TOWARD A THENSA CONSORTIUM OF SCIENCE PARKS AND BUSINESS UNITS:

A SYNOPSIS OF INNOVATION, BUSINESS-UNIT AND TECHNOLOGY TRANSFER ENTITIES AT MEMBER INSTUTIONS OF THE TECHNLOGOGICAL HIGHER EDUCATION NETWORK OF SOUTH AFRICA

September 2020

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1. EXECUTIVE SUMMARY

The last decade has seen a growing realisation in Africa of the need to respond to developments in the global economy and in particular to take initiatives to break away from the dominant dependency on resource economies. The COVID-19 pandemic has re-directed the importance of innovation and commercialisation of research solutions for economic revitalisation, human development and job creation. The International Association of Science and Technology Parks (IASP) maintains that an entrepreneurial spirit and a solution-oriented mindset is key components in higher education and views the establishment of science and technology parks as platform to facilitate the production of knowledge and its transfer to the economy in the form of spin-offs, enhanced by the co-location of R&D university centres and high-level technology enterprises on-site at Universities. The concept of science parks can be traced back to the 1950s, when, with the support of Stanford University, the Silicon Valley region was transformed from an agricultural valley into a vibrant ICT industry. In the 1960s the UK based Cambridge Science Park and the French Sophia Antipolis Science Parks set the benchmark for the European countries. The majority of the science parks internationally were established during the 1990s, and to date, there are approximately 400 science parks globally, located primarily in countries with developed economies with as many as 140 in North America.

An important function of any science park is to contribute to the establishment of a knowledge-based economy by fostering market-oriented technological development. This type of economy, therefore, depends on three interrelated processes: 1) Local knowledge creation; 2) Transfer of knowledge from external sources; and 3)Transformation of that knowledge into productive activities and valued outcomes. Consequently, quad-helix partnerships and networking among commerce and industry and higher educations to transfer knowledge and foster collaboration and innovation, are processes which are vital to science parks. It is widely acknowledged that science and technology parks are the ideal ecosystems to facilitate multi- inter and -transdisciplinary engagement in the global knowledge economy. Science & technology parks internationally have demonstrated how such facilities can promote the economic development and competitiveness of regions and cities by:

- Creating new business opportunities and adding value to mature companies
- Fostering entrepreneurship and incubating new innovative companies
- Generating knowledge-based jobs
- Building attractive spaces for emerging knowledge workers - Enhancing the synergy between universities and companies
- Facilitating the pipeline from knowledge to concept and enterprise and finally socio-economic development in ground-breaking and contemporary innovations such as the 4IR, the circular economy and climate change.

1.2 MOTIVATION FOR THE ESTABLISHMENT OF A CONSORTIUM OF SCIENCE PARKS/BUSINESS UNITS

Whilst South Africa's science and technology system has taken important strides forward, there are gaps between South Africa and those countries identified as knowledge-driven economies. The Aim of SATN (THENSA) is, therefore, to firstly assess the status quo amongst innovation, business-unit and technology transfer entities at member instutions of the south african technology networke, and secondly etablish a consortium of science and technology parks of its member institutions in odre to create a consolidated and combined entity to promote the technological intensification of the economy, a more effective knowledge transfer and sharing and the construction of competitive advantages. The objectives of the THENSA consortium of Science Parks and Business Units are as follows:

1. Coordinate an active network of managers of science/technology/research parks, innovation districts and other areas of innovation
2. Enhance new business opportunities for members and their companies
3. Increase the visibility of our members and multiply their global connections
4. Ensure member representation at international forums and institutions
5. Assist member institutions in the development of new parks and areas of innovation
6. Become members of the international association of science and technology parks and connect with experts in science and technology parks and areas of innovation globally
7. Submit joint proposals to government and business and industry whilst responding to building third stream income for their respective institutions.

2 METHODOLOGY

A survey was conducted amongst member university of THENSA. At each university the repsonbiple official was identified and a standardised questionnaire completed (refer to annexures). In selected cases the officials were contacted to soliciti additional qualitative information. Results were compiled by categorising related responses.

Information was collated directly as received from respondents with some minor adaptations to technical care and formatting.

3 EXPOSé

3.1 COMPOSITION

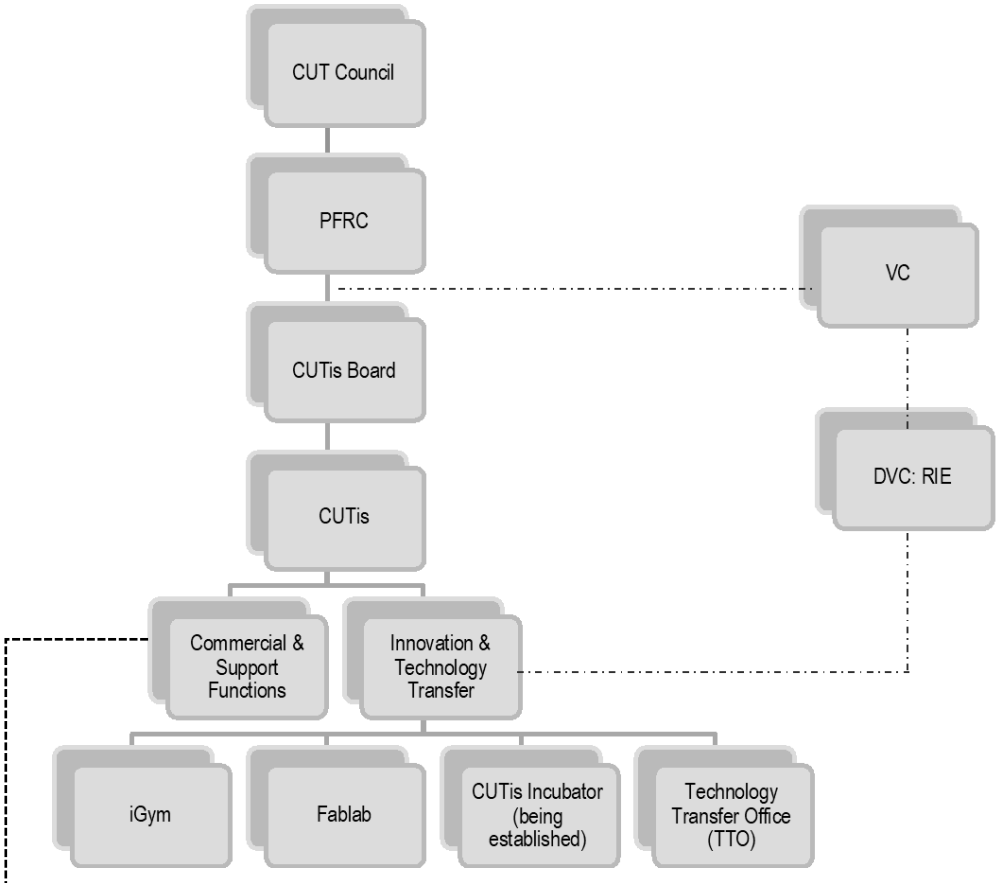
Host university	Science park	Business unit/s	IP office
Central University of Technology	Innovation Center to be established in 2021	1. Central University of Technology Innovation Services (Pty) Ltd 2. Product Development Technology Station 3. Centre for Rapid Prototying and Manaufacturing (Additive Manufacturing)	Innovation and Technology Transfer
Vaal University of Technology	Southern Gauteng Science and Technology Parfk	1. ICBT 2. Co-Lab 3. Fablab 4. Dihlare 5. TTI 6. eKasilab 7. TTO 8. Sebokeng Technology Station 9. eWaste 10. Idea 2 Product Lab	TTO
Cape Peninsula University of Technology		1. Aonyx Holdings	Technology Transfer and Industry Linkages
Durban Univerity of Technology	N/A	1. Entrepreneurial Desk and Center: 2. Midlands 3. Durban. 4. Center for Social Entrepreneurship (CSE): 5. Durban	Technology Transfer and Innovation (TTI) Directorate.
Mangosuthu University		1. Technology Station in Chemicals	Research and Innovations Directorate
University of Venda		1. UIGC , PTY, LTD	
Tshwane University of Technology		1. N/A	IP office

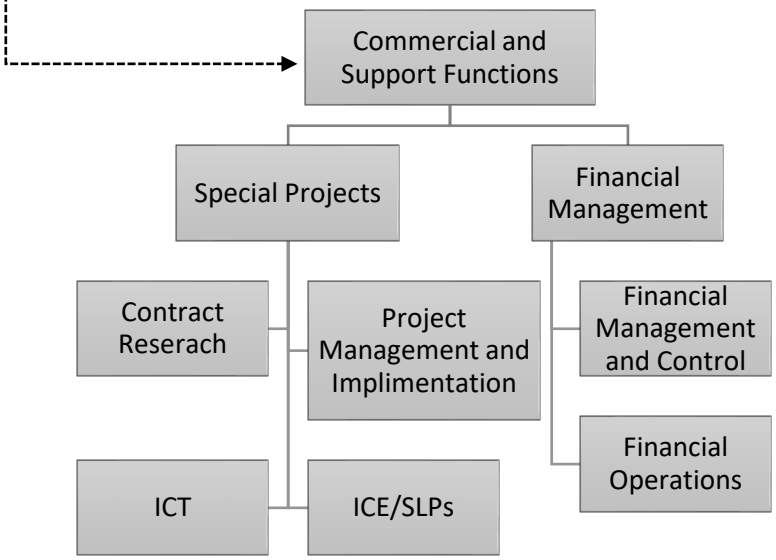
3.3 YEAR ESTABLISHED

CUT	VUT	CPUT	DUT	MUT	UNIVEN	TUT
2018 (Following disbanding of previous trust)	2012	2004	2008 (TTI) 2015 (CSI) 2018 (Centre)	2001	2010	2016

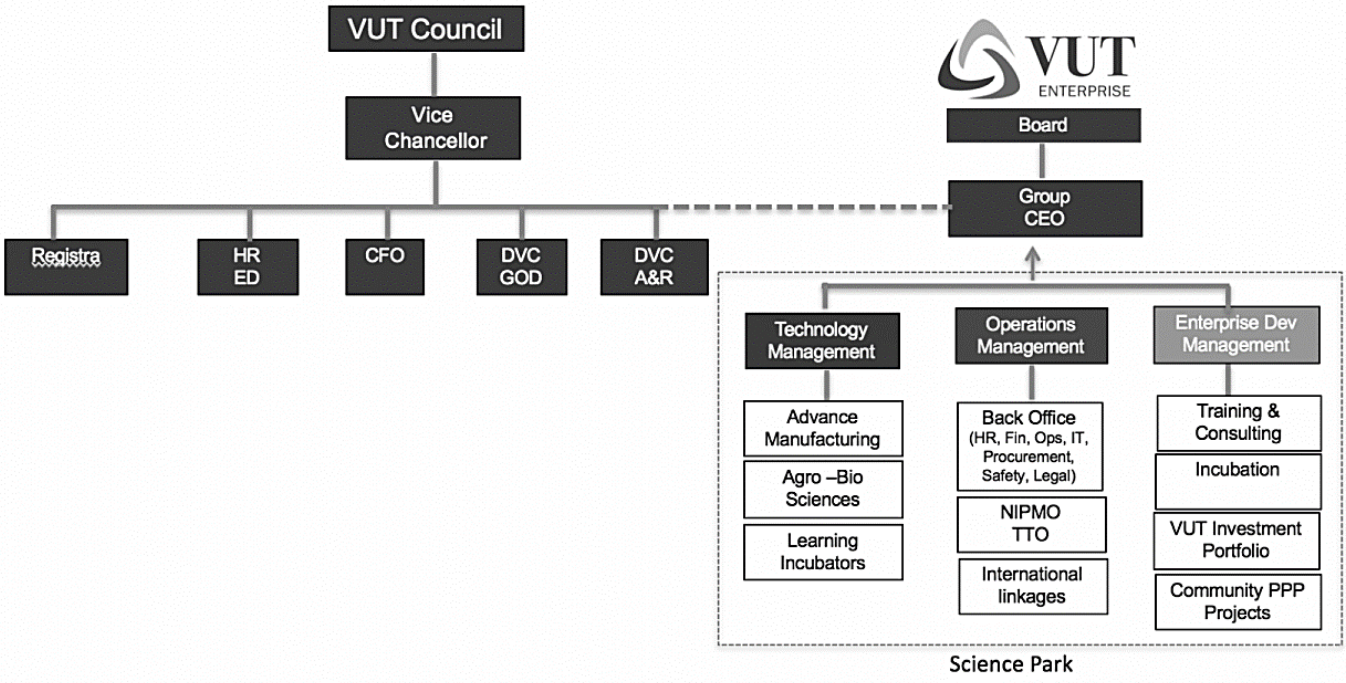
3.4 GOVERNANCE STRUCTURE

Organogram: CUT

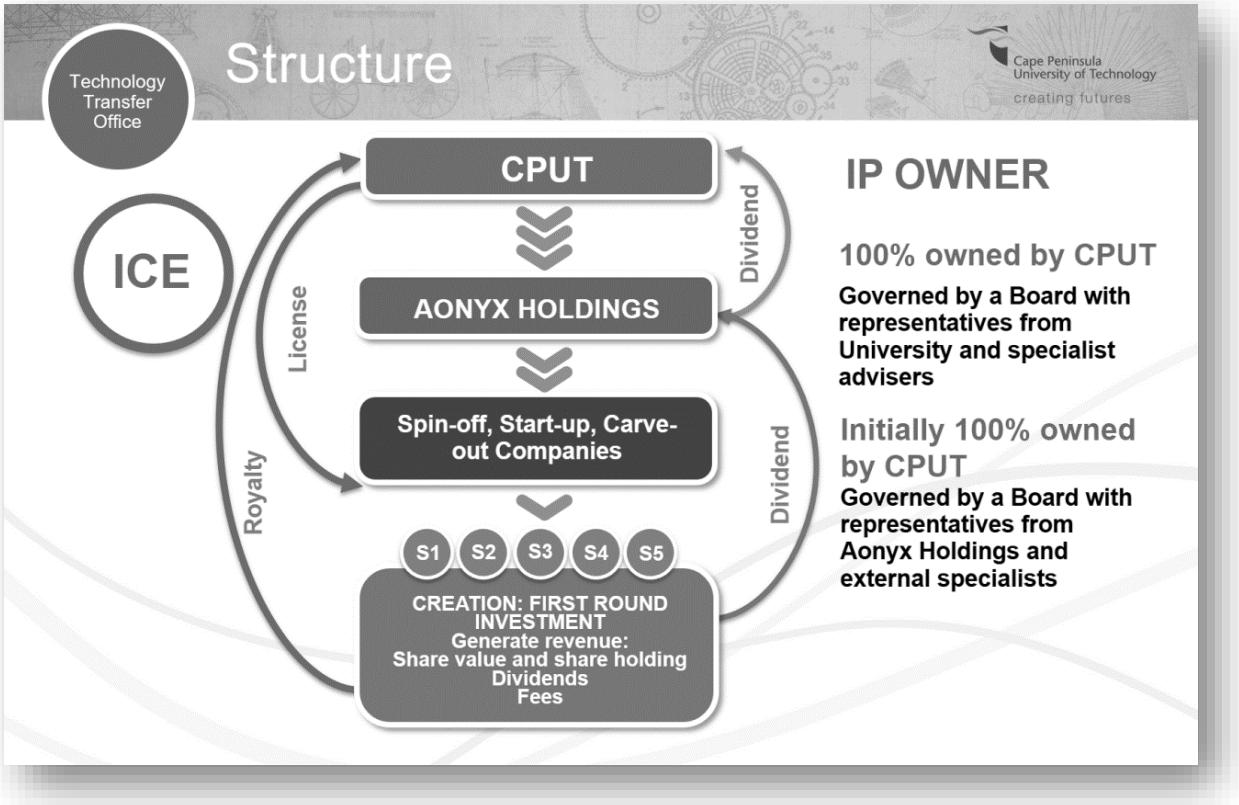




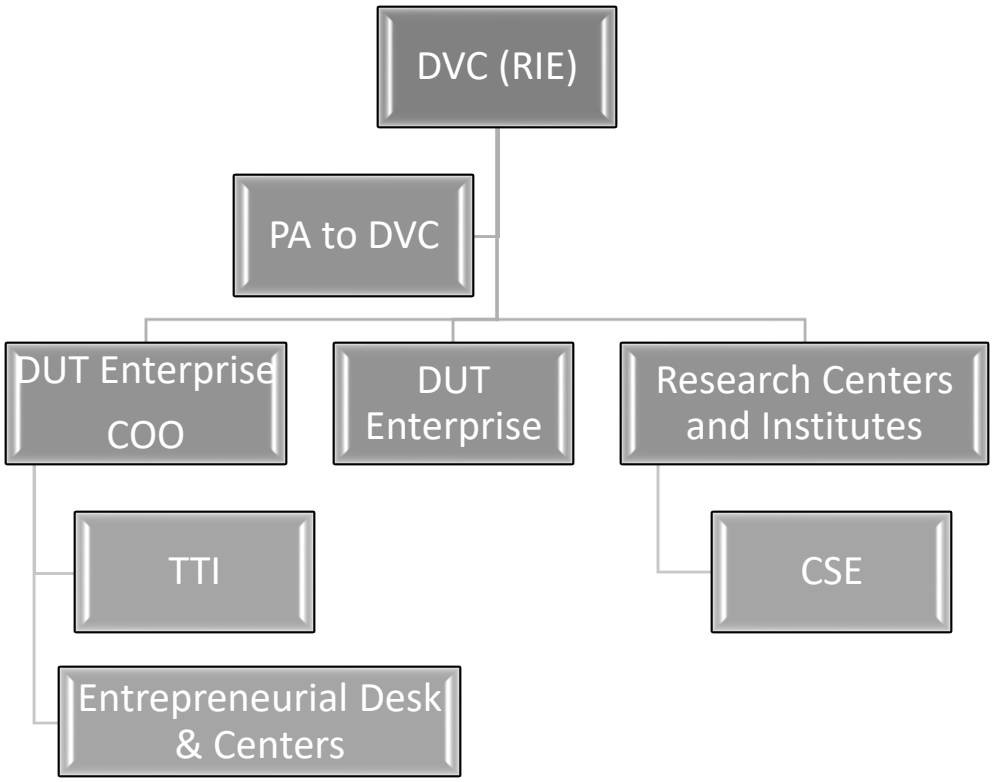
Organigram: VUT



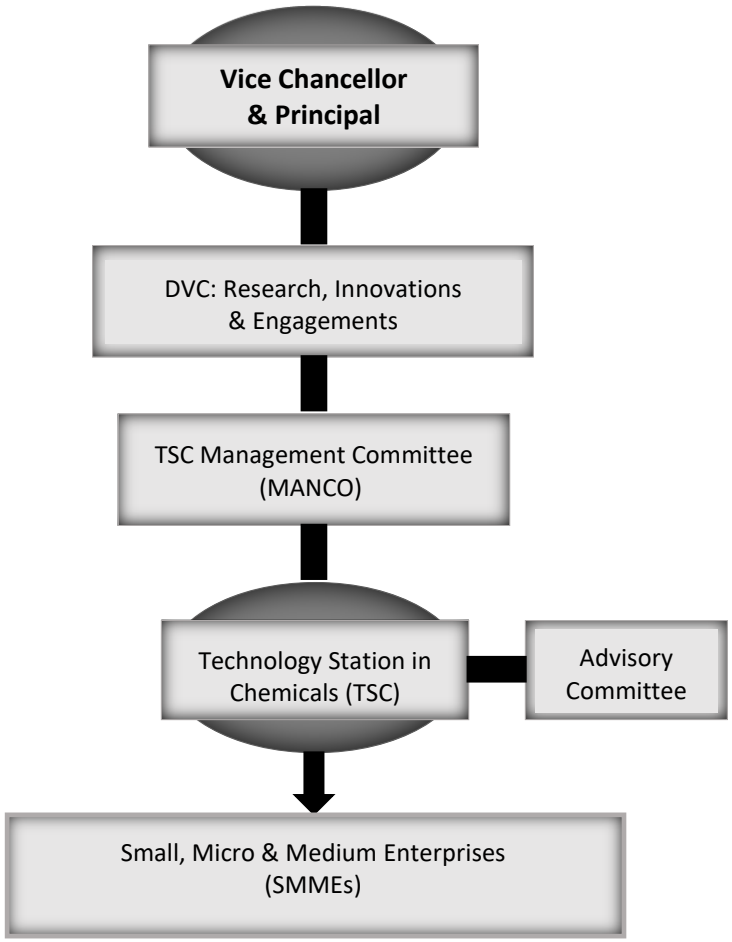
Organigram: CPUT



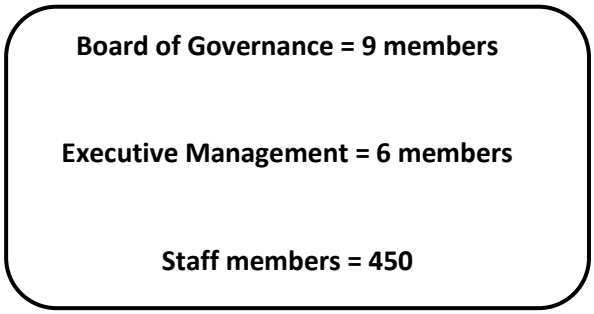
Organigram: DUT



Organigram: MUT



Organigram: UNIVEN

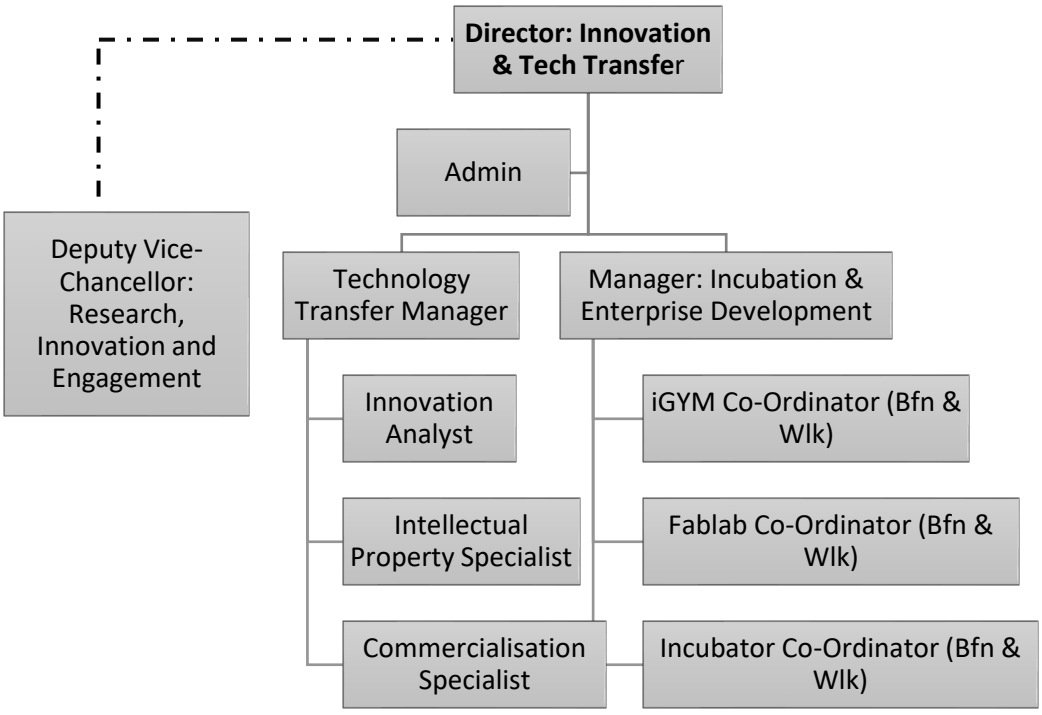


Organigram: TUT

The TTO is headed by the Head of Innovation and Technology Transfer. Who reports to the Director: Research and Innovation. The TTO also reports to the Senate Committee on Reseach and Innovation which is chaired by the Deputy Vice-Chancellor: Research, Innovation and Engagement.

3.5 SYNOPSIS: BUSINESS MODELS AND STRATEGIES

Approved new structure of ITT: CUT



VUT

1. Our primary financial objective is to raise the R1 billion required to implement this strategy over the next five years (2018-2022). The funding will include a contribution from VUT, soliciting grants from government as well as obtaining strategic equity partners.

The Science Park drives technology platforms to enable research, innovation, product development and prototyping to complement the research capacity located at main campus. The two core technology platforms that we have selected includes the Advanced Manufacturing and Agro/Bio Sciences. A series of learning incubators will be established under the two themes. These technology platforms will support external clients for a fee as well as allow employees to develop products that can be commercialised.

The Advanced Manufacturing Programme offers state-of-the art, cutting- edge technology in manufacturing, especially in the area of design and additive/ digital manufacturing (3D printing). The key funded project includes the Technology Station which has been funded for the last 8 years by the Technology Innovation Agency (TIA).

The competencies established in advanced manufacturing includes: composite manufacturing, Idea 2 Product Lab + FabLab Training Centre, 3D Scanning + Robotic Milling, Industrial Design, Tooling + Computer Numerical Control (CNC) milling, Additive Manufacturing, Sand casting and Reverse Engineering.

Planned projects include

- Ongoing improvement of Additive Manufacturing (AM) technology. We are planning to acquire Voxeljet 2000 3D printing system that is capable of printing larger pieces (sand moulds and patterns) at one go, as well as exploring purchasing all-purpose laser sintering machine that sinters metal, glass, ceramic and magnets.
- Improvement of the design department so as to acquire latest design technologies. This department is the entry point for all product development and therefore an income-spinner.
- Continue establishing I2P lab/ I2P lab plus 3D printing within schools and community based initiatives.
- Conduct research to locally produced raw materials. This will reduce the amount spent on importing raw materials thereby reducing the cost of printed products.
- Continue managing the Casting Simulation Network (CSN).
- Establish Research Chair in Advanced Manufacturing in partnership with the National Research Foundation (NRF) and industry partners.

2. Develop a New Organisational Structure

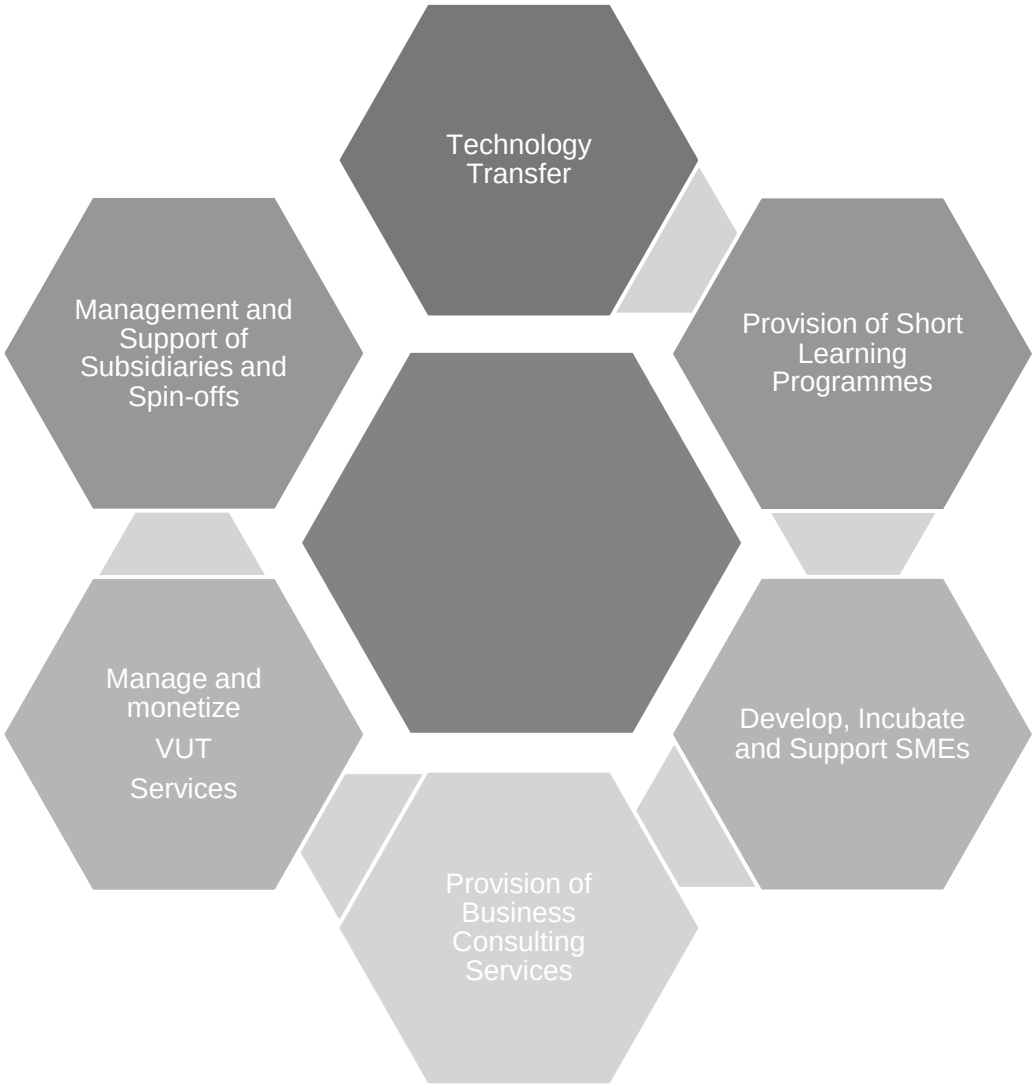
Various models will be debated to agree on an ideal structure for the Science Park. Most Science Parks which drive commercial activities are managed through a ring-fenced independent structure separate from the university structure, directed by a board of directors with the key activities in operations, technology management and enterprise management.

The activities to be executed under this outcome include:

- Develop the ideal structure to manage commercial activities;
- Ensure proper governance such as establishment of the board and necessary subcommittees;
- Establish delegation of authorities;
- Benchmark and grade all the proposed positions;
- Align the existing team to the proposed structure;
- Hire new personnel; and
- Establish and train new staff on new organisational culture.

3. Develop new organizational policies

Portfolio Name	Policy	Status of policy	TTI Responsible Department
DVC: Technology Transfer and Innovation	1. Intellectual Property Rights (IPR) Policy	Draft form	TTO Management
	2. Staff incentive policy	Policy to be drafted	TTO/ Commerciallisation Mananger
	3. Fundraising policy	Policy to be drafted	Back Office
	4. Consulting and Benefits sharing Policy	Policy to be drafted	TTO/ Commerciallisation Mananger
	5. Commercialisation Policy	Policy to be drafted	TTO/ Commerciallisation Mananger
	6. Spinout Policy	Policy to be drafted	TTO/ Commerciallisation Mananger
	7. Procurement policy	Policy to be drafted	Back Office
	8. Short Learning Policy	Policy to be drafted	SPL programme



CPUT

TTO is a standard Directorate within the University responsible for commercialisation of technology innovations.

ICE is an advisory committee (numbering as per source document)

5.2 IP, Commercialisation and Enterprise Development (ICE) Committee
5.2.1 An ICE Committee shall be established, which shall comprise members selected as follows:
5.2.1.1 The DVC: RTIP
5.2.1.2 The Director of the TTO
5.2.1.3 Technology Transfer Managers
5.2.1.4 The Executive Director of Finance or a nominee
5.2.1.5 Four external experts serving a three-year term, renewable
5.2.1.6 Any such person(s) the members above may wish to co-opt, such as faculty members drawn from the faculties or external expert(s).

5.2.2 The responsibilities of the ICE Committee in relation to protection of technology innovations and the distribution of benefits arising from the commercialisation thereof shall be to advise the TTO on matters relating to:

5.2.2.1 Ownership of IP and innovations;
5.2.2.2 Distribution of income derived from exploitation of IP and innovations;
5.2.2.3 Protection of IP and innovations;
5.2.2.4 Such other matters as the TTO may deem appropriate.

"Aonyx Holdings (Pty) Ltd" is a private company wholly owned by CPUT. The founding vision is that the company will hold equity in companies created following recommendation by CPUT. It is envisaged that the new companies will be predominantly in the form of technology spin-offs, however it is conceivable that university carve outs may also be created.

5.3 Rights, relationship and implied obligations of Aonyx Holdings, in respect of CPUT

5.3.1 CPUT created the company to serve as a vehicle to carry out the mandate of the university in terms of the IPR Act, where commercialisation involves spin-off company creation.
5.3.2 The founding vision of Aonyx Holdings is that it will commercialise CPUT technology innovations through spin-off company formation for the benefit of all South Africans.
5.3.3 The rationale for the creation of this vehicle is that Aonyx Holdings:
5.3.3.1 will function as a company as envisaged by the Companies Act; and
5.3.3.2 will have the agility to execute on business opportunities as it will not be burdened by the administrative and financial processes of CPUT

5.3.4 CPUT thus recognises that Aonyx Holdings will hold equity in spin-off companies created following recommendation by CPUT
5.3.5 CPUT acknowledges and respects the legal personality of Aonyx Holdings as a separate legal person.
5.3.6 In its capacity as founder and shareholder of Aonyx Holdings, CPUT will strive to hold Aonyx Holdings:

5.3.6.1 accountable to its founding mandate;
5.3.6.2 to not compete with CPUT by itself or through its spin-off companies;
5.3.6.3 accountable to upholding the highest standards of corporate governance; and,
5.3.6.4 to being nimble in its spin-off activities to ensure that it is responsive and relevant to the needs of South African society

DUT

- In the process of consolidating
- Implementing a centralized model for Entrepreneuship.
- To set up an incubator even though the University did have one which became independent.
- The reporting lines will be reviewed.

MUT

Key Partners
Government Agencies
SEDAs
Local Municipalities
Chemical Industries
Other Technology Stations

Key Activities
Technology Information Support & Training
Toll Manufacturing (Detergents & Beauty Care Products)
Product Development & Improvements (Formulations)
Process Design & Development
Batch Processing Technology
Product Quality Testing against set Standards
Water and Wastewater Management: Laboratory Analyses

Value Propositions
We aim to improve the competitiveness of SMMEs through the application of specialised knowledge and chemical technology. We provide scientifically proven quality product formulations and offer to SMMEs in the chemical sector, especially new entrants, our signature Chemicals Manufacturing Training Course and further make available to them toll manufacturing opportunities.

Customer Relationships
Our customer relationships are LONG TERM. As long as the business is still viable, we will continue to offer technological and information support through Technology Audits to keep it running and relevant.

Customer Segments
Small & Medium-sized Businesses
Co-operatives
Youth in Business
Businesses owned by Marginalised Individuals
Corporates

Revenue Streams
TIA Grant Funds
Training & Learnerships
Service Fees

TUT

The TTO model of TUT is the central office that receive all the invention disclosures, assess the disclosures, patenting, markert reports development, marketing of technologies, negotiating licenses, managing contract research. The TTO is an office withing the Direcctorate of Research and Innovation.

3.6 CRITICAL MASS AND INFRASTRUCTURE

CUT		
CRITICAL MASS (PLEASE DESCRIBE BRIEFLY IN THE SPACE PROVIDED): CUTReal-estate and infrastructure	**Equipment and assets**	**Staff**
Fablab	**AM Equipment** Formlabs Form 2 Formlabs Form 3 Tiertime X5 Tiertime UP Mini Creality Ender 5 Creality Ender 3 Peopoly Phenom **Other Equipment** Argus 5070 Lasercutter Bosch Standing Drill Manual Standing Drill Dremel Station w Vice Vinyl Cutter Dremel Soldering equipment Complete Toolbox Miscelaneous powertools **PC's** (6 Workstations)	2
Idea Generator (iGYM)	Hall equipment to host events, workshops etc. (big screen, audio visual equipment etc.) with office space and front desk. 3D cameras	1 FTE Half day Admin Assistant 2 Student Assistants
PDTS	**Equipment:** Milling Machines x2 Guilitine Bending Machine Plasma cutter Plastic Injection Molder Turnmill Waterjet Lathe x5 Milling Machine CNC (3 axis) Pan Bender Surface Grinder Pipe Bender (Hydraulic) Pipe Cutter (Plasma) UP Mini printers x6 Emblaser Laser Cutter Kreon 7 axis Reverse Engineering Scanner Office: 16 Workstations	**24**

CRPM	**Equipment** EOS M280 – 200W, EOS M280 – 400W, EOS M290, EOS P385, EOS P395, EOS P396, EOS Formiga Arburger Object Connex 360 Vacuum Furnace MTS Criterion 43 (Tensile-30kN) **PC's** 12 Workstations	**16**
VUT		
172 ha	120 million Additive Manufacturing and other	64 Technical and Administive 46 Ground and Maintenance
CPUT		
None	**None**	**9**
DUT		
Midlands & Durban Centers	**No assets and equipment**	**1x Permanent; rest contract**
MUT		
MUT Infrastructure - 3 x Laboratories - 10 x Staff Offices - 1 x Boardroom - 1 x Classroom	• Analytical Instruments & Equipment • Detergents & Cosmetics • Manufacturing Equipment • Solid & Bar Soaps Production • Equipment • Wastewater Treatment Pilot- • plant (Mobile on a Trailer)	4 x Chemists 2 x Chemical Engineers 1 x Accountant 1 x Business Graduate
UNIVEN: NA		
TUT		
No infrastructure, the TTO is currently based at the Library Building	The TTO has 7 latops, two bar fridges. All other assests such as the shared printer belong to the ICT	**5**

3.7 SOURCES OF FUNDING (INDICATE APPROXIMATE 3-YEAR INCOME)

Government eg IDC, TIA,SEDA	Private partners	Host University	Venture capitalists	Angel investors	Commercial activities	Other (specify)
CUT						
R7.5M					R26M	
VUT						
R 30M	R1M	R 20M			R 5M	
CPUT						
		R2M				
DUT						
R7.5M		R15M				
MUT						
TIA, IDC, SEDA, R20m						

TUT						
TIA, DSI, Innovation Hub					Roylaties from licencees	

3.8 PRODUCTS AND OUTPUTS

Products commercialised	Patents registered	Innovations	Spin-out/off companies	Jobs created
CUT				
6 (in process to finalise the license agreements)	12	Not applicable	Nil	Difficult to quantify
VUT				
Technology Transfer and Industry Support	16/17	17/18	18/19	19/20
Number of SMEs assisted	316	308	198	YTD 210
Projects implemented in collaboration with at least one stakeholder and/or agency	9	6	7	6
Number of product & Process Development & Processes Improvements (Prototypes)	16	7	11	13
Invention Disclosures	30	24	33	None yet
Provisional Patents	0	1	3	None yet
Patents	0	1 (approved)	0	None yet
Youth project Supported in the TS*	143	127	118	121
Accredited Training Courses On offer: Footwear Manufacturing 3D Printing for I2P	0 0	0 0	4 1	4 1
Clients assisted in Accredited Training	0	0	23	42
* Schools supported		17	15	7 (TBC)
TOTALS: Products commercialised	Patents registered	Innovations	Spin-out/off companies	Jobs created
	1	87	2	12
CPUT				
5	16	16	4	1
DUT				
	4	5	1	150
MUT				
15		12		200
UNIVEN: NA				
TUT				
7	54		4	20

3.9 INCUBATION CENTRE AND PROCESS

Type and composition of incubator enterprise	Entrance and exit planning	Approximate worth
CUT, DUT		
(In progress)		
VUT		
eKasiLabs Sebokeng	12 month programme	R 2-3 million per annum
Sasol Programme	6 month x 2 groups of 50	R 0,8- 1 million
	20 per annum	R0,5 million
CoFE (Centre for Footwear Entrepreneurship)	20 per annum	R1,2 million
CPUT, DUT, MUT, UNIVEN: NA		
TUT		
Rail Manufacturing Incubator	Pre-incubation of 6 months Incubation period 3 years	R10 million

3.10 TRAINING PROGRAMMES (E.G ENTREPRENEURSHIP, IP PROTECTION ACT, PATENTING ETC)

Type of training	Number of candidates trained
CUT	
IPWise^{TM} Training (SARIMA & NIPMO)	
Entrepreneurship Development Programme	
Introduction to IP (CIPC)	
VUT	
Entrepreneurship Programme	100 per annum
CoFE (Centre for Footwear Entrepreneurship)	20 per annum
F'SASEC (French South African Schneider Education Centre)	35 per annum
CPUT: NA	
Entrepreneurial Training	Minimum target of 500 annually. 2020 target is 3500 students
Enactus training	100 students
Business and entrepreneurial mentorship	Target 3500
Post incubation mentorship	25
MUT	
HIETA Learnerships – Chemical Operations	36
Detergents Manufacturing Training Program	80
Cosmetics Manufaturing Training Program	50
UNIVEN	
Vary from NQF L 1 to NQF L 5	Employed and unemployed candidates
TUT	
IP Protection and IPR Act	70
Corporate Governance	61
Entreprenurship	80

3.11 CONCLUSION

The survey respondents utilised in the study comprised the designated officials as communicated by all THENSA member institutions. The survey response rate was 64% of all member institutions, but considering institutions with active activities indicated in the survey, the response rate was considerably higher (100%) as these were followed up telephonically through purposive sampling. These include (also see Annexure 1):

INSTITUTION	ABBREVIATION	TYPE	RESPONSE
Central University of Technology	CUT	UoT	Yes
Vaal University of Technology	VUT	UoT	Yes
Cape Peninsula University of Technology	CPUT	UoT	Yes
Durban University of Technology	DUT	UoT	Yes
Mangosotho University of Technology	MUT	UoT	Yes
Tshwane University of Technology	TUT	UoT	Yes
University o Venda	UNIVEN	Comprehenisve	Yes
University of Mpumalanga	UMP	Comprehenisve	No
University of Zululand	UNIZULU	Comprehenisve	No
Walter Sizulu University	WSU	Comprehenisve	No
Namibia University of Science and Technology	NUST	SADC International Member Institution	No

The intent of this report was to provide a descriptive synopsis of the landscape of Science and innovation park, Business unit and TTO landscape at THENSA member institution. Currently, the report does not endeavour to critically compare the infrstaructure and activities at the said institutions, but to provide an informative source document to be utilised by the stakeholders of respective institutions in order to facilitate future collaboration and interaction.

The endeavour of THENSA is to ultimately facilitate a strategy for the coordinated and joint activities of its member universities to enable activities such as joint funding submissions, collaboration on projects and streamlining of services.

ANNEXURE 1: LIST OF CONTACT INDIVIDUALS AND OFFICES

BUSINESS UNITS:

INSTITUTION	DESIGNATION	NAME OF COMPANY	TITLE, NAME AND SURNAME	E-MAIL ADDRESS	OFFICE NUMBER	CELL NR
TUT	Director/ CEO	TUT Business School	Kobus Jonker	JonkerJA@tut.ac.za	012-382-3004	082-373-6647
	Personal Assistant		Ms Evodia Motedi	MotediEM@tut.ac.za	012-382-3004	
MUT	Director/ CEO	Technology Station in Chemicals	Mr Charles Jiyane	charles@mut.ac.za	031-819-9305	078-265-0956
	Personal Assistant					
CPUT	Director/ CEO	Technology Transfer Office	Dr Revel Iyer	iyerr@cput.ac.za	021-959-6431	
	Personal Assistant		Karen Martin	martink@cput.ac.za	021-959-6044	
	Director/ CEO	Aonyx Holdings	Dr Revel Iyer	iyerr@cput.ac.za	021-959-6431	
	Personal Assistant		Wendy Smidt	smidtw@cput.ac.za		
DUT	Director/ CEO	Enterprise Development Unit	Dr Colin Thakur	thakur@dut.ac.za	031-373-6438	083 787 6991
	Personal Assistant			sudhika04@gmail.com	072-428-5386	
	Director/ CEO	Business Studies Unit	Prof F. Netswera	fulufhelon@dut.ac.za	081-541-4082	
	Personal Assistant			-		
CUT	Director/ CEO	Central University of Technology Innovation Services (CUTis)	Mr. Gcobane Quvile	GQuvile@cut.ac.za	051-507-4088	078-517-1265
	Personal Assistant		Ms Mookhoane Moremoholo	mmoremohomo@cut.ac.za	051-507-3578	071-299-2358
UNIVEN	Director/ CEO	University Income Generation Company (UIGC)	Dr. John Mudau	john.mudau@univen.ac.za	015-962-8761	084-606-8784

SCIENCE PARKS:

INSTITUTION	DESIGNATION	NAME OF COMPANY	TITLE, NAME AND SURNAME	E-MAIL ADDRESS	OFFICE NUMBER	CELL NR
DUT	Director/ CEO	DUT Entrepreneurial Desks & Centers	Prof S Moyo	dvcrie@dut.ac.za	031-373-2576/3607	083-789-9465
	Personal Assistant		Ms Nosipho Dube	nosiphod@dut.ac.za	031-373-3607	081-585-5619
VUT	Director/ CEO	VUT Southern Gauteng Science and Technology Park	Hendrik van der Merwe	hendrikv2@vut.ac.za	016-930-5012	071-386-1262
	Personal Assistant		Evette Theron	evettet@vut.ac.za	016-930-5305	083-631-9575