KNUST **RANKS NO.1 GLOBALLY** FOR THE PROVISION OF QUALITY EDUCATION **(SDG 4)** By: THE WORLD UNIVERSITY RANKINGS

Distributed IoT Platform for Safe Food Production in Education, Research and Industry (DIPPER)

(Applied Sciences as drivers for regional innovation ecosystems in Africa)

6th September, 2023

Presenters:

Dr. Eric Tutu Tchao (Scientific Director, DIPPER Lab)
Prof. Abdul-Rahman Ahmed (Dean, Faculty of Electrical and Computer Engineering, KNUST)

Presentation Outline

- Introduction
- Project Overview
- Use Cases: Palm Oil and KTP
- Framework for Success
- Summary

Where is KNUST?

KNUST, Ghana's Premier Science and Technology University

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Introduction

01

Africa has the world's highest per capita incidences of foodborne illness with 91 million cases of sickness.

02

GFSD reports reveal that more than half of the donor-funded food safety projects in Sub-Saharan Africa emphasize export markets.

03

Intra-African food demand is projected to increase by 178% by 2050.

04

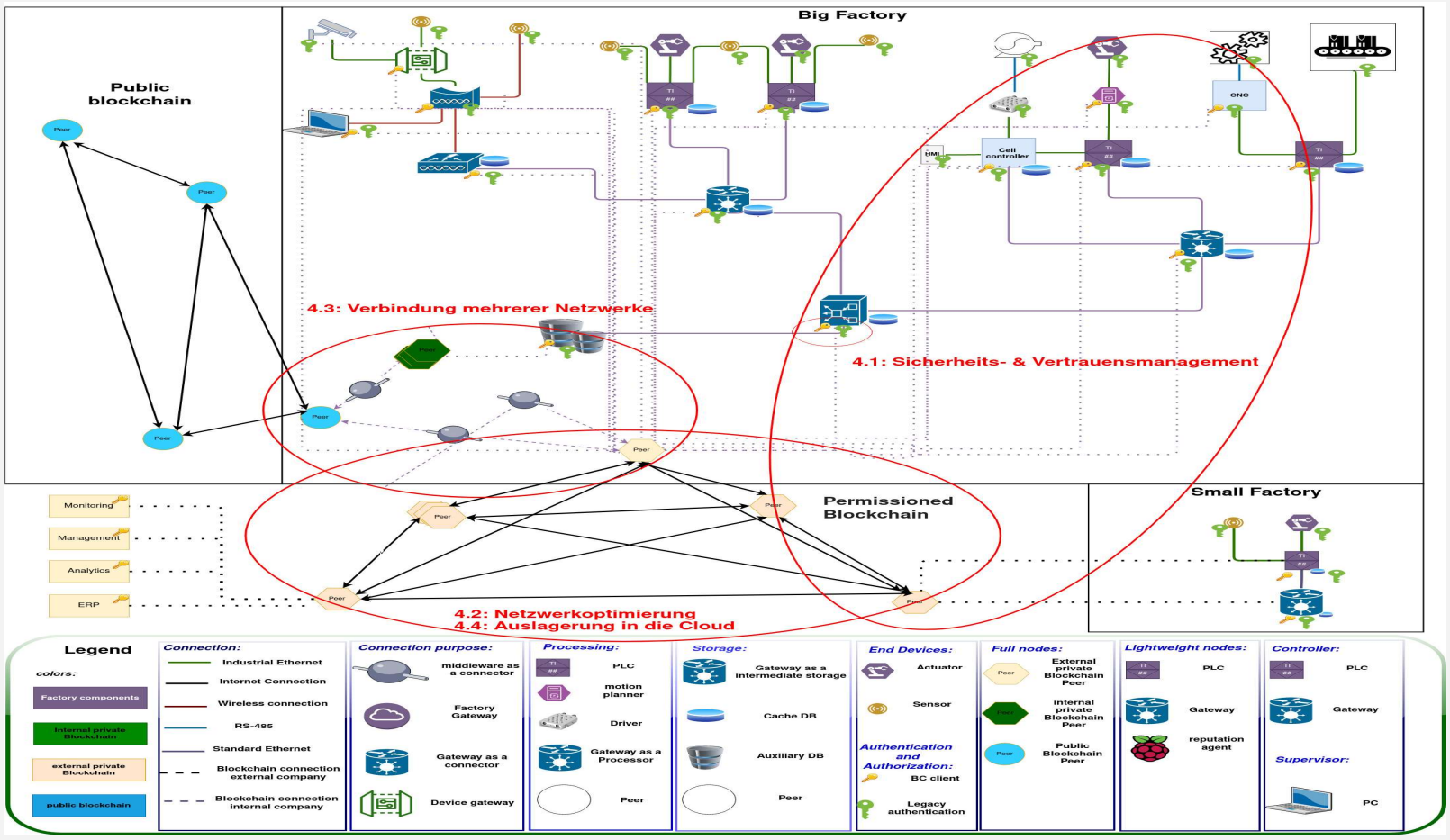
There is no food security without food safety.

Background **of the DIPPER Project**

- Design, implement and validate prototypes for food production elements in distributed ledgers.
- Evaluate the performance and possible trade-offs of deploying the developed prototypes into Ghanaian and Sub-Saharan food industry,
- Conceptualize, implement and validate the suitability of smart contracts for food production.
- Create a toolbox for stakeholders producing or processing agricultural and food products, which will be provided as open-source for re-use through the whole community.

Approach: Problem is too big to solve – Focus on Applied Research

DIPPER Problem Formulation



Achievement **of the DIPPER Project**

Status of Lab: 2021

Status of Lab: 2023

Achievement **of the** DIPPER **Project**

05 Development of Expertise - Leading to promotion of Staff

04 5 Publications in High Impact Journals

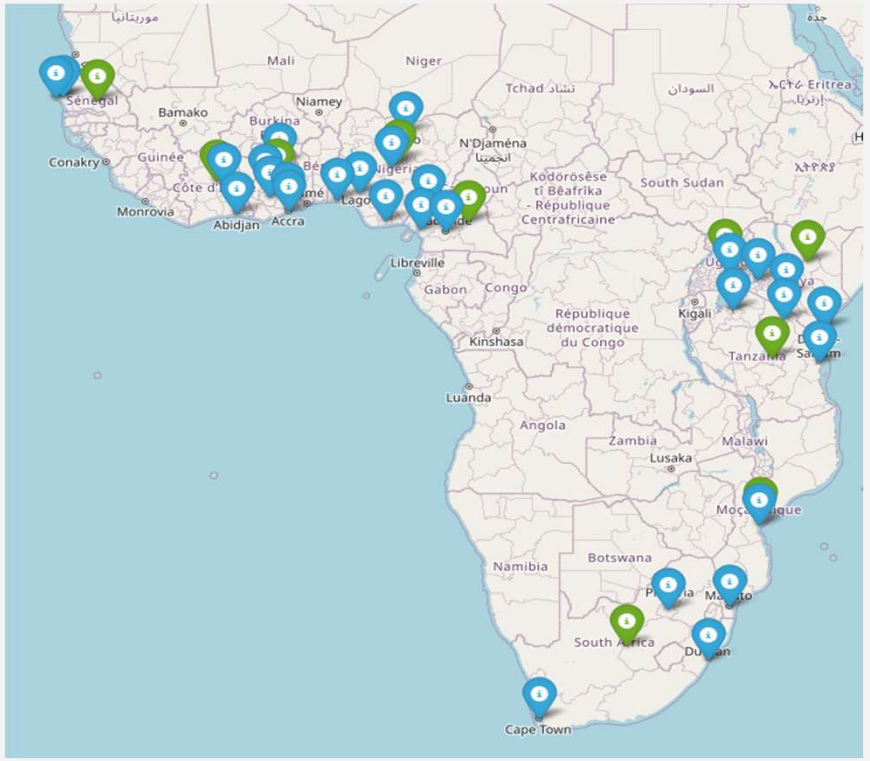
03 3 PhDs, 2 MPhil Students and 2 Staff successfully exchanged – Joint training activities

02 3 MPhil thesis in the domain of blockchain and IoT have been successfully defended – Joint Research Supervision

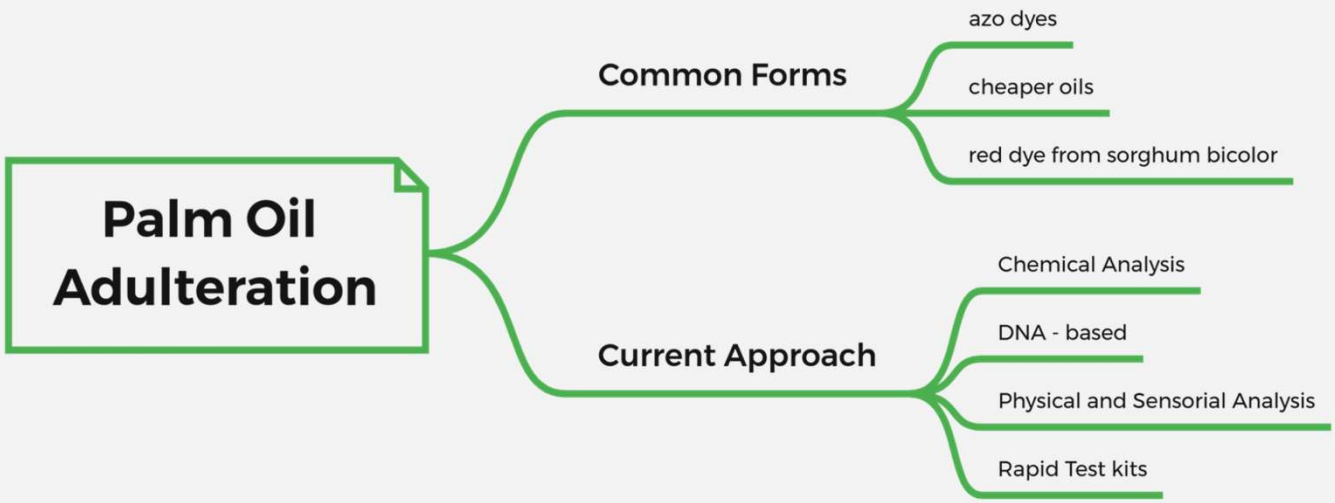
01 Setting up of the blockchain lab (DIPPER Lab) at KNUST which is now an avenue to train students at KNUST in course related to blockchain, Artificial Intelligence and Internet of Things (IoT) – Commitment from University Management

Applying Results of Research to Solving Real Life Problems in Ghana

Use Case: Palm Oil



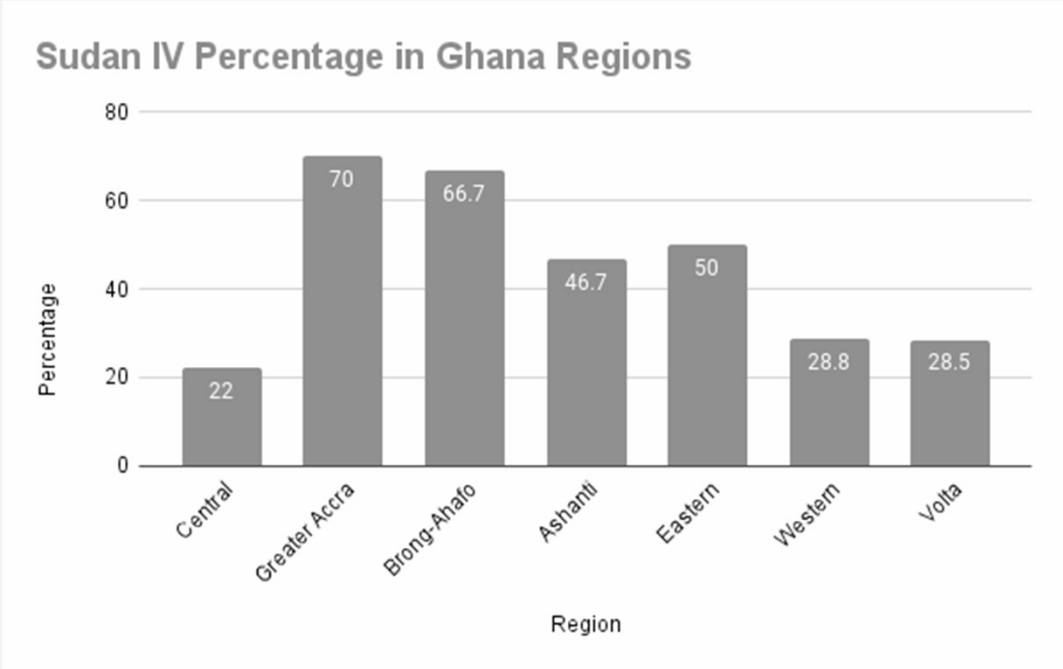
Use Case: Palm Oil - continued



Use Case: Palm Oil - continued

Sudan IV

- This dye is carcinogenic and hence IARC and FDA banning it usage.

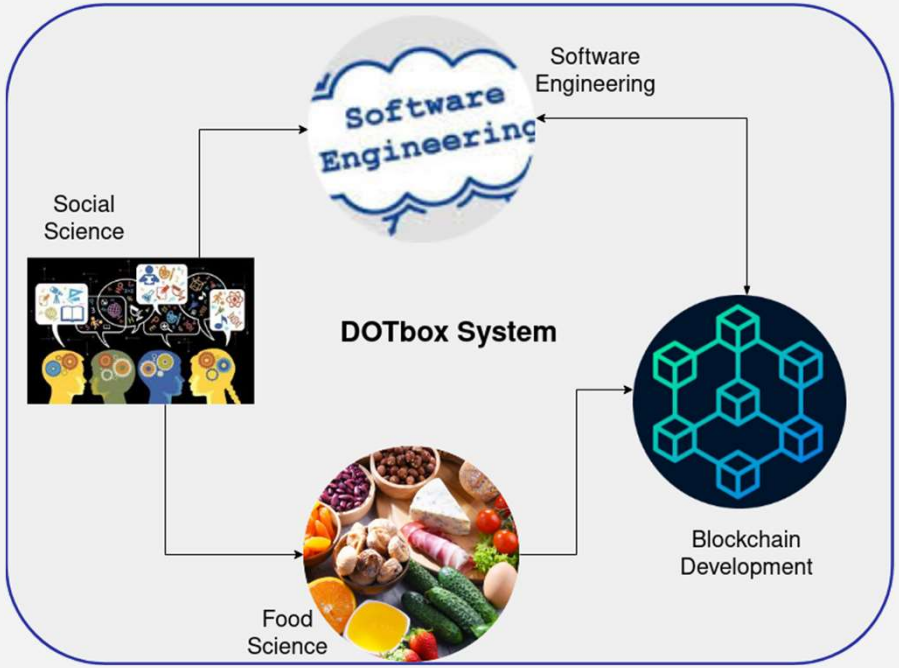


[S. Dakwa, E. Teye, R. McArthur- Quality and safety evaluation of important parameters in palm oil from major cities in Ghana- 2021]

Use Case: Palm Oil - Transdisciplinarity

The DOTbox System:

- Majorly involves knowledge in the following disciplines
  - Computer Science/Engineering
  - Food Science
  - Humanities and Social Science
  - Regulators (FDA, GSA)
  - End users (Market women, Industry, etc)

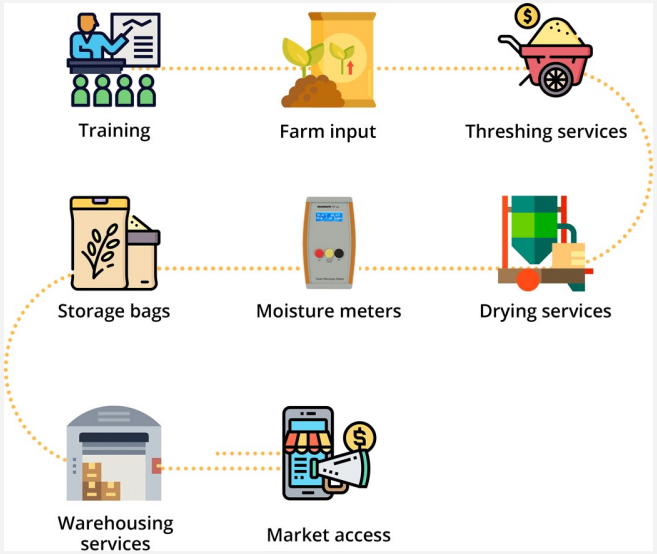


Scaling Up – Knowledge Transfer Activities

Knowledge transfer initiatives

Current Portfolio Service

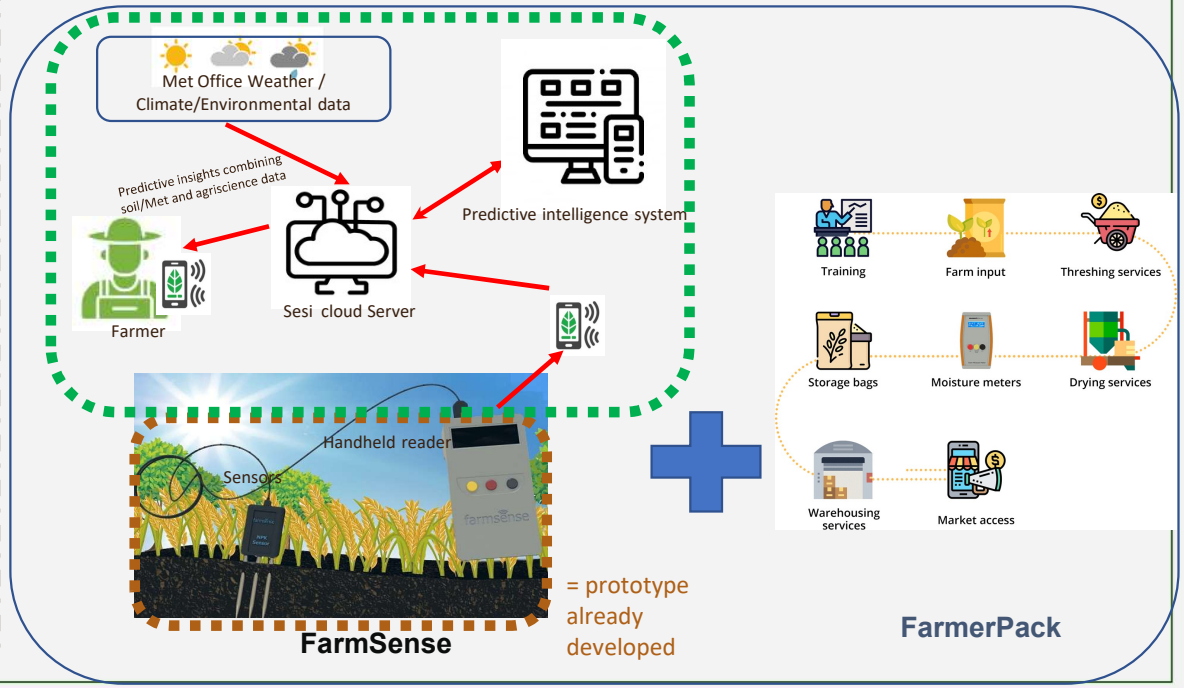
- Comprehensive Post-harvest solution for small holders through FarmerPack
- Kit sales to larger commercial/agribusiness (Moisture meter, warehouse monitor, AgroMarket platform, Storage bags)
- No pre-harvest solution / technology offered through there is market need



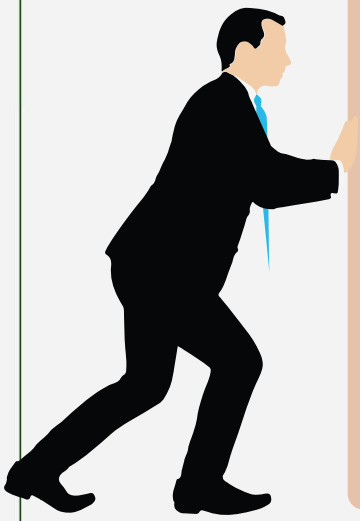
FarmerPack

DIPPER Lab Collaboration enabled

- Expand Sesi product range to cover pre-harvest market needs through FarmeSense - an affordable modular IOT enabled test and predictive analytic solution
- Develop a 360 degree solution approach to support customers (both pre and post harvest productised solution)



Framework for Success



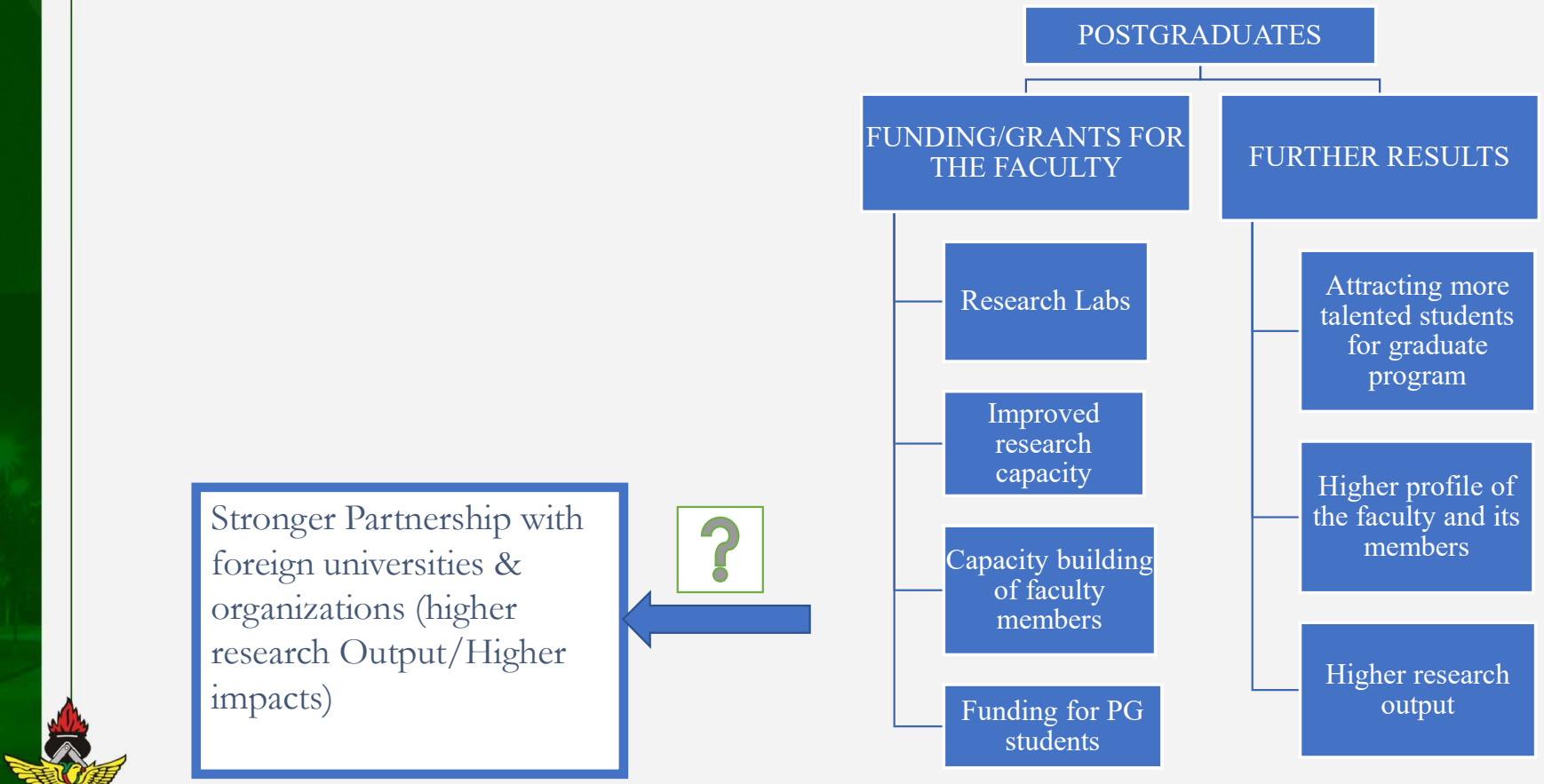
Postgraduate Program

- Create Postgraduate Labs Concepts
- Establish and strengthen research in disruptive technologies

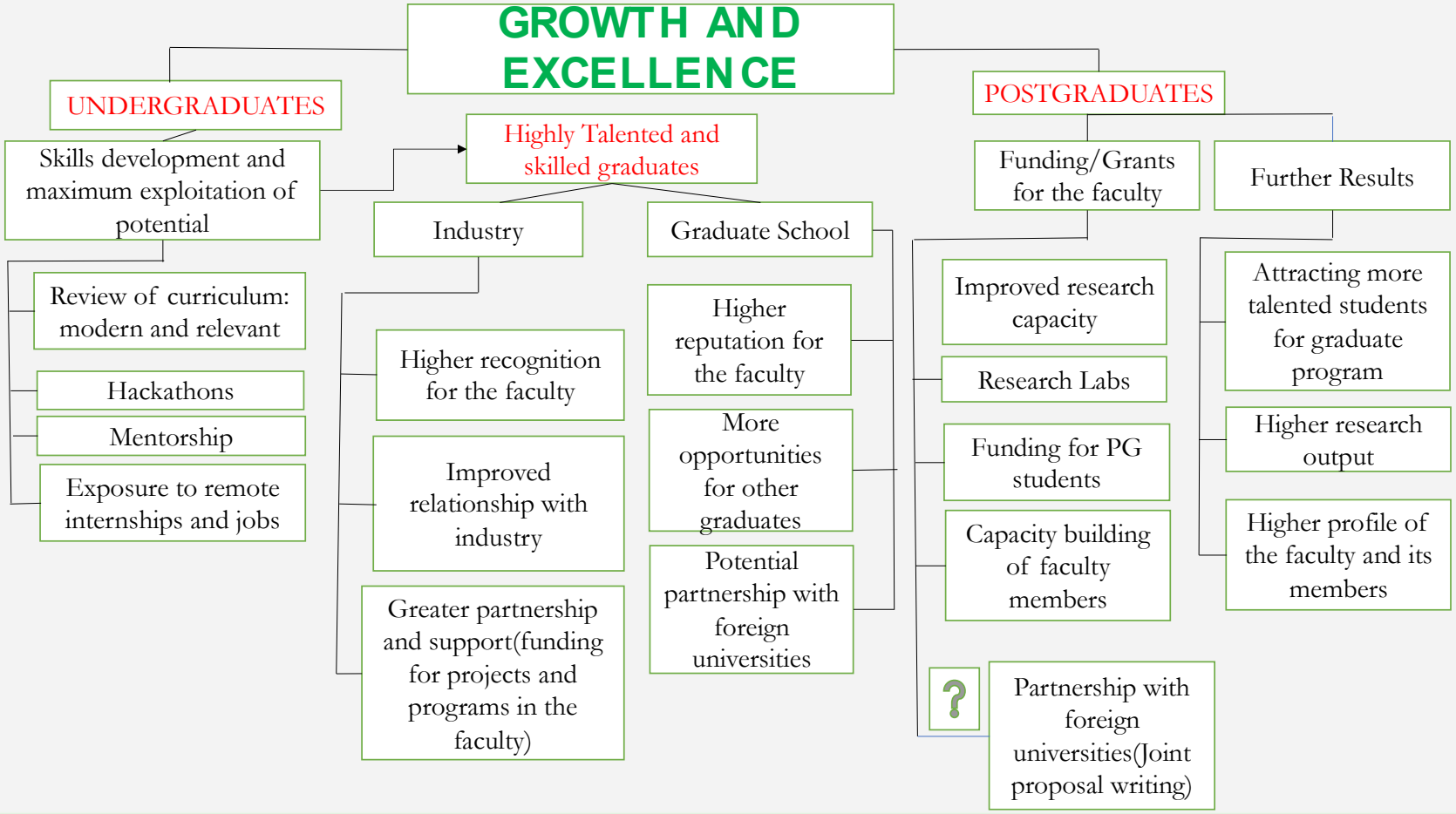
Collaboration and Partnership

- Create international collaboration for each Department
  - For all year round proposal writing
    - for attracting grants and for capacity building
    - For channelling part of grants into postgraduate research labs.
  - Structure and give life to local industrial partnerships for each Department

Growth and Excellence: Postgraduates



Summary


GROWTH AND EXCELLENCE
UNDERGRADUATES
Skills development and maximum exploitation of potential
Review of curriculum: modern and relevant
Hackathons
Mentorship
Exposure to remote internships and jobs
Highly Talented and skilled graduates
Industry
Graduate School
Higher recognition for the faculty
Improved relationship with industry
Greater partnership and support(funding for projects and programs in the faculty)
Higher reputation for the faculty
More opportunities for other graduates
Potential partnership with foreign universities
POSTGRADUATES
Funding/Grants for the faculty
Further Results
Improved research capacity
Research Labs
Funding for PG students
Capacity building of faculty members
?
Partnership with foreign universities(Joint proposal writing)
Attracting more talented students for graduate program
Higher research output
Higher profile of the faculty and its members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