  - Environmental Engineering Laboratory
  - Environmental Fluid-dynamics Research Laboratory
  - Biochemical PRG Laboratory
  - Shared facilities in Rabie Saunders PMB

- Coursework Masters:
  - The School offers a Coursework Master in Environmental Engineering, and we are developing an MSc in Waste and Resources Management in collaboration with DSt.

2.7.2.2 Power and Energy Focus Area

This focus area is aligned with the College Focus Area: Technology for Renewable Energy and Sustainable Development.

- Centres/Groups:
  - HVDC High Voltage (DC) Engineering Centre and Laboratory
  - We are in the process of establishing the Centre for Renewable Energy & Resources Management, under IREAP Integrated Renewable Energy Advancement Programme funded by THRIP/Industry/Dti
  - SERG – Solar Energy Research Group in Mech Eng
  - Energy, Food and Water Engineering Research Group in Bioresources Engineering focussing on irrigation and water use efficiency in agricultural production systems and design/engineering hydrology

- Chairs:
  - ESKOM Chair in High Voltage Engineering (DC)
  - NRF-SARCHI Chair in Intelligent Real Time Power Systems

- Coursework Masters: The School offers a Coursework Master in Power & Energy

- Resources:
  - HVDC Laboratory (Westville campus – STIP)
  - HVAC/RTDS Laboratory (HC campus)
  - Renewable Energy/SMART GRID Laboratory (Westville campus – STIP)

2.7.2.3 Processing Focus Area

This focus area is aligned with the College and University Research Focus Areas in Sustainable Development, as well as with the Department of Science and Technology's Ten-year Innovation Plan for South Africa (Innovation towards a Knowledge-based Economy 2008-2018).

- Centres/Groups:
  - Thermodynamics Research
  - A Bio-processing Research Group is forming around the newly awarded SMRI Chair
  - Energy, Food and Water Engineering Research Group in Bioresources Engineering focussing on irrigation and water use efficiency in agricultural production systems and design/engineering hydrology

- Chairs/Research Professors:
  - NRF-SARCHI Chair
  - SMRI Chair in Sugar Bio-processing Technology
  - SASRI Research Professor
  - CSIR/UKZN Forestry Processing Research Professor

- Resources:
  - TRG Laboratories
  - Shared facilities in Rabie Saunders Bld and Ukalinga Research Farm
  - CSIR/SMRI/SASRI Shared facilities

2.7.2.4 IT/Telecommunications Focus Area (Electrical, Electronic and Computer Engineering)

This focus area is aligned with the College and University Research Focus Areas in IT/Telecommunication, as well as with the Department of Science and Technology's Ten-year Innovation Plan for South Africa (Innovation towards a Knowledge-based Economy 2008-2018).

- Centres/Groups:
  - CRART is the Centre for Radio Access and Rural Technologies which is funded by TELKOM, ALCATEL-LUCENT and THRIP. There are 10 academic staff working in the centre supervising 25 MSc, 15 PhD and 2 Postdoctoral fellows.
  - Positional Communications Research Group
    Research in this group aims towards establishing a Mobile Ad-hoc Network (Manet) using iPaq PDA's. iPAQ pocket PC's has opened the doors to many new, cutting edge, technological solutions, with their ability to provide powerful, compact, handheld processing. This includes wireless networking (via its 802.11b wireless LAN card) and USB slave connectivity. There are two academic staff in this group and they are supported by Armscor and Grintek.

- Resources:
  - RAT Laboratory and LANs in EECE

2.7.2.5 Mechatronics/Manufacturing Focus Area

This focus area is aligned with the College and University Research Focus Areas in Sustainable Development, as well as with the Department of Science and Technology's Ten-year Innovation Plan for South Africa (Innovation towards a Knowledge-based Economy 2008-2018).

- Centres/Groups:
  - Mechatronics Group in Mechanical Engineering
- Chairs/Research Professors:
  - Fulton Chair Professor in Mechatronics
- Resources:
  - Robotics/Mechatronics Laboratory in Mechanical Engineering.

2.7.2.6 Urban/Sustainable Engineering (Under Development) – Civil Engineering

This focus area is currently under development. It is aligned with the College and University Research Focus Areas in Sustainable Development, as well as with the Department of Science and Technology's Ten-year Innovation Plan for South Africa (Innovation towards a Knowledge-based Economy 2008-2018).

- Centres/Groups:
  - EcoTD – Eastern Centre for Transport Development (Partnership between DoT and UKZN)

- Chairs/Research Professors:
  - eThekwini Chair in Urban Infrastructure
  - eThekwini Professor in Transportation Engineering (under development)
  - SANRAL Professor in Roads (under development)

2.8 INDUSTRY PARTNERSHIPS

The School maintains strong linkages with South African industry. Several academic staff members provide training and consultancy services to industry. Significant support in the form of bursaries, research funding, donations in kind and staff subvention has been secured for a number of years. The School attracts from industry approximately R60 million and this is used to support various activities. These are largely in the form of student bursaries and targeted research projects. The university main fund receives a component of this through overhead recovery.

In addition, a number of the external examiners for design courses, as well as part-time lecturers come from the industry. The School intends maintaining and strengthening its partnerships with industry particularly in support of postgraduate and research activities.

To date the School has actively engaged with UKZN Extended Learning and Industry partners with respect to the implementation of short courses. A workable financial model has been developed through CEPS.

3. STRATEGIC INITIATIVES TO MEET COLLEGE OBJECTIVES

Based on the situational analysis of the School, the substance of the strategic initiatives was developed.

They are informed directly by both the current circumstance of the School of Engineering and external imperatives, namely: the strategic goals of the University and the College, the transformation charter specific to the School of Engineering, the DoHET-approved enrolment plan, and the national education and training priorities mentioned above.

The intention of this document is to delineate a path of strategic interventions, in the form of a plan, which will reinforce the school's position as a centre of excellence in engineering education in South Africa and guide it to become a centre of excellence globally.

Broadly speaking, the core strategic objectives of the School of Engineering can be summarised as follows:

- To progressively increase undergraduate and postgraduate student enrolment. To increase FTE's, student throughput rates, postgraduate to undergraduate ratios and doctoral to masters ratios in line with the University objectives and enrolment plan.
- To sustain the above by attending to the structure of the School, and by progressively improving overall staffing numbers and qualification levels, recruiting academic staff in such a manner as to achieve a balanced distribution of seniority, areas of specialisation and gender.
- To rationalise curricula, where necessary, to ensure that all programmes are viable and that the academic standards maintain the required level for accreditation by the respective professional bodies.
- To progressively increase the research productivity of academics to both comply with Senate requirements, and in order to build the reputation of the school as pre-eminent in its areas of focus.
- To forge and maintain strong links with industry, NGO's and government. This will ensure relevance in curricula, sources of funding for research and student programmes, and will provide opportunities for continuing professional development via extended learning courses.
- To optimise efficiencies throughout the school, but particularly in the area of technical support, workshop and laboratory facilities and, postgraduate administration.

The initiatives to achieve the vision of the School are grouped under the following headings:

3.1 Organisational structure: to make additions and changes in order to optimise its efficiency as the vehicle required to deliver as the School of Engineering;
3.2 Enrolment plan: to seek ways to meet the targets set down by the enrolment plan;
3.3 Key undergraduate initiatives;
3.4 Key postgraduate initiatives;
3.5 Industry relevance: to increase and improve the responsiveness of the School to the industrial and state sectors;
3.6 Increased research output;
3.7 Infrastructural and safety improvement;
3.8 Third-stream income and capital campaign.

3.1 CHANGES TO THE ORGANISATIONAL STRUCTURE

3.1.1 Increase Numbers and Develop Technical and Support staff

Motivation: To support increased academic staff and student numbers. Improve competence of existing staff to increase efficiency and service delivery.

Detailed Steps to Execute

- Recruitment of additional staff
- Redefine job profiles/deliverables

Table 10 below presents the funding requirements to achieve strategic initiative number one and two above.

Table 10 : Funding Projection for Staff Expansion Plan

School of Engineering Financial Requirements 2013 - 2017 , 74 posts in 2013, 83 in 2014, 88 in 2015, 92 in 2016 and 97 in 2017 - New scales from 2013 and 7% salary increase (which ever was the higher)						
Years	2012	2013	2014	2015	2016	2017
Expenses						
Academic Staff	32,560,418	43,138,959	51,767,070	58,742,833	65,617,004	73,672,530
Technical Staff	12,242,722	13,229,331	15,039,384	16,340,141	17,731,950	19,221,187
Admin Staff	4,458,317	4,726,950	5,250,837	5,618,395	6,221,683	6,432,501
Part time Ad Hoc Staff	2,000,000	500,000	535,000	572,450	612,522	655,398
External Examiner staff	370,000	395,900	423,613	453,266	484,995	518,944
Student Appointments	3,200,000	3,424,000	3,663,680	3,920,138	4,194,547	4,488,166
Total Staffing	**54,831,457**	**65,415,140**	**76,679,584**	**85,647,223**	**94,862,700**	**104,988,726**
Supplies and Services	**4,000,000**	**4,000,000**	**4,400,000**	**4,840,000**	**5,324,000**	**5,856,400**
TOTAL REQUIREMENT	**58,831,457**	**69,415,140**	**81,079,584**	**90,487,223**	**100,186,700**	**110,845,126**

3.1.2 Increase numbers of academic staff members and increase the number at associate and professorial levels

Motivation: To increase supervision, mentoring and research capacity, move the School towards Senate objectives in terms of staff-student ratios, and supervision requirements, in line with international norms. To be a vehicle to realise transformation towards a research-led culture.

Table 11 : Staffing by level vs University Norms

		2012		**2013**		**2014**		**2015**		**2016**		**2017**	
	UKZN Norm %												
Professor	15%	10	16%	13	16%	15	17%	16	17%	17	18%	18	18%
Assoc Prof	20%	3	5%	8	10%	10	11%	11	12%	12	12%	14	14%
Senior Lecturer	30%	13	21%	15	19%	20	23%	23	25%	25	26%	27	26%
Lecturer	35%	36	58%	43	54%	43	49%	43	46%	43	44%	43	42%
		62		79		88		93		97		102	

Detailed Steps to Execute

- Recruitment of additional staff
- Direct headhunting / approaches to known specialists
- Specifically find established/experienced people to mentor/supervise junior staff and postgraduates
- The School would like to retain quality PhD students as postdoctoral candidates, with the intention of being groomed and retained as lecturers. This could serve as a good back-up plan where there is no success in external recruiting.
- Include mentoring objectives in KPAs for senior staff members
- Clearly communicate the policy with respect to retention of productive staff at normal retirement age.

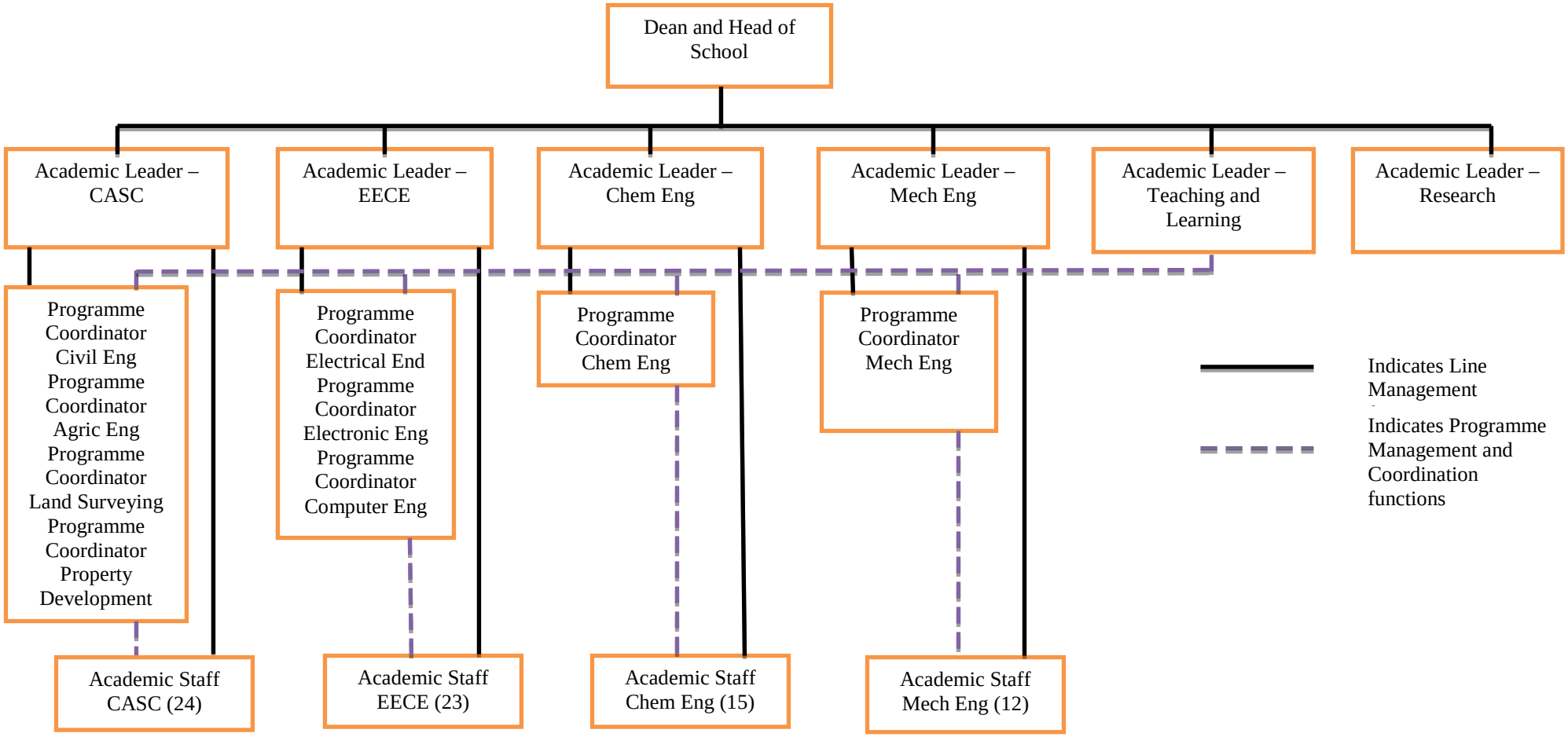
3.1.3 Defining the Roles of Programme Co-ordinators and Embedding into the Structure

Motivation: A critical component of accreditation, in order to provide academic direction to the UG programmes in line with the requirements of the external accrediting bodies. It is also important to point out that to fulfill ECSA requirements, all Programme Coordinators, in charge of the academic quality of the UG Programmes, should hold a PrEng registration as an endorsement of quality as Engineering educators.

Detailed Steps to Execute

- Detailed job profiles
- Recognition of the importance of the role of Programme Coordinators to the integrity of the structure of professional degree programmes, particularly with reference to ECSA accreditation requirements.

Table 12: Organogram Showing the Role of the Programme Coordinators



3.1.4 Embedding of UNITE Programme in the School of Engineering

Motivation: Maximise synergies between the engineering degree programmes and this vehicle for student access. Increase UNITE programme from 75 to 150 students using a DoHET subsidy request. Up to 15 % of 1st year enrolment from quintile 1 and 2 schools.

Detailed Steps to Execution

- Subsidy application for UNITE numbers increase up to 150 in place
- Increase 1st year enrolment from quintile 1 and 2 students to 150 students
- Other detailed plans to be developed

3.1.5 School Efficiencies

Motivation: To address the limits in staff numbers growth available in technical and support functions and to extract efficiencies from further consolidations.

Detailed Steps to Execute

- Improve competence of existing staff to increase efficiency and service delivery
- Rationalise workshops and planning systems
- Promote Academic leader/Technician team work
- Assess all productivity and efficiency improvement opportunities
- Potential regarding of support staff to provide required levels of expert assistance to academic leaders.

3.2 SCHOOL ENROLMENT PLAN

3.2.1 Increase Undergraduate student Numbers

Motivation: Table 13 reflects the predetermined institutional parameters within which the school developed its strategic plan. These set parameters refer to the students' enrolment numbers 2013-2019, PG/UG ratios, research productivity etc. We are limited in the number of undergraduate students that we can accept but are very aware of the national imperative to produce more professionals in Engineering, Construction and Land Surveying.

Detailed Steps to Execute

- School marketing initiatives: have a promotion plan for every programme for the next three to five years
- Target high achievers
- Target females
- Market a benchmarked profile of Engineering as a means of attracting students
- Re-establishment of Property Development programme.

3.2.2 Increase of All Postgraduate Categories

Motivation: Accelerated rate of postgraduate admission to meet College PG/UG required ratios; Increase the research base; UKZN Engineering grows its own base of academics; Increase delivery of collaborative initiatives with Industry with relevant research projects; Development of new knowledge & innovation.

It must be noted that the achievement of the 2013 target is highly unlikely.

Detailed Steps to Execution

- School marketing initiatives as above

- Target high achievers
- Partner with Industry for attracting and retaining students for higher degree studies
- Develop Research profile of school and staff by way of Research Chairs
- Ensure full registration of staff without PhD's and performance management of non-achievers
- Improve image of university and facilities through access to DoHET infrastructure grant 2013/2015.
- Re-establishment of Property Development Honours programme.

Table 13: School Growth Plan

FTE and Weighted FTE ratios and Throughput rates								
	2012	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**
UNDERGRADUATE								
4 year degrees	2235	2359	2365	2347	2358	2358	2358	2358
FTEs for 4 year degree	1082	1142	1145	1136	1142	1142	1142	1142
Weighted FTEs for 4 year degree	3400	3589	3598	3570	3587	3587	3587	3587
3 year degree	46	16	75	123	167	167	167	167
FTEs for 3 year degree	33	11	54	88	120	120	120	120
Weighted FTEs for 3 year degree	77	27	126	206	280	280	280	280
Throughput rate 4 year degree	0.15	0.16	0.17	0.17	0.18	0.19	0.2	0.22
Output of BSc Eng Graduates 4 year degree	335	377	402	399	424	448	472	519
Throughput rate Prop Dev	0.8	0.8	0	0	0.4	0.4	0.4	0.4
Output of Prop Dev Graduates 3 year degree	37	13	0	0	60	63	67	67
POST GRADUATE								
Total Honours	50	31	20	0	0	59	68	70
FTE Hons	40	25	16	0	0	47	54	56
Weighted FTE Hons	196	122	78	0	0	231	267	274
Masters CW	22	12	15	30	32	33	35	36
FTE Masters CW	3	2	2	10	11	11	12	12
Weighted FTE Masters CW	22	12	15	30	32	33	35	36
Total masters research	176	170	173	176	183	184	184	185
FTE Masters Research	67	65	66	67	70	70	70	70
Weighted FTE Masters Research	500	483	491	500	520	523	523	526
PhD	88	91	100	105	110	116	122	128
FTE PhD	35	36	40	42	44	46	49	51
Weighted FTE PhD	350	362	398	418	438	461	485	509
Throughput Hons	0.76	0.8	0.85	0.9	0.95	0.95	0.95	0.95
Throughput CW Masters	0.2	0.33	0.33	0.33	0.33	0.33	0.33	0.33
Throughput Research Masters	0.2	0.33	0.33	0.33	0.33	0.33	0.33	0.33
Throughput PhD	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Output per year Hons	38	25	17	0	0	56	65	67
Output per year CW Masters	4	4	5	10	11	11	12	12
Output per year Masters	35	56	57	58	60	61	61	61
Output per year PhD	9	18	20	21	22	23	24	26

3.3. KEY UNDERGRADUATE INITIATIVES

3.3.1 Accreditation of All Programmes

Motivation: Requirement that all programmes are accredited by professional bodies (more to be added).

Detailed Steps to Execution

- A comprehensive plan is in place, which is separate from this Strategic Plan. It is presently being executed in relation to the Engineering degree programmes in preparation for the ECSA accreditation visit in September 2013.
- The position of Programme Co-ordinator (referred to in item 3.1.4 above) requires specific enhancement and recognition attention, to align with the requirements of the accrediting bodies.

3.3.2 Throughput Improvement

Motivation: This initiative specifically relates to College goal number 1 and has obvious positive impacts. The education and training of professional engineers, land surveyors and construction managers is a national priority.

There is a risk that these targets may not be achievable because 15% - 19% throughput improvement requires an increase of pass rate from the average current 60% in the School (which matches national trend) to 76%-80% and must take into consideration the constraints arising from the level of preparedness of our first year intake.

Detailed Steps to Execution

- Improve academic support by increasing number of permanent ADO's to 5, in order to be active in all the 5 satellite ASAP Learning Centres in the Howard College campus
- Improve fluidity in curriculum to enhance vertical articulation of all programmes but, in particular, those with throughput history
- Improve teaching through mentoring and attendance of Teaching and Learning induction plan
- Possible reassessment of admission criteria and college process
- Reassessment of marginally viable programmes
- Investigate the use of an entrance examinations, and redistribution of students to alternate programmes with capacity.

3.3.3 Reduce Student Dropout Rates

Motivation: Relates directly to College goal number 3 and has obvious positive financial impacts.

Detailed Steps to Execution

- Access external student financial support through Industry liaison
- Optimise ASAP and student counseling to ensure full benefit
- Offer bursaries for specific programmes where specific government/industry needs exist.

3.4 KEY POSTGRADUATE INITIATIVES

3.4.1 Enrolment and throughput improvement

Motivation: College goal 1, 4 and 5. Positive Financial impacts on RAM; positive School profile

Detailed Steps to Execution

– Focused marketing and rebranding of the school
– Improved supervision and CEPS admin support
– Continuous and sustained funding for research and scholarships including equipment, facilities, bursaries etc.
– Enforce progression through the application of the 'robot' system
– Encourage/recruit multi-disciplinary researchers.

3.4.2 Fully-Embedded Centre for Engineering Postgraduate Studies (CEPS)

Motivation: To streamline and facilitate administration of postgraduate students and research in the School.

Detailed Steps to Execution

- Monitor progression plan
- Facilitate administration of postgrad students/coursework masters and short courses
- Industry liaison wrt projects and funding
- Monitor and assist in staff supervision
- Organisation of short courses/CPD modules

3.4.3 One-year Research Masters

Motivation: To improve throughput in order to meet the throughput targets, efficient use of resources, and to increase the pool of potential PhD candidates.

Detailed Steps to Execution

- Enforce progression system
- Create adequate admin infrastructure

3.4.4 Coursework Masters

Motivation: Provide relevant professional development and focussed knowledge transfer to graduates and professionals from industry

Detailed Steps to Execution

- Deliver existing CW Masters in a partially self funded mode in liaison with industry
- Develop CW Masters in Renewable Energy.
- Develop CW Masters in Waste and Resources Management
-

3.4.5 Postgraduate Student Access

Motivation: Untapped potential in student group not meeting 60 % cut off; Potential for fast-tracking cum-laude and summa-cum-laude students from BScHons/BScEng to PhD; Public image, active marketing endeavor.

Detailed Steps to Execution

- Lower entry requirement to 55% class of pass and monitor effect of decision

- Develop a supporting institutional strategy for increasing PhD vs MSc numbers
- Investigate bridging finance from strategic funding or research groups to keep student admission momentum going.
- Access bursaries for new postgraduate students.

3.5 INDUSTRY RELEVANCE

3.5.1 Reinstate Property Development

Motivation: The reinstatement of the Property Development Programme speaks directly to the goals of Industry relevance as well as college and university goals. It will meet industry and government demands for profession Construction Management and Quantity Surveying degrees and graduates, in KZN. A thorough analysis of the viability of the programme – in liaison with industry partners and accrediting bodies – has highlighted that the financial constraints of the University can be addressed by the Construction CETA.

Detailed Steps to Execution

- Detailed plan is at execution stage (requiring final approval of MoU)

3.5.2 Appoint Discipline Advisory Boards

Motivation: It is a requirement for the accreditation of all disciplines.

Detailed Steps to Execution

- All to be appointed by mid June 2013

3.5.3 Transforming the Curriculum

Motivation: Rationalise the curriculum where required to increase fluidity and articulation, as well as relevance with industry and modern requirements.

Detailed Steps to Execution

- Each programme will be required to do a strategic analysis of its curriculum and syllabi.
- Phase out irrelevant courses and structure to be in line with modern requirements.
- Curriculum reform, addressing issues of prerequisites, subminima, consolidation of 8cr to 16cr plus modules.

3.5.4 Continuous Development of Professional Staff

Motivation: To position UKZN-Engineering as preferred service provider of knowledge transfer and capacity-building with industry in KZN.

Detailed Steps to Execution

- Offer coursework masters and CPD opportunities in key strategic areas

3.5.5 Ongoing Sourcing of Government, NGO and Industry Support of all Programmes

Motivation: Increase relevance and synergy with research programmes

Detailed Steps to Execution

- Active marketing and capital campaign
- Appointment of Research Chairs in all the research focus areas,
- Mobilise funds for subventions and research fellowships.
-

3.6 INCREASED RESEARCH OUTPUT

3.6.1 Recruitment Policy

Motivation: Need to better resource the School with research active staff

Detailed Steps to Execution

- All new staff to have PhD's and current publication potential.

3.6.2 Link New Academics to Established Research Groups

Motivation: Need to minimise the effect of large number of junior staff without a PhD or not research active.

Detailed Steps to Execution

- All academic staff members will be linked to a research group.
- Foster collaborative research within the School and disciplines in the College.
- Develop specific research progress steps for new staff and students.

3.6.3 Expansion of International Students and Research Work

Motivation: This responds to the driver: Globalisation and impact of our research as well as enhances the marketing profile of the School.

Detailed Steps to Execution

- Through marketing and industry liaison.

3.6.4 Establishment of Externally funded Chairs of Centres of Excellence

Motivation: To provide leadership in research and scholarship**;** To better position the School as a key service provider in South Africa.

Detailed Steps to Execution

- High-level recruitment drive through industry and institutional liaison
- Infrastructure Safety Improvement.
- One or more Research Chairs in each of the focus areas of research.

3.7 RENOVATION AND UPGRADING OF FACILITIES

Motivation: To preserve and promote safety in engineering.

Detailed Steps to Execution

- A detailed plan is in place and a DoHET grant has been awarded for the execution of a number of safety-related projects.
- Specific emphasis will be given to health and safety education and performance of all staff.

3.8 THIRD-STREAM INCOME AND CAPITAL CAMPAIGN

3.8.1 Develop Third-stream Income Opportunities

Motivation: Third-stream income is required to address a gap in School operational funding requirements and the RAM budget allocation to the School.

Detailed Steps to Execution

- Develop short courses with UKZN Extended Learning
- Align coursework masters and CPD module opportunities
- Active development of programmes supporting CPD needs within industry advisory boards.
- Develop a major capital campaign initiative.

3.9 CONCLUSION

From a reading of the above initiatives, it should have become evident that the School of Engineering is intent to achieve the following outcomes:

3.9.1 Progressively increase UG enrolment from 2375 in 2013 to 2525in 2019 representing a 6.3 % increase

3.9.2 Progressively increase FTEs from 1323 in 2013 to 1407 in 2019 representing a 6.3 % increase

3.9.3 Progressively increase UG throughput rate from 16% in 2013 to 20 - 22% in 2019.

3.9.4 Progressively increase PG enrolment from 304 in 2013 to 419 in 2019 representing 37.8 % increase.

3.9.5 Progressively increase PG to UG ratios from 12.8 % in 2013 to 16.6% in 2019.

3.9.6 Progressively increase the PhD to MSc ratios from approximately 50/50 in 2013 to 60/40 in 2019.

3.9.7 Sustain the above by progressively increasing staffing levels and rationalising the School' structure.

3.9.8 Strategically recruit academic staff to achieve a balanced distribution of levels and qualifications across the School.

3.9.9 Progressively increase the number of staff members with a PhD from approx. 45% in 2013 to at least 90% in 2019.

3.9.10 Progressively increase the research productivity units per staff ratios to normalise with Senate's requirements.

Table 14: Summary of Initiatives with Some Costing

STRATEGIC OBJECTIVE	SPECIFIC INITIATIVES	FUNDING SOURCES	INCREMENTAL FUNDS REQD
Organisational structure proposed changes	Increase of academic staff at Assoc/ Professorial level	Main fund College	2014- R4.9m 2015- R3.3m 2016- R2.7m 2017- R3.5m
	Increase Technical and Support staff	Main Fund College	R350 K per annum
Enrolment Plan	Increase of UG students	Main Fund College	
	Increase of all PG categories	Jointly funded by established researchers and support from College/ School strategic funds Industry support	PhD bursaries at R 100k / yr Masters bursaries at R 70 K / yr Research Support at 50 K /yr Conference funding 50 K/ yr
Key Undergraduate Initiatives	Accreditation	College funding R 500K JW Nelson fund	R500k (once off)
	Throughput improvement	College Strategic fund	
	Reduce dropout	Industry College Strategic Funding	
	Access	DOE Subsidy Request	
	Embedding of UNITE Programme	College Strategic Funding DOE Subsidy Request Industry	
Key Postgraduate Initiatives	Enrolment and Throughput improvement	College strategic funds Industry funds	
	Fully embedded CEPS support	External funds/Industry	
	One Year Research Masters	UKZN/URO/College funds	
	Course work Masters	External funds/industry	
	Access		
Industry Relevance	Reinstate Property Development	Govt. funds/CETA	
	Appoint Discipline advisory boards	JW Nelson Fund	
	Continuous Development of Professional Staff	Industry funds	
	On going sourcing of Govt , NGO and Industry support for all programmes	UKZN Fdn	
	Transforming the curriculum		
Increased research Output	Recruitment policy		
	Link new academics to established research groups		
	Expansion of International student and research network	College findings	
	Establishment of Externally Funded Chairs / Centres of Excellence		
Infrastructure Safety Improvement	Renovation and maintenance of equipment and		

Table 15 below presents the estimated income based on the RAM for the strategic initiatives detailed in Table 14

Table 15 : Income Projections Based on RAM

			Income							
			2012	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**
UG	BSc Prop Dev	Fee Income	1 150 000	432 000	2 187 000	3 873 614	5 680 041	6 134 445	6 625 200	7 155 216
		Teaching Input Income	837 556	308 803	1 534 366	2 667 341	3 838 803	4 069 131	4 313 279	4 572 075
		Teaching Output Income	704 533	259 758	0	0	1 453 101	1 625 859	1 814 116	1 922 963
		Total BSc Prop Dev	**2 692 088**	**1 000 561**	**3 721 366**	**6 540 956**	**10 971 945**	**11 829 434**	**12 752 595**	**13 650 255**
UG	BSc Eng	Fee Income	71 520 000	81 527 040	88 285 096	94 599 332	102 653 790	110 866 093	119 735 380	129 314 211
		Teaching Input Income	36 981 800	41 375 602	43 975 638	46 248 211	49 256 547	52 211 940	55 344 657	58 665 336
		Teaching Output Income	9 627 498	11 489 429	12 974 637	13 645 140	15 387 590	17 217 003	19 210 551	22 399 502
		Total BSc Eng	**118 129 298**	**134 392 071**	**145 235 371**	**154 492 683**	**167 297 927**	**180 295 036**	**194 290 588**	**210 379 049**
PG	Hons	Fee Income	1 000 000	669 600	466 560	0	0	1 733 807	2 158 149	2 399 354
		Teaching Input Income	2 131 960	1 401 124	958 188	0	0	3 366 591	4 112 947	4 487 951
		Teaching Output Income	363 753	251 641	182 845	0	0	718 006	877 185	957 163
		Total Hons	**3 495 713**	**2 322 365**	**1 607 593**	**0**	**0**	**5 818 405**	**7 148 281**	**7 844 469**
	Masters Course Work	Fee Income	660 000	388 800	524 880	1 133 741	1 306 069	1 454 635	1 666 218	1 850 930
		Teaching Input Income	239 302	138 360	183 327	388 653	439 437	480 359	540 040	588 798
		Teaching Output Income	294 809	281 247	372 653	790 024	893 254	976 438	1 097 753	1 196 864
		Total Masters	**1 194 110**	**808 407**	**1 080 860**	**2 312 418**	**2 638 760**	**2 911 432**	**3 304 011**	**3 636 593**
	Masters Research	Fee Income	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
		Teaching Input Income	5 438 673	5 568 460	6 006 730	6 477 547	7 139 287	7 608 998	8 065 537	8 595 934
		Teaching Output Income	4 379 987	7 399 441	7 981 821	8 607 448	9 486 777	10 110 934	10 717 590	11 422 388
		Total Masters	**9 818 661**	**12 967 901**	**13 988 551**	**15 084 995**	**16 626 064**	**17 719 932**	**18 783 128**	**20 018 322**
	PhD	Fee Income	0	0	0	0	0	0	0	0
		Teaching Input Income	3 807 071	4 173 069	4 860 938	5 410 224	6 007 925	6 715 767	7 486 923	8 326 440
		Teaching Output Income	3 284 990	7 201 595	8 388 671	9 336 591	10 368 062	11 589 608	12 920 415	14 369 196
		Total PhD	**7 092 062**	**11 374 664**	**13 249 609**	**14 746 815**	**16 375 987**	**18 305 376**	**20 407 338**	**22 695 636**
	Totals		**142 421 932**	**162 865 969**	**178 883 349**	**193 177 866**	**213 910 682**	**236 879 615**	**256 685 941**	**278 224 324**

4 INDICATORS OF SUCCESS

The following table captures the measures that will be used to track the progress of the School's initiatives.

Table 16: Engineering Indicators as at 13 August 2013

	Indicator	Comments	Achieved			Targets							
			2011	2012	2013	2012	2013	2014	2015	2016	2017	2018	2019
1.	**Enrolment – meet input expectations of the government**												
1.1	Meet the undergraduate target	subsidy earning undergrads per enrolment plan	2313	2281	2371	2291	2375	2440	2470	2525	2525	2525	2525
1.2	Meet the postgraduate target PG to UG	subsidy earning postgrads per enrolment plan	12%	12.9%	9.9%*	13%	12.8%	12.6%	12.6%	12.9%	15.5%	16.2%	16.6%
1.3	Meet the percentage PhD to student ratio	based on enrolment plan	3%	3.0%	3.1%	3.2%	3.4%	3.6%	3.8%	3.9%	4.0%	4.2%	4.3%
1.4	Meet the percentage international students	10% by 2016	10.4%	10.36	9.41		10%	10%	10%	10%	10%	10%	10%
1.5	FTE student to staff ratio	based on enrolment plan	21	20.1	18.1	n/a	17.44	15.24	14.75	14.29	13.45	13.19	12.94
1.6	New intake into Unite/5 year curriculum	Expansion of Access for quintile 1 and 2 schools	71	66	71	75	75	75	150	150	150	150	150
1.7	Pass rate into mainstream from UNITE	Improvement of Access programs	39.40%	37.90%			60%	65%	70%	75%	75%	75%	75%
2.	**Graduation – contribute to human capacity development**												
2.1	Meet the graduation rate	as per enrolment plan											
	graduation rate (UG)		*15%*	*15%*	16%	17%	17%	18%	19%	20%	22%	22%	22%
	graduation rate (PG)		*22.76%*	*33.54%*	33.9%	32.2%	28.6%	28.6%	38.5%	39.4%	39.4%	33.9%	32.2%
2.2	Meet the retention rate (Based on Headcount over 3 years)		60%	60	60%	63%	65%	69%	72%	75%	75%	75%	75%
2.3	Meet the graduation target (total)	as per enrolment plan											
	graduation target. (UG)		*348*	*332*			390	402	399	485	511	538	586
	graduation rate (PG)		*71*	*108*			103	99	89	93	151	161	165
2.4	Meet the PhD graduation target	as per enrolment plan	8	11		9	18	20	21	22	23	24	26

3.	**Research – Premier University of African Scholarship**		**Achieved**			**Targets**							
			2011	**2012**	**2013**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**
3.1	Exceed the national norm of research units per staff member	National norm 1,25, achieve 2.00 in 2019	1.03				1.25	1.30	1.40	1.55	1.75	1.85	2.00
3.2	% of PhD qualified staff	90% by 2019	50%	45.0%	50.0%		59.5%	70.1%	78.0%	84.4%	95.1%	100.0%	100.0%
3.3.1	Number of PhD students per staff member	Professor: Associate Professor: Senior Lecturer: Lecturer (with PhD):					3,3 2,5 1,2 0,6	3.5 2.7 1.5 0.7	3.7 2.9 1.7 0.8	4,0 3,0 2,0 1,0	4,0 3,0 2,0 1,0	4,0 3,0 2,0 1,0	4,0 3,0 2,0 1,0
3.3.2	Number of Masters students per staff member	Professor: Associate Professor: Senior Lecturer: Lecturer (with PhD):					2.7 3.5 4.8 4.4	2.7 3.5 4.8 4.4	2.7 3.5 4.8 4.4	2.7 3.5 4.8 4.4	2.7 3.5 4.8 4.4	2.7 3.5 4.8 4.4	2.7 3.5 4.8 4.4
3.4	Impact of publications	Number citations by staff per year	Progressive percentage increase										
3.5	Number of Postdocs			17	14		19	24	28	30	30	30	30
3.6	Research Funding	Number of research grants Rand value of grants/contracts	Progressive percentage increase										
3.7	Increase NRF rating and international collaboration	Increase no NRF rated scientists: Increase NRF rating category of rated scientists: Number of visiting Professors: Number of staff on international editorial boards: Number of joint international collaborative projects: Number of international engineering MOUs:	Progressive percentage increase										

4.	**Meeting the expectations of society (Reputation)**		**Achieved**			**Targets**							
			2011	**2012**	**2013**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**
4.1.	Community engagement - % of student in placements	Number of students registered for programmes requiring experiential learning	92%	94%	94%		95%	95%	95%	95%	95%	95%	95%
4.2	Community Research Engagement	External research funds per academic staff member Number of projects				R 60,000	R 80,000			R 220,000			
4.3	Transformation of people – meeting equity target in terms of student enrolment and graduations.	Enrolment plan African:	39%	42%	44%			46%	48%	50%	50%	50%	50%
		Coloured:	1%	1%	1%			1%	1%	1%	1%	1%	1%
		Indian:	47%	46%	45%			43%	41%	39%	39%	39%	39%
		White:	13%	11%	10%			10%	10%	10%	10%	10%	10%
		Other	1%	1%	0%			0%	0%	0%	0%	0%	0%
		Male:	73%	73%	73%			68%	65%	60%	60%	60%	60%
		Female:	27%	27%	27%			32%	35%	40%	40%	40%	40%
		Graduands: African:	30%	30%									
		Coloured:	1%	2%									
		Indian:	48%	50%									
		White:	21%	17%									
		Other	0%	1%									
		Male:	72%	71%									
		Female:	28%	29%									
4.4	Transformation of people – Meeting lower quintile enrolment targets	% of students from quintile 1 and 2 schools in new intake	8.5%	11.0%	11.2%		15.0%	17%	19%	20.0%	20.0%	20%	20%
4.5	Transformation of operations – BBBEE rating target.	Rating level	not rated			Level 4	Level 4	Level 4	Level 3	Level 2	Level 2	Level 2	Level 2
4.6	Equity index	Rating level											
4.7	Stakeholder satisfaction – various survey responses.	Surveys of staff, students, alumni, parents, employers, donors focusing on satisfaction attributes per group	Not known			Obtain an average satisfaction level of “fully meets expectations”							

5. THE WAY FORWARD

This Strategic Plan aims to be a "living document" and a road map to enable the School to achieve its strategic goals. The implementation plan requires input from all school stakeholders through the various structures. The consolidated plan will be collated in a Gantt chart and will be monitored for progress as part of the school management committee function.

Each Academic leader will be required to provide a plan for attraction and retention of staff in their specific discipline and drive the progress towards the school and institution goal of staffing PhD's (School Goal 8).

Each discipline will be required to provide input on the implementation plan initiatives as applicable to their area of strength and expertise.

Each of the research groups will be required to develop:

- A plan for establishing new or strengthening/building existing groups
- A plan of execution on how this will be done/funded; number of staff involved currently and the plan to grow these individual research units;
- A plan as to how laboratories and facilities will be supported;
- A plan to leverage focussed industry support

Appendix 1 :

School of Engineering Transformation Charter Action Plan

Research, Teaching, Learning and Scholarship are a Vocation for All	**Current Activity**	**Enabling Systems**	**Proposed Activity**	**Target**
Access to learning will continue to be promoted to advance social transformation and redress;	Acceptance of learners on academic merit with no racial or class discrimination UNITE Programme expanded in 2010/11 to accommodate 75 students ASAP Programme in Engineering provides SI and Ad-hoc tutorship in fully equipped satellite learning centres and in the central Desmond Clarence Bld. throughout the four years of all degrees offered in the School.	1. Fully integrated and symbiotic sharing of information and planning activities between the College Administrative Office and the School Admin. Office 2. Operating the UNITE Programme as a fully integrated academic programme in the School, with a Programme Coordinator that seats in the School T&L Committee and whose activities are directly coordinated by the S-AL T&L. 3. Suitable number of ADOs, whose activities are coordinated by the S-AL T&L and the College Centre for Academic Support (Directed by the College Dean of T&L), to increase throughput. 4. Funding from the DoHET for the ECSA Deans' initiative to be used to increase the number of first year intake in PMB campus in Civil and AgEng.	1. Increase the intake of female engineering students to 40% (currently between 20-30%) through targeted marketing and recruiting campaigns in schools. 2a. Expansion of the UNITE Programme to become the first year of the 5-year extended and augmented programme in Engineering. This will result in a general expansion of the first year UNITE Programme to 150 students, of which 50% will be access students and 50% main-stream. Also at least 15% of the enrolment will be from Quintile 1 and 2 schools. 3. This activity depends on the availability of funds from College 4. Development of a Civil and Environmental Engineering Programme in PMB to increase the overall intake of first year students in Engineering to 720 (2013),	1. From 2013 2. By 2014 (after accreditation visit by ECSA) 4. Depending on the availability of funds from DOHET for the capstone proposal of the ECSA Deans.

			720 (2014) and 900 (2015)	
Students will pursue their studies in accordance with the principle of freedom of inquiry and research;				
Scholars will advance knowledge and culture through globally-competitive research and studentship, and research-led teaching and learning;	Alignment of the University with international QS ranking, and redefinition of targets and deliverables to achieve relevant position among the first 200 universities in the world.	1. Promoting multidisciplinarity within the College and across the University. 2. An operational and efficient procurement/financial system. 3. A School-driven targeted recruitment campaign for appropriately qualified students, that has full support from College	1a. Development of Multidisciplinary Centres, Master Programmes and short courses that foster interaction and collaborations within the School, across the College and the University. 1b. Involvement in large multidisciplinary and collaborative projects	From 2013 On going By 2012

		4. Targeted Scholar induction/internship/developmental programmes 5. Provision of teaching and mentoring services as well as funding support from industry.	2. Establishment of CEPS, Centre for Engineering Postgraduate Studies as enabler of an improved environment for research and scholarship 3. Targeted searching for appropriate students to achieve AES Research and T&L and Scholarship Agenda. Including actively raising funds for industry-supported Chairs and Professorial positions. 4. Mentoring programmes for developmental lecturers including completion of PhD and Professional registration. 5. MoAs signed with industry and local municipality for the provision of mentoring and teaching services in Engineering	By 2012 By 2013 By end of 2012
Research and curricula will be socially and contextually relevant;	Most of the research in Engineering is applied, community/industry driven and socially relevant All our curricula are accredited by the relevant professional bodies,	Full accreditation of ALL degrees in Engineering by the relevant professional bodies	1. Preparation for next accreditation visit 2. Establishment of Industry Advisory Boards for each Programme or Cluster in Engineering.	On going By end of 2012

	ensuring social and contextual relevance			
African languages will be promoted as academic languages;	English as a medium of instruction and research dissemination		Isi-Zulu will be a compulsory elective for ALL students in Engineering	2014
The University will be student-centred and provide a caring environment for every student;	UKZN is student-centred	N/A	None	N/A
A holistic approach to education, characterized by excellence in teaching and learning, will produce skilled self-confident and socially responsible graduates, conscious of their role in contributing to the national development effort and social transformation.	School visions and missions in skills development are not sufficiently encouraged	School autonomy to determine locally relevant and globally competitive curricular and research programmes	Allow visibility of School visions and missions which clearly state the kind of student they aim to produce	2012
Race and Gender Representation is Evident in All Structures	**Current Activity**	**Enabling Systems**	**Proposed Activity**	**Target**
The staff profile of the University at all occupational levels will reflect the demographics of our province and country;		Employment Equity plan Appointment of developmental lecturers LEAP Programme re-instated and expanded to incorporate Masters and not only PhD. The gap year, between MScEng and PhD (when targeted applicants become eligible) prevents the School to "grow our own timber" and	Staff development programmes to improve qualifications of existing staff	2015

		retaining potential developmental lecturers in Engineering.		
Gender equity within the management levels of the University will be ensured, and women will be adequately represented in all management structures;	Male dominated School and College management	Female staff development	Target females in new appointments without compromising quality	2015
The implementation of employment equity and the advancement of designated groups within the University structures will be part of the performance management requirements of all line managers;	UKZN has been using employment equity in staff employment since the merger	Non-racialism in staff employment	Create an environment where all racial groups feel at home across all University structures	ASAP
Mentorship programmes that develop, support and nurture black and female academic staff members will be provided;			The WOSA programme should be reinstated and started from Masters.	ASAP
Mentorship and professional development programmes that attract and retain staff of the highest calibre, develop all staff to their full potential, and meet equity objectives will be developed.	Development lecturer programme	Qualified supervisors; mentoring that includes Dean & HOS; exposure of developmental lecturers to both research and teaching simultaneously	1. Continue the programme beyond 2012 2. Establishment of Industry Advisory Boards for each Programme or Cluster in Engineering.	From 2012
A Socially Cohesive and Inclusive Institutional Culture Thrives	**Current Activity**	**Enabling Systems**	**Proposed Activity**	**Target**
Social cohesion will be valued and promoted through engagement and	Very little social cohesion; Current space reallocation	Relevant seminars, workshops and provision of social spaces	Provide social spaces and dialogues	ASAP

understanding, tolerance and respect for diversity in all its forms;	plans remove social spaces			
Every individual will be encouraged to promote social interaction among diverse social groupings, whether among or between staff and students;	Current space reallocation plans remove social spaces	Freedom of expression	Provide social spaces and dialogues	ASAP
The University will adopt, implement and monitor policies and procedures that aim to eliminate discrimination in all its manifestations including ethnicity, race, gender, nationality, class, religion, sexual orientation and disability;				
Processes will be devised in such a way as to break a code of silence around instances of discrimination in any form;				
Structures and procedures for problem-solving and dispute resolution will be strengthened to handle grievances in a fair and constructive manner;				
The University will enhance on-going education and training for staff and students that sensitises the University community to the lived experiences of its diverse constituencies. It will in this way foster				

understanding and tolerance, and promote the celebration of diversity;				
The social and personal well-being of staff and students, and an enabling environment for the realization of their full human potential, will be actively promoted.	Very few or no activities that promote staff interaction to promote and recognise good health and other positive aspects	Sport; creative activities	Special days for activities within and across Schools	2013
Good Modes of Governance are Enshrined	**Current Activity**	**Enabling Systems**	**Proposed Activity**	**Target**
Good corporate governance will be ensured through commitment to democratic representation, devolution, consultation, accountability and transparency;	Relevant School Committees to represent staff needs and provide opportunities for devolution, consultation, accountability and transparency;	Committees Full consultation across School	Continuous monitoring and self-reflection of systems put in place, with flexibility to adapt and effect any necessary change rapidly. Revise the decision-flow at least every-year until transitional period post-reconfiguration is over and stability of the new College system achieved.	ASAP 2013
Governance, leadership and management will be practiced in a manner that encourages and facilitates positive, proactive, and continuous institutional transformation;	Generally, there is a top-down approach in governance and leadership	School autonomy; individual academic staff accountability and authority (with decisions related to their teaching and research)	Stick to the existing nine principles of College Reorganisation strictly	ASAP
The University leadership and management will be responsible and directly accountable for creating an environment that	Generally, there is a top-down approach in governance and leadership	School autonomy; individual academic staff accountability and authority (with decisions related to their teaching and research)	Stick to the existing nine principles of College Reorganisation strictly	ASAP

cherishes diversity and equity, and which is conducive to respect, tolerance and understanding				
The Right to Freedom of Expression is Guaranteed	**Current Activity**	**Enabling Systems**	**Proposed Activity**	**Target**
Every individual whether student or staff is a valued member of the University community, and each voice will have the right to be heard;				
Ongoing debate and dialogue on all aspects of transformation and organisational culture will be fostered;	Nine principles of College Reorganisation	Frequent dialogue between leadership and staff	Promote principles of College Reorganisation strictly	ASAP
The University will enhance its role as a leader in transformation by holding regular debates and discussions that will broaden understanding, and identify trends that inhibit and obstruct transformation;				
These engagements will be conducted according to commonly developed "rules of debate" appropriate to a university that espouses critical thinking and well-founded argument;				
Members of Senate will participate actively in debates and discussions and will assume a				

responsibility in preparing the University for the advent of the broader transformational challenges inherent in global change and the achievement of the University's vision;				
The right to freedom of expression will be counterbalanced by responsibility, accountability and the limitations spelt out within the Constitution of the Republic of South Africa.				
Advancement of the Transformation Agenda is the Responsibility of All	**Current Activity**	**Enabling Systems**	**Proposed Activity**	**Target**
All members of the University community will understand the meaning of transformation and accept individual and collective responsibility for its advancement;				
Leaders within all stakeholder groupings will play a critical role in advancing the transformation agenda;				
Leaders will develop a shared understanding of transformational leadership behaviour, and practice it;				
Key stakeholder groupings will commit to the process of transformation, and				

contribute actively to it by clearly defining their roles and responsibilities, and improving interpersonal stakeholder relationships at all levels;				
Academics will embrace the notion that universities are places of reflection to extend the boundaries of human existence and will acknowledge the centrality of human relationships in meeting the challenges of our times, and in realising the vision and strategic objectives of the University;				
Students will recognise that they have individual and collective responsibilities to participate in the building of an institutional identity based on mutual respect and tolerance;				
Staff members will take pride in making the University an institution where courtesy; accountability; mutual respect and efficiency are core values.				