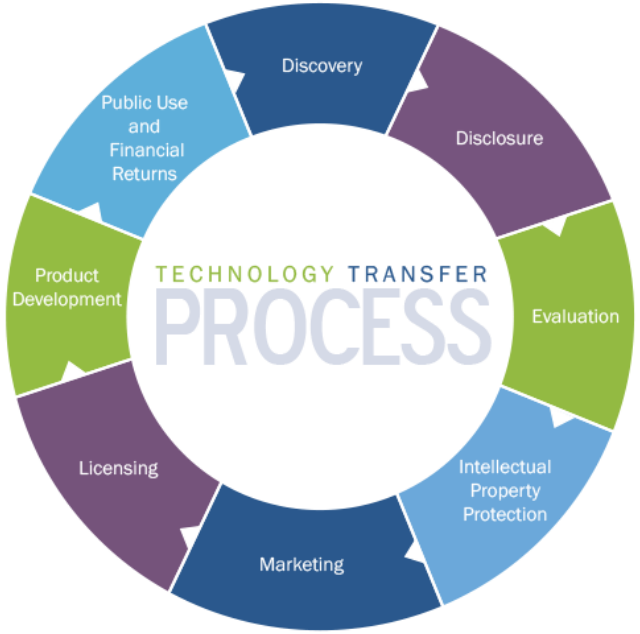
The Making of an Entrepreneurial University: Repositioning Rivers State University (RSU) for Excellence, Creativity & Innovation



RSU Easter Retreat 2026

Joseph A. Ajienka, *FNIPetE, FNSE, FAEng*

Emeritus Professor/Emmanuel Egbogah Chair of Petroleum Engineering

University of Port Harcourt

University Research

Every year some university research yield discoveries with commercial potential. Technology transfer professionals associated with universities and other academic institutions manage the complex process of shepherding ideas from the lab to the marketplace — from evaluating and protecting discoveries to commercializing the inventions through new and existing companies

AUTM

Challenge: How do we train Technology Transfer Professionals?

RSU: What is our Intellectual Capital Portfolio and Impact?

- ✓ New Discoveries, IP/Invention Disclosures
- ✓ Patents and Royalties
- ✓ New Products: New Technologies, Processes, Policies, Software Applications, Goods and Services
- ✓ Licences and Income Generated?
- ✓ New Start-ups/Spin-Off Companies
- ✓ Jobs created?
- ✓ Wealth generated?
- ✓ Contribution to regional, national and global development?
- ✓ Contribution to GDP?
- ✓ Recognitions & Awards etc

- What are we known for among our peers

in academics and industry? Nationally and Globally?

Vital Questions

- ✓ What Role Model Universities?
- ✓ What profiles of National and Global Ranking of RSU?
- ✓ What Research Architecture, Structure
- ✓ Any Science/Technology Park ?
- ✓ Research Strategic Plan, Policies, Programmes
- ✓ How Many Research Groups, Centres, Labs?
- ✓ Digital Assets: Websites; Social Media Handles for University, Institutes/Centres. Labs/Profs
- ✓ Ranking Profiles (Historical Plots of Different Ranking Bodies)
- ✓ Labs (ISO Certifications)
- ✓ Teaching Labs/Research Labs
- ✓ Library Collections/ Museums
- ✓ Interdisciplinary Research Collaborations & Partnerships: Research Divisions like CalTech?
- ✓ Any Post-Doc Research programme?
- ✓ Are all Lecturers and Graduate Students registered with SCOPUS, Google Scholar, Research Gate to improve international Visibility?

Agenda for Making RSU an Entrepreneurial University

- Architecture of R&D Function (GRICE)
- Foundation, Substructure, Structure
- Pillars
- The Upbuilding
- Infrastructure
- People, Policies, Programmes, Projects
- Culture of Academic Entrepreneurship
- Case Studies

GRICE: Grantsmanship, Research, Innovation, Commercialisation, Entrepreneurship

INNOVATION IS KEY

It is all about Strategic Transformation

Research is the transformation of

Money into Knowledge

Innovation is the transformation of

Knowledge into MONEY!

Also, VALUES (with High RoI)

Money to Fund Research

- Personal (self-funded students)
- Sponsor-funded
- Grantsmanship

So why stop after the research

And not go down the Innovation Value Chain?

21st Century University Mission

Up till today some Nigerian Professors have not accepted the Change to the 3rd Mission: They argue for and against 'Publish or Perish' or Patent, Publish and Produce

Teaching

1st Mission

University Advancement

*Strategies for **Fund Raising** for Implementation of Strategic Plan*

Community Service through

The Other Missions

Impact measured through ICE Ecosystem and contribution to SDGs

New University Mandate

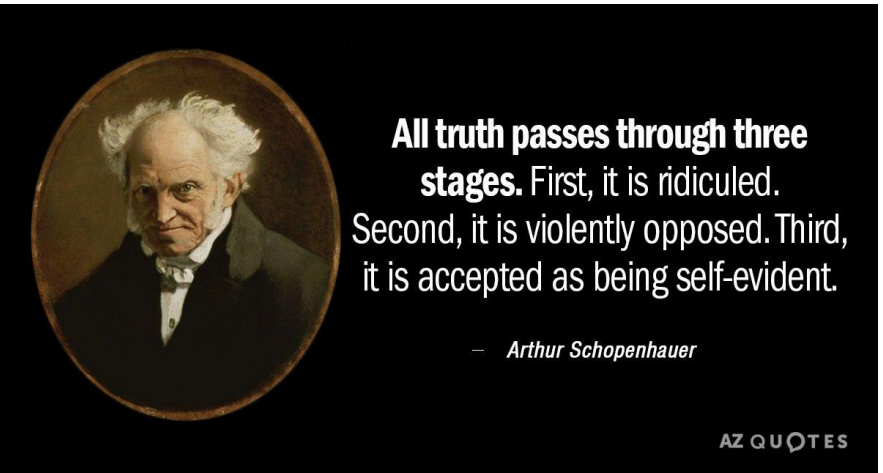
Innovation

Commercialization

Entrepreneurship

3rd Mission

2nd Revolution



Research

2nd Mission

1st Revolution

Research: Second Mission

- Critical for Academic Progression (± 70%)
- Major Factor in Global University Ranking
- Foundation for Knowledge and Technology Transfer; Basis for ICE

Evolution of University Mission: Adopt the 3rd Mission

	Mission	Outcomes/Products
1	Teaching & Learning	Quality Human Capital
2	Research (1st Academic Revolution) =.=.=.=.=.=.=. Innovation, Invention	New Discoveries of Knowledge =.= Patents; Innovation Products such new technologies, software applications, processes, policies, Programmes for Knowledge & Technology Transfer
3	Academic Entrepreneurship (2nd Academic Revolution)	Licenses, Start-ups/Spin-offs, Products to market, Royalties; (Development of ICE Ecosystem)
	IMPACT: Community Service/ Engagement	Job Creation Wealth Creation Sustainable Development !!!

- ✓To fund the University Mission and Secure the Future requires Funding from different Sources:
- ✓ Academic Entrepreneurship
- ✓ **University Advancement**
- ✓Comprehensive Fundraising Strategies through Staff and Students, Parents, Stakeholders, Friends of the University (Corporate and individuals); Philantropic organisations; Foundations

But the Argument rages: to Change or not to Change!!!

African Professors must stop counting publications — And start building nations
A Call to African Professors
Dear Professors, Africa needs you more than ever — not as lecturers of theories, but as inventors of hope……..

Publications alone cannot feed nations, generate jobs, or solve our pressing problems. The world does not remember who published the most — it remembers who invented the most.

Stop counting your publications. Start counting your inventions. Let your laboratories speak louder than your citations. For in the end, a continent is not built by those who publish the most, but by those who create the most.

By **Dr Isaac Yae Asiedu**

Professors Must Uphold the True Mandate of Universities not Become Industrial Entrepreneurs
Rejoinder **by O. Fasanu**

The argument that African professors should abandon academic publishing to focus on inventions and commercialization, as proposed by Dr. Isaac Yae Asiedu, may sound revolutionary but is institutionally flawed. It ignores the established mandate of universities, the division of responsibilities within national research systems, and the strategic importance of scholarly publication in scientific advancement…..
the three core mandates of universities are:
1. Teaching and Learning to produce skilled graduates for various sectors;
2. Research to expand knowledge through systematic investigation;
3. Community Service to apply expertise for societal benefit .
Nowhere in these mandates is there an expectation that universities should manufacture products or commercialize research outputs independently. Such activities are typically the responsibility of sectoral research and development agencies under the Federal Ministry of Science, Technology and Innovation (FMSTI) and other specialized parastatals

North Carolina State Uni IP Annual Report 2012

(After Essien, NUC Abuja, Retreat July, 2013)

No	Item	Quantity
1	Patent Issued	806
2	Patent Pending	248
3	IP Disclosure	3,450
4	Products To Market	230
5	Startup Companies	100
6	Jobs Created	6,800
7	Jobs Created In North Carolina Only	320
8	Royalty	$1.5 Bln.
Source	Office of Technology Licensing (OTL)	

What a great Loss of IPR in 5 years with over 700 PhD graduates? vs North Carolina University in one year

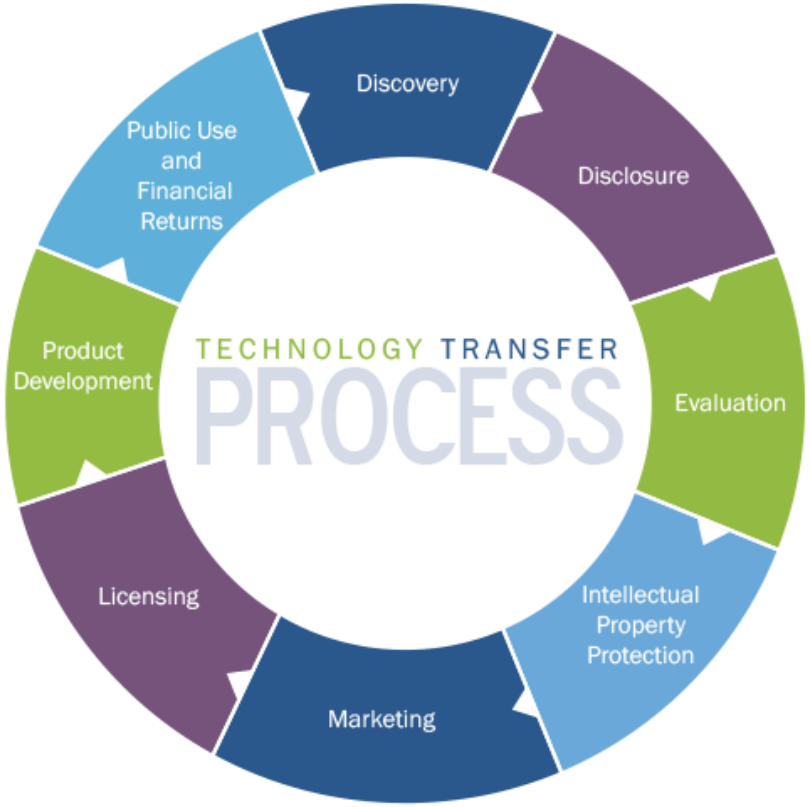
UniPort Technology Transfer METRICS FY10-FY15 (From IPPTO)

Higher Degree	*2013/ 2014*	*2011/ 2012*	*2010/ 2011*	*2009/ 2010*	*Total*
Conv.	***30th***	*29th*	*28th*	*27th*	
Masters	*2616*	*734*	*532*	*634*	*4516*
PhD	*441*	*149*	*98*	*79*	*767***

TT Metrics	*2010-2015*
IP Disc.	**ND
Patents	*+6*
Royalties	*ND*
Licenses	1
Spin-Offs/ Spin-ins*	2
Jobs created	+10

**DataCentre, Academy Colours*

From Research to Academic Entrepreneurship
From Ideas to Impact; Publications to Portfolio



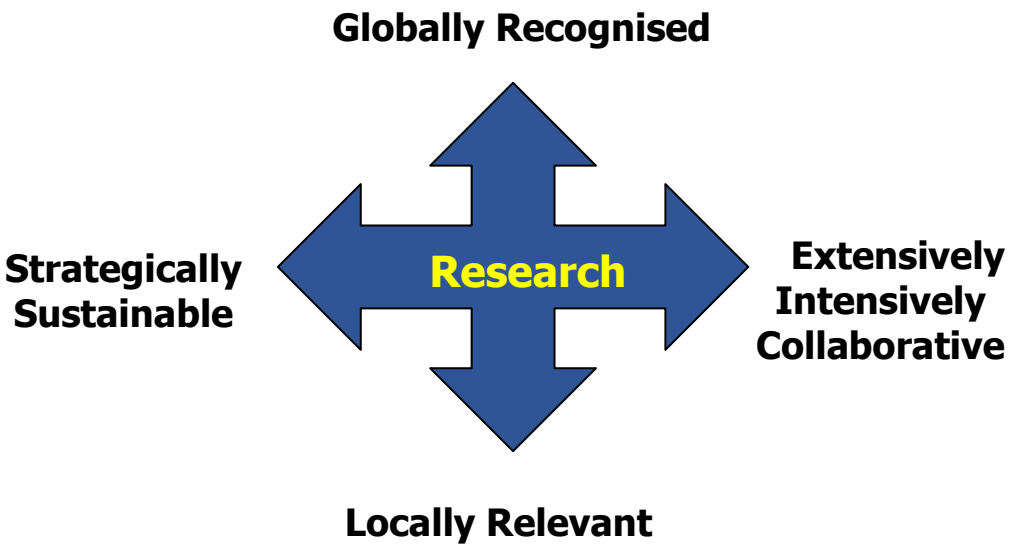
Publication of UPTH source of Product by a Chinese Company

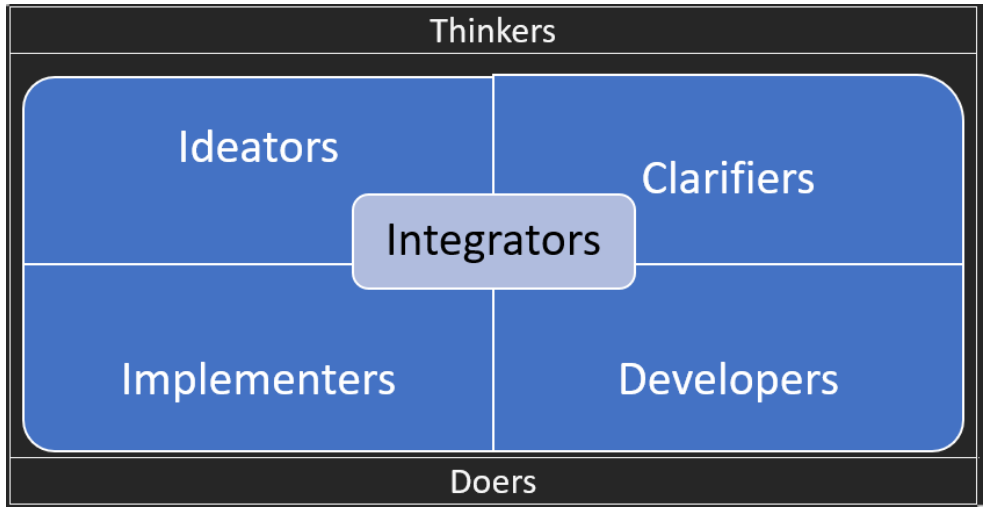
The Wealth of Higher Education Institutions to be explored and exploited but we are making ourselves intellectual slaves to Journals and Companies behind them

(Video of a young scholar who published)

PCC, Startup of Chemical Engineering Department of Tianying University now International Chemical Company

Impactful Research, Heart of Innovation Culture: Four Fundamental Characteristics





- **Globally recognised:** addresses global challenges; published and known worldwide and impactful beyond borders; competitive in attracting grants; balanced in diversity of funding sources, RAE/REF Ranking, UK; NSF Ranking South Africa
- **Locally relevant:** focuses on local challenges and contributes to widest public good; of peoples, governments, industries and organisations
- **Strategically Sustainable:** Contributes to sustainable development of present and future generations in time and space; socially, environmentally, economically and culturally. In tune with Nature! Going Green!!
- **Extensively & Intensively Collaborative:** through internal and external collaborations and partnerships across disciplines, institutions , industries and countries; Spirit of collaboration drives innovation; SDG 17

Interdisciplinary !! Collaboration, Basis of Triple Helix !!

Impactful Research Team based on Gerard Puccio's Thinking Preferences: Professors/Scholars; Adolescent Researchers; Post Doc Fellows; Technologists (hands-on); Data analysts (era of Big Data Analytics)

Caltech: Research Divisions (Basic + Applied) e.g. Faculty of Agriculture with Agric Engineering; Stanford Unicorns; UniPort (Amitech Startup)

Change the Paradigm: From 'Publish or Perish' to 'Patent, Publish and Produce!'

Patents
(Intellectual Property (IP) Assets)

Publications
(*Journal Articles, Books, Book Chapters, Monographs, Reviews, Conference Proceedings, Field Operations Manuals)*

Research Outcomes

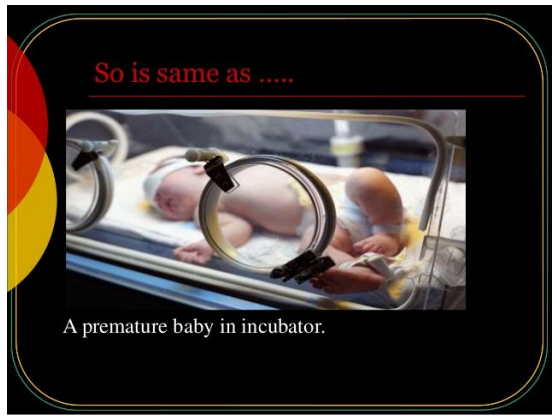
Prosper(Impact)
(Licenses, Startups, Commercialisation, Entrepreneurship; Recognitions; Grants Upfront for Research)

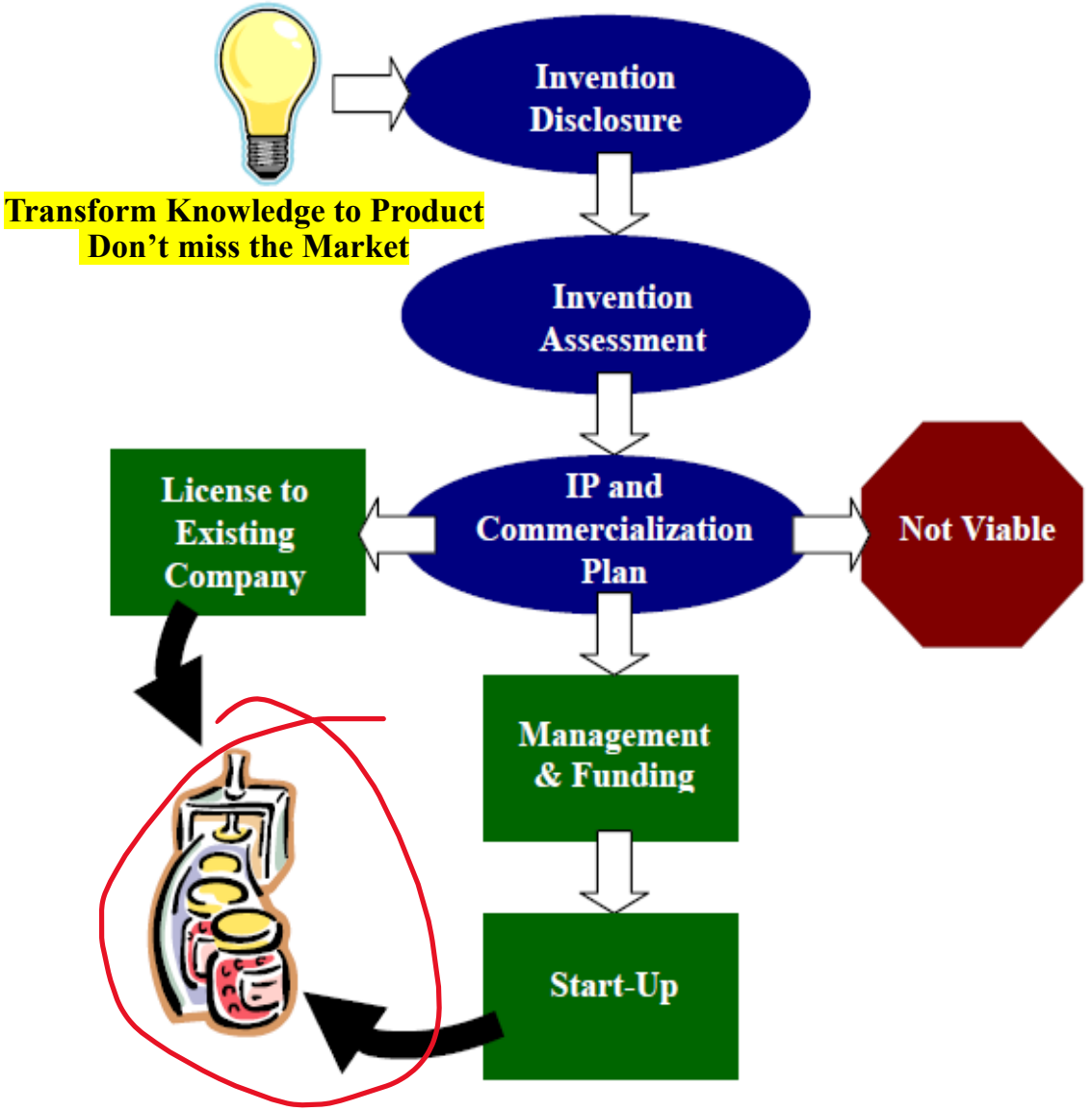
Products
(technologies, software applications, goods, designs and services+)

Policies**
(Policy White Papers on Practices, Procedures, Programmes, Projects)


CERT. No:

FEDERAL REPUBLIC OF NIGERIA
Certificate of Registration of Patent
(Patents and Designs Act; CAP 344 Laws of the Federation of Nigeria 1990)





(ref: University of Purdue Technology Transfer Office; www.prf.org/otc)

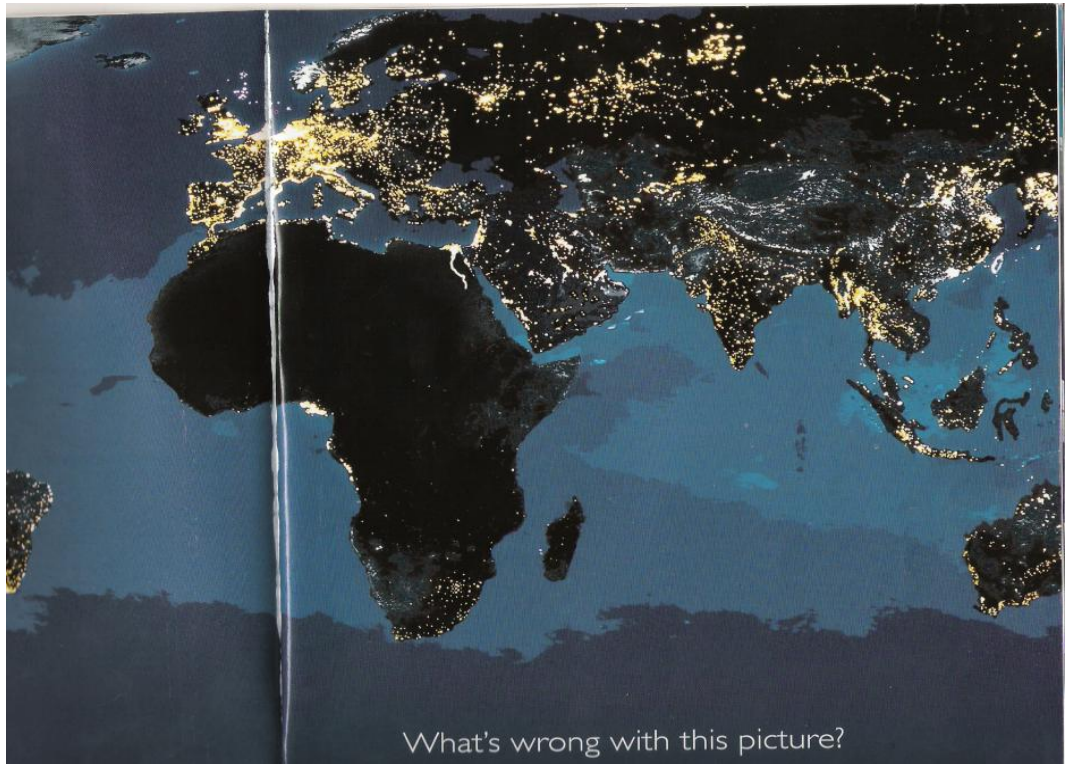
Ajienka 2018 Egbogah UI Lecture, The Wealth of Universities

Sources of Revenue segregated according to the Mission of Universities

Mission/ Streams of Income	Sources of Revenue								
Top-ranked Entrepreneurial Universities	1 Fees	2 Auxiliary Services	3 Research Contracts	4 Consultancies	5 Funding Council/ Bodies	6 Health Services	7 Tech/ Science Park	8 Advancement/ Foundation	9 Other services and sources
1) Teaching (1st Stream)	✓	✓			✓	✓			✓
2) Research (2nd Stream)			✓	✓					✓
3) Entrepreneurship (3rd Stream)				✓			✓		
4) Community Service (4th Stream)	✓	✓				✓		✓	✓

Percent Revenue from Key Sources (from Annual Reports of the Universities)

Classification of Entrepreneurial Universities	Examples of Universities (Year of Annual Report)	R &D ++	Advancement (Endowment/ Investment/ Interests)	Funding Council/ Bodies	Medical Services	Net Academic Fees & support services	Other services and sources
Tech Universities	Imperial College of Sc. & Tech (2013)	40.2	1.6	20.6	0	22.3	15.3
	Georgia Tech, 2016	49.6	1.6	16.55	0	22.3	9.94
	MIT (2016) 3 Research. Facilities	50	26	0	0	13	11
	CalTech, (2016)	45.6	39	0	0	5.9	9.5
Universities with Medical Colleges and Hospitals	University of California San Diego (2015/16)	21	7	8	36	15	13
	University of Washington (2016)	27	8	9	29	19	8
	Cornell (2016)	17	8.6	4	28	26.5	16.5
	John Hopkins (2016)	55.7	11.0	0	12.0	12.8	9.5
All-Purpose Universities	Harvard, (2016) (Endowment grows 7% per annum exceeding investment revenue)	17	45	0	0	21	17
	Oxford (2013/14) est.	36	4	20	0	23	17
	Cambridge (2016)	26.1	11.8	10.7	0	14.6	36.8**
	Stanford University (2016)	28	33*		17	11	10
	Carnegie Mellon (2016)	33.3	10.8	0	0	41.7	14.2
	NW University (2016)	29.6	24.7	0	0	35.2	10.5
Public Funded Universities	UCL (2016)	39	3	14	0	31	13
	ETH (2016)	18.3	4.8	73	0	1.2	2.7
		R&D	Advancement	Funding Council	Medical	Fees	Others



The World At Night

From the pictures, Africa is seen to be in almost total darkness.

At night, there is little or no productivity in Africa.

Crime wave may be on the increase according to police reports.

The pictures support the data for the world indices for poverty level.

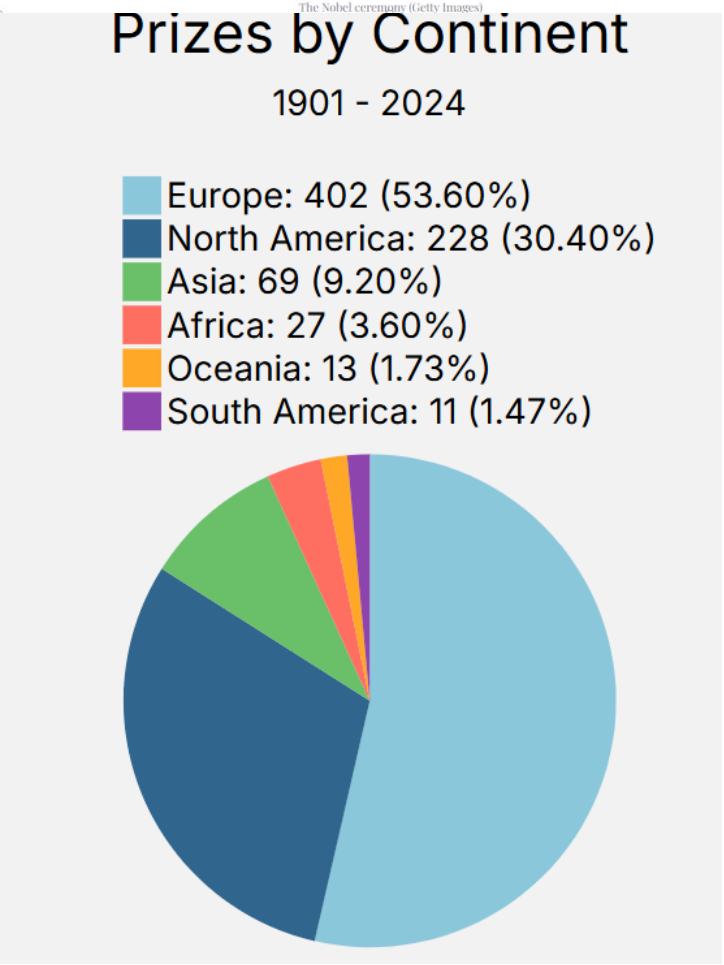
The Best HEIs, Nobel Prize Winners and Billionaires are where the lights are.

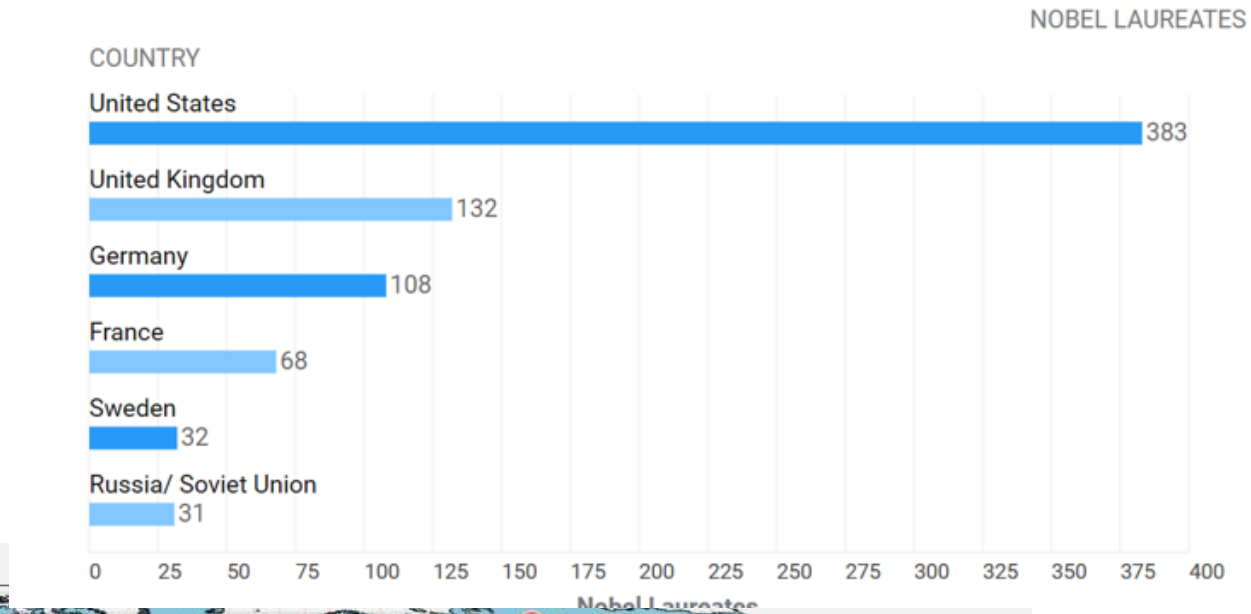
Nollywood, 3rd globally!!!

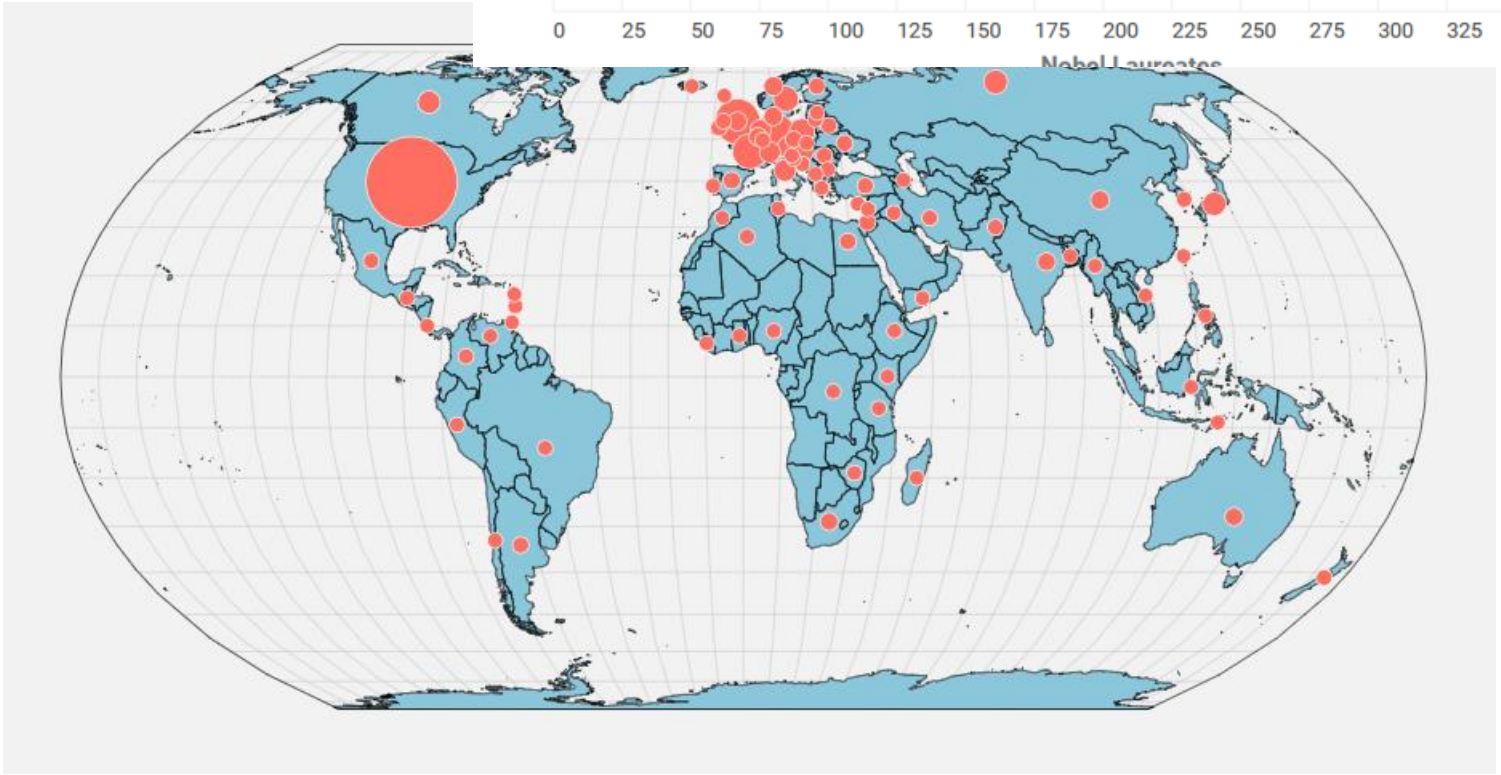
Let us light up Africa and contribute to SD through R &D, ESD, Triple Helix Plus+

Legacy of the Nobel Prize

The Nobel ceremony (Getty Images)





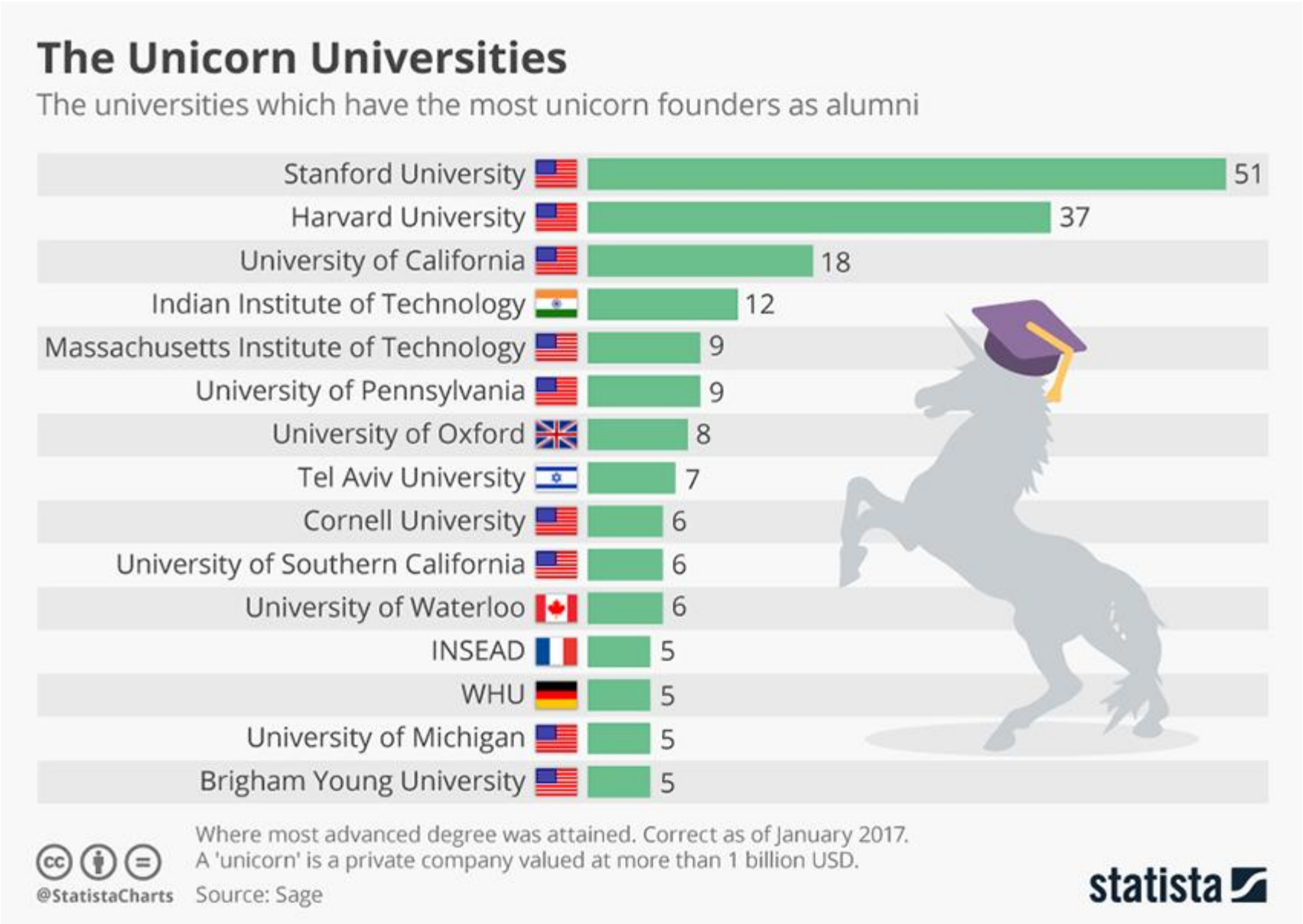


The Top Universities of the World[1]

Based upon Nobel Prize and Fields Medal Winners' Affiliations[2]

World Rank	U.S. Rank	University	Nobel Prizes	Fields Medal Mathematics	Total
1	1	Harvard	152	18	170
2	2	Columbia	100	5	105
2		Cambridge	95	10	105
2	2	University of California, Berkeley	92	13	105
5	4	Chicago	92	10	102
6	5	MIT	87	6	93
7		Oxford	65	4	69
8	6	Stanford	60	7	67
9		Paris (The Sorbonne)	50	16	66
10	7	Yale	52	5	57
11	8	Cornell	54	1	55
11	8	Princeton	41	14	55
13	10	CalTech	37	5	42
13	11	New York University	37	4	41
15		Gottingen	40	0	40
15		Humboldt	40	0	40
17	12	Johns Hopkins	36	1	37
18		Munich	36	0	36
19		ETH Zurich	32	3	35
20		University College London	31	3	34
21	13	Pennsylvania	30	0	30
22		Manchester	25	0	25
22	14	Illinois	25	0	25
22	14	Rockefeller	25	0	25
22	14	Minnesota	25	0	25
26	17	Washington University St. Louis	24	0	24
27	18	University of California, San Diego	20	3	23
28	19	Michigan	21	0	21
28		Edinburgh	21	0	21
30		Zurich	20	0	20
30	20	Wisconsin	20	0	20
30		Strasbourg	18	2	20
33	21	Carnegie Mellon			

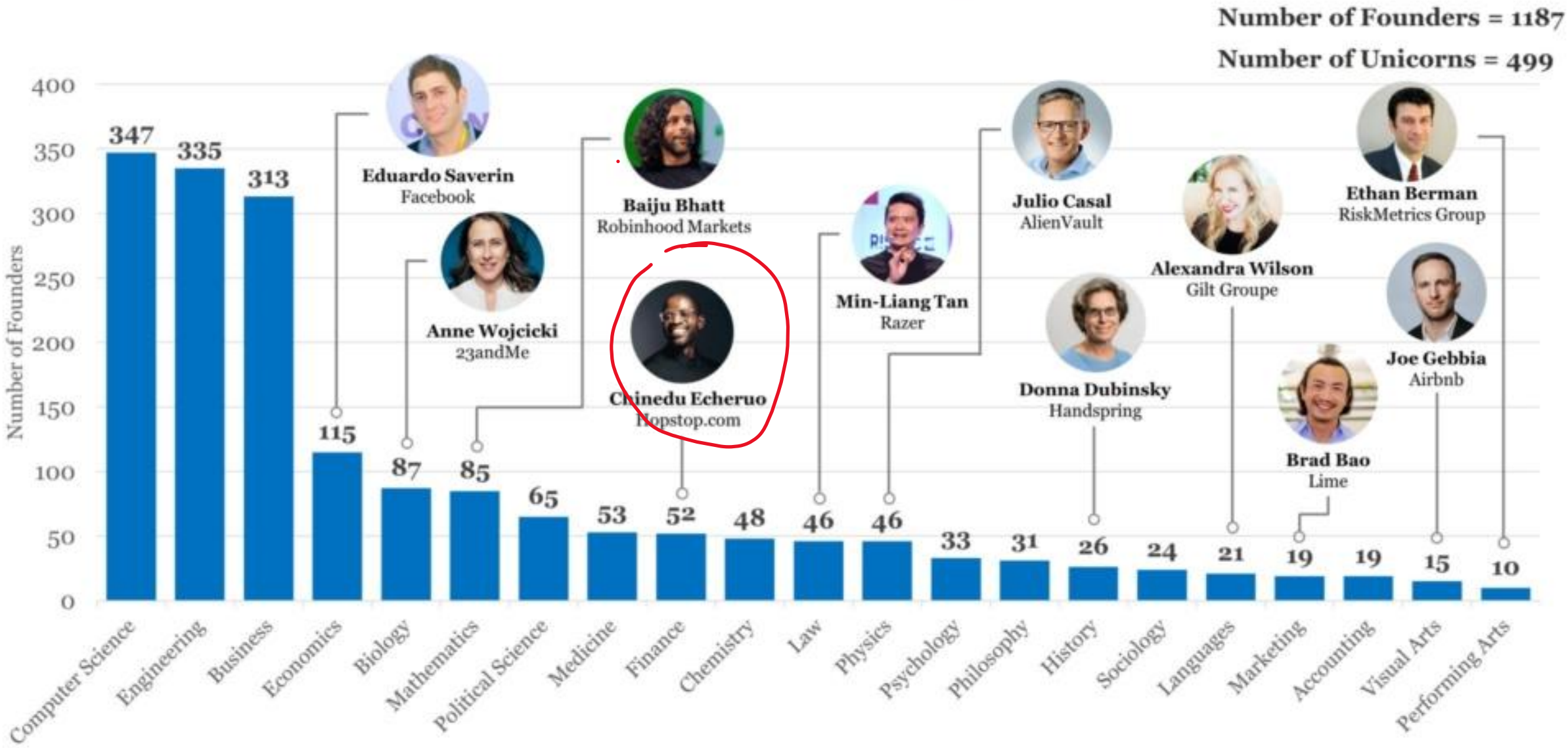
What are Unicorns?



Cambridge University has produced **12 unicorns**[1]. These are companies founded by its alumni that have reached a valuation of $1 billion or more. Additionally, there are **22 future unicorns** among its alumni-founded companies[1].

Nigeria had 3 but only one, MoniePoint, is actively in the Unicorn class

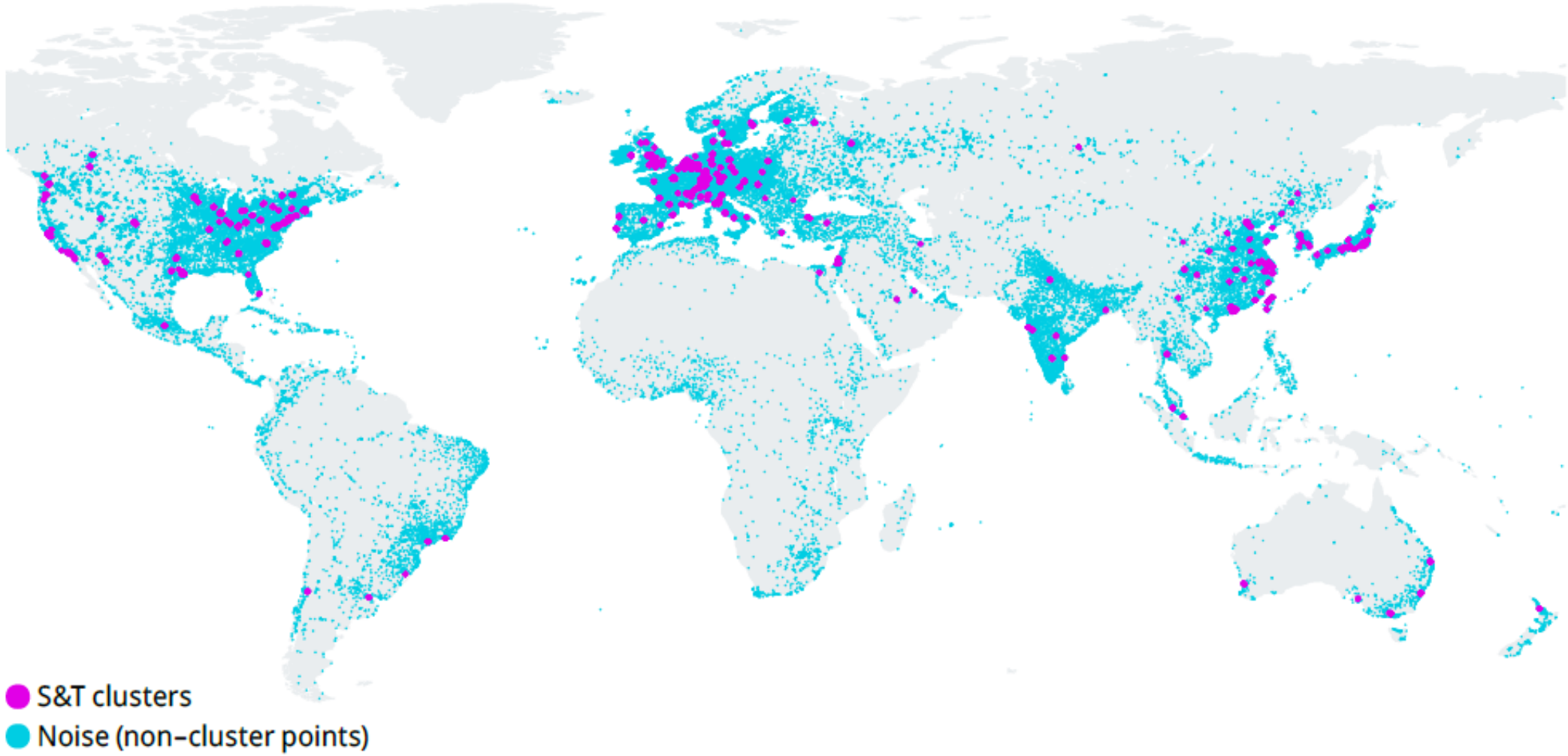
Academic Majors of Unicorn Founders



Values show the number of unicorn (co-)founders who majored in that subject either in college or in graduate school. All majors with at least 10 founders are shown. Values add up tp more than han 1,187 because many founders have more than one major. Data covers 531 US companies that became unicorns between 1997-2019.

Source: Ilya Strebulaev, Venture Capital Initiative, Stanford Graduate School of Business (12/2021)

Map 1 Top 100 clusters worldwide, 2022



Source: WIPO Statistics Database, April 2022.

Note: Noise refers to all inventor/author locations not classified in a cluster.

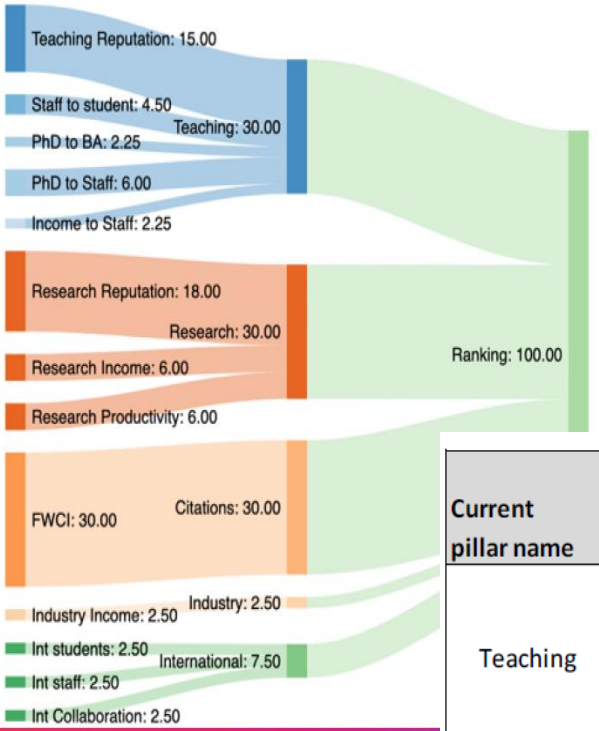
Shanghai Rankings 2020 (Statistics by Country)

Shanghai Rankings of Global Universities (2020) and Status of Indian Universities

Hardev Singh Virk* Professor of Eminence, SGGS World University, Fatehgarh Sahib (Punjab), India

Country	Top20	Top100	Top200	Top300	Top400	Top500	501-1000
United States	15	41	65	94	114	133	73
United Kingdom	3	8	20	28	34	36	29
France	1	5	8	12	16	17	13
Switzerland	1	5	7	7	7	8	1
Australia	—	7	8	15	22	23	11
China	—	6	24	38	57	81	87
China-Mainland	—	6	22	32	49	71	73
China-Hong Kong	—	—	2	4	5	5	2
China-Taiwan	—	—	—	2	3	5	10
China-Macau	—	—	—	—	—	—	2
Germany	—	4	10	19	24	30	19
Canada	—	4	9	12	18	19	9
Netherlands	—	4	9	10	10	12	1
Japan	—	3	7	8	10	14	26
Sweden	—	3	5	6	9	11	3
Belgium	—	2	4	5	7	7	1
Denmark	—	2	3	3	5	5	1
Singapore	—	2	2	2	2	2	2
Israel	—	1	4	4	4	6	1
Norway	—	1	2	2	3	3	2
Russia	—	1	1	1	2	3	8
Finland	—	1	1	1	2	3	5
Italy	—	—	3	7	10	17	29
Saudi Arabia	—	—	2	3	3	4	—
South Korea	—	—	1	6	9	11	21
Spain	—	—	1	5	9	13	27
Austria	—	—	1	3	5	7	7
Brazil	—	—	1	1	3	6	16
Portugal	—	—	1	1	2	3	3

World University Rankings Methodology



WUR 3.0

The next iteration of our methodology

Current pillar name	Proposed pillar name	Metric code	Propsed metric name	*Subject weighted*	*Scoring algorithm*	WUR 2.1 metric weight	WUR 2.1 pillar weight	WUR 3.0 metric weight	WUR 3.0 pillar weight
Teaching	Teaching	t1	Teaching reputation	*FALSE*	*exponential_65*	15.00%	30.00%	15.00%	29.50%
		t2	Student staff ratio	*FALSE*	*normal_cdf*	4.50%		4.50%	
		t3	Doctorate bachelor ratio	*FALSE*	*normal_cdf*	2.25%		2.00%	
		t4	Doctorate staff ratio	*TRUE*	*normal_cdf*	6.00%		5.50%	
		t5	Institutional income	*FALSE*	*normal_cdf*	2.25%		2.50%	
Research	Research Environment	r1	Research reputation	*FALSE*	*exponential_65*	18.00%	30.00%	18.00%	29.00%
		r2	Research income	*TRUE*	*normal_cdf*	6.00%		5.50%	
		r3	Research productivity	*TRUE*	*normal_cdf*	6.00%		5.50%	
Citations	Research Quality	c1	Citation Impact	*FALSE*	*normal_cdf*	30.00%	30.00%	0.00%	30.00%
		c2	Research strength	*FALSE*	*normal_cdf*			10.00%	
		c3	Research excellence	*TRUE*	*exponential_cdf*			10.00%	
		c4	Research influence	*TRUE*	*exponential_cdf*			10.00%	
Industry	Industry	e1	Industry income	*FALSE*	*normal_cdf*	2.50%	2.50%	2.00%	4.00%
		e2	Patents	*TRUE*	*exponential_cdf*			2.00%	
International Outlook	International Outlook	i1	International students	*FALSE*	*normal_cdf*	2.50%	7.50%	2.50%	7.50%
		i2	International staff	*FALSE*	*normal_cdf*	2.50%		2.50%	
		i3	International co-authorship	*TRUE*	*normal_cdf*	2.50%		2.50%	
		i4	Studying abroad	*FALSE*	*normal_cdf*			0.00%	
TOTAL						**100.00%**	**100.00%**	**100.00%**	**100.00%**

Key
Changed
New
Removed
Being finalised

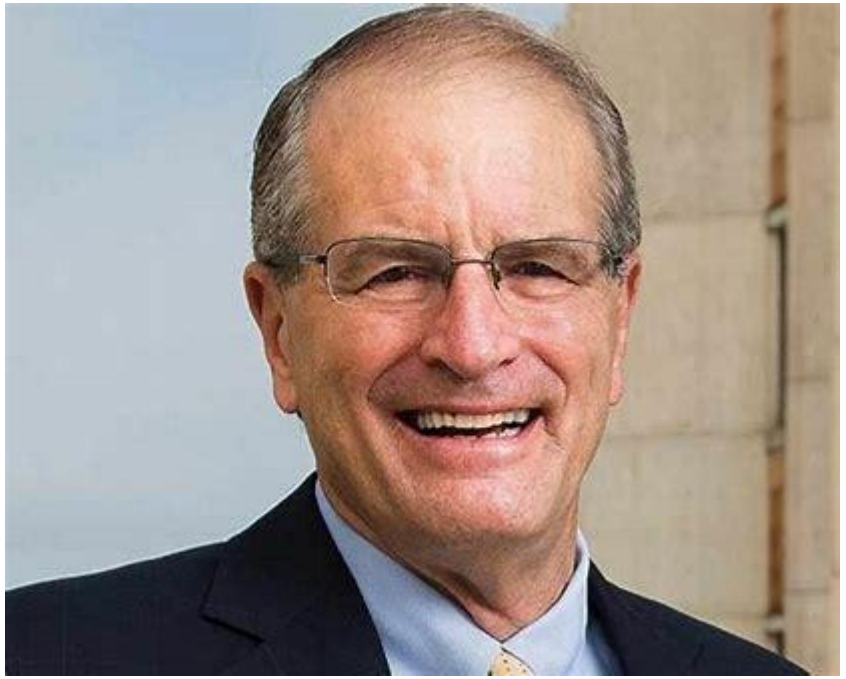
Weights shown are for the Overall subject

RESEARCH IMPACT CANADA | TURNING RESEARCH INTO ACTION

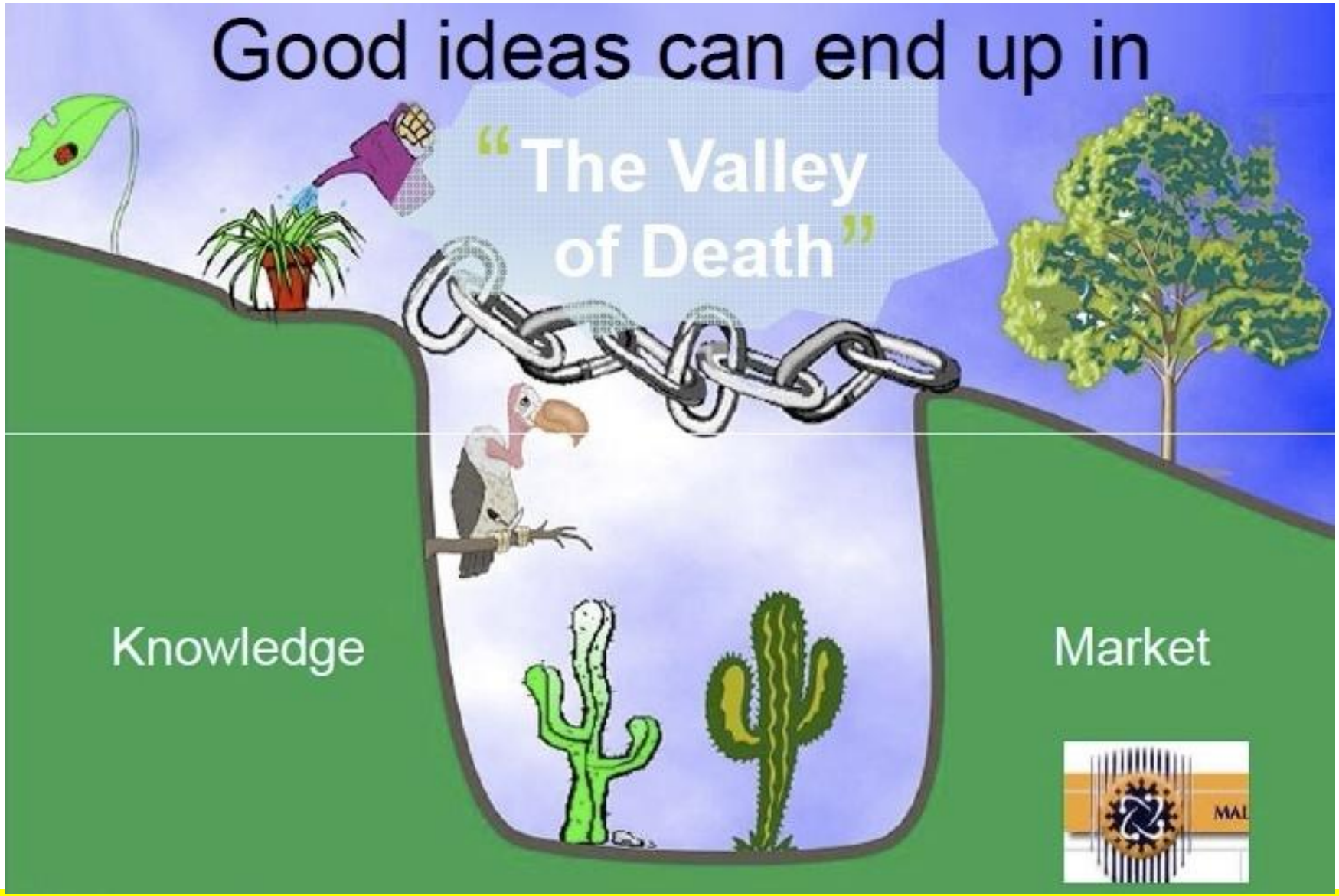
[Home - Research Impact Canada]

Research costs money. Thus, Grantsmanship training and Policy, the way forward

"What is really the calculus of Innovation? The calculus of Innovation is really simple: Knowledge drives innovation, Innovation drives productivity and Productivity drives economic growth" ***-William Ralph Brody, American Scientist***



William Ralph Brody (born January 4, 1944) is an American radiologist and academic administrator. He was the President of The Johns Hopkins University, a position which he held from 1996 to 2009 before becoming the President of the Salk Institute from 2009 to 2015



Thus, Requires Proper Entrepreneurial Education; Mentorship; Business Incubation

Entrepreneurial Education not Skills Acquisition Training

Academic Entrepreneurial is about transforming Outcomes of Research in every discipline into New Products and Services that generate Wealth and Growth Opportunities

Creativity: What can those of us in the STEM Disciplines learn from the Success of Nollywood Film industry?

Entrepreneurial University: The 3rd Mission: Transformation of Knowledge into Wealth/Values

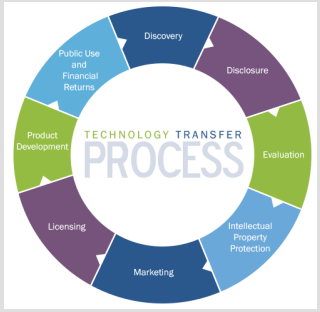
Transformation: Deliberately Guided Systemic Process

Beyond Intention, Well-determined Journey and Trajectory

Adopt 3rd Mission of University
Develop Policies and Procedures
Choose R&D Architecture, Plan
Rebuild Substructure, Structure
Determine Growth Trajectory

Implementing Transformation into Entrepreneurial University

Best Available
Resources
(Human and Material)/Finance



Implementation Management

Best Available
Tools, Techniques, Transition,
Transformation, Trajectory

Best Operating
Policies, Practices, Procedures, Plans etc.

From Research to Academic Entrepreneurship From Ideas to Impact; Publications to Portfolio

South African universities ‘generate R500bn for economy’

South Africa’s 26 public universities contributed significantly to the economy—about R500 billion (US$26bn)—in 2018, a pair of academics have argued.

Sector as profitable as gold mining or beverages and tobacco industry

UCL spinout Orchard Therapeutics to be acquired by Kyowa Kirin for $477M

Orchard was founded in 2015 through a partnership between UCL Business (UCLB), the commercialisation company for UCL, and F-Prime Capital Partners. Its revolutionary treatments are the result of decades long gene therapy research and clinical work led by UCL Professors Bobby Gaspar and Adrian Thrasher, both based at UCL Great Ormond Street Institute of Child Health.

10 Oct 2023 | Network Updates | Update from University College London

Times Higher Education today's headlines

WEDNESDAY 3 MAY 2023

Few higher education institutions inspire the same awe among academics and politicians as the Massachusetts Institute of Technology, a global powerhouse for research and spin-out companies (its offshoot companies turn over about £1.5 trillion – about 60 per cent of the UK's GDP, one report found). Today we speak to its new president about the challenges ahead, plus we profile a new report on how inequality continues to play out after graduation in the UK and look at how Labour is set to scrap a flagship policy to abolish undergraduate tuition fees in England.

– Jack Grove, reporter & deputy features editor
jack.grove@timeshighereducation.com

RSU Innovations: Key Performance Indicators (KPIs) : Innovation Metrics

S/N	KPI	Number for Current Year	Cumulative from inception
1	Research Grant received (Million Naira)		
2	Contract Research (Million Naira)		
3	Number Companies/Agencies sponsoring research		
4	Intellectual Property Disclosures		
5	Patents Issued		
6	Patents Pending		
7	Start-up Companies started		
8	Spin-off Companies		
9	Products to Market		
10	Licenses issued		
11	Jobs Created		
12	Royalty earned (Million Naira)		

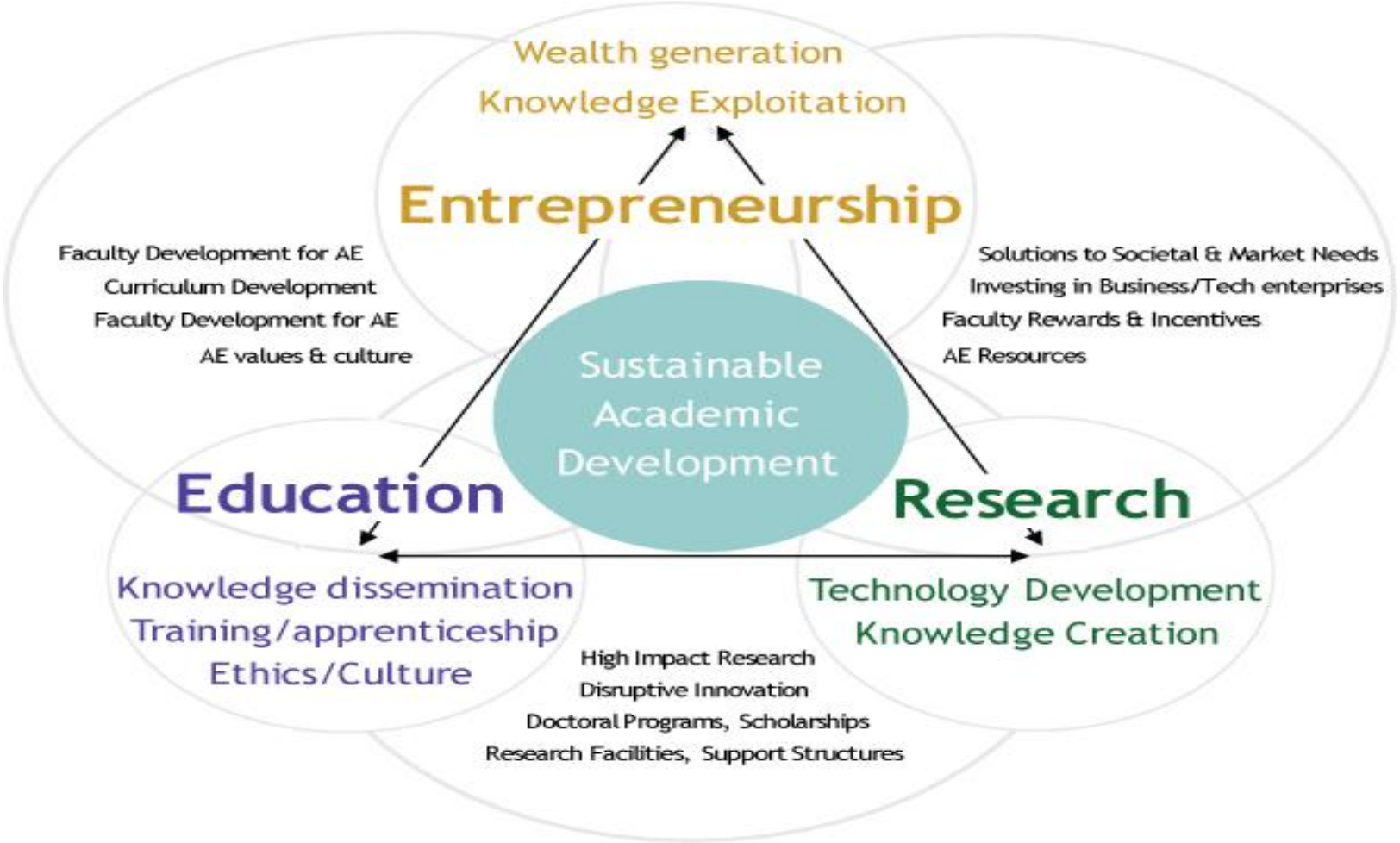
RSU Creatives: Key Performance Indicators (KPIs)

S/N	KPI	Number for Current Year	Cumulative from inception
1	Documentaries: Creative and Cultural		
2	Conferences & Exhibitions		
3	Productions		
4	Intellectual Property Disclosures- Creatives		
5	Copyrights Issued		
6	Copyrights Pending		
7	Creative Start-ups started		
8	Creative Spin-off Companies		
9	Creative Products to Market		
10	Licenses issued		
11	Jobs Created		
12	Royalty earned (Million Naira)		

21st Key Performance Indicators (KPIs) : Strategic Collaborations & Partnerships

KPI	Number for Current Year	Remarks
National		
Academic Collaborations		
Partnerships with MDAs		
Partnerships with Industries		
Partnership with LGAs		
International		
Academic Collaborations		
Partnerships with Agencies		
Partnerships with Industries (IOCs)		

The Making of Entrepreneurial University



Academic Entrepreneurship (AE) more than **technology transfer** process.
It is a shift in academic culture that adds another dimension to higher education.

The Academic Triangle: Evolution of University Roles

Entrepreneurial University

Entrepreneurial University is a research- intensive university committed to Creativity, Innovation, Commercialization and Entrepreneurship (ICE) for sustainable development of school and society

+25% of Professors engaged in entrepreneurial activities with industry; involved in *globally recognized and locally relevant* industrial research and production , Creativity, Innovation Commercialization and Entrepreneurship (ICE)

(Henry Etzkowitz)

Professors with industry experience, known and recognised by industry in research, consultancy, technology transfer through ATWs, Short courses, Conferences, publications, patents and technology licenses.

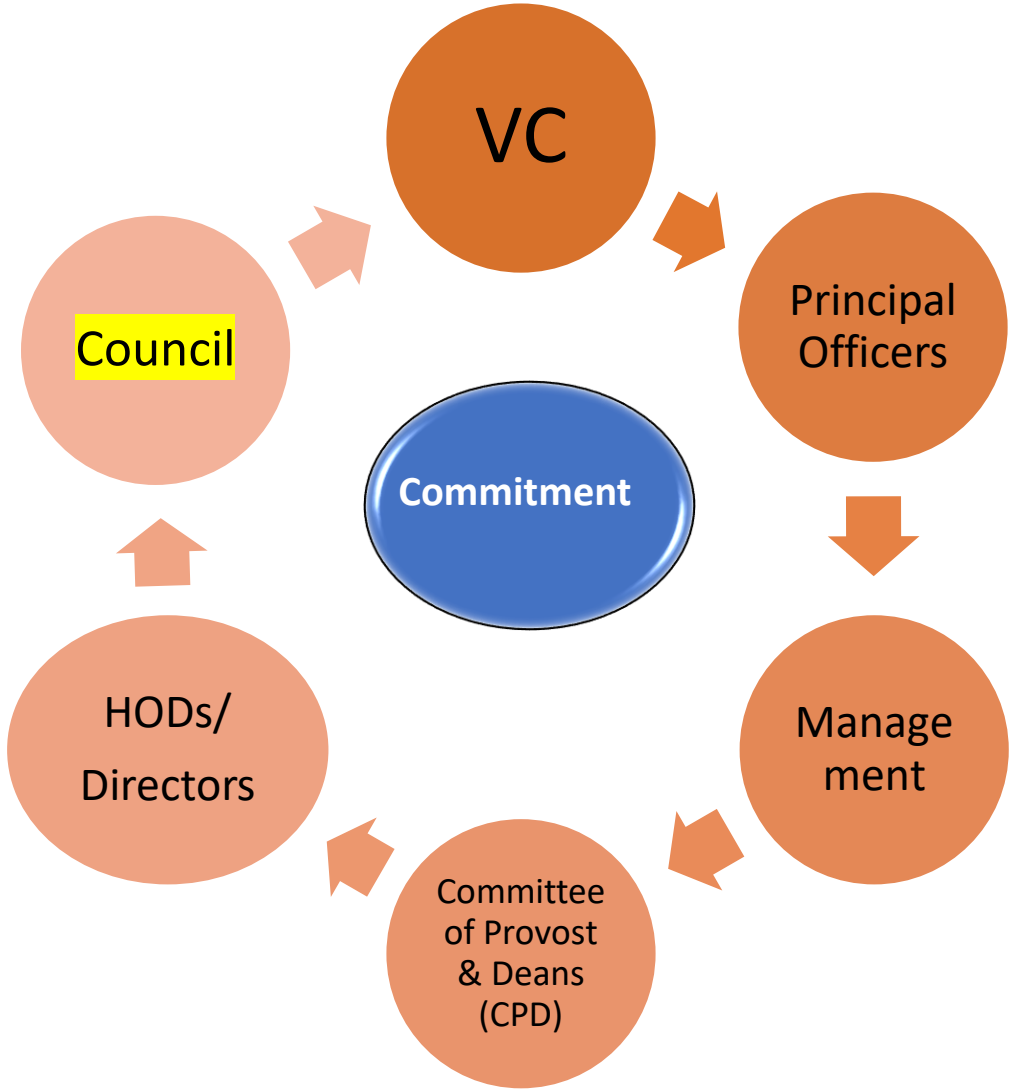
Entrepreneurial University and Key Strategic Goals

Entrepreneurial University

- New Curriculum based on UNESCOs ESD, Education 4.0
- Deepened Research Culture
- Research Policies
- People: Research Teams as Quasi SBUs
- Post-Doctoral Programme
- Infrastructure: Research Labs/Workshops ; Business Incubation; Science & Tech Park
- Strategic Plans – University, R&D, Institutes & Centres
- Well defined Key Performance Indicators (KPIs)
- Research & Innovation Management/Quality Monitoring
- Marketing & Communication
- Globally recognised and locally relevant Centres of Excellence
- Secured Future thru Advancement Mgt/UniPort Foundation
- Sustainable Development of School & Society

Entrepreneurial University

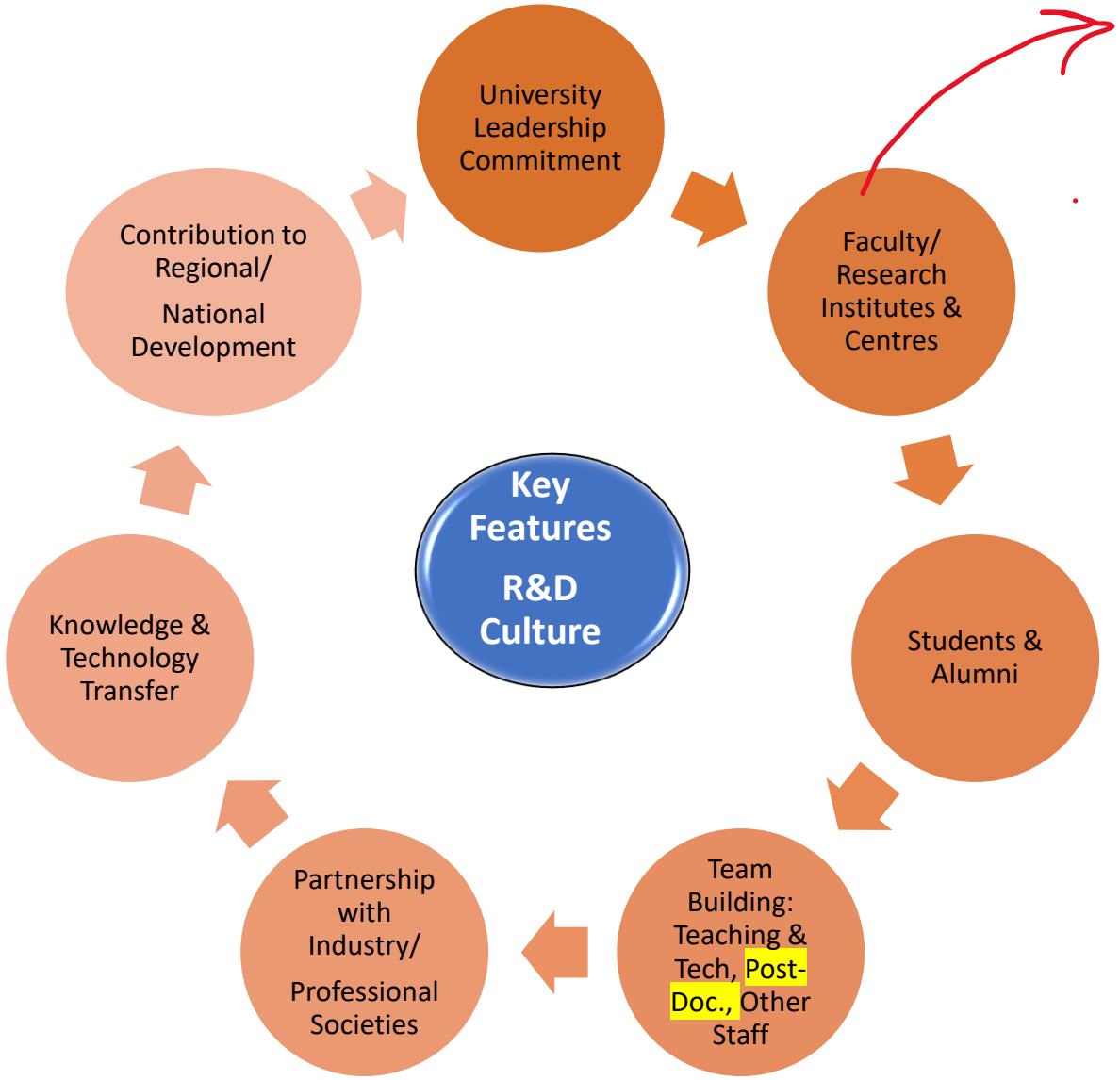
Leadership Commitment; Solid Foundation



- ✓Wind of Change in Nigeria: UniPort, UniIlorin, UI, FUTO, BUK
- ✓Strengthen College of Graduate Studies as Engine of Research headed by a Provost
- ✓UI, OAU, NSU, RSU etc

Entrepreneurial University

rooted in Creativity, Innovation, Commercialization and Entrepreneurship



Research Teams/Centres/Institutes/Labs

WITS University
Centres, Institutes, Labs, Research Groups & Networks

A - Z of Research at Wits

A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R | S | T | U | V | W | X | Y | Z

A

Accountancy Research Projects
Adult Neurogenesis Research Group
Africa Array
African Centre for Migration & Society (ACMS)
African Ecology and Conservation Biology Research Group
African Micro-Economic Research Umbrella (AMERU)
Antiviral Gene Therapy Research Unit
Artificial Intelligence and Machine Learning (AIML)

B

Biocontrol Lab
Biological Anthropology
Biomechanics Laboratory
Biomedical Engineering Research Group
Bioprocess Engineering
Brain Function Research Group (BFRG)

C

Carbohydrate and Lipid Metabolism Research Unit
Cardiovascular Pathophysiology and Genomics Research Unit
Centre for African Ecology
Centre for Applied Legal Studies (CALS)
Centre for Astrophysics

Centre for Medical and Industrial Ultrasonics, Medical and Industrial Ultrasonics (C-MIU)

Centre for Research & Development in Adult and Lifelong Learning

Chemical Photonics, Research Group

Child Health, Research Area

Childhood Leukaemia Research, Halsey Lab

China Research, Scottish Centre for

Classics, Research

COGITO Centre for Epistemology

Communications, Sensing and Imaging (CSI)

Community Oral Health, Research Group

Complex chemical systems, Cronin Group

Computing Science Education, Centre for

Conservation and Cultural Heritage Research, Kelvin , Centre for

Continuum Mechanics, Research Group

Cordero Laboratory, Research Group

Corporate & Financial Law, Research Group

Research Groups, Research Institutes, Research Centres, Research Labs Example U of Glasgow

Importance in Research Structure

The more the Professors the more the Research Groups/Centres

Some Universities have over 100

Entrepreneurial University

R&D Architecture, Foundation, Substructure, Structure

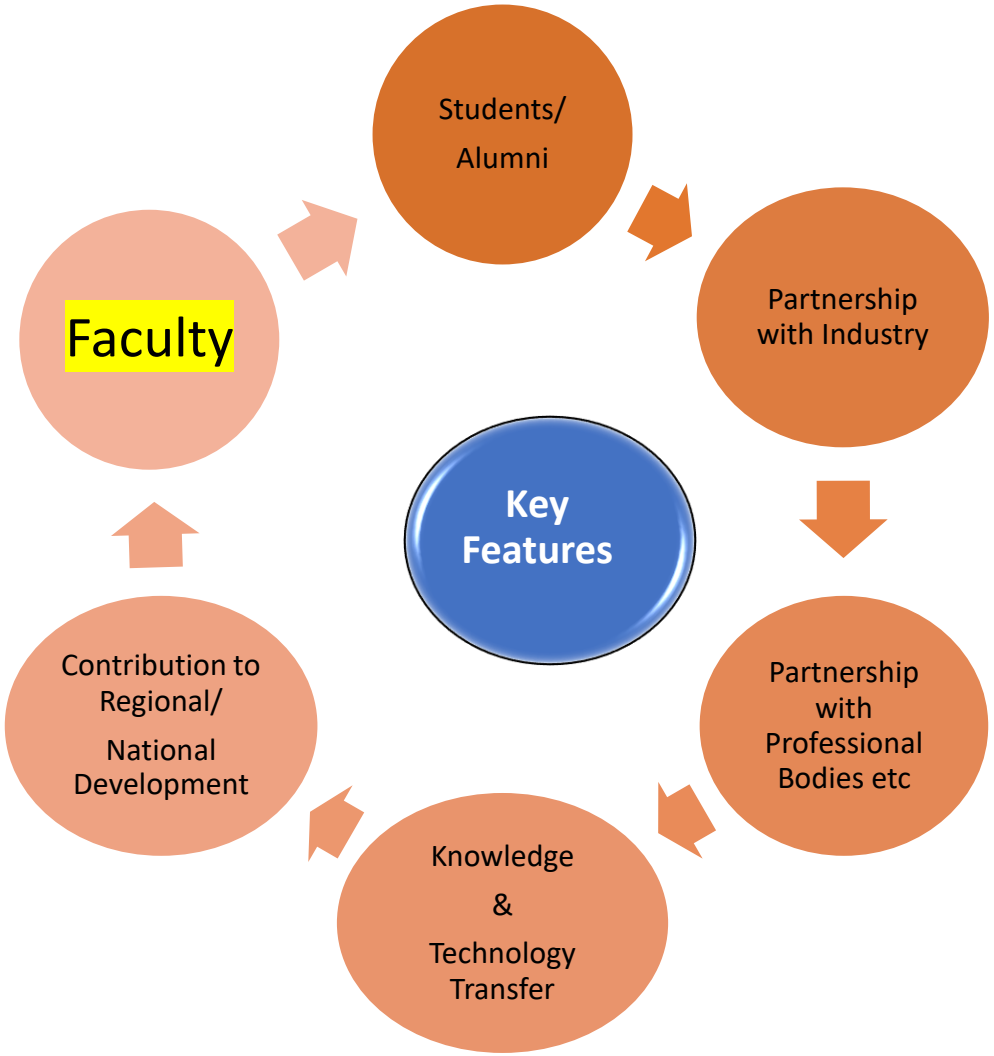
Entrepreneurial University

R&D Architecture, Foundation, Substructure, Structure

Entrepreneurial University Models

rooted in Creativity, Innovation, Commercialization and Entrepreneurship culture & ecosystem

University Strategic Plan **▪Strategic Goals** **▪Each Goal: Well defined Objectives** **▪Key Performance Indicators (KPIs)** **▪Critical Success Factors (CSFs)** **▪Implementation and Monitoring Plans**	• **University Strategic Research Plan** • **Institute or Centre-specific Strategic Plans e.g. IPS and IARD**

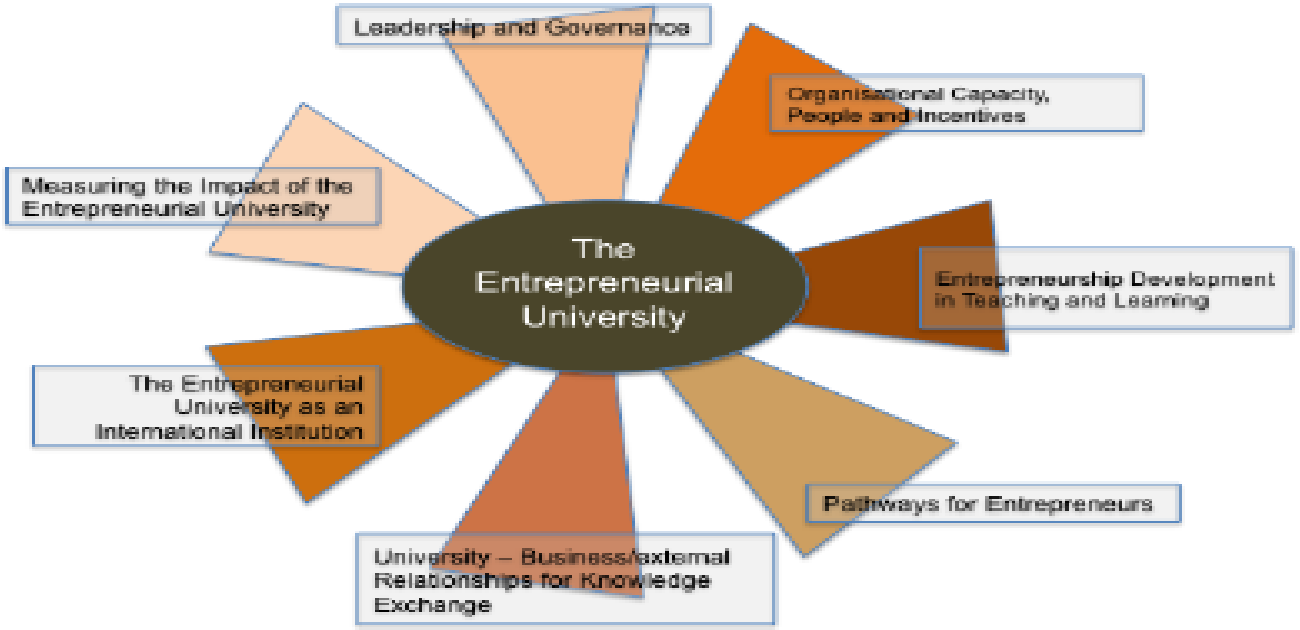


USA: Guiding Framework for Entrepreneurial Universities,

Higher Education Innovate (heinnovate.eu): A self-assessment tool

- Leadership and Governance
- Organisational Capacity: Funding, People and Incentives
- Entrepreneurial Teaching and Learning
- Preparing and Supporting Entrepreneurs
- Knowledge Exchange and Collaboration
- The Internationalised Institution
- Measuring Impact

A Guiding Framework for Entrepreneurial Universities

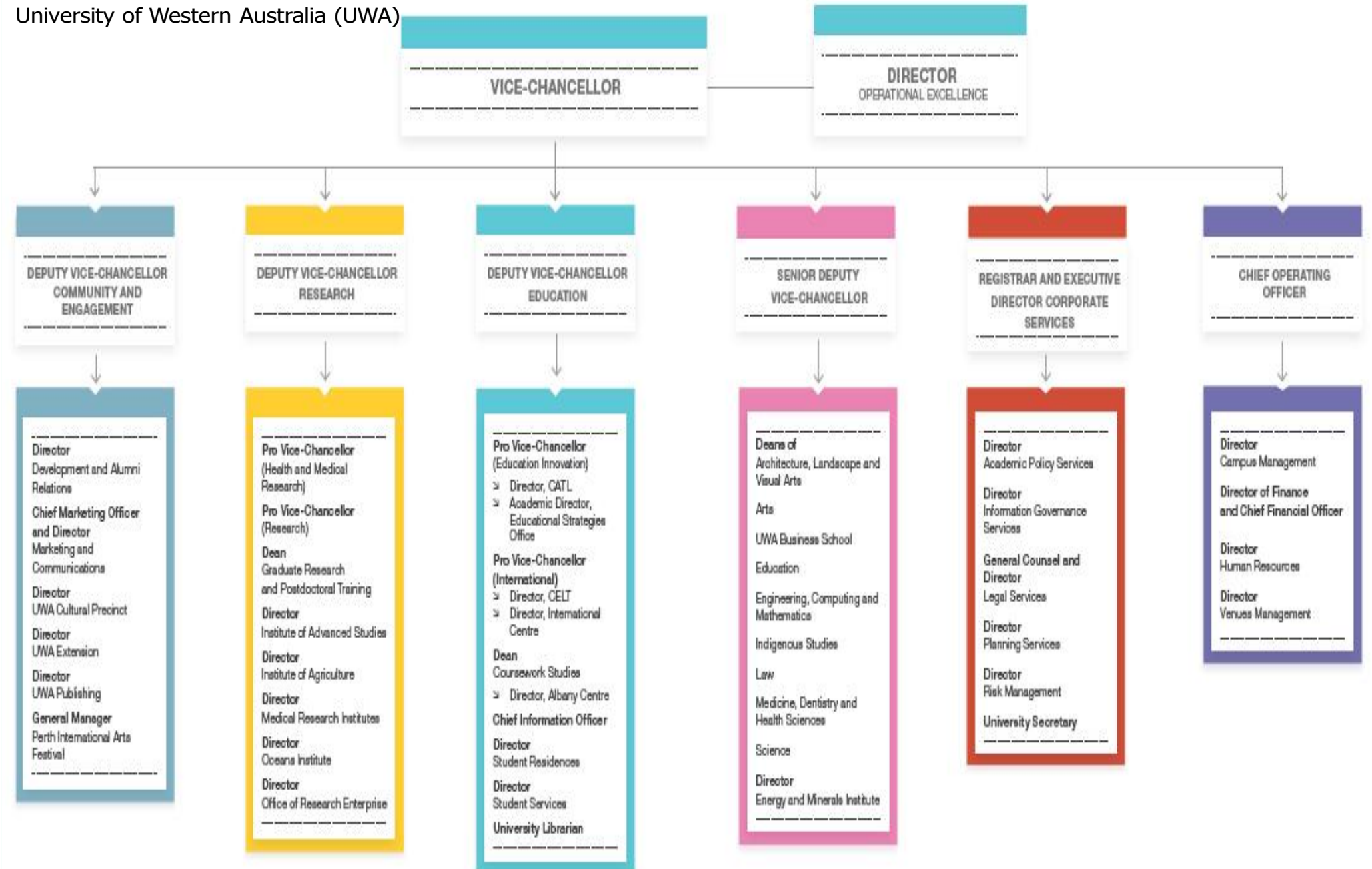


EU: A Guiding Framework for Entrepreneurial Universities,

Final version 18th December 2012

Organisational Structure/Architecture

University of Western Australia (UWA)



PENNSTATE

Senior Vice President for Research
Dean of the Graduate School
Eva J. Pell

- Assistants to the Senior Vice President
  - Virginia B. Imboden
  - Janis E. Smith

- Associate Vice President for Health Sciences Research
  Vice Dean for Research & Graduate Studies
  Chief Scientific Officer
  College of Medicine
  Alan Snyder, Interim
  - Development
    Robert J. Booz, Director
  - Financial Officer
    Carla K. Rossi
  - Human Resources
    Susan B. McWhirter, Manager
  - Office for Research Protections
    Candice A. Yekel, Director
  - Research Publications & Policy
    David A. Pacchioli, Director

- Associate Vice President for Research
  Director, Strategic Initiatives
  Coordinator, Worldwide University Network
  Peter E. Schiffer
  - Animal Resource Program
    Mary J. Kennett, Director
  - Military & Security Programs
    Ronnie R. Madrid, Director
  - Research Program Development
    Paul M. Hallacher, Director
  - Strategic Initiatives and Research Program Development
    Alicia J. Knoedler, Associate Director

- Assistant Vice President for Research
  Director, Office of Sponsored Programs
  David W. Richardson
  - Research Information Systems
    David Gindhart, Director

- Assistant Vice President for Research & Technology Transfer
  Director, Intellectual Property Office
  Ronald J. Huss
  - Ben Franklin Technology Center
    Stephen P. Brawley, Director
  - Industrial Research Office
    Tanna Pugh, Director
  - Innovation Park & Research Commercialization
    Daniel R. Leri, Director

- Interdisciplinary Consortia/Institutes
  - Director, Institute for the Arts & Humanities
    Marica S. Tacconi
  - Director, Penn State Institutes of Energy and the Environment
    Thomas L. Richard
    - Director, Huck Institutes of the Life Sciences
      Peter J. Hudson
    - Director, Materials Research Institute
      Carlo G. Pantano
    - Director, Social Science Research Institute
      Director, Children, Youth, & Families Consortium
      Susan M. McHale
    - Director, Institute for CyberScience
      Padma Raghavan

- Defense-Related Research Units
  Edward G. Liszka, Director
  - Director, Applied Research Laboratory
    Edward G. Liszka
  - Director, Electro-Optics Center
    Karl A. Harris

■ Service
■ Research

July 2008

Case Studies

The Economic Impact of the University of Cambridge

Final Report

LE London Economics

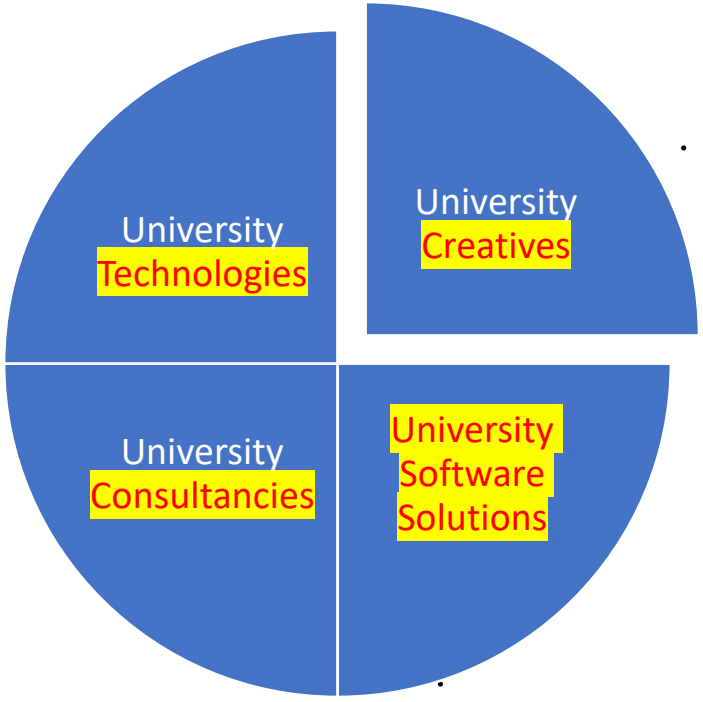
March 2023

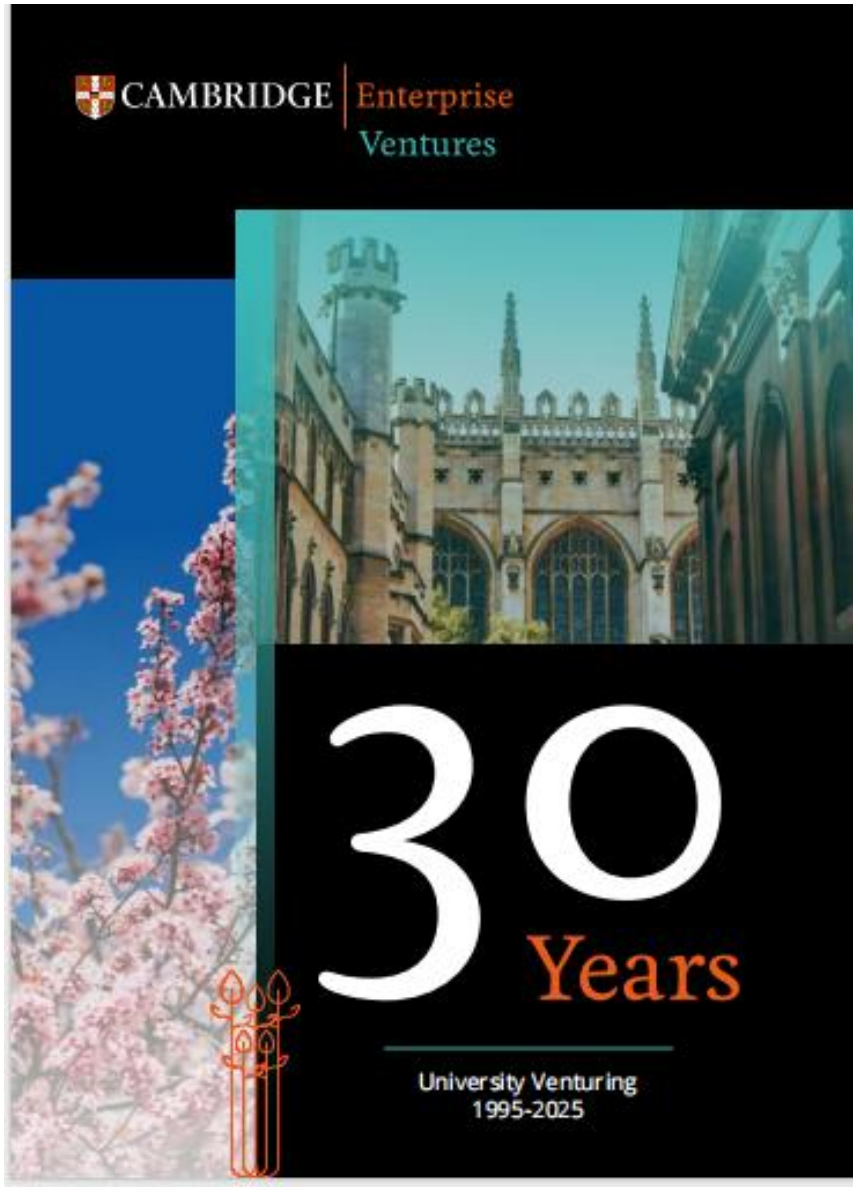
The main findings are:

- **The University's net total economic impact on the UK economy is nearly £30 billion annually.** It supports more than 86,000 jobs across the UK, including 52,000 in the East of England. For every £1 we spend, we create £11.70 of economic impact, and for every £1 million of publicly funded research income we receive, we generate £12.65 million in economic impact across the UK. The University's contribution to the UK economy is almost four times that of the Premier League[2].
- **Cambridge is the most successful cluster and local ecosystem in the UK. Just over £23 billion (78%) of our economic impact is generated by the companies spun out from – or closely associated with – the University, as well as research and commercial activities carried out at the University.** This includes the impact of 178 spinouts and 213 start-up companies that have connections to the University. It is the biggest impact of any university in the UK. Success is the result of long-term, strategic decisions that have established the University at the heart of one of the world's most successful innovation and technology clusters.
- **Very few government interventions bring higher economic benefits than investment in the University.** This finding is from a unique comparison between government investment in Cambridge and a sample of almost 600 impact assessments published by UK government departments and public sector agencies.

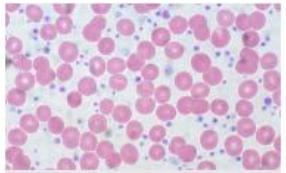
The University of Cambridge's activities have changed people's lives for the better because we have been successful at getting research to market, and in doing so helped create significant economic growth both around Cambridge and across the UK. Some of the depth and breadth of this influence is illustrated on the University's UK impact map[3] and global impact map[4], which

University Innovations and Enterprise in the Knowledge Economy





Cambridge Technologies



LIFE SCIENCES · REF NO: GRE-7381-20

Mouse Models of Essential Thrombocythemia (ET) and Myelofibrosis (MF) – Available for Preclinical Studies

Mouse Models of Essential Thrombocythemia (ET) and Myelofibrosis (MF) Available for Preclinical Studies

ARTS, HUMANITIES & SOCIAL SCIENCES · REF NO: KHA-8385-21

Augmented Page: enhance the printed page

Bringing the printed page to life through augmented reality

PHYSICAL SCIENCES · REF NO: MOO-3793-19

Deep neural network for perceived loudness calculation

A low-cost and highly accurate, deep neural network model to analyse perceived loudness at faster than real-time speeds

PHYSICAL SCIENCES · REF NO: WRI-3843-19

Safe and efficient synthesis of Ansa Indenyl Catalysts

Reducing cost, the need for specialist equipment, and the dangerous chemicals in the production of polymer

PHYSICAL SCIENCES · REF NO: ALL-3115-15

Flexible profile ring rolling

Revolutionary new process for producing seamless ring components resulting in material and energy savings of 25-50%, a significant reduction in processing requirements, the elimination of tool set up time, and increase in process stability

LIFE SCIENCES · REF NO: MAR-3702-18

Densified Collagen Tubes for Human Tissue Replacement

Generating human-size tubular tissue scaffolds with the potential to be used as a replacement for diseased or damaged conduits in the human body

PHYSICAL SCIENCES · REF NO: MOL-7671-20

High performance data transmission

Increasing data transmission performance and efficiency in PCB devices and ribbon cables

PHYSICAL SCIENCES · REF NO: WIL-8373-21

Improved metal additive manufacture

Creating stronger, more durable metal 3D printed parts whilst also reducing early component failure

PHYSICAL SCIENCES · REF NO: GRE-7712-20

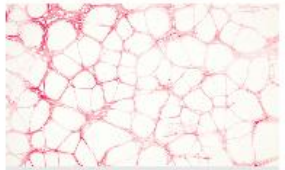
Reliable redox flow battery state-of-charge measurement

A simple, effective technique for monitoring the SOC of redox flow battery electrolytes during operation, optimising performance to enable use in widespread grid storage

PHYSICAL SCIENCES · REF NO: NAM-3386-16

Reinforced Bulk Superconductors

New optical methodology to study battery chemistry in real working conditions, vital for the next generation of battery development



LIFE SCIENCES · REF NO: CAM-3575-17

A New Class of Collagen Membranes

Innovative technology developed to address unmet surgical needs in tissue regeneration, wound healing, orthodontic and barrier functions

LIFE SCIENCES · REF NO: GRI-2367-09

Transgenic mice with fluorescently labelled intestinal K-cells

Unique opportunity to interrogate the mechanisms of GIP secretion with the potential to identify targets in these cells that could be exploited therapeutically for treatment of obesity

PHYSICAL SCIENCES · REF NO: GRE-7604-20

Enhanced NMC-811 stability by scalable bimetallic coating

Coating NMC particles at scale for improved Li-ion cell lifetime

LIFE SCIENCES · REF NO: BER-7105-19

Ortho-quinone prodrug strategy (self-immolative linkers)

Self-immolative linkers for protection and controlled release of ortho-quinones

LIFE SCIENCES · REF NO: FIT-3738-18

MutREAD – Mutational Signature Detection by Restriction Enzyme-Associated DNA Sequencing

A cheap, fast, reproducible and

LIFE SCIENCES · REF NO: SIN-2501-11

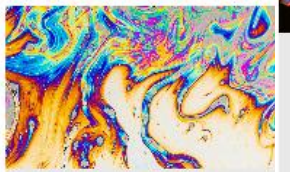
Generation of origin-specific vascular smooth muscle cells

Pure (> 90%), mature and contractile cells with potential uses in therapeutic and preventive strategies for vascular diseases and regenerative medicine

ARTS, HUMANITIES & SOCIAL SCIENCES · REF NO: NOL-2585-11

Database of contemporary spoken English

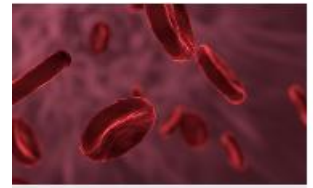
An extensive source of contemporary spoken English particularly beneficial to companies involved in speech technologies



PHYSICAL SCIENCES · REF NO: FER-2710-12

Printable inks based on layered nanomaterials

Transforming the ability to produce printable inks onto flexible substrates



LIFE SCIENCES · REF NO: MOR-2564-11

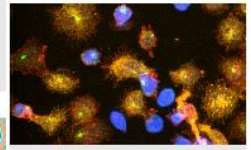
iPS cells derived from circulatory endothelial progenitors

Scalable technology generating iPSCs with high genomic stability for cell therapy applications

LIFE SCIENCES · REF NO: GRI-1716-06

Transgenic mice with fluorescently labelled proglucagon-expressing cells

Paves the way for exploration into mechanisms underlying GLP-1, PYY and glucagon release that could be exploited therapeutically for the treatment of diabetes and obesity



LIFE SCIENCES · REF NO: DE-7580-20

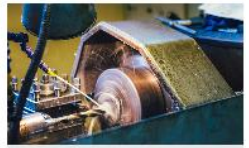
LGR5 monoclonal antibody for cancer immunotherapy

A first-in-class humanised monoclonal antibody against LGR5 validated as a platform for ADC, BiTE and CAR-T therapies

PHYSICAL SCIENCES · REF NO: PEN-7846-20

Enabling high data rate optical communications with directly-modulated lasers

Meeting the demand for increasing higher communication data rates by reducing the non-linearity of optical laser outputs



PHYSICAL SCIENCES · REF NO: ALL-2440-10

Flexible mandrel-free metal spinning

Eliminating the need for a dedicated mandrel in metal spinning reducing cost and time to produce with added asymmetry and geometry control benefits

Driving the Innovation Economy

U.S. Academic Technology Transfer in Numbers

From 1996 to 2020, up to...

$1.9 trillion contributed to **U.S. gross industrial output**

$1 trillion contributed to **U.S. gross domestic product**

6.5 million **jobs** supported

580,000+ **inventions disclosed...**

149,000+ **U.S. patents issued...**

to research institutions since 1996

19,000+ **startups formed**

69% of university licenses are to **startups and small companies**

200+ **drugs and vaccines developed** through public-private partnerships since **Bayh-Dole Act** enacted in 1980

autm

For more information visit:
www.autm.net

The information was compiled from AUTM and the Biotechnology Innovation Organization's The Economic Contribution of University/Nonprofit Institutions to the United States: 2020-2030, June 2022 as well as the AUTM 2024 Licensing Activity Survey and STATT's AUTOMATED for Technology Transfer Database, www.autm.net/STATT, and Academic Patent Licensing Helps Drive the U.S. Economy, IPWatchdog.com, June 29, 2021.

Thank you to our sponsors

Qualcomm INNOVATION

AUTM 2024 Licensing Activity Survey

A Survey of Technology Licensing Related Activity for US Academic and Nonprofit Research Institutions

autm

Benefiting Society and the Economy

U.S. Academic Technology Transfer for 2024

autm

For more information visit:
www.autm.net

Every year U.S. university research yields discoveries with commercial potential.

Technology transfer professionals associated with universities and other academic institutions manage the complex process of shepherding ideas from the lab to the marketplace – from evaluating and protecting discoveries, to common licensing transactions through new and existing companies.

R& D Structure

John Hopkins University USA VP Research	Over 100 Research Institutes and Centres Received $1.856 billion in federal research grants—more than any other US university.	33 Nobel Prize winners affiliated most cited institutions In 2014, filing 92 new U.S. Patents and creating 13 new startups, 2,324 Active Patents and 3,898 Transfer Agreements.

R& D Structure

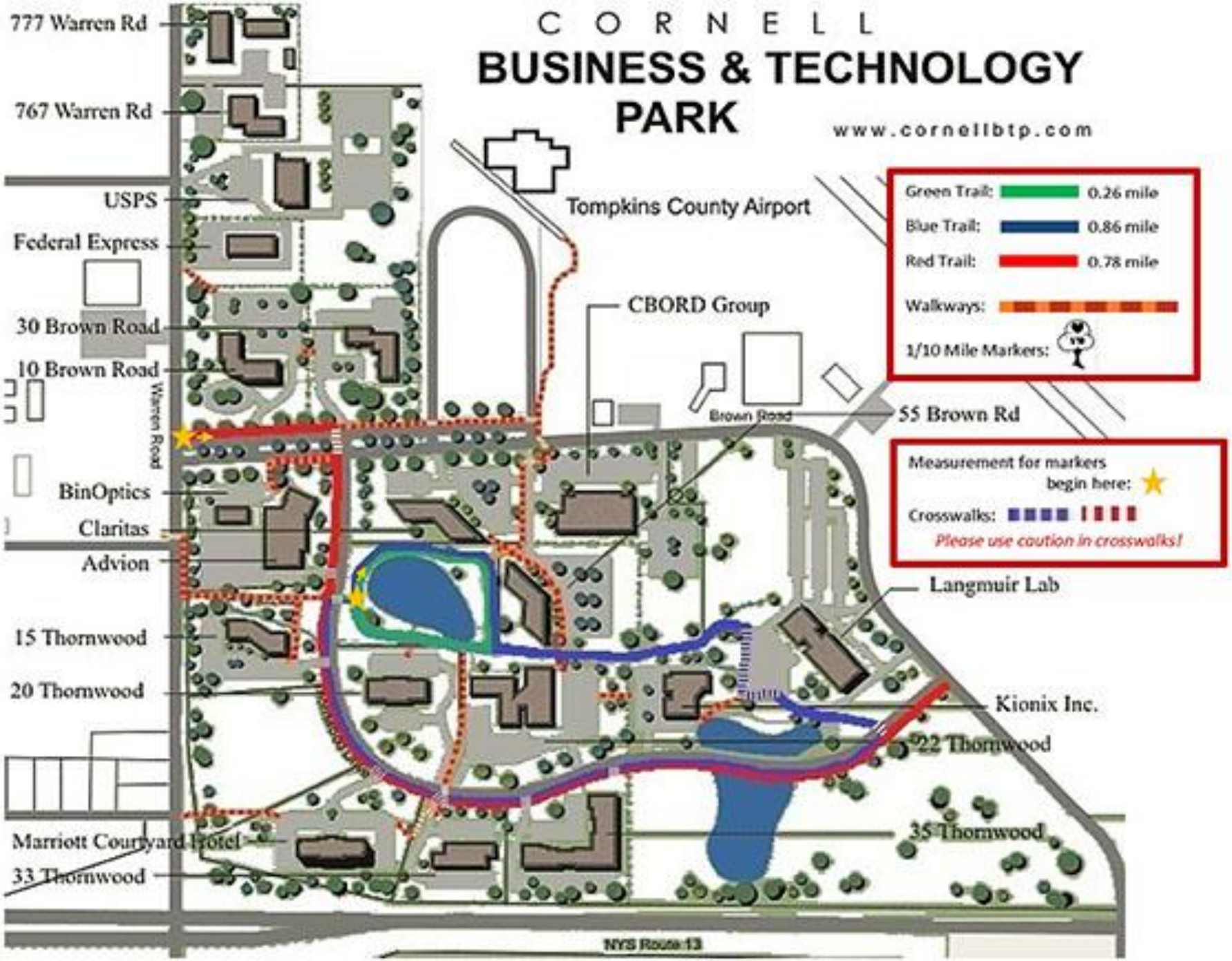
University R & D Officer	Research Institutes & Centres Budget	Impact
Harvard University Vice- Provost for Research	Over 100 Research is supported by more than $800 million of sponsored research funds each year,	Several Nobel Prize Winners and Presidents, Prime Ministers and global leaders

R& D Structure

University R & D Officer	Research Institutes & Centres Budget	Impact
MIT VP Research	55 In 2009, research expenditure was $718.2 million.	MIT employs approximately 1300 researchers in addition to faculty. In 2009, MIT faculty and researchers disclosed 530 inventions, filed 184 patent applications, received 166 patents, and earned $136.3 million in royalties and other income.

Technology Transfer and Commercialization Hebrew University Jerusalem, 2011

- Over $1 Billion annual sales of - based products
- 5,500 patents
- 1,600 inventions
- 480 licenses
- 110 spin-of companies
- Raised over $165 mil in 2011 from leading VCs and private investors

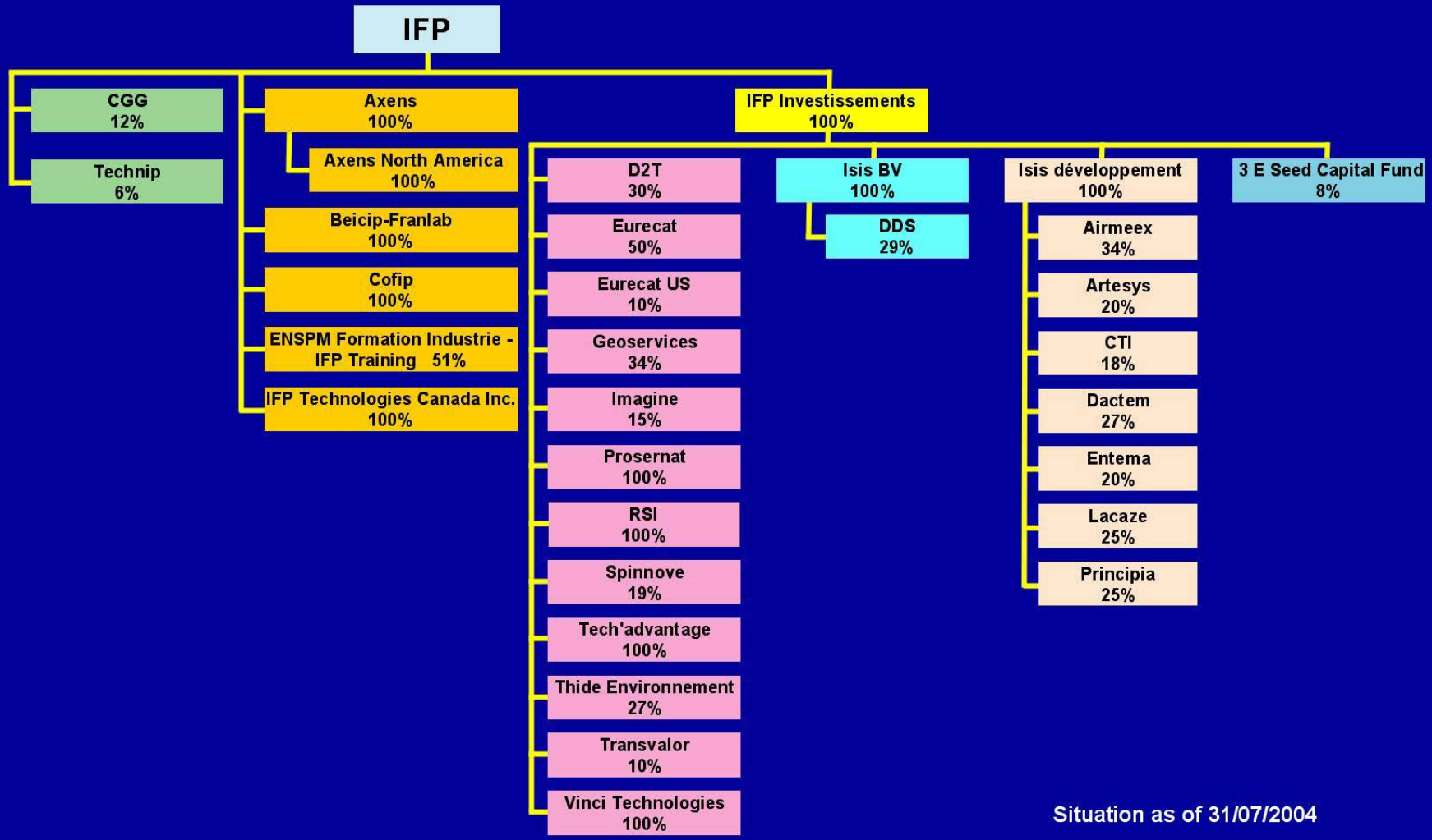

CORNELL
BUSINESS & TECHNOLOGY PARK
www.cornellbtp.com
777 Warren Rd
767 Warren Rd
USPS
Federal Express
30 Brown Road
10 Brown Road
Warren Road
BinOptics
Claritas
Advion
15 Thornwood
20 Thornwood
Marriott Courtyard Hotel
33 Thornwood
Tompkins County Airport
CBORD Group
Brown Road
55 Brown Rd
Langmuir Lab
Kionix Inc.
22 Thornwood
35 Thornwood
NYS Route 13
Green Trail: 0.26 mile
Blue Trail: 0.86 mile
Red Trail: 0.78 mile
Walkways:
1/10 Mile Markers:
Measurement for markers begin here:
Crosswalks:
Please use caution in crosswalks!

Some Cornell Startups

Businesses listed below founded on licensed Cornell technologies to help create jobs and economic vitality in New York State and beyond.

INDUSTRIAL DEVELOPMENT

Portfolio of the main investments



Situation as of 31/07/2004

© IFP-9-2004

CALTECH Innovation @ a Glance

Vice- President , Research
Research Institutes , Centres and Labs: +47
OTTCP
Endowment:$ 2.199B (2015)

Annual Data (FY 2016)
Innovations Reported
229 Invention disclosures (Caltech campus only)
196 U.S. patents issued
1,922 U.S. patents active
Start-Ups
9 Start-up companies formed
Commercialization & Partnerships
67 Licenses (including options)
41 Companies sponsoring research
82 Companies giving gifts
225 Material Transfer Agreements
$23M in corporate contracts & gifts

Historical Data
Innovations Reported
Nearly 3,200 invention disclosures (campus only) since 1985
Nearly 2,300 U.S. patents issued since 1985
Start-Ups
Over 130 start-up companies formed since 1995
on average, 8 new companies started each year
Commercialization & Partnerships
over 700 new licenses and options granted since FY 1995
on average, 40–50 licenses executed per year

CALTECH Innovation @ a Glance

Research and Education

Academic Divisions (Example of Collaborative Research)

- Biology & Biological Engineering
- Chemistry & Chemical Engineering
- Engineering & Applied Science
- Geological & Planetary Sciences
- Humanities & Social Sciences
- Physics, Mathematics & Astronomy

Academic options (majors)

Cross-disciplinary research institutes and centers

Faculty [1]

Approximately 300 professorial faculty

More than 600 research scholars

3:1 student-faculty ratio

Honors

Nobel Laureates [2]: **37**

National Medal of Science Recipients [2]: **58**

National Medal of Technology and Innovation Recipients [3]: **13**

National Academies Memberships [3]: **125**

Global Facilities

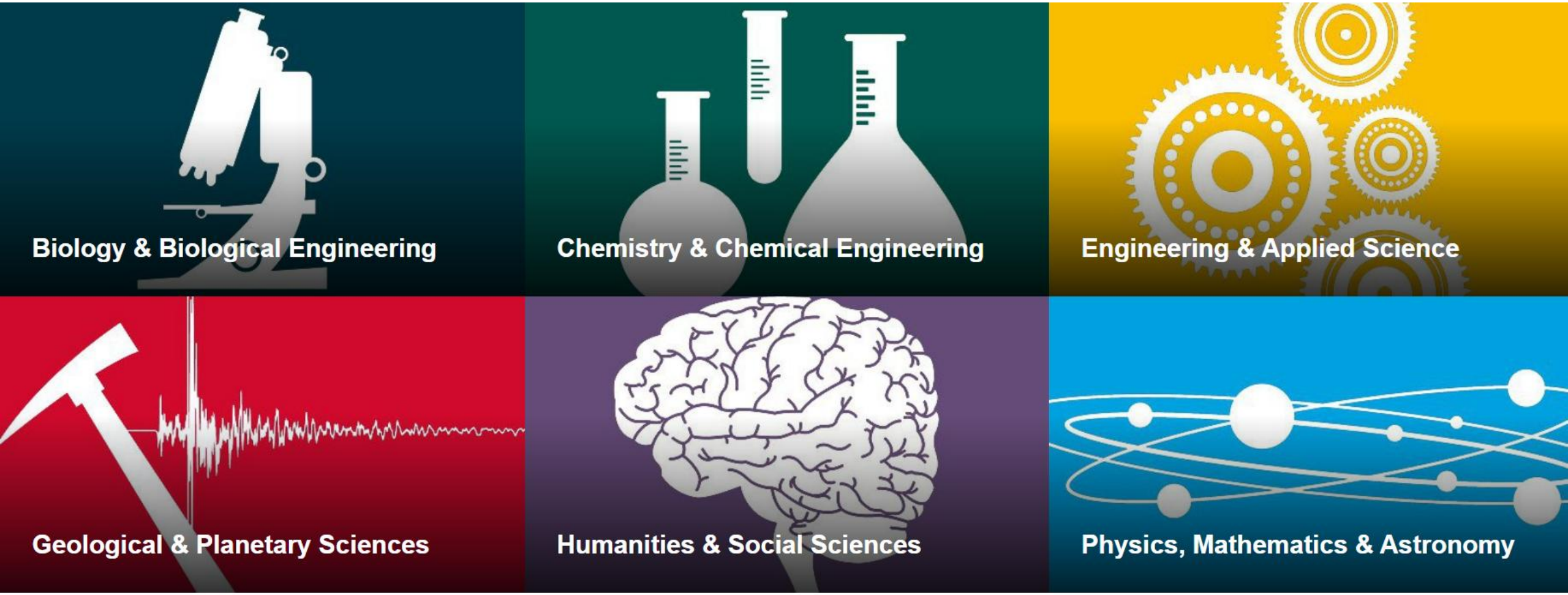
Jet Propulsion Laboratory

- Founded by Caltech in the 1930s and managed for NASA since 1958
- 19 spacecraft and ten instruments employed in active missions
- Recently launched missions include the Mars Science Laboratory, Juno, Jason 3, and NuSTAR
- More than 100 research and mission collaborations with Caltech faculty
-

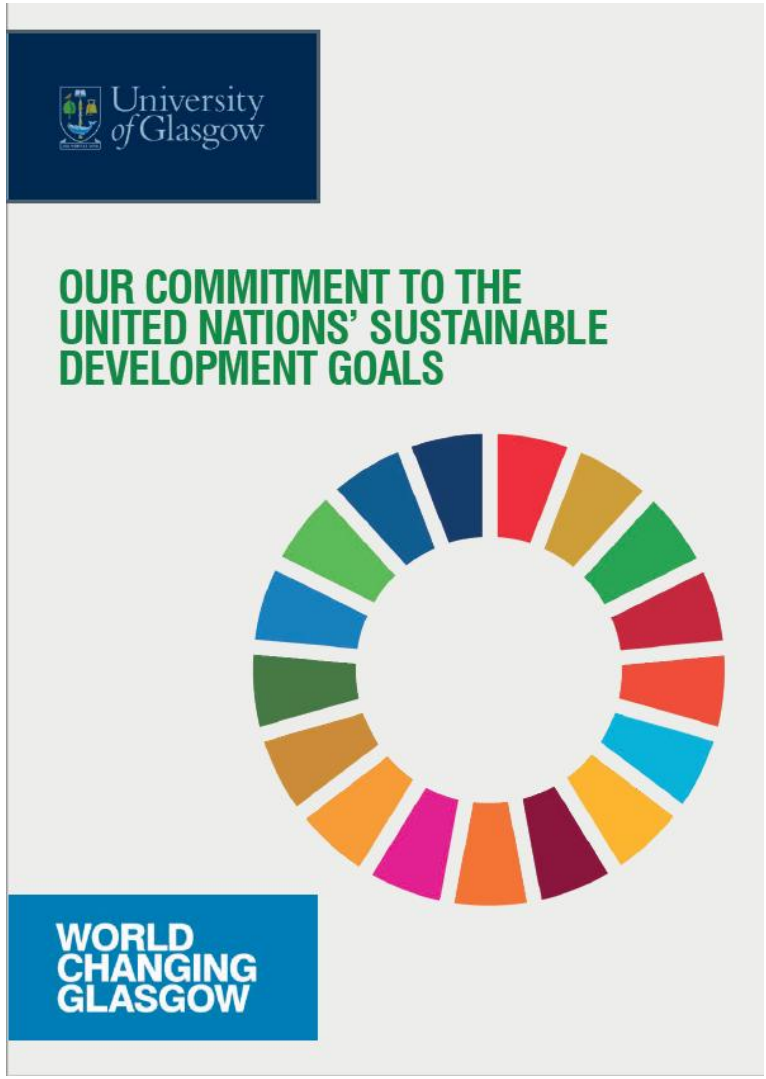
Caltech Seismological Laboratory

- Internationally recognized for excellence in geophysical research
- Provides research centers for seismic studies, high-performance computing, and mineral physics
- Preeminent source for earthquake information in Southern California and around the world

CALTECH RESEARCH DIVISIONS



Universities Mainstreaming SDGs into Curriculum and Research Agenda to train graduates for Sustainable Future; Improve Ranking and Contributions to Community Service



Cape Town, 2014

RESEARCH DASHBOARD, 2010—2014

Performance indicator	2010	2011	2012	2013	2014
Research income (external sources)[1]	R713 million	R841 million	R894 million	R957 million	R1.23 billion
Research contracts (number of contracts signed in brackets)	R550 million (1056)	R722 million (1360)	R682 million (1217)	R978 million (1702)	R1.18 billion (2113)
Postgraduate funding (all sources)	R120 million	R135 million	R148 million	R175 million	R207 million
Funding for postdoctoral fellows	R38 million	R44 million	R52 million	R60 million	R62 million
NRF-rated researchers	336	379	415	457	480
SARChI Research Chairs	26	28	33	33	33
Publication count (units)[2]	1188.22	1253.03	1314.40	1390.89	1549.12
Number of journal articles	1668	1773	1887	2044	2305
Number of books	15	18	17	24	15
Number of chapters in books	146	174	248	258	224
Number of conference proceedings	269	309	364	314	283
Subsidy income: publications[3]	R152 million	R150 million	R156 million	R160 million	R175 million
University rankings (position)					
Times Higher Education (THE) World University Rankings	107	103	113	126	124
THE BRICS and Emerging Economies Rankings				3	4
Quacquarelli Symonds (QS) World University Rankings	161	156	154	145	141
QS BRICS Rankings				11	9
Shanghai Jiao Tong Academic Ranking of World Universities	Top 300	Top 300	Top 300	Top 300	Top 300

Nigerian Example: Highly Published but How Prosperous?

- ✓Emeritus Professor of Petroleum Engineering
- ✓Pioneer Director, IPS; 7th VC UniPort; Chairman CVC/AVCNU
- ✓Published over 250 journal articles
- ✓15 Books
- ✓15 Book chapters
- ✓14 Monographs
- ✓6 software Apps; 6 Patents
- ✓14 national & international research Grants
- ✓Recognitions & Awards etc

- What Products to the Market??
- What Income generated from Innovation like scholars abroad???
- How Prosperous????

DOXIL®

Doxorubicin HCl liposome injection

Alza's Lead Product for Oncology

Prof. Yechezkel Barenholz

Department of Biochemistry
Faculty of Medicine

The Hebrew University
Of Jerusalem

2009 sales $417 million

Johnson & Johnson

Schering-Plough

An Inspiring Nigerian Example: Highly Published

- ✓ Professor Friday Okonofua, MD, PhD
- ✓ Pioneer VC 1st Medical University in Nigeria (University of Medical Sciences Ondo State 2015-2020)
- ✓ Global Champion on Women's He
- ✓ Published over 370 journal article
- ✓ 4 Books
- ✓ 26 Book chapters
- ✓ 30 Monographs
- ✓ 48 international research Grants
- ✓ Co-Chair of Harvard University Research Team
- ✓ Centre Leader World Bank ACE in UniBen
- ✓ Founding Editor African Journal of Reproductive Health, the best in Africa
- ✓ Recognitions & Awards etc

What Products to the Market????

What Income generated from Innovation like scholars abroad?

Success Stories - Exelon

EXELON (rivastigmine)

For Treatment of Alzheimer's Disease and Dementia

Prof. Marta Weinstock-Rosin

Department of Pharmacology
Faculty of Medicine

The Hebrew University
Of Jerusalem

2010 sales $632 million

NOVARTIS

Examples of Entrepreneurial Professors

University of Ibadan:

retired Prof Engr. Olusoji Ofi, former DVC Adm, UI and his yam flour machine (now running his factory)

University of PH:

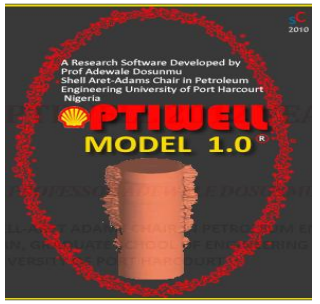
late Prof Ekeke of Biochemistry

and CIKLAVIT, food supplement

for Sickle Cell Anaemia (Licensed to Neimeth)

Prof. Adewale Dosunmu's OPTIWELL

Software for Wellbore Stability Management



UniPort dominance in NUGA and WAUG due to Sports Nutrition;

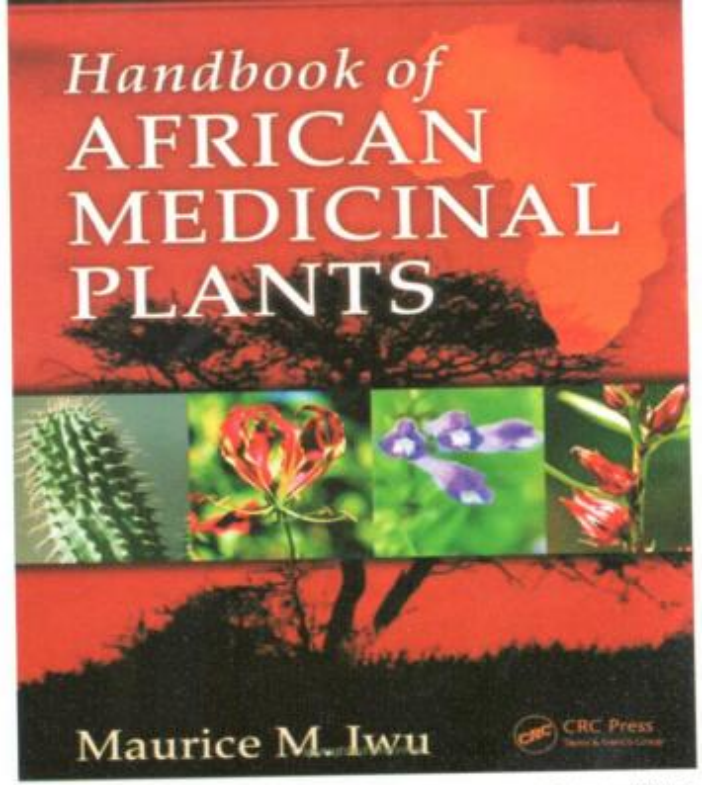
UniSports/Sports Institute

UNN

Prof Maurice Iwu and his Pharmaceutical & Nutraceutical Products developed by the Bioresources Development Group (BDG) in the laboratories of International Centre for Ethnomedicine & Drug Development

(interCEDD) at Nsukka; IHP-InterCEDD Health Products

Prof. Maurice Iwu:The Doyen of Natural Medicine
Prof. Iwu is the series editor of the Elsevier Science Series, "Advances in Phytomedicine"; as well as being a member of the Editorial Board of several international scientific journals.



Second Edition of Handbook of African Medicinal Plants (2014) by Prof. Maurice M. Iwu, one of the founding fathers of BDG. A testament of how research driven we are.

Entrepreneurial Professor

- ✓ Mary Steen is a Professor of Midwifery at University of South Australia and **UniSA Clinical and Health Sciences**.
- ✓ Visiting Professor UniPort. Developed Research from Nature Study on Child Birth to Discoveries, Patents, Publications and Products: Birthing Chair; Ball etc
- ✓ An entrepreneurial Professor
- ✓ She is the Chair of the Mothers, Babies and Families Research Group and facilitates the promotion of research and scholarly activities both nationally and internationally
- ✓ Mary's has received several awards for clinical innovation, original research, leadership, partnership working and outstanding services to midwifery.

HOW TO...

...encourage a woman to remain active in labour

There are significant benefits to remaining active during labour. The University of Chester's Professor Mary Steen describes these benefits and the 'dry land' positions women can adopt to maximise the opportunity of achieving them.

Historically, women have been active during birth for centuries and frequently adopted squatting, kneeling or sitting positions. During the 17th century, it became fashionable for women in many European countries to labour horizontally and this coincided with a trend towards medical supervision in childbirth. Pain relief methods introduced during the 19th and 20th century contributed to reduced mobility and drowsiness of women in labour (Steen, 2012). This led to an expectation and acceptance that during childbirth women lay passively in bed (RCM, 2008).

Mary Steen Professor of Midwifery - Search (bing.com)

Marketing & Communication

to the different Publics to Advertise Values that Capital can chase

Public Relations Office Unit under VC's Office

- ✓ RSU Weekly
- ✓ RSU Quarterly
- ✓ RSU Annual (Convocation Edition)
- ✓ RSU Daily (Last, when fully established)

RSU Media

- ✓ WhatsApp
- ✓ Social Media Handles
- ✓ Event Recordings for YouTube/Media Stream

RSU Website

Very Rich and up to date. Learn from global best practice

Digital Asset

- ✓ Mid Year and Annual Reporting & Reports
- ✓ HODs/Deans
- ✓ Principal Officers

Major Publications

- ✓ RSU Annual Report
- ✓ VC's Mid-Term Report
- ✓ VC's End-of-Tenure Report
- ✓ University R & D Report/ Magazine
- ✓ Innovation Metrics at a Glance
- ✓ RSU Facts & Figures
- ✓ Community Service/SDG Report
- ✓ Institute Newsletters and Magazines
- ✓ Historical Publications/Anniversary Publications

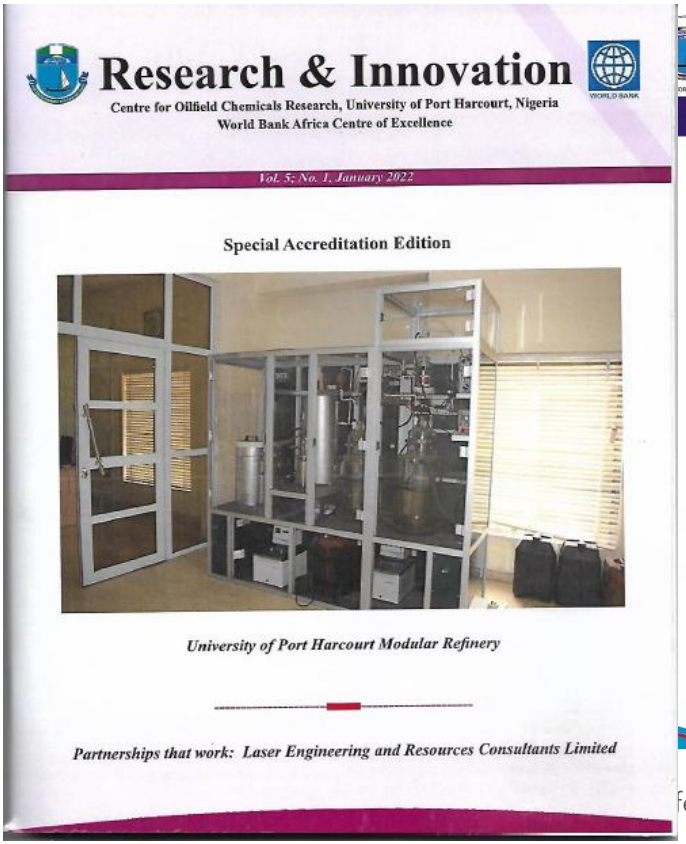
M & C Unit of University Advancement Office

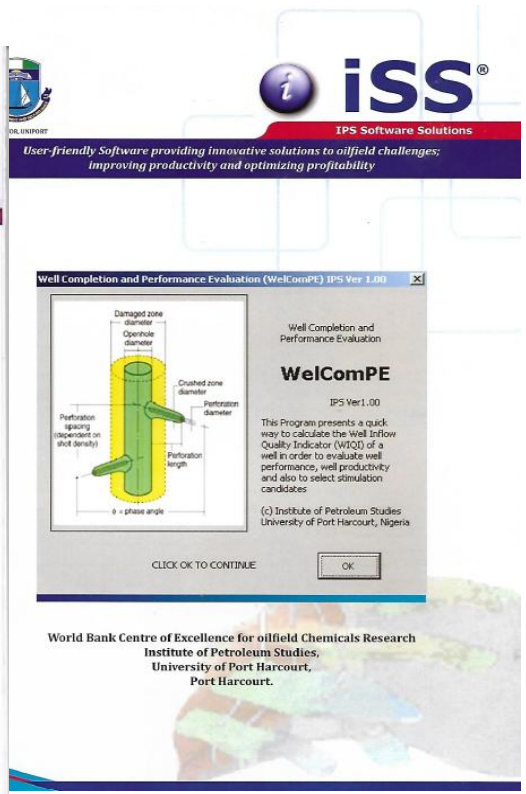
- ✓ Advancement Stewardship Report/ Alumni Magazine
- ✓ Special Purpose Publications

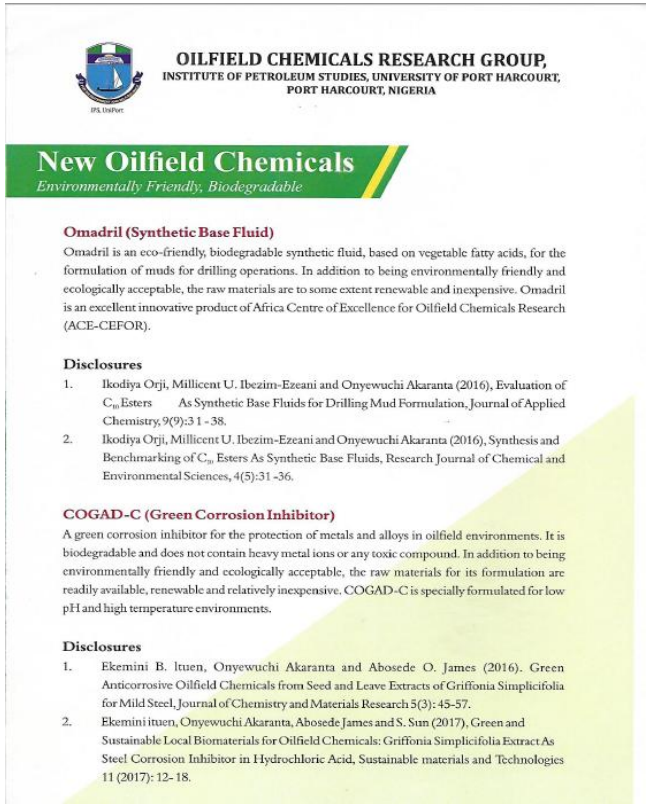
Marketing Research and Communication Plan

Marketing & Communication Plan must highlight the following:

1. Sponsorship or Collaboration Required
2. Benefits and likely Beneficiaries
3. Status of Innovation







Marketing Research and Communication Plan

2015 Featured Inventions

Invention
A microwave laser for quantum computing
Inventor
Jason Petta, *Professor of Physics*

What it does
The quantum-dot microwave laser, or "maser," produces coherent microwave-frequency light and is powered by the one-by-one flow of single electrons. Its low power consumption, coupled with the ability to operate at extremely low temperatures, makes the maser useful for the creation of compact microwave amplifiers suitable for end-uses in chemical sensing and future quantum-computing applications.

The maser consists of two double quantum dots, which are small bits of semiconductor material that act like single atoms, placed at either ends of a microwave cavity. Unlike regular atoms, quantum dots can be connected to a battery that enables current to flow, causing the dots to emit photons that bounce off mirrors at each end of the cavity. The photons then build into a coherent beam of microwave light.

The quantum dots are made from single-crystal indium-arsenide nanowires just 50 nanometers in diameter that enable the isolation of single electrons in each double quantum dot. "This is basically as small as you can go with these single-electron devices," Petta said. The maser uses about one-billionth of the electric current needed to power a hair dryer and works at temperatures near absolute zero, so it is ideal for quantum computing, which requires cryogenic temperatures.

Another advantage of the new maser is that the energy levels inside the dots can be fine-tuned to produce light at other frequencies, which cannot be done with other semiconductor lasers in which the frequency is fixed during manufacturing.

Collaborators
Graduate students Yinyu Liu and Jiri Stehlik, and associate research scholar Christopher Eichler in the Department of Physics; Jacob Taylor and Michael Gullans at the Joint Quantum Institute operated by the University of Maryland, the National Institute of Standards and Technology and the Laboratory for Physical Sciences.

Development status
Patent protection is pending. Princeton is seeking industrial interest for further development of this opportunity.

Funding sources
The David and Lucile Packard Foundation, the National Science Foundation, the Defense Advanced Research Projects Agency's QuEST (Quantum Entanglement Science and Technology) program, and the Army Research Office.

Invention
A diagnostic test for the female biological clock
Inventor
Coleen Murphy, *Professor of Molecular Biology and the Lewis-Sigler Institute for Integrative Genomics*

What it does
The invention tests a woman's reproductive ability by diagnosing the status of her egg cells, or oocytes. The quality of a woman's oocytes generally declines in her mid-to-late 30s, the basis of the so-called biological clock. Yet a subset of women will experience oocyte decline earlier or later than average, and a test that can reveal oocyte quality could give women much-needed information about their reproductive status.

Current tests of oocyte quality examine either the cell's chromosomes, a process that destroys the oocyte, or its form and structure, which yields imprecise information. Although ultrasound and endocrine tests can report the number of remaining oocytes, these tests do not reveal their quality and have a very limited prognostic window. A test of biomarkers of oocyte quality will not only be a useful indicator for individual women and their families, but also could improve the success rates of *in vitro* fertilization (IVF) and egg-freezing procedures.

The diagnostic test looks for genetic markers of oocyte decline. To construct the test, genetic material will be collected from human oocytes and other cells, sequenced, and then evaluated by age and other factors to develop an oocyte-aging profile. Next, researchers will identify the genes that are most indicative of oocyte age and fertility as biomarkers to be included in a test that compares a patient's gene expression pattern to the profile to determine the oocyte's fertility status.

Researchers in the Murphy lab also are looking at correlating oocyte health with gene expression in other tissues such as blood and urine that could be accessed more easily than oocytes. The researchers hope to develop a set of diagnostic tests, including a direct test of oocytes that could be done during IVF procedures, a test of cells collected during a clinic visit, and a diagnostic test that can be used at home.

Collaborators
Daniel Notterman, molecular biologist.

Development status
Patent protection is pending.

Funding sources
National Institutes of Health and the March of Dimes Foundation.

Invention
A non-invasive test for assessing battery health
Inventor
Daniel Steingart, *Assistant Professor of Mechanical and Aerospace Engineering and the Andlinger Center for Energy and the Environment*

What it does
The method detects a battery's "acoustic fingerprint" to assess its level of charge and state-of-health. Unlike other methods, the technique does not deplete the battery's charge and works while the battery is in operation. The technique potentially can be used for all battery types, from simple household batteries to ones capable of powering electric vehicles.

The inspiration for the technology came when a friend asked Steingart to check out a popular YouTube video showing that a depleted battery bounces higher than a fully charged one. Steingart and graduate student Shoham Bhadra found that there is indeed a relationship, albeit indirect, between bounciness and charge, suggesting a way to use the phenomenon to interrogate the charge-level and performance characteristics.

Bouncing a battery is similar to hitting it with a hammer — both actions cause sound waves to flow through the interior. The researchers measured how sound waves travel in different types of batteries, and found that each battery type has a distinct acoustic fingerprint. They also discovered that the acoustic fingerprint changes with the battery's state-of-charge, so that a drained battery has a different sound profile than a charged one.

"We came up with a model describing this relationship between sound and battery health, and so far it has worked on every battery we've tried, regardless of shape or chemistry," Steingart said.

The finding that sound travels differently through charged versus drained batteries is not surprising given how batteries work. Most batteries experience a change in internal structure as chemically stored energy transforms into electricity. For example, a common household battery contains zinc that converts into zinc oxide as the battery generates electricity. The zinc oxide particles

Shoham Bhadra (left), a graduate student in electrical engineering, and Daniel Steingart

link to each other via tiny bridges that act like a network of springs, giving the battery more bounce.

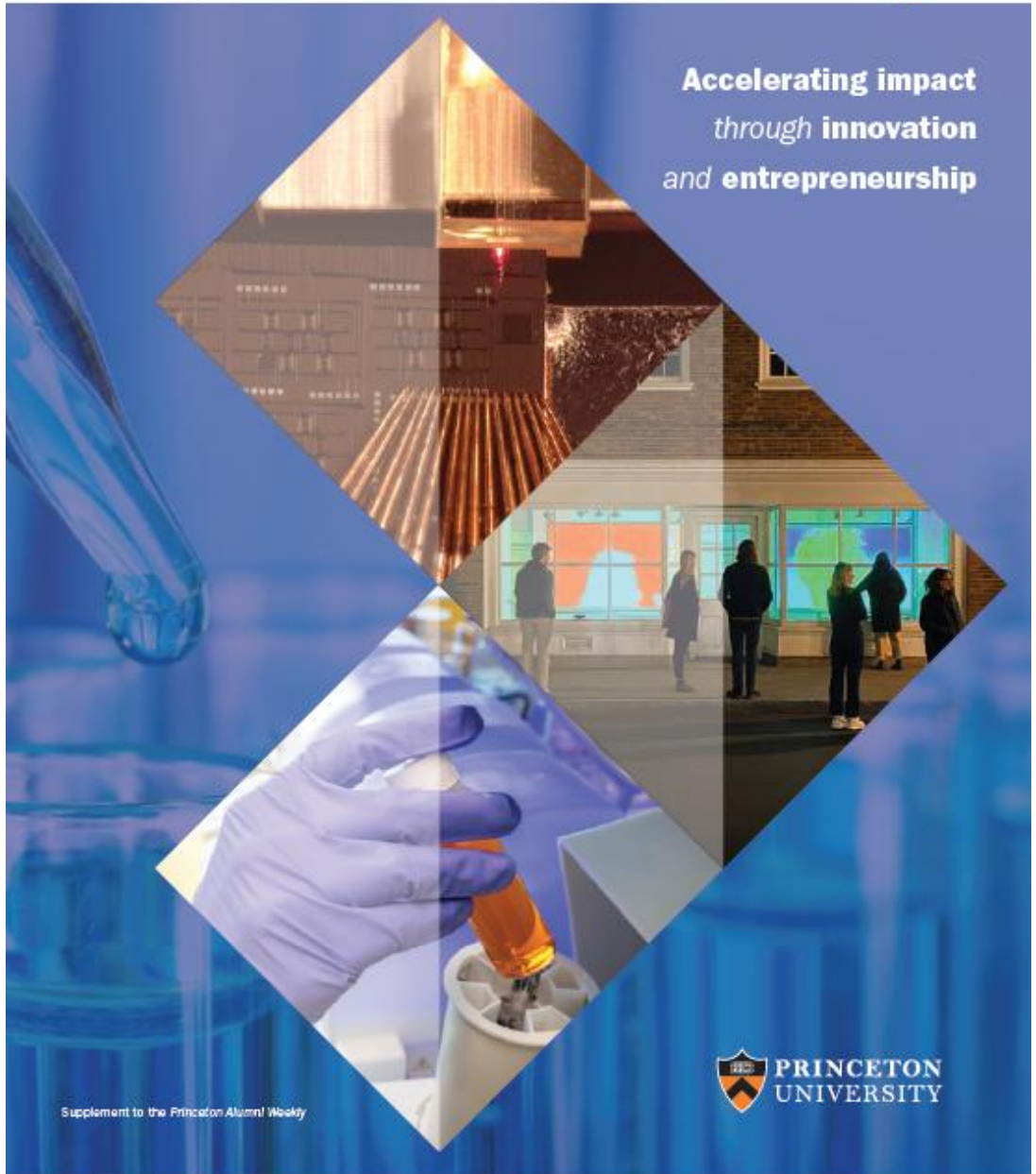
The researchers envision that the technology could be used by battery manufacturers for quality control, by electric-vehicle mechanics at auto-repair shops, and to help guide the research and development of better batteries for applications such as grid-scale electricity storage.

Collaborators
Graduate student of electrical engineering Shoham Bhadra; Professor of Mechanical and Aerospace Engineering Clarence Rowley and Associate Professor of Electrical Engineering Jason Fleischer; postdoctoral research associate Andrew Hsieh in mechanical and aerospace engineering; former postdoctoral research associates Benjamin Hertzberg in mechanical and aerospace engineering and Alexandre Goy in electrical engineering; and 2015 graduate Peter Gjeltema.

Development status
Patent protection is pending. Princeton is seeking industrial interest for further development of this opportunity.

Funding sources
National Science Foundation, the U.S. Department of Energy's Advanced Research Projects Agency, the Andlinger Center for Energy and the Environment, and Princeton E-ffiliates Partnership.

PRINCETON
INNOVATION



Innovation
with impact

Bermuda Institute of Ocean Sciences
The longest, most complete data set of key markers in the Atlantic

Monitoring the effects of climate change in the Atlantic and Pacific oceans. Pinpointing at-risk coral reef zones. Removing CO_2 at scale and taking knowledge from the lab to the front lines of our communities. Arizona State University, home to the first-of-its-kind Julie Ann Wrigley Global Futures Laboratory™, is **using innovative research and action** to advance the United Nations Sustainable Development Goals and build a better world.

First-of-its-kind global satellite Mapping of coral reefs

Sustainable Cities Network Aligning people and the planet by solving local sustainability issues

MechanicalTrees™
Capturing carbon 1,000x more efficiently than natural trees

Ranked #1 in the world for advancing these United Nations Sustainable Development Goals

Year after year, ASU tops the lists in areas that matter

#1 in innovation
ASU ahead of MIT and Stanford – U.S. News & World Report, 2016–2023

#1 in sustainability
ASU ahead of UCLA and Yale – Sierra Club, 2021

#1 in global impact
ASU ahead of MIT and NYU – Times Higher Education, 2020–2022

No. 1 in the U.S. for innovation and global impact. No. 1 in North America for sustainability.

ASU Arizona State University

globalimpact.asu.edu

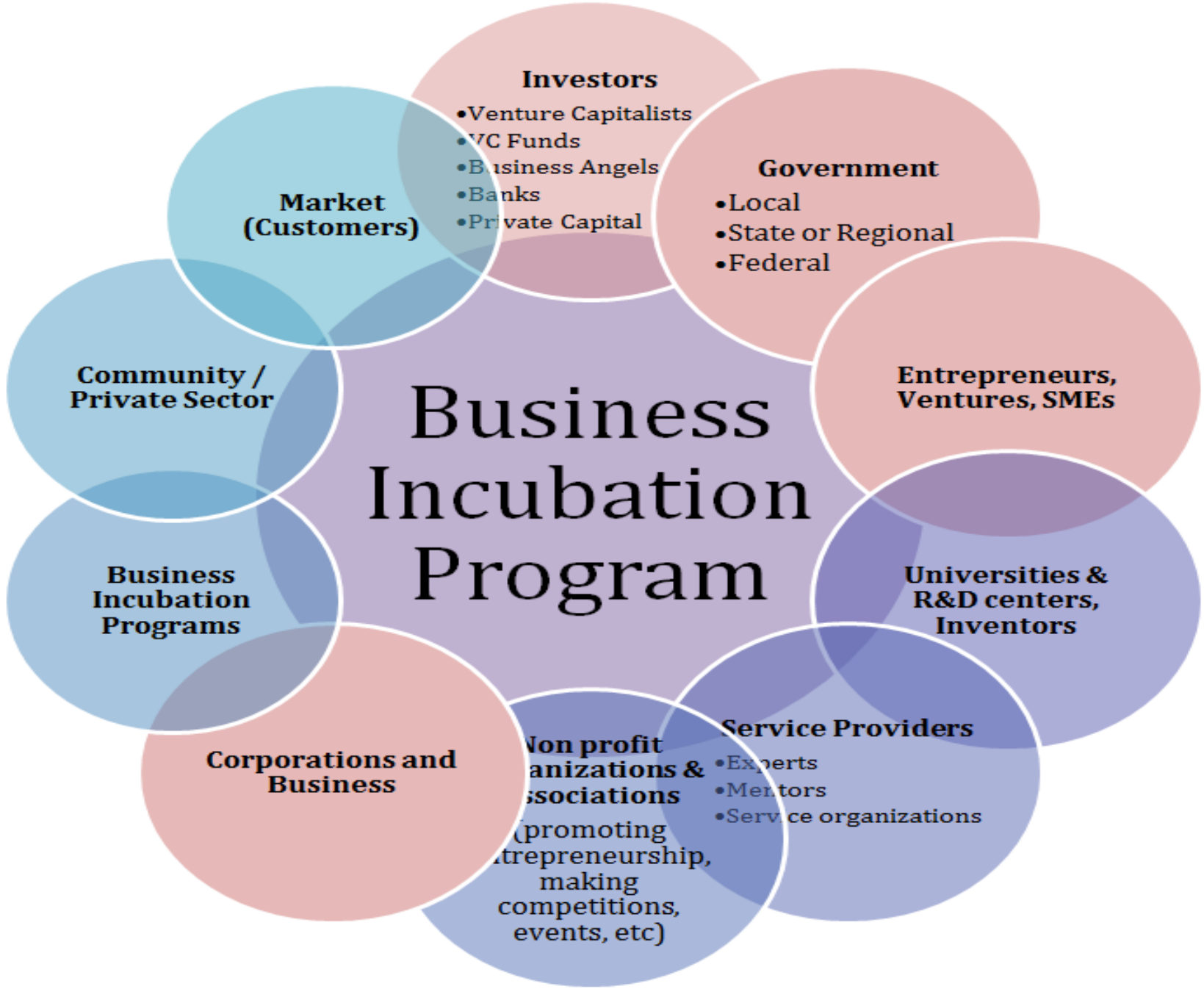
Princeton’s Empower 2023 entrepreneurship conference

The Empower 2023 Pitch Competition on April 27 will feature over $135,000 of cash and in-kind prizes for the winners, including a first-place cash prize of $100K and a bundle of in-kind legal services. Your ticket for Empower includes admission to the Pitch Competition.

Empower is a Princeton University entrepreneurship conference hosted by Princeton Entrepreneurship Council, part of Princeton's Office of the Dean for Research and a partner of Princeton Innovation. For sponsorship opportunities, please contact **Don Seitz**, Princeton University.

Open to the public. Please share with your research, innovation and entrepreneurship colleagues!

External environment of Business Incubation Program (Business Incubator)



List of Nigeria Tech Hubs (Faborode, 2020, UniPort Founder's Day Lecture)

NORTH:

1. Enspire Hub, Abuja
2. Blue Hub, Kano
3. StoneBricks, Abuja
4. StartPreneurs, Abuja
5. CoLab Hub, Kaduna
6. nHub, Jos
7. Ventures Park, Abuja
8. TD4PAI – Technology Dev for Poverty Alleviation Initiative, Kuje, FCT
9. Civic Innovation Lab, Abuja
10. BD Hub, Abuja
11. The Tangent Eco-Innovation Hub
12. Founders Hub, Ilorin
13. Arewa Hub, Kaduna

SOUTH SOUTH

1. Start Innovation Hub, Uyo
2. RootHub, Uyo
3. Edo Innovates
4. Delta State Innovation Hub, Asaba
5. Olotu Square, Port Harcourt
6. GIG Innovation Hub
7. Focus Hub, Port Harcourt
8. Strategic Hub, Port Harcourt

SOUTH EAST

1. Roar Nigeria Hub, UNN
2. Innovation Growth (IG) Hub, Aba

List of Nigeria Tech Hubs

SOUTH WEST:

1. Wennovation Hub, Ibadan & Lagos
2. iDEAHub, Yaba, Lagos & Tinapa
3. Co-Creation Hub (CcHub), Yaba, Lagos
4. Leadpath Hub, Lagos
5. AkureTechUp, Akure
6. DevsDistrict Hub, Akure
7. Passion Incubator, Yaba
8. Impact Hub, Lagos
9. VerveTree, Abeokuta
10. Artificial Intelligence Hub, UNILAG
11. Hebron Startup Labs, COVENANT, Ota
12. Project Enable Africa Hub, Lagos (Disability compliant; US supported)
13. Facebook NG_HUB, Yaba
14. OAUTech Hub, Ife (ACE-based)

For more info: visit, TechPoint.Ng website

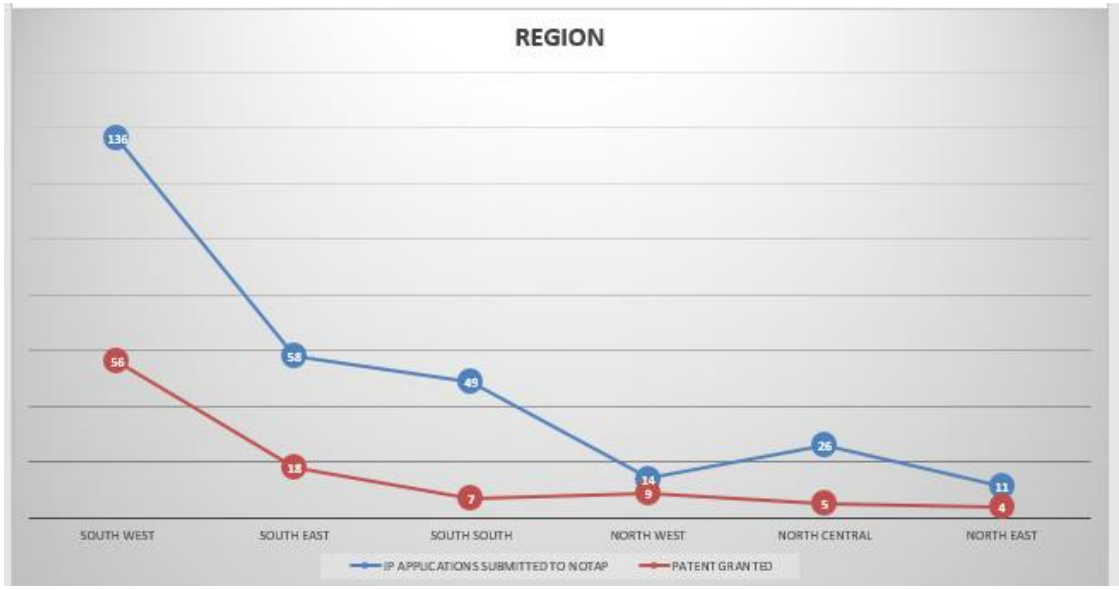
NOTAP Patent Statistics

NOTAP is the National Office for Technology Acquisition and Promotion, an Agency under the Federal Ministry of Science and Technology (FMST).

Mandate of NOTAP

NOTAP carries out following activities:

1. Evaluation and Registration of Technology Transfer Agreements.
2. Monitoring the implementation of Technology Transfer Agreements.
3. Capacity building of Researchers.
4. Development of critical mass(Technology Magnets)
5. Promotion of Intellectual Property Culture in Tertiary Institutions
6. Assistance in Patenting of Inventions/R&D results
7. Promotion and Commercialization of indigenous Technology.
8. Linking R & D with industry.



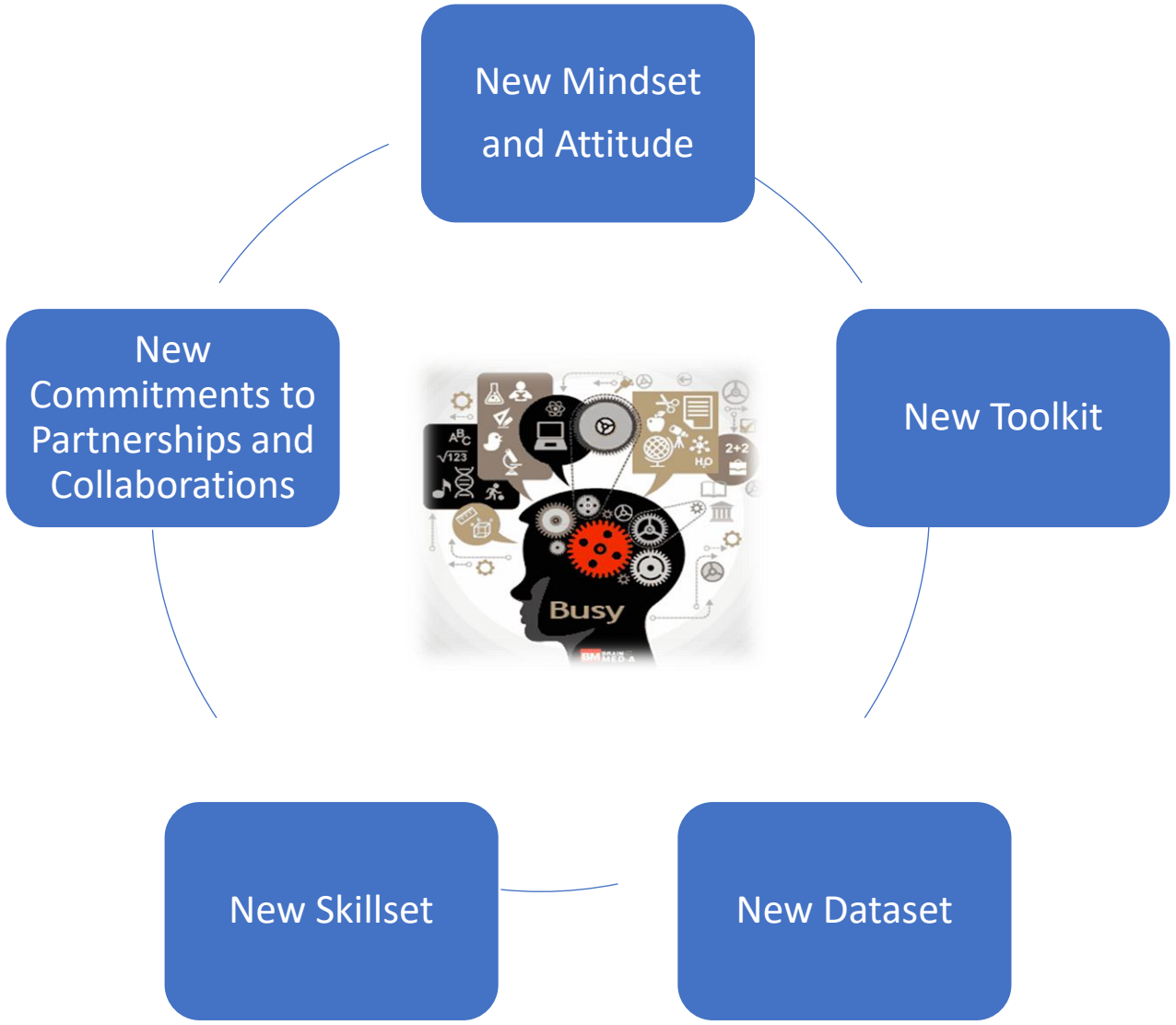
Covenant highest No. of Patents

Some Challenges

Internal and External

1. Partnership with industries, corporate culture of speedy decisions/profit motive
2. On Collaboration with Other Universities, we must have something to offer
3. On Change of University Administrations and failure to honour agreements
4. University Bureaucratic operations and lack of respect for partnerships and collaborations
5. Policy Summersault
6. Poor Implementation Strategies
7. Poor Institutional Memory and Archiving
8. Poor Digitalisation
9. Academic Corruption and Lack of best Practices
10. Obvious Challenges: Funding, Power Supply, Quality Manpower(Academic Crew Change), Functional Labs and Libraries

Change of Mindset

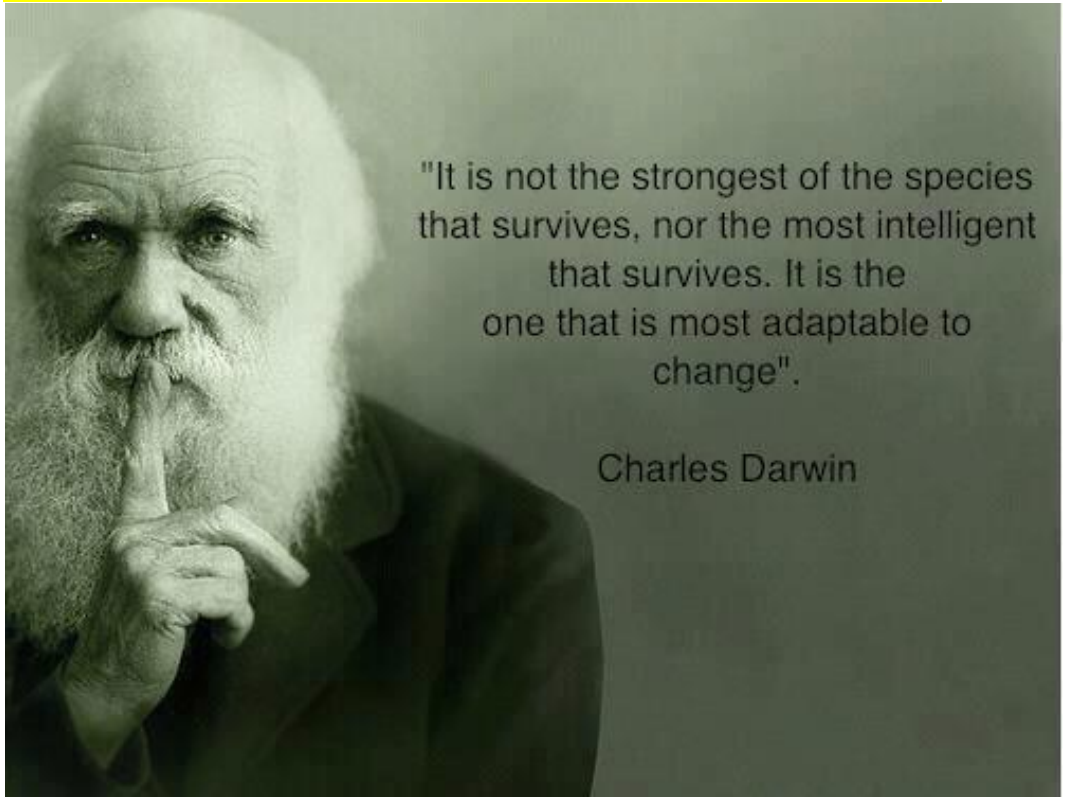


Why Change of Mindset?

- ✓Enhance Academic Productivity
- ✓Contribute to Sustainable Development of University and Nation

Improve Intellectual Asset and Profile

Our Intellectual Harvest; Our Pride!!



Conclusion: Key Takeaways

Entrepreneurial University Development

- Innovation Hubs & Incubators: Establish startup accelerators to nurture student and faculty-led ventures.
- Set up Innovation Fund; Partner with Venture Capitalists
- Curriculum Reform: Embed entrepreneurship, design thinking, and digital skills across disciplines.
- Industry Partnerships: Create pathways for students to co-develop solutions with businesses, ensuring employability and relevance.

Strategic Roadmap

Timelines

- DVC R&D Office Architecture and Structure: 6months –one year
- ICE Policies: 2026
- Membership of UIIN, THS, AUTM etc 2027
- Entrepreneurial Training for Staff: From 2026
- Short-term (1–2 years): curriculum reform:

- Entrepreneurial Education for all Graduate Programmes
- For All Undergraduate Programmes like GES

- Medium-term (3–5 years): Tech Park, Innovation hubs, global partnerships.

-Startup School/Business Incubator
-Mentorship of young Innovators: Appoint EiR, XiR
-Annual Innovation Week; Weekly Innovation Afternoon
-Founders Day Celebrations

Entrepreneurial University KPIs

- Convocation, Intellectual Harvest of Startups
- PhD Students: At least 1 patent, 2 Publications, 1 product
- Department: At least 1 Startup/Licence per year
- Innovation Hub: 50 startups by 2031.
- Entrepreneurship in all programs by 2028.
- ₦1 billion commercialization revenue by 2030.

Entrepreneurial Development

Be part of the new Knowledge Economy
Invest in the K-Bank
Create Knowledge Enterprise
Play in the Digital Economy
Creative Edge
Create ENACTUS

Alumni
Start-ups

Students
- Individual Projects
- Team Projects

In the Age of Knowledge and the Knowledge Economy

What Products have you taken to the global Knowledge Market? Digital Platform Markets; through Academic Entrepreneurship; What special Projects and Programmes?

Products	Projects	Programmes
✓*Policies* ✓*Technologies* ✓*Software Applications* ✓*Goods and Services; Databases* ✓*Processes & Procedures (development of ISO Standards)* ✓*Industry Chemicals* ✓*Documentaries* ✓*Creative Products: Art of Storytelling, Drama, Poetry, Prose, Comedy, Film, Music, Artworks; Translations, etc.*	Innovation Hubs Art Hubs; Games Hubs Community Heritage Centre Projects Garden City Music Festivals - Choral, Highlife, Opera, (with UniPort) Garden City Art Festivals/Markets (with UniPort); Literary Festivals (Poetry; Drama; Documentary, Film; Comedy etc) Garden City Marathon; Relays, Swimming; Community Sports Festivals (with UniPort) Book Fairs to celebrate PH as World Book Capital 2013 Conference Tourism *(imagine WEF in Davos)*	Capacity Building Programmes (Training Programmes, Short Courses); Workshops Consultancy Special Schools & Institutes Community Farms like Songhai

Profile of Prof X / Future of Entrepreneurial University
Innovation to Impact

Looking Back

RSU
Prof X

Looking Ahead

- ✓New Discoveries, IP/Invention Disclosures
- ✓Patents and Royalties
- ✓New Products: New Technologies, Processes, Policies, Software Applications, Goods and Services
- ✓Licences and Income Generated?
- ✓New Start-ups/Spin-Off Companies
- ✓Jobs created? Wealth generated?
- ✓Impact: Contribution to regional, national and global development? Contribution to GDP?
- ✓Recognitions & Awards etc
- What are we known for among our peers

in Academics and Industry? Nationally and Globally?

Thank You!

Future of Entrepreneurial University

Staff Profile, Recognitions for Impact

Looking Back

RSU

Looking Ahead

- ✓Staff Disposition (Professor/ SL/Others)NUC Guidelines
- ✓Staff Disposition (Teaching/Non-Teaching/Technologists) NUC Guidelines
- ✓Fellows of Academies
- ✓National Merit Award Winners
- ✓NLNG Prize Winners
- ✓International Awards/Prizes
- ✓National Appointments
- ✓International Appointments
- What are we known for among our peers in Academics and Industry? Nationally and Globally?

To Improve University Ranking and Visibility: All Academics and Graduate Students must Register

Register Today

Show leadership by example in the matter of visibility in globally-accepted citations in Scopus and Google Scholar.

For Google Scholar

Log on to scholar.google.com and click the “My Profile” link at the top of the page to get your account setup started.

For ORCID ID

https://www.youtube.com/watch?v=9cccd-Y9_Ww (3 minutes)

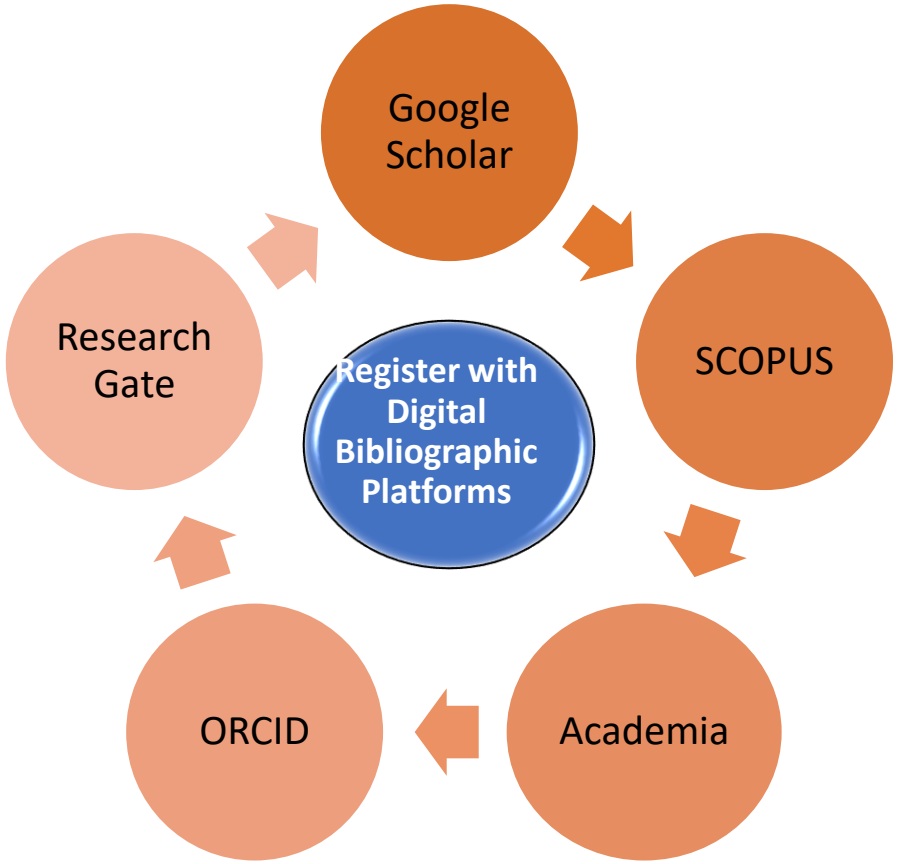
https://www.youtube.com/watch?v=DeLCfDDn2SY (4 minutes)

For Scopus

Go to the Scopus login page (www.scopus.com) .

Click Create and Account in the upper right corner of your screen. Fill in the empty text fields with your credentials. Read the 'Registered User Agreement' and check the box to register your acceptance.

Click 'Register' to finish the registration process and continue to the confirmation screen.



Avoid Predatory/Ambush Journals
Check List of Such Journals