

RESEARCH, PRODUCTION AND EXTENSION - JKUAT



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PRESENTATION OUTLINE :

INTRODUCTION;

JKUAT RPE DIVISION;

GRANTS;

RESEARCH THEMES;

INSTITUTES AND CENTRES;

EXTENSION, TECH EXPO., LINKAGES;

CONCLUSIONS & FUTURE.



INTRODUCTION

In knowledge-based economies, universities have become key elements of innovation systems both as human capital providers and as seedbeds of new businesses.

Developed countries are now focusing on the potential of the universities in enhancing innovation environments and creating a regime of science based economic development.

One way for universities to become entrepreneurial is by commercializing research outputs.

HISTORY OF UNIVERSITY RESEARCH

Drawing on experience of US research oriented universities, we find that

Before world war II, universities undertook research for academic advancement without regard to its use in societal improvement

After world war II and on the basis of the 1945 report by Vannevar Bush *Science, The Endless Frontier*", the US government decided to support research on the following basis:

- Support of basic science, and Industry's focused on applied research
- Though patents increased in number, they were owned by government and few were ever commercialised.

TORY OF UNIVERSITY RESEARCH

The enactment of the Bayh-Dole Act (Patent and Trademark Amendments of 1980) invigorated the technology transfer process from universities and federal laboratories to business and industry

- Universities now benefit as they co-own patents with researchers/innovators
- Private sector could commercialise patents/innovations
- Country benefits from economic growth arising from new jobs, new streams of income and increased competitiveness in international markets.

EVOLUTION OF UNIVERSITY RESEARCH- THE CASE OF STANFORD

Outcomes of technology transfer (US)

Over the years universities have become entrepreneurial creating many Jobs through commercialization of innovations

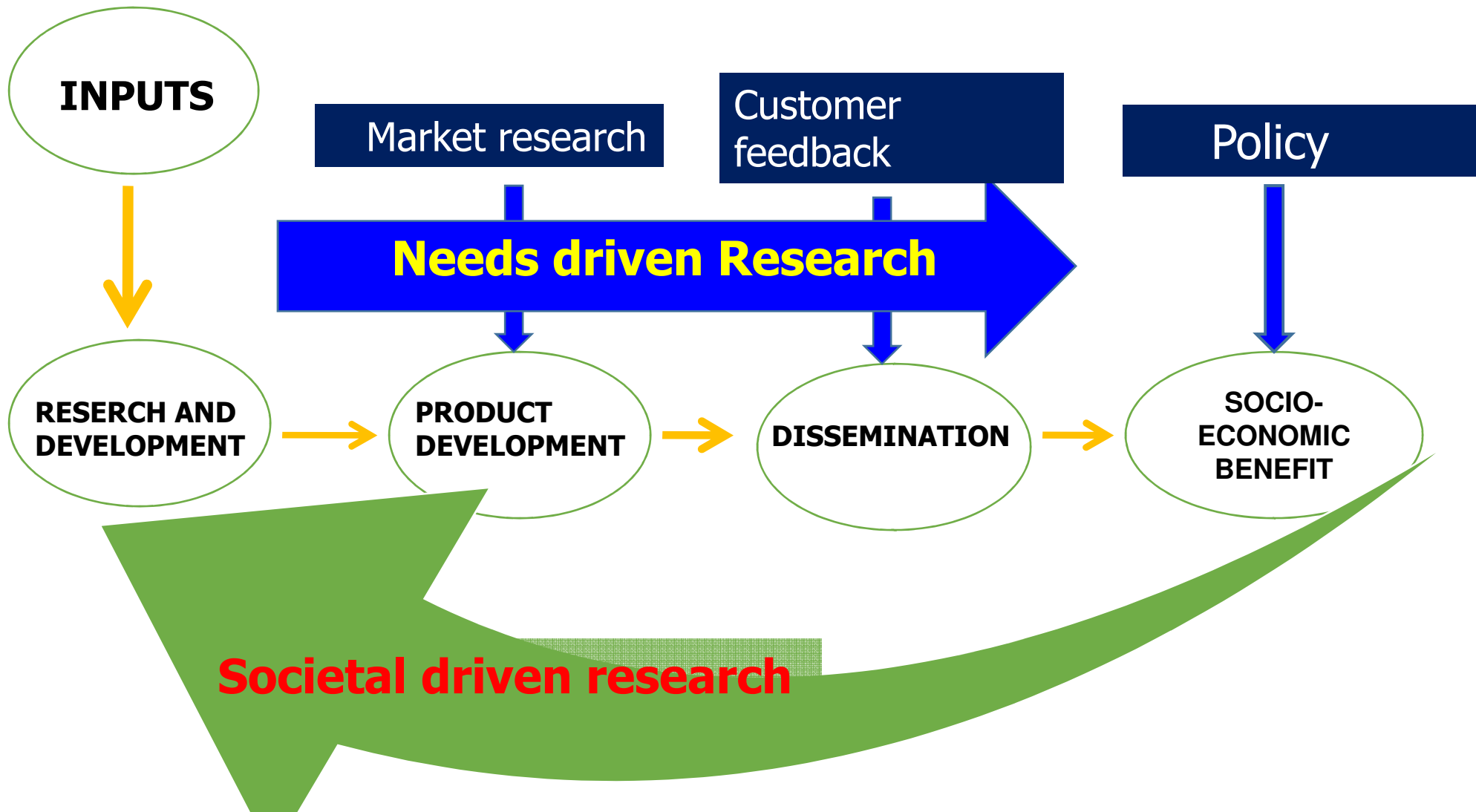
Stanford university currently generate 3 million jobs annually worth USD 2.1 trillion



StanFord innovative Warmers to Reduce Infant Mortality

THE INNOVATION PROCESS

Capital, equipment, scientists



THE JKUAT RPE DIVISION

The RPE division is in charge of management and administration of all research, innovation, technology transfer and collaboration activities in JKUAT. The division was established by JKUAT Act 1994.

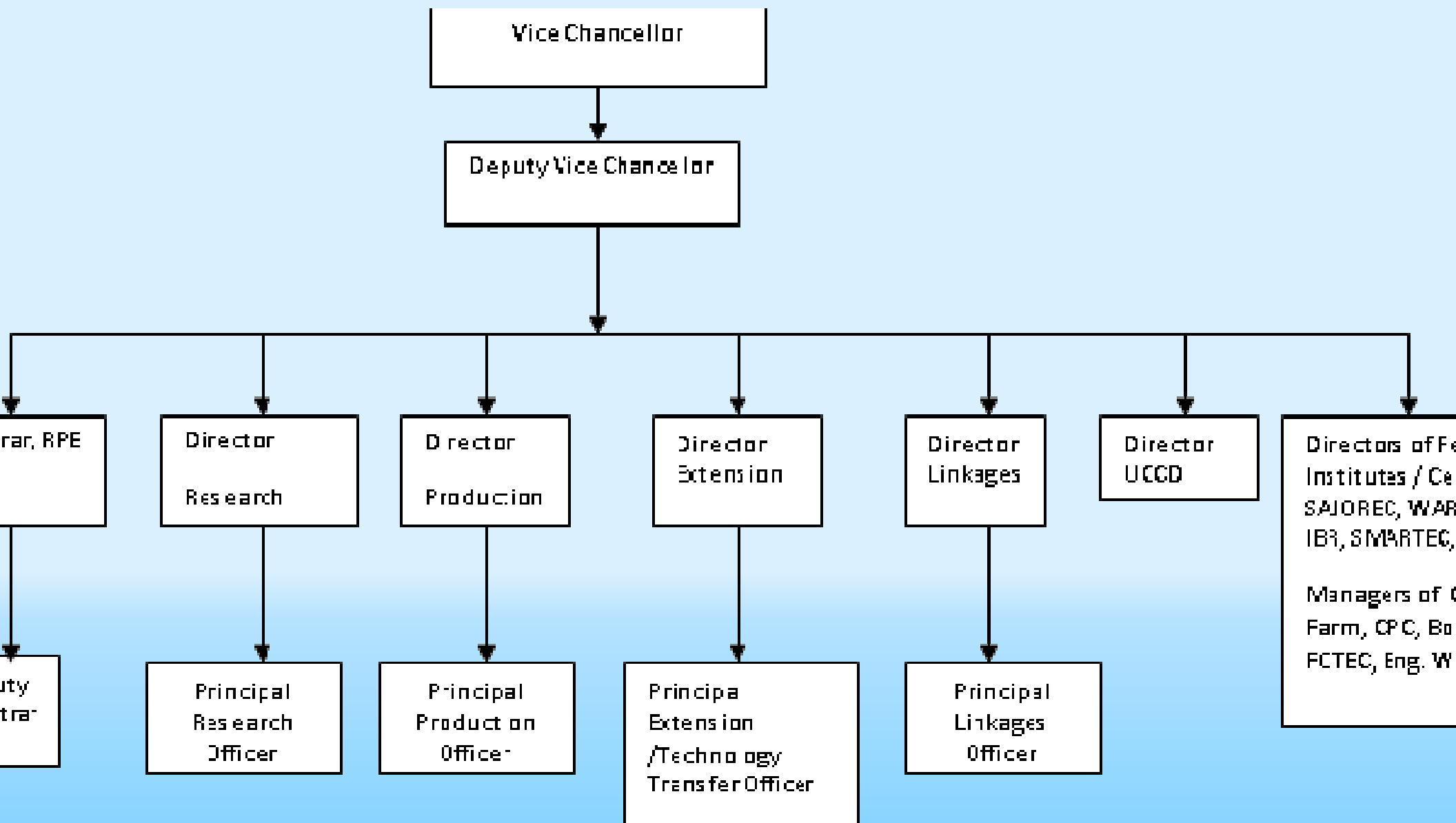
The main objectives of the division are:

• To play an effective role in the development of Agriculture and Technology in conjunction with industry;

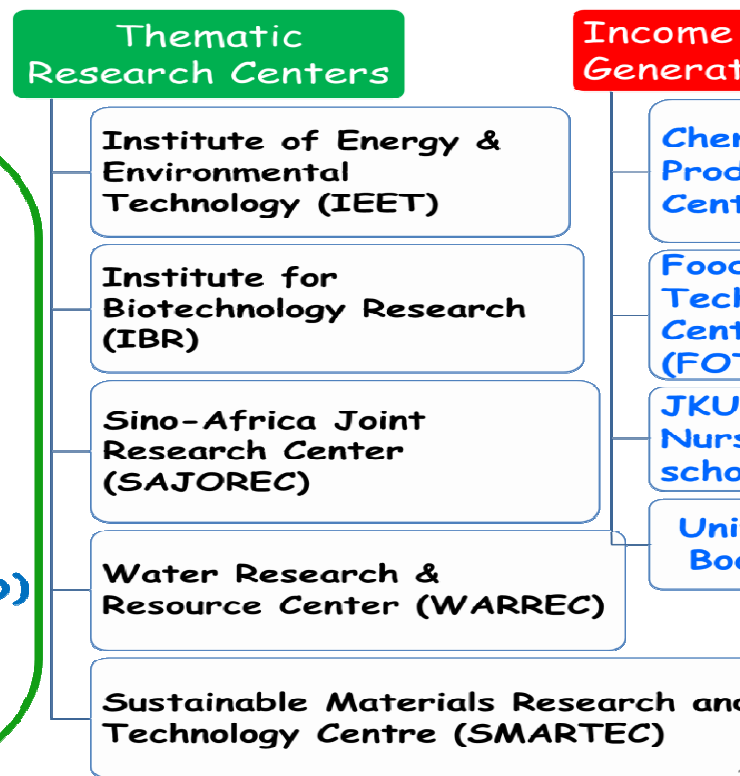
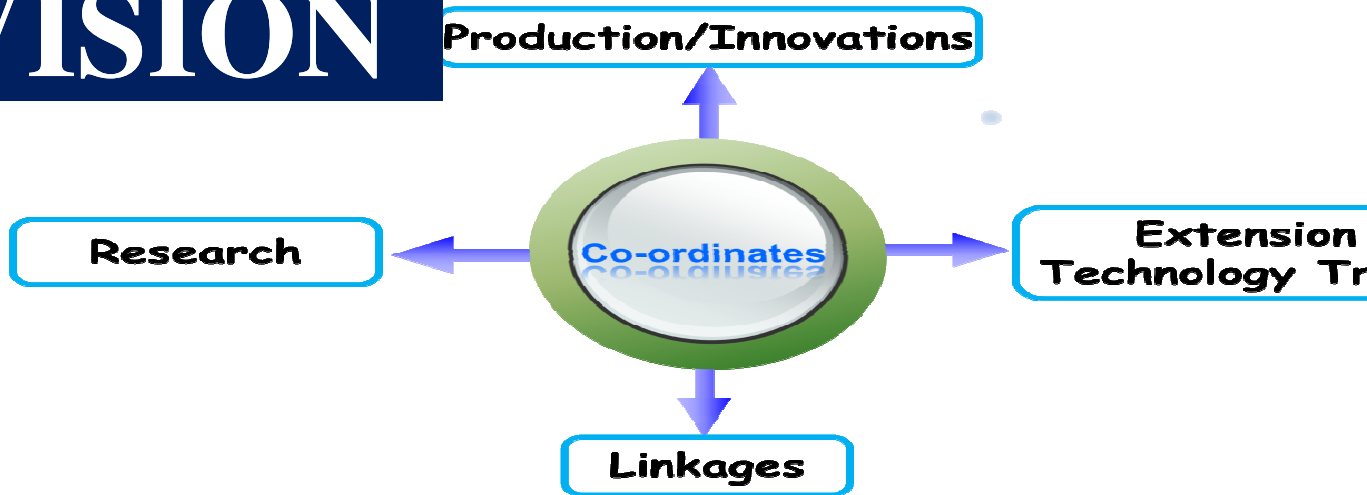
• To provide extension services to contribute to the social and economic development of Kenya.

It is commendable that the drafters of this Act clearly appreciated the emerging importance of research units in modern HEIs.

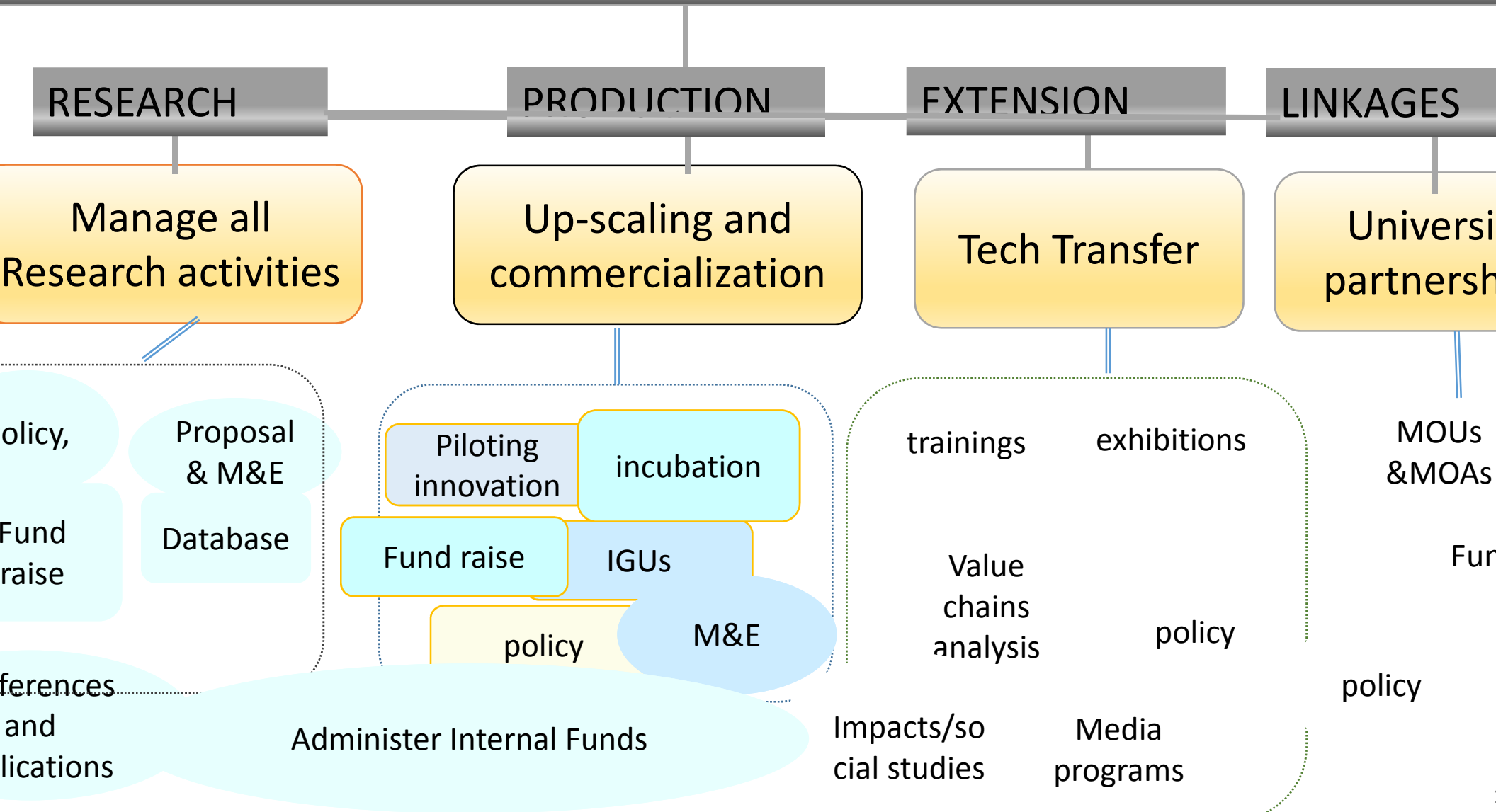
RPE GOVERNANCE STRUCTURE



JAT RPE DIVISION



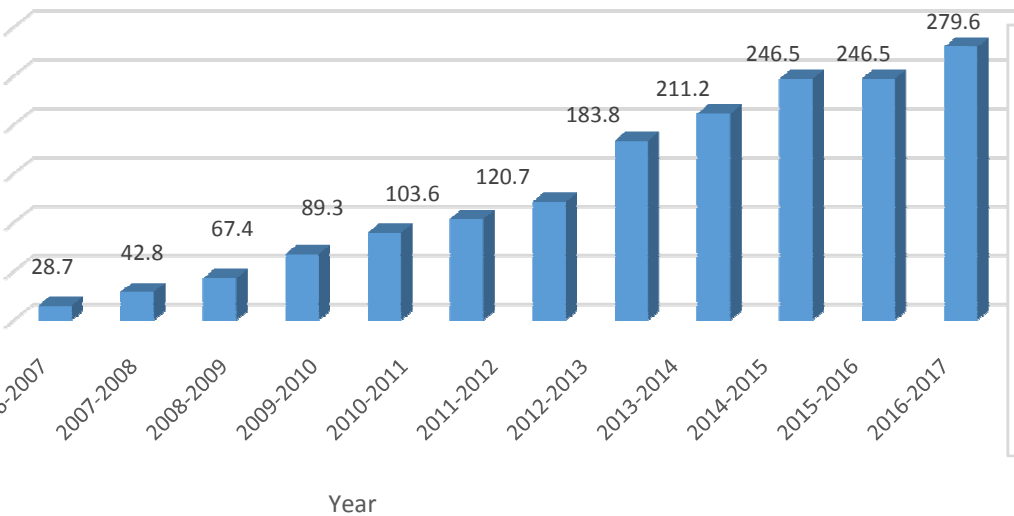
ROLE OF RPE DIVISION



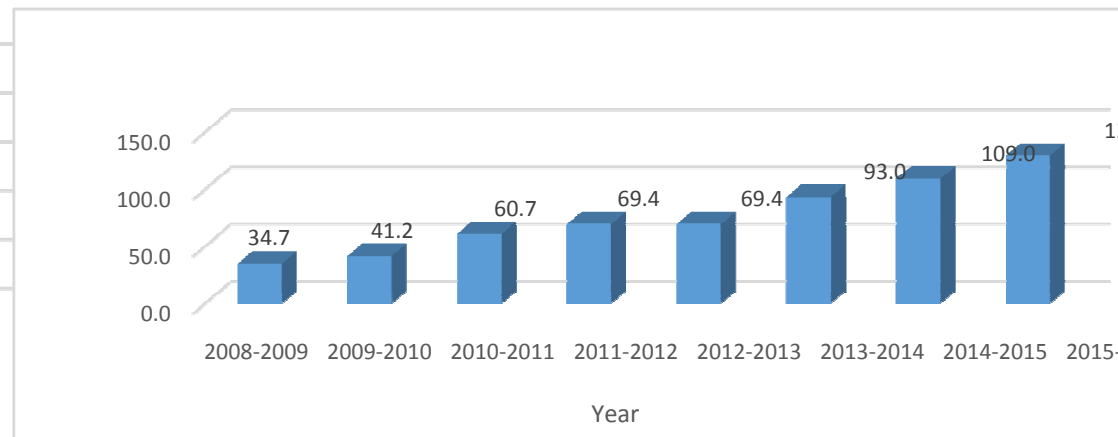
GRANTS

Grants grew exponentially in terms of funding levels in the last ten years. There are three main sources of research funding for the university namely, JKUAT, Government of Kenya (through NACOSTI) and more recently the National Research Foundation. Other local and external international donors. The innovation projects are mainly funded by JKUAT.

Cumulative research funding (2005 to 2016)

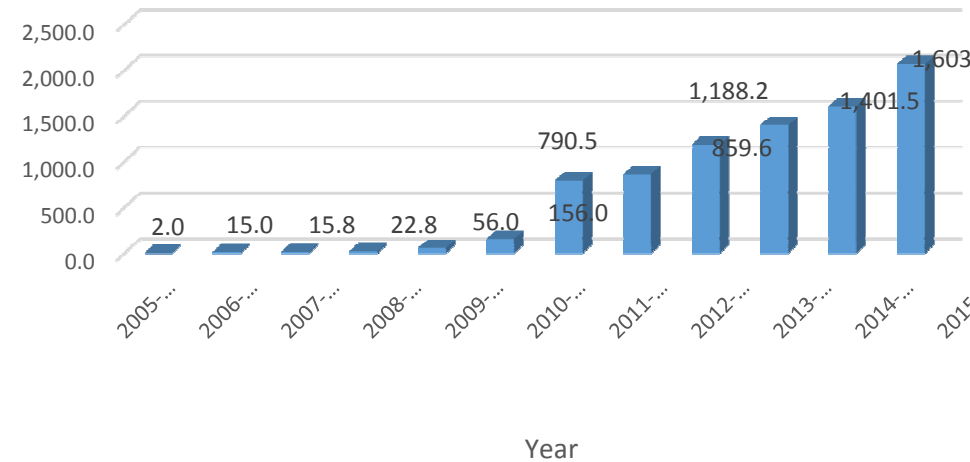
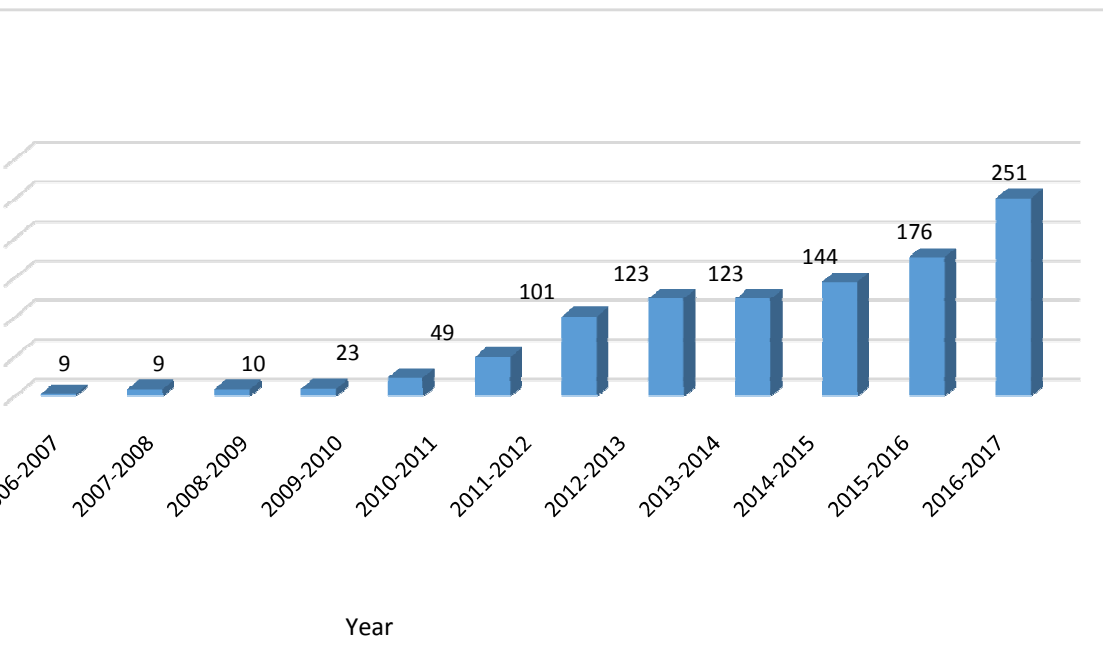


JKUAT, Cumulative Innovation funding (2008 to 2015)



GRANTS

TI, Cumulative research funding (2005 to 2016). International donor, Cumulative research funding (2005 to 2016).



JKUAT RESEARCH THEMES

Agric and Food Security

Human and Animal Health

Nanotechnology

ICT

Natural products

Built Environment

Water Resources

Social Science

Engineering Tech & Industrial Development

JKUAT CENTRE OF EXCELLENCE

SINO
AFRICA

WARREC

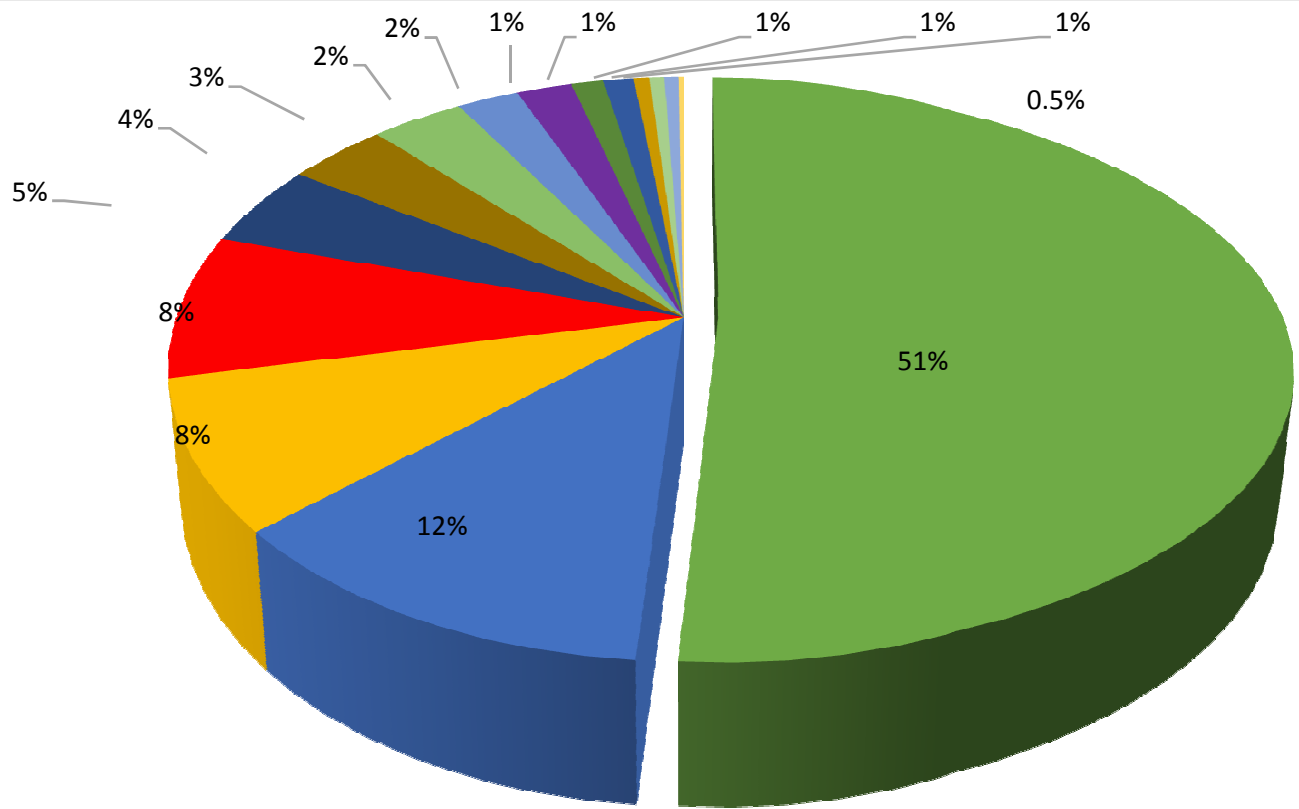
IBR

IEET

SMARTEC

Food Security
(Legume, fortification)

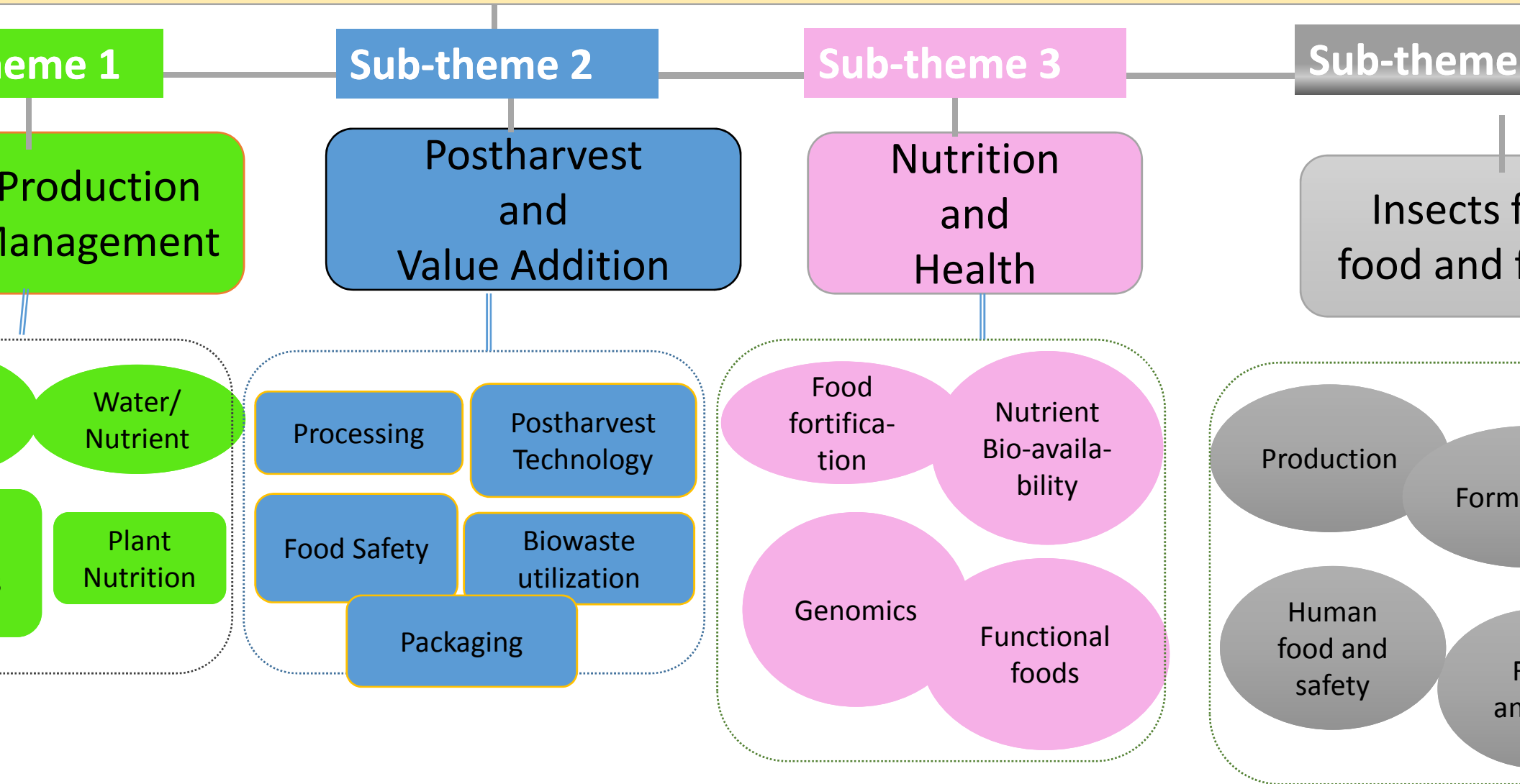
Distribution of Research funding per theme



Agriculture and food security
 Energy, climate and environment
 OREC
 Human and animal health
 Technology
 Biological sciences
 Sustainable materials

- Extension and technology transfer
- Engineering technologies
- Infrastructure technologies
- Natural products
- Water resources
- Tech Expo
- Nanotechnology

Food Security Theme (KES: 1.086 b)

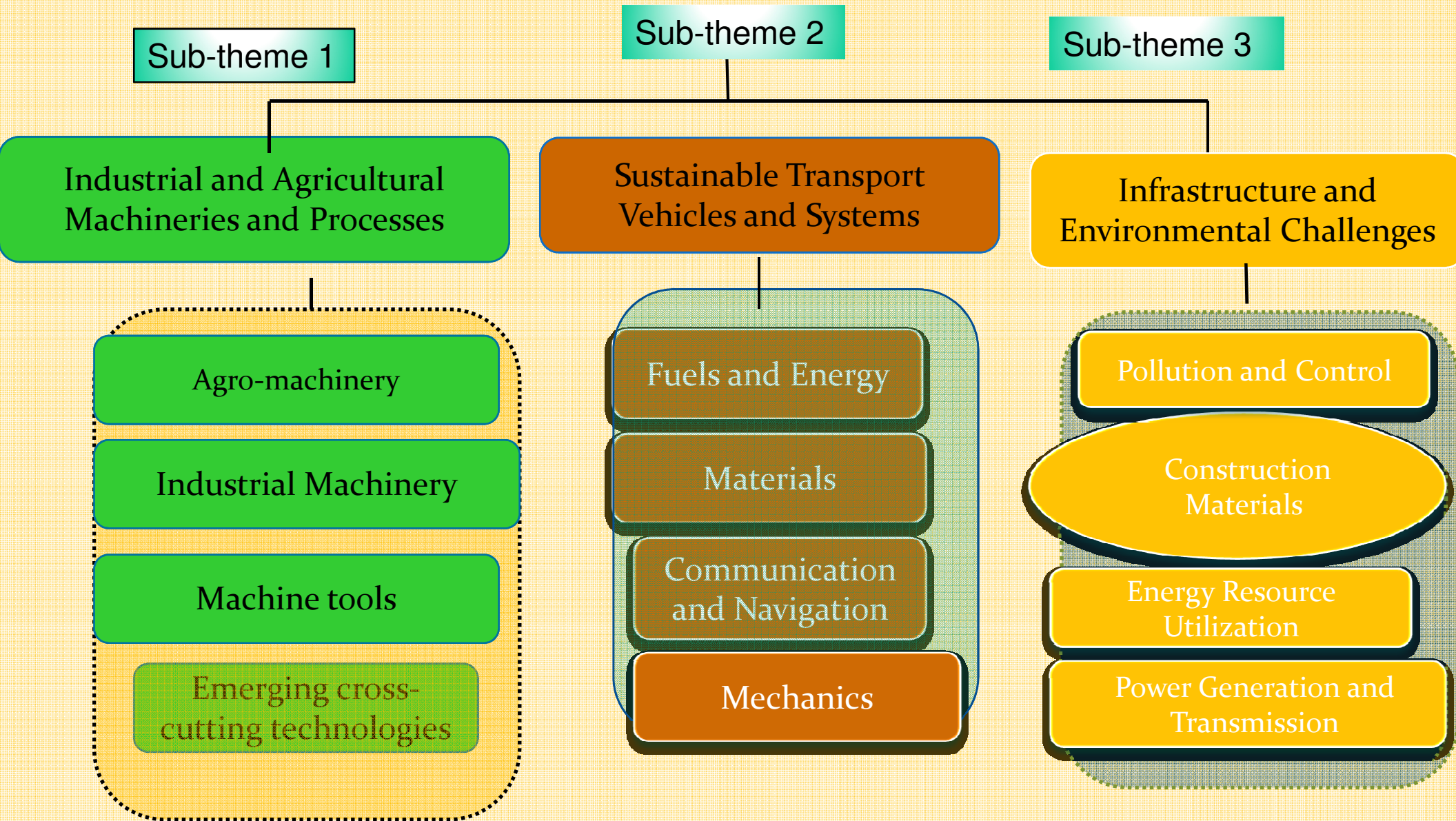


Library building	Quantity
Doctoral students	4
	40
	21
	14
Scientists	4
Partnerships	2
	85
Key Performance Indicators	Quantity
Publications in peer reviewed journal and conference proceedings	113
Number of products developed	17
Projects qualifying for patent/ plant breeders	4
Infrastructure developed	7
Technology development	2

PRODUCTS



RESEARCH THEME: ENGINEERING AND TECHNOLOGY (199 m)



KEY PERFORMANCE INDICATORS AND PRODUCTS

Capacity Building	
Ds	3
Sc	15
Technicians Trained	10
Internships	8
Total	36

Other Key Performance Indicators

Publication in peer reviewed and conference proceedings	50
Products developed	12
Products filed for patents	3
Structure developed/maintained	10
Technology development	5



Electrical Discharge Machine



Reinforced earth block



Fruit pulper



Plant mills

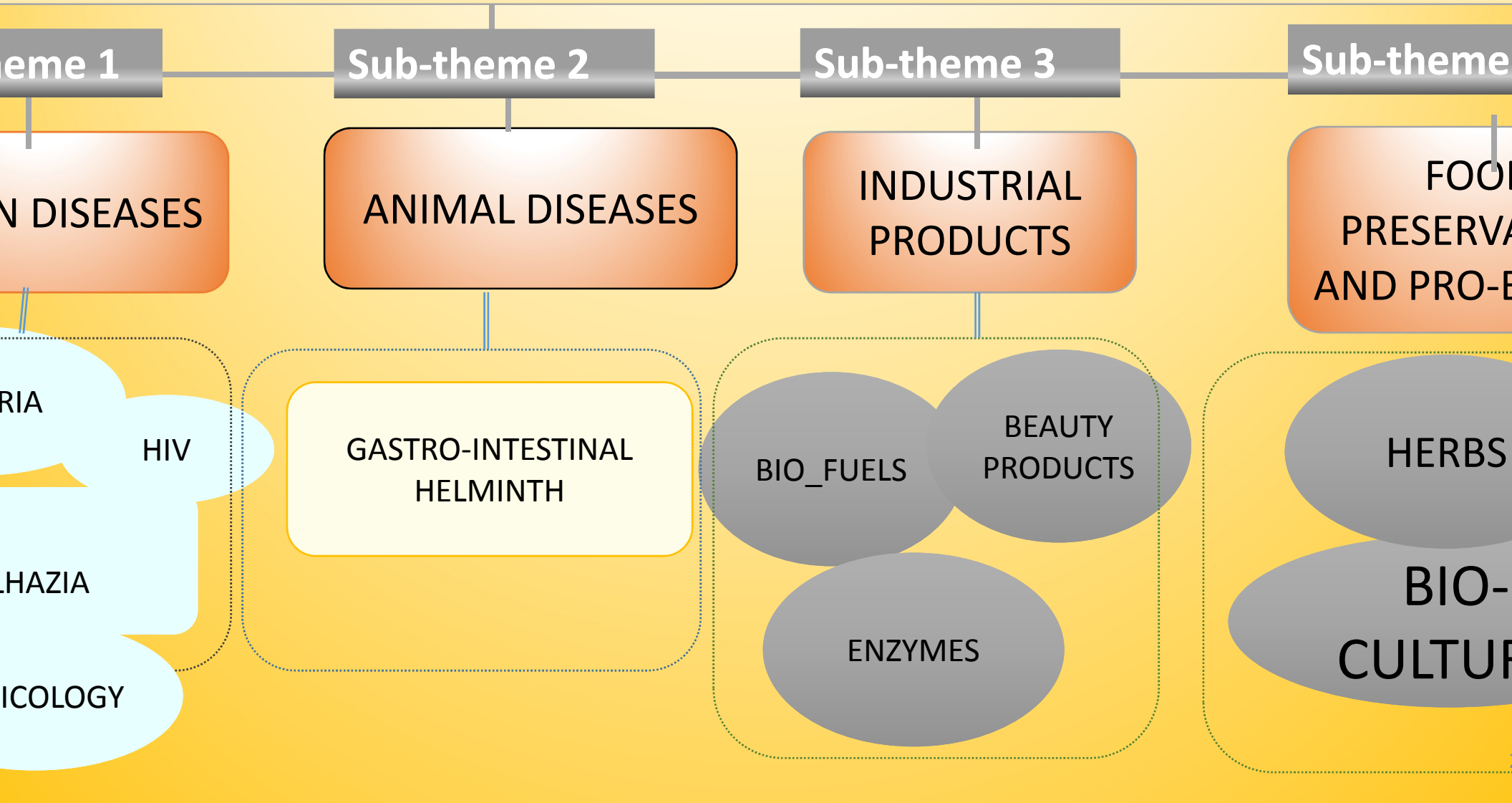


Blow molding machine



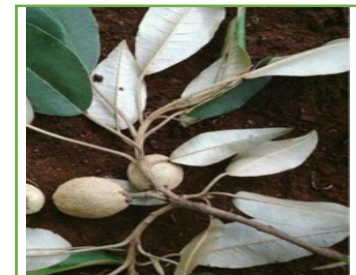
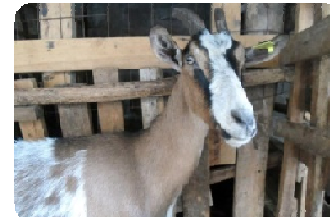
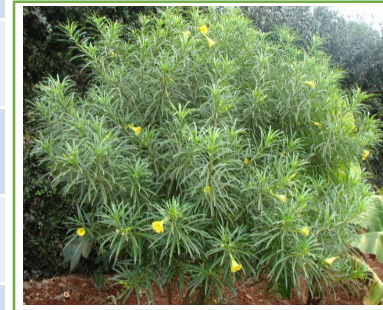
Tricycle with carrier

Natural Products Theme (KES: 66.3 m)



	Quantity
city building	
doctoral students	0
	7
	11
	17
icians	4
nships	2
	36
er Key Performance Indicators	Quantity
ications in peer reviewed journal	39
conference proceedings	
ber of products developed	9
uct qualifying for patent	2
nology development	Yes

PRODUCTS



HUMAN AND ANIMAL HEALTH (KES:118.6 m

Theme 1

Human Health

CANCER

ZOONOTIC

SLEEPING
SICKNESS

MALARIA

Sub-theme 2

Animal Health

HELMINTHS

ECF

city building	Quantity	PRODUCTS
	5	
	20	1. Biomarker for late staging sickness
	2	2. LAMP test for diagnosis of sickness.
r Key Performance Indicators	Quantity	3. A cyrobank for parasites (tacyz
ications in peer reviewed journal	14	bradyzoites.
onference proceedings		4. Accurate method for establish
ber of products developed	9	safety of herbal preparations
uct qualifying for patent	6	5. Three drugs compounds for Ma
		three for Leishmanias (Patents
		for 4 & 5)

Water Resources Theme (KES: 34.2 m



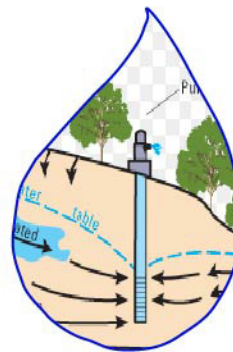
or agriculture:
harvesting
irrigation



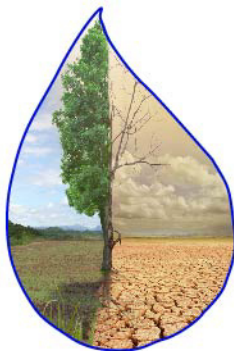
Catchment management,
soil erosion
and sedimentation



Water management
and
business linkages



Groundwater
manageme



Climate change and
water resources

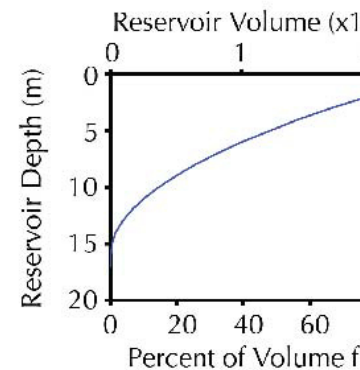
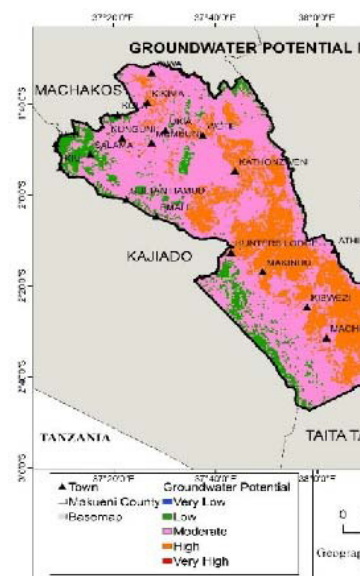


Water
for cities

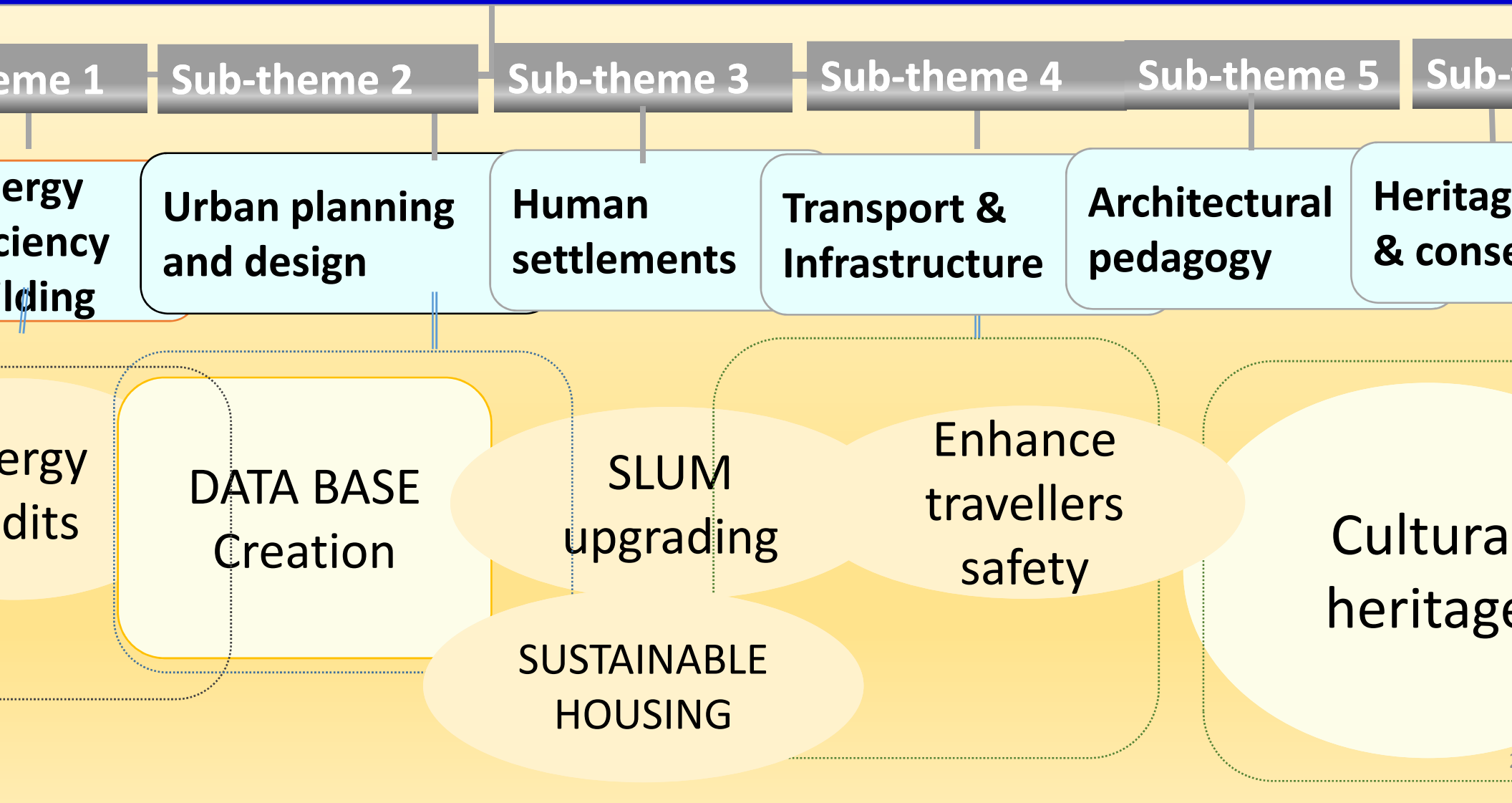


Water for sanitation,
hygiene and health

city building	Quantity
doctoral students	7
	16
	76
	45
icians	12
nships	11
Key Performance Indicators	
ications in peer reviewed journal	Quantity
conference proceedings	98
ber of products developed	7
nology development	2

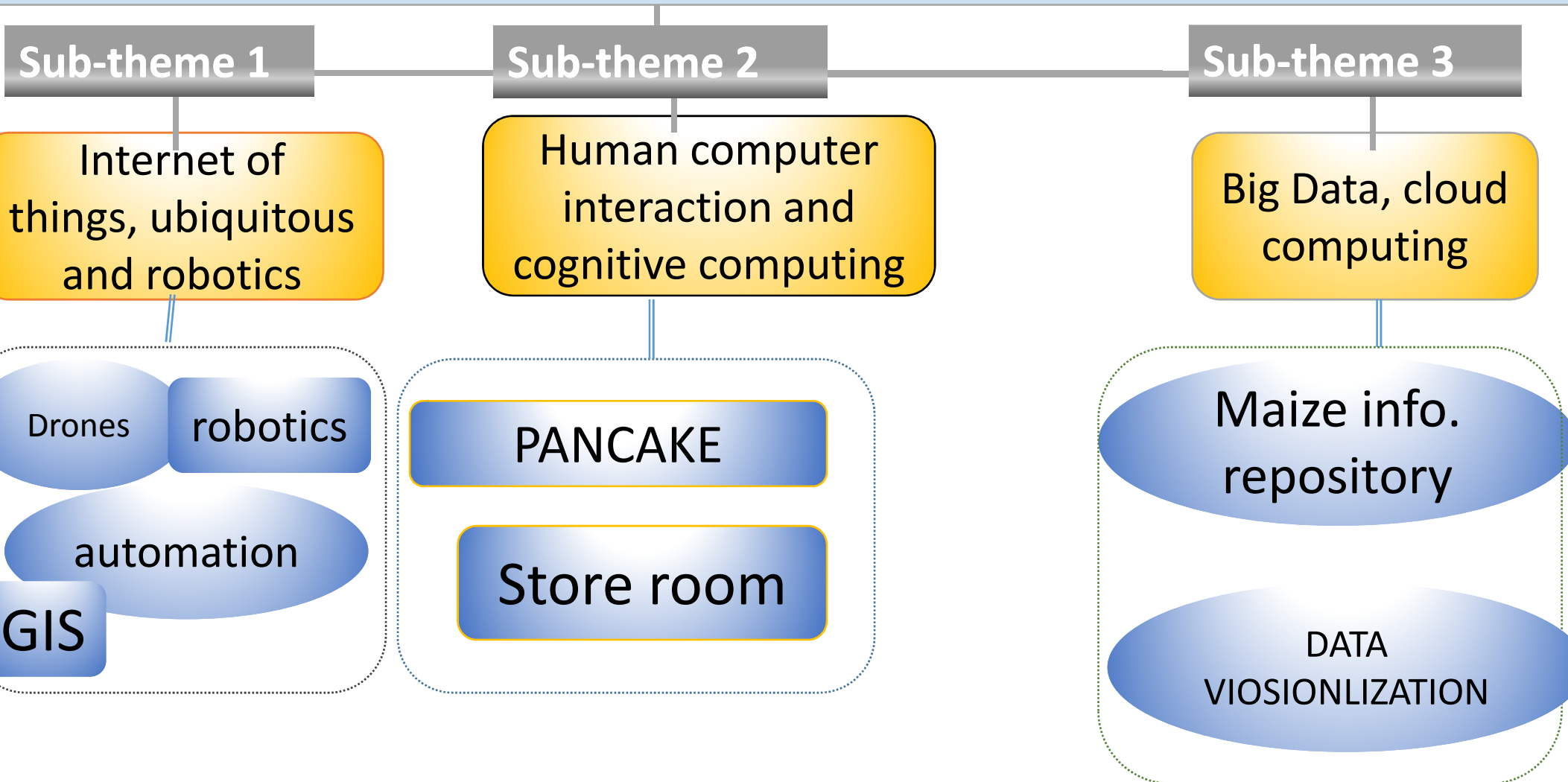


ENVIRONMENT AND INFRASTRUCTURE TECHNOLOGIES (94.4 m)



Quality building	Quantity	PRODUCTS
	3	
	18	1. Energy use in Buildings data base.
ships	4	2. Urban planning, design and development data
	25	3. Design-build curriculum (Training of trainers)
Key Performance Indicators	Quantity	4. Students design prototype construction
Publications in peer reviewed journals and conference proceedings	63	5. Good school, good neighborhood handbook 6. Guidelines for achieving “good school, good
Number of products developed	6	neighborhood” model
Grants	6	

ICT Theme (KES: 21.2 m)



Capacity building	Quantity
Post-doctoral students	1
PhD.	9
MSc.	4
Technicians	1
Internships	2
Total	17
Other Key Performance Indicators	Quantity
Publications in peer reviewed journal and conference proceedings	20
Number of products developed	1
Technology development	2

- 1. Maize information reporting system**
- 2. Mobile application for recording poultry data**
- 3. Opportunities and Res Portal for Kenyan University Students**

NANOTECHNOLOGY (KES: 9.4 m)

Sub-theme 1

Agriculture

Chemical
residues

Fertilisers

Pests/
Diseases

Sub-theme 2

Renewable Energy

Nano Structure Solar Cells

Quality building	Quantity
	3
	5
	1
icians	1
ships	1
	11
Key Performance Indicators	Quantity
ations in peer reviewed journal and rence proceedings	4
er of products developed	3
cts patented	1
ology development	Yes

PRODUCTS



IBR (KES: 56m)

Theme 1

PLANT BIOTECHNOLGY

Tissue culture

Crop improved

Pests/
Diseases

Sub-theme 2

ANIMAL BIOTECHNOLGY

Rabbit and chicken improvement

Genetic studies on wildlife

ty building	Quantity
	4
	2
Key Performance Indicators	Quantity
ations in peer reviewed journal and ence proceedings	9 (1 nature)
er of products developed	2

PRODUCTS



TISSUE CULTURE BANANA SEEDLINGS GROWING IN A GREENHOUSE IN JKUAT



JKUAT RESEARCHER EXAMINING INDIGENOUS CHICKEN FOR GENETIC TRAITS



THE LEAD RESEARCHER ON RHINO DNA MARKERS AT WORK



STUDENTS COLLECTING DNA SAMPLES

IEET (KES: 235.2m)

Sub-theme 1

RENEWABLE ENERGIES

Solar
energy

Mini-
Hydros

omas

Solar wind
hybrids

Training

Sub-theme 2

ENVIRONMENT




Environme
ntal audits

Waste
manage
ment

Climate
change

Trainings

Occupational
safety and health

ity building	Quantity	PRODUCTS	
	13		
	70		
icians	1380		
Key Performance Indicators	Quantity	<p><i>Solar training practical session</i></p>	
ations in peer reviewed journal and rence proceedings	112	<p><i>Installation of a 200W electricity generator at Girls' Secondary School</i></p>	
er of products developed	10		
cts patented (Applied)	2		
ructural development	6		

Solar training practical session

*Installation of a 200W
electricity generator at
Girls' Secondary School*

*Factory visit by IEEET Solar Water
heating trainees at Steelstone
Ltd.(Nairobi)*

*JKUAT researchers at the N
show exhibiting a rice husk*

RTEC



o-Housing.

Reclaimed
Asphalt
Concrete.

stabilized soil
Blocks,

SAJOREC



Biodiversity
studies.
Floristic
investigation.
genomics.

WARREC



Fog Harvesting.
SRI promotion.
Groundwater Risk
Management.
Bathymetric
Reservoir Survey

LCEFORM



Breeding
Storage
value
addition
Nutrition
and health

Extension and Technology Transfer Activities (359.5 m



ms



Nissin Noodles



Trainings



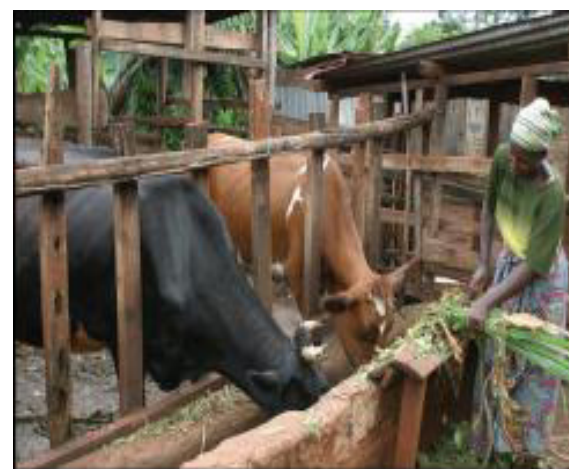
Social Studies



Radio and TV



Promotion Material



Dairy, Cow Milk, value chain studies





THE JKUAT TECH EXPO .

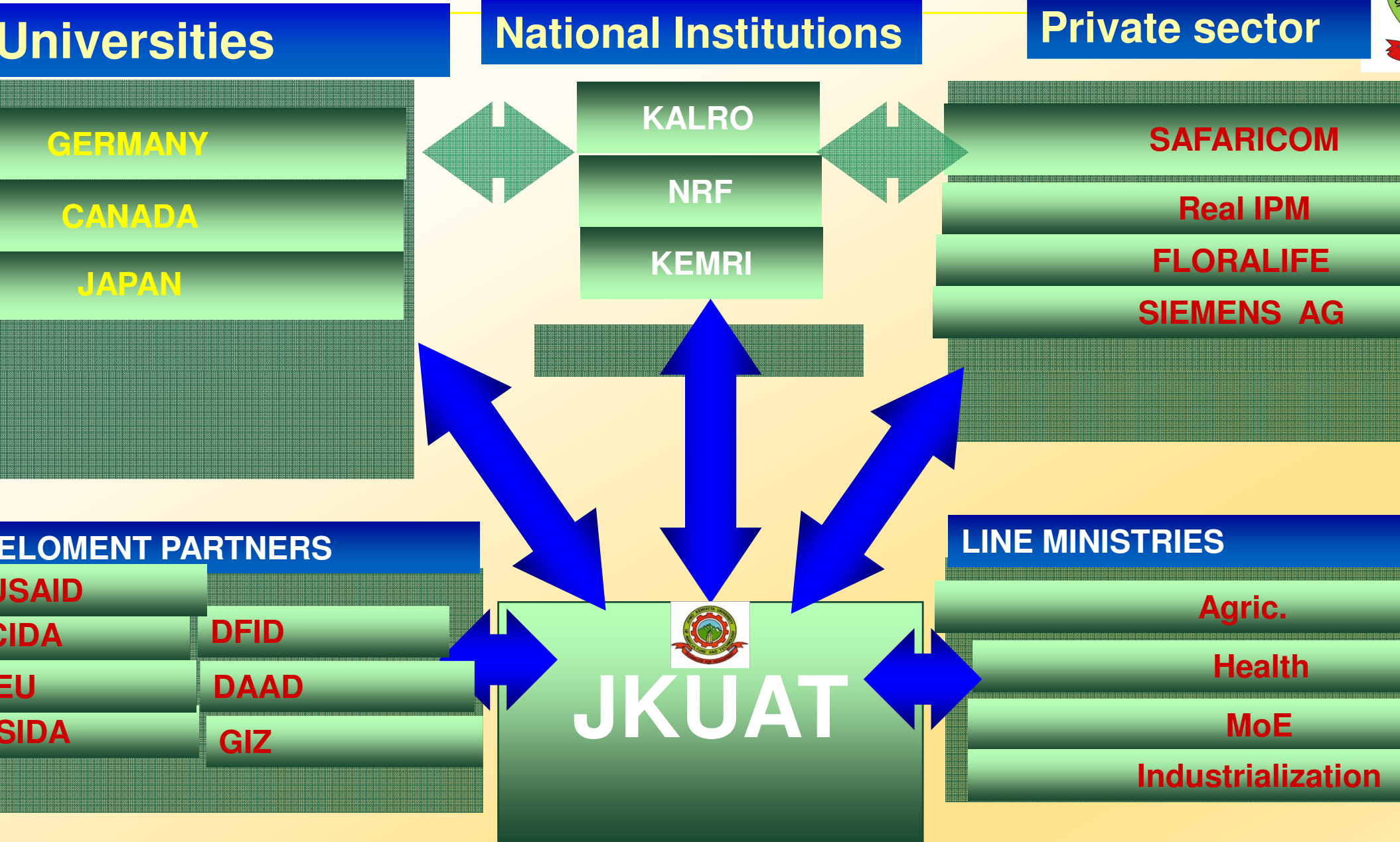


**THE JKUAT
TECH EXPO**
ALL FOR PROJECTS
20th and 21st October 2016
and 4th November 2016
at JKUAT Main Campus - Nairobi
with 11 live shows
IMAGINE LIVING THROUGH INNOVATION!
Registration fee: projects/organizers
Maximum of 4 members!
www.jkuattechexpo.com
#techexpo16

ORIGINATING COMPANIES

Innovation	output
TARI	Medical Services Digitization Platform
MOBILE GAMING SOLUTION	Software for Mobile Gaming
CALL CENTRE	Remote management of client services via a call center
FROM PLASTIC TO BRICKS	Composite construction material from plastic wastes and sand
TOMATO FLAVOUR PRODUCTS	Food grade Flavours from Tomato

UNIVERSITY LINKAGES



CONCLUSIONS

Research and innovation culture in JKUAT has just began;

There is a long way to go before a research-based competence that generates innovations and new technologies that contribute to prosperity is achieved;

Innovation is not a sudden flash of inspiration, but a long process of experimenting and learning and therefore must be carefully managed through various stages in order to deliver useful results;

The aim is to develop an ecosystem of research and innovation culture where the university is interacting with stakeholders so that research and innovation products can be turned into new businesses.

THE FUTURE

THE ENTREPRENEUR UNIVERSITY CONCEPT

Technologies moved from Lab. to the Market

- Through Licensing
- Encouraging inventors to start business from their innovations (SPIN -OFFS)

University Contribution

Establish enabling Facilities e.g.(iLABS, wet-LABS, incubators).

Establish Venture capital funds

JRE :-Venture Capitals Examples

UNIVERSITY	YEAR	Value (m)
BRIDGE -UK	2013	£ 50
University of California	2014	\$ 250
Card ISIS	2015	£ 300
University College London	2016	£ 50

WHAT Should Follow this Example

FUTURE-Focus

Universities	Startups
University of Cambridge UK	Life sciences
University of Munich	Mobile technology
University of Zurich -Swiss	Computing Technology
University (Finland)	Energy and design
Copenhagen and Malmo- Sweden	Life Sciences

FUTURE- JKUAT Focus

AS TO FOCUS ON

Mobile Technologies

Renewable energies

Computing and information technologies

Sciences

FUTURE- SPIN-OFFS

Income from Spin-off and Licensing

EXAMPLES:

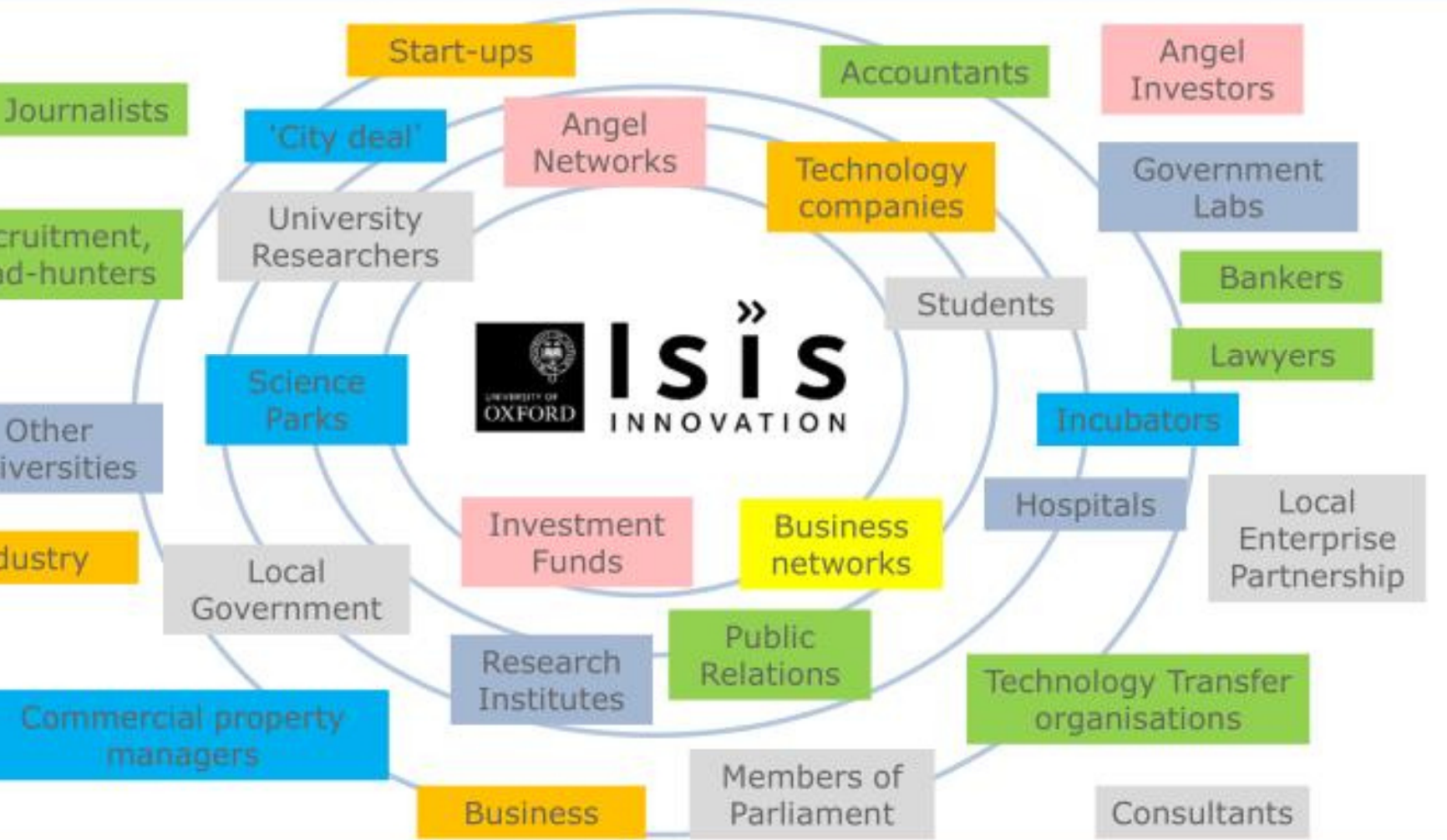
ISIS got £ 54.6 million in 2015

got \$16.1 m from 14 firms created from their own technologies in 2015
income goes back to fund research but relatively small compared to her
ts (\$ 4.5 Billion)

Spin-off and licensing are mainly for creating impacts

ISIS innovation Ltd., University of Oxford

The Innovation System



PARTING SHOT

**... frontiers of the mind are before us, and if they are pioneered with the
vision, boldness, and drive with which we have waged this war we can
... a fuller and more fruitful employment and a fuller and more fruitful**

FRANKLIN D. ROOSEVELT

September 17, 1944.

ACKNOWLEDGEMENT

JKUAT University Council

JKUAT Chancellor

Chancellor

Staff

the JKUAT Community

JKUAT Researchers and Innovators

JKUAT Students Body esp. Tech. Expo.

JKUAT Development Partner; NACOSTI and International Donors

THANK YOU