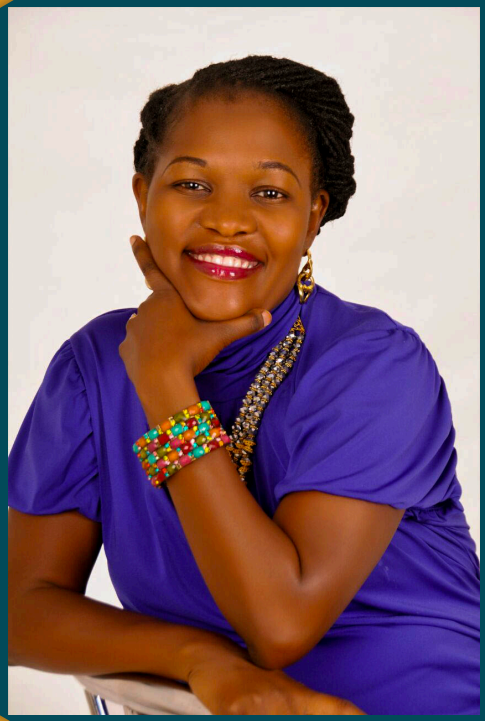
# RESEARCH TO COMMERCIALISATION EXPERIENCES IN UGANDA & MALAWI

## UC 2023, Kampala, UG

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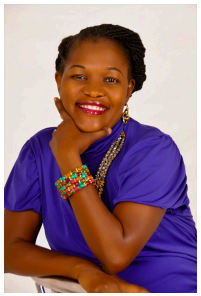
# Panel Outline



- Effective Knowledge Transfer - Dr. Julianne Sansa-Otim

- Postman case study in Uganda - Dr. Grace Kamulegeya

- COVID-19 PPE & Hygiene Tools case study in Malawi - Prof Nancy Chitera


- IoT-ra lab AWS & Smart bee hive case studies in Uganda - Dr. Isaac Mugume

- Universities safeguarding their Intellectual Property - Canon Goddy Muhanguzi Muhumuza

- RENs' role in facilitating the transfer of academic knowledge to the industry - Prof. F. F. Tusu Tusubira

# Effective Knowledge Transfer

- Addressing societal challenges is the main motivation for Research & innovations
- Most innovations end at “PoC” stage and fail to penetrate the target market
- Based on case studies, systems & structures that support the commercialisation process are discussed
- Informal and formal modes of cooperation have been used in the observed knowledge transfer
- Formal cooperation leads to deeper commitment / accountability hence superior solutions

# Bridging the gap between research and practice

- Innovations must be demand-driven i.e. with real clients
- Industry must be engaged to standardise the process of technology scaleup
- After PoC, stakeholder mapping and validation is critical to confirm business case
- Business collaboration expose innovators to valuable commercialisations experiences but NDAs are vital for IP protection
  - Incubators: validate product, roll out MVP, define business model, marketting plan
  - Accelerators: identify investors, prep for seed funding, support in pitching
  - i-hubs & coworking spaces for affordable facilities and services (legal, accounting, consultancy)
- Funding support is critical for scaling up, otherwise good ideas are shelved

# CASE STUDY 1

INNO-MAK
Commercializing Tech

# Innovation Commercialisation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# Outline

- The innovation-commercialisation pipeline
- The University Software Product Maturation Cycle
- Postman as a Commercialisation Success story

# Technology Commercialisation

Technology commercialization involves transforming innovative ideas or technologies from research settings into marketable products or services for profit generation. In software innovation, this involves converting ideas into commercially viable products or services that can be sold to clients or customers.

# The innovation-commercialisation pipeline

**Idea Generation: Unleashing Creativity**

Brainstorming and conceptualizing innovative software ideas

**Feasibility Study: Evaluating Viability**

Evaluate the technical, financial, and market feasibility of the software concept.

**Prototype Development: Bringing Ideas to Life**

Develop a functional prototype or proof-of-concept to showcase the key features and capabilities of the software.

**Intellectual Property Protection: Safeguarding Innovation**

To protect software innovation, use patents, copyrights, or trademarks to prevent competitors from unauthorized use and replication.

**Funding and Investment: Fueling Growth**

Secure funding to develop, market, and scale the software product.

# The innovation-commercialisation pipeline (Cont'd)

**Product Development: Crafting Market-Ready Solutions**

Develop the software into a complete, market-ready product

**Market Testing and Validation: Refining for Perfection**

Validate the product-market fit and identify potential issues by introducing the software to a small audience and gathering feedback

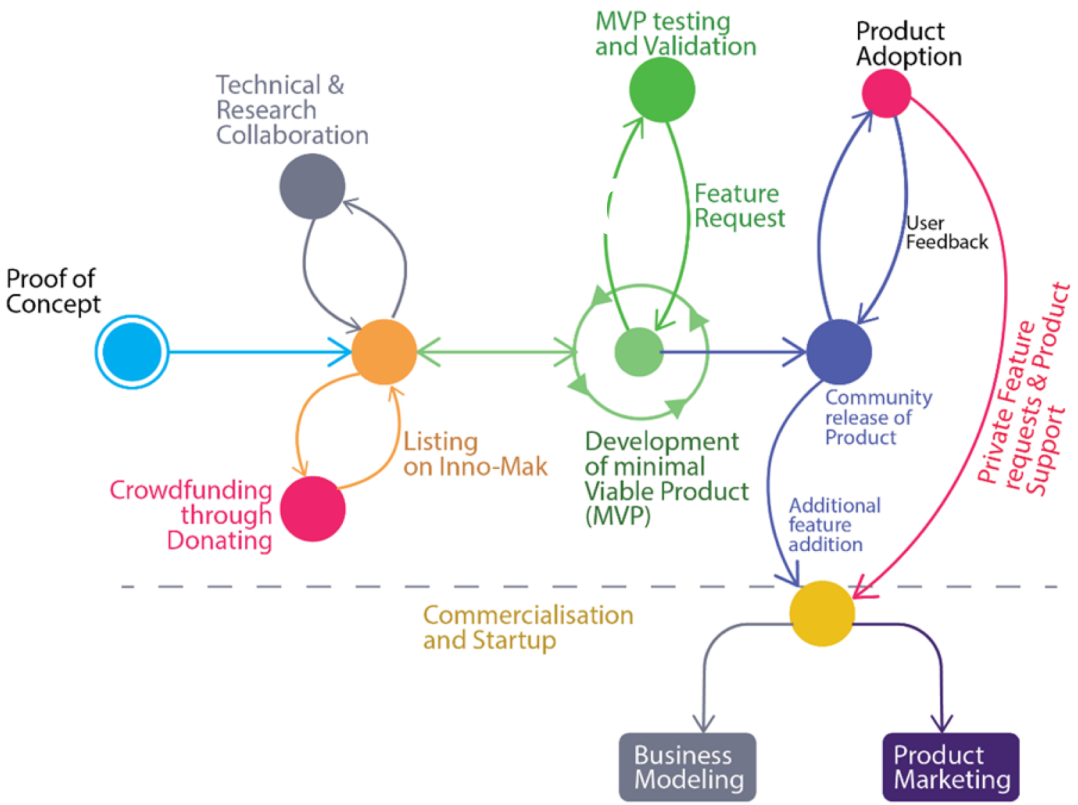
**Launch and Marketing: Making Waves in the Market**

Develop marketing strategies to successfully launch the software in the market, create awareness, attract users, and drive sales.

**Post-launch Support and Updates: Enhancing User Experience**

To improve the software's functionality, security, and user experience, provide continuous customer support and release frequent updates and patches.

# The University Software Product Maturation Cycle



# Postman in a nutshell

**Postman App Limited, founded in 2018, is a free mobile application available on IOS and Google Play Stores that offers last-mile delivery services to the Ugandan public. Its primary features include generating National Postcodes and Address Codes, which can be used to dispatch and receive goods from anywhere in Uganda. The codes are provided to players in the courier/logistics ecosystem as a Software as a Service (SaaS). POSTMAN maintains a national-scale digital infrastructure that supports the needs of both the public and private sectors and has received accreditation, funding, and grant support from various sources.**

# Postman- Commercialisation Timeline

**2017** Company Formation

**2020** Signing of a Government 5-year Concession

**2020** Signing of a grant agreement

**2022** Completion of the Minimal Viable Product

**2023** Full commercialisation with an Venture capitalist

# Postman Ug: Our Commercialisation Journey

### Inventor or team with a dream

An idea was translated into a business venture by formulating and analyzing basic ideas on paper for a business opportunity.

### Evidence of Business Opportunity through Experiments

Postman conducted active research and development to assess the market potential, competition, and technology.

### Ability to work on focused programs with project teams.

The technological and business components were tested to ensure compatibility, and an initial business plan was created.

### Ability to support project engineering development and design, with no product or revenues.

The integration of basic technology and business components was supported reasonably.

# Postman Ug: Our Commercialisation Journey

**Ability to support market-driven product development and design, even without revenues.**

A prototype was tested in a relevant environment, but the venture was not yet ready for commercialization due to an incomplete business team. However, a comprehensive business plan covering market, operational, technological, and financial aspects was available.

**Capable of supporting limited production with a full business team in place, including product and limited revenues.**

The business to operate on a small scale was developed as the complete team was already in place.

**Ability to Scale Production and Distribution (Product and Revenue)**

The technology and venture structure were proven effective in supporting growing market shares.

**A successful business necessitates proper infrastructure, staffing, increasing market share, and revenue growth.**

The business successfully integrates new technology and gains market share through operational usage.

# Postman in the field


Residential postcode

Business postcodes


Guild of Professional
Software Engineers
and IT Practitioners

# Thank You

## For Your Attention

# CASE STUDY 2

# Malawi Case Study: COVID-19 PPE & Hygiene Tools

Prof. Nancy Chitera

- INNOVATE
- CREATE
- GENERATE

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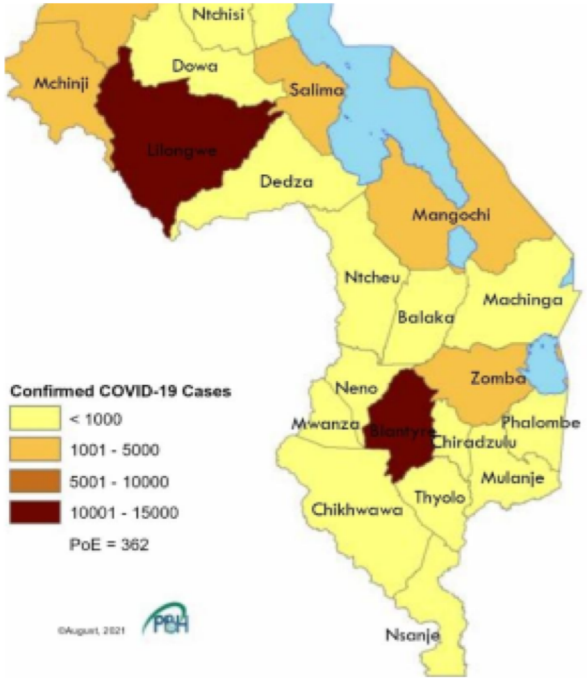
MALAWI UNIVERSITY OF BUSINESS AND APPLIED SCIENCES
MUBAS

# Outline

- Background
- Description of the problem
- Our Solutions
- Technology Features
- Production Methods
- Impact and Benefits
- Challenges

# Background

- COVID-19 in Malawi
  - In 2020, COVID-19 swept across Malawi, straining its healthcare system and resources.
    - Especially Lilongwe & Blantyre
  - Hospitals and health workers faced overwhelming pressure, and the need for protective equipment was critical.
- PPE and Hygiene Shortages
  - Shortages of face shields and handwashing units were particularly severe.
  - Malawian healthcare workers and communities needed affordable and accessible solutions.

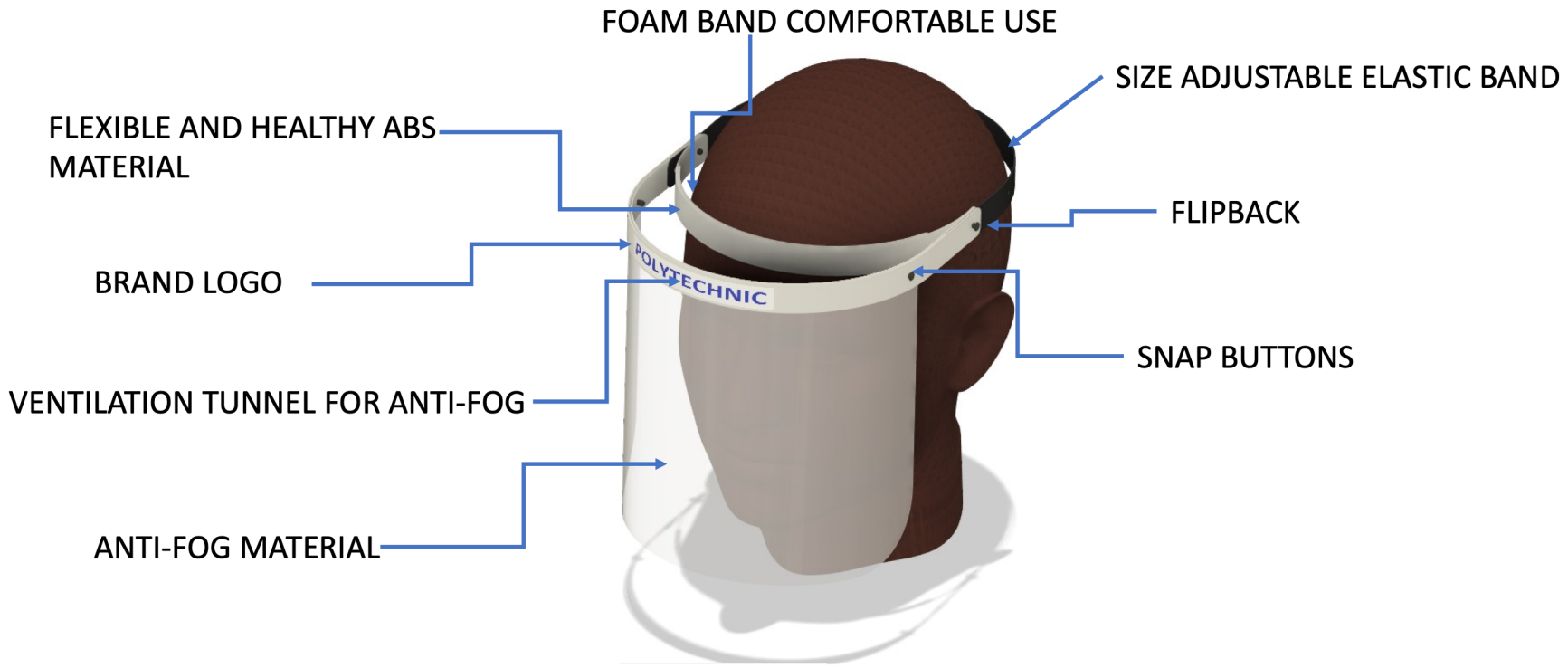


# Description of the problem

- The Lack of Affordable PPE and Hygiene Solutions
  - Malawi faced a dire shortage of affordable personal protective equipment.
  - The cost of PPE was a significant barrier to healthcare access.
  - Most international borders closed- importing was a challenge
- Significance of PPE and Hygiene in Pandemic Control
  - Effective PPE and hygiene are essential in controlling virus transmission and saving lives.
  - Addressing this challenge was vital in mitigating the spread of COVID-19.

# Our Solutions

# Technology features- Faces shield



# Protective Face Shield

- Face shields are a type of personal protective equipment (PPE) that protects the wearer from direct splashes of potentially infectious droplets
- When worn it covers forehead, extend below chin and wrap around side of face
- Disposable face shields are only worn for a single use
- Reusable face shields are cleaned and disinfected after each use
- For maximum protection against corona virus face mask usually need to be worn under a face shield
- Additionally, face shields discourage individuals from touching their face, which can help maintain better hand hygiene.

# Production Methods

- **Automatic Design Cutting**
  - Utilized CAD Designs and Laser Cutting Technology: Incorporated computer-aided design (CAD) to create precise designs and harnessed the efficiency of laser cutting machines for precision cutting.
- **Manual Design Cutting**
  - **Masterpiece:** Developed a master component using laser cutter
  - **Mass Production**: Utilized the master component as a template for mass production of face shields using knives & drilling machines.

# Packaging

# Hand Washing Units

- Hand hygiene is one of the most essential practices for preventing the spread of COVID-19.
- Hand washing units promote regular and effective hand hygiene.
- Designed to minimize contact with potentially contaminated surfaces, reducing the risk of infection.
- Their convenience and efficiency encouraged individuals to practice proper hand hygiene more frequently.

# Impact & Benefits

- Positive Outcomes of Open Source Designs
  - Healthcare workers received the necessary PPE.
  - Communities had access to handwashing units, contributing to better hygiene and infection control.
- Statistics and Testimonials
  - Over 100,000 face shields and 150 hand washing units were distributed.
  - Testimonials from healthcare workers and community members reflected the positive impact on their safety and well-being.

# Cont'd…

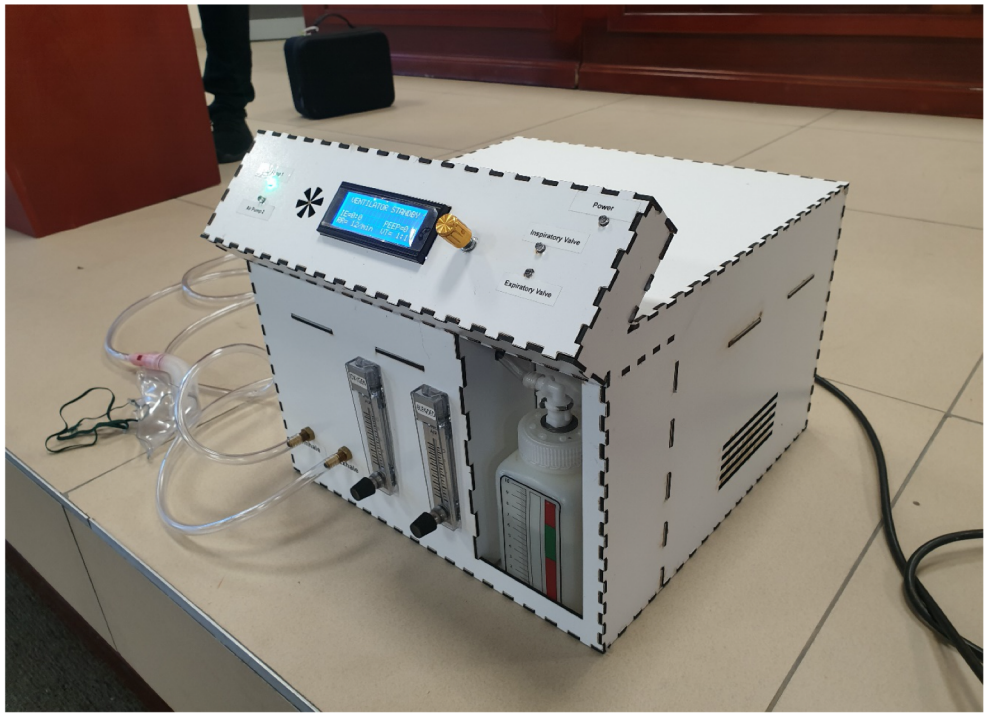

MUBAS produced and distributed 100 000+ units of reusable protective face shields

MUBAS produced and distributed 150+ units of foot pedal operated hand washing machines

# Walk Through Full-Body Decontamination Unit

- A walk-through free-standing cubicle that delivers fine mist to thoroughly dampen full-body clothing designed specifically for environments where there is a potential risk of contamination of protective clothing by infectious particles.
- The decontamination unit is designed to operate automatically by sensing presence of a person and deliver treated mist for a specified amount of time

# Low Cost Electronically Controlled Ventilator



# Low Cost Electronically Controlled Ventilator

- A low-cost medical ventilator designed and manufactured to help move breathable air in and out of the lungs of the patients who are physically unable to breathe on their own as is the case with COVID-19 patients.
- This locally made full feature ventilator offers hope to local health personnel in the fight against coronavirus amid global lack of ventilators. The ventilator is made by assembling a variety of electronic instruments set up to move breathable air in and out of the device in a controlled manner.
- This process involves designing and fabricating electronic circuit boards and enclosure from Computer Aided Design (CAD) models. Additionally, the process, involves writing a computer program that capacitates the device to listens to user inputs or commands from within the device and control operations automatically.

# Flexible 3D-Printed Masks

- The individualized 3D printed protective mask is reusable custom-made three dimensionally (3D) based on materials and techniques of 3D printing.
- MUBAS created these digital files that are fed into 3D printers to produce 3D parts of the mask assembly.

# Challenges

- Supply chain management (Equipment and machine spare parts)
  - These being developed at the hike of COVID-19
  - Closed borders
- Impacted by Country Lockdowns: Facing interruptions in work schedules due to nationwide lockdowns and health restrictions.
- Shortage of Equipment for Scaling: Confronting difficulties due to the insufficient equipment needed for large-scale production.
  - Existing equipment primarily tailored to fulfill prototyping requirements.
  - Adapting to circumstances that necessitated the transition to manual production methods.
- Invaluable Support from Unskilled Volunteers: Receiving valuable assistance from unskilled volunteers in managing the production workload.

# Safeguarding University Intellectual Property

# Intellectual property

- Intellectual property plays a pivotal role in fostering innovation and generating revenue for universities
- University Intellectual Property (IP) includes inventions, discoveries, creative works, and innovations generated within the university's research and academic activities.
- Forms of university IP include patents, copyrights, trademarks, trade designs, and trade secrets.
- These assets are valuable not only for the university but also for fostering progress and innovation in society

# Importance of University IP

- University IP plays a vital role in research, innovation, and commercialization.
- It serves as a source of revenue for universities through licensing, partnerships, and startups.
- University IP contributes to regional economic development and fosters an environment of innovation.

# IP Creation at Universities

- Universities create IP through research, innovation, and academic activities.
- Examples of university-generated IP include new technologies, academic publications, software, and more.
- University research and inventions often lead to novel and practical solutions.

# Ways of safeguarding MUBAS IP

- Legal Frameworks(National and International)
- Clear and comprehensive University IP policies e.g. National IP policy., University IP Policy, Copyrights act, Trademarks act, patents act, etc that define ownership, rights, and procedures for handling university IP.
- Establishment of Technology Transfer Offices (TTOs) responsible for managing and safeguarding university IP and ensures technologies leaves university lab spaces to the market; facilitate partnerships with external entities to utilize and benefit from university IP
- Research and Collaboration Agreements(TTO collaborates legal counsel and patent attorneys) that needs careful consideration and negotiation of these agreements are crucial
- Patenting(TTO facilitated+ patent attorneys), which grants exclusive rights to the inventor or university to make, use, and license the patented technology
- License agreements(TTO facilitated+ patent attorneys) that grant others the right to use the university's IP for specified purposes
- Spin-offs(TTO facilitated+ patent attorneys)
- Co-owned ventures(TTO facilitated Legal Counsel)

# Collaborations with industry partners

- IP is protected through collaboration with funders, partners and industries to ensure proper R&D and smooth translation of technologies from universities to the society.

# IP Training and Awareness

- Educating university staff and students about IP is vital.
- Training programs and awareness initiatives raise knowledge about IP rights, policies, and best practices.
- IP education fosters a culture of IP protection.

# THANK YOU

- INNOVATE
- CREATE
- GENERATE

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# CASE STUDY 3

## Dr. Isaac Mugume

# The drive to research

- Re-think the partnership between academia and industry to avoid ineffectual partnerships (Fransman & Newman, 2019);
- What research is being carried out? Basic – so as to publish as many papers as possible?
- Move to differential weighting of commercialized products
- 6 criteria for R&D projects → technology, marketing, finance, intellectual property, resource & beneficial impact (Karaveg, *et al.,* 2014)

# Research environment in Uganda

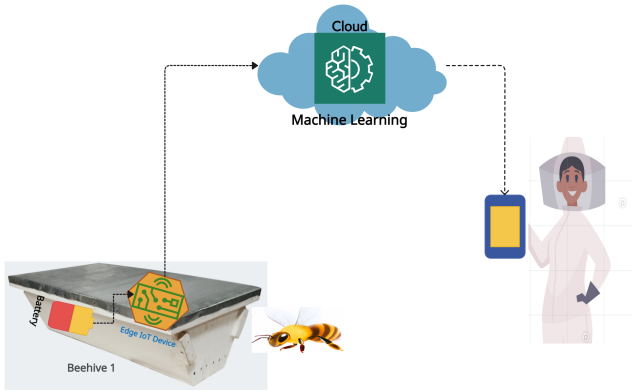
- The government of Uganda actively supports research → NARO, UNCST, STI-President Office, RIF-Mak, & several Presidential initiatives;
- High pay for Scientists right from Secondary School Teachers;
- Support to promising research initiatives e.g. the Kiira Motors corporation;
- Wide range of donor support → NORAD, DANIDA, World Bank, DAAD, Welcome Trust, Bill & Mellinda Gates, SIDA, KOICA, JICA, USAID ...

# The case study of IoT-ra lab AWS

- In 2013, the WIMEA-ICT project funded by NORHED embarked on improving weather information management in EA;
- The solutions ranged from NWP, WDR, AWS, WIDS → at the center was research;
- The AWS were tailor made at low cost and deployed to improve density of network in Ug. Tz & S.S
- Research; and engagement of industry was a critical success factor

# The case study of IoT-ra / AdEMNEA Smart Bee Hive

- Bees, the key plants pollinator are being threatened due to the anthropogenic applications of chemical spraying;
- Monitoring the health of bees is thus critical; but how do you monitor without distroting their habitat → smart bee hive
- With the growing apiary industry, the smart bee hive is envisaged to make both scientific and commercial case



# Key references


- Fransman, J. & Newman, K. (2019). Rethinking research partnerships: evidence and the politics of participation in resaerch partnership for internal development
- Karaveg, C., Thawesaengskulthai, N., & Chandrachai, A. (2014). Evaluation model for research and development commercialization capbility

# Universities safeguarding their IP

# HOW UNIVERSITIES ARE SAFEGUARDING THEIR INTELLECTUAL PROPERTY

**Presented at UbuntuNet-Connect Conference 26. 10. 2023**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## WHAT IS INTELLECTUAL PROPERTY?

**Simply put, it is the creation of the mind.**

- **Ideas born in the mind but once these ideas move from thoughts into some form of expression then Intellectual Property(IP) is created.**
- **The expression determines how you best will protect your creation.**
- **Protection is based on what the applicant discloses**

# LAWS GOVERNING IP

1. The Trademarks Act 2010 and the regulations under it,
2. The Copyright and Neighbouring Rights Act 2006 and its regulations,
3. The Trade Secrets Act 2009 and
4. The Industrial Property Act of 2014 and the regulations thereunder, which repealed the Patents Act Cap 216

## PURPOSE OF PROTECTING INTELLECTUAL PROPERTY

- Intellectual property protection is **critical to fostering innovation and Technology Transfer (TT)**.
- Without protection of ideas, researchers, students, staff and individuals would not reap the full benefits of their innovations/inventions and would focus less on research and development.

# WHAT IS TECHNOLOGY TRANSFER (TT)

TT is a collaborative process that allows scientific findings, knowledge and Ipto flow from Creators/Innovators, such as University Reasearchers, Staff, Students and Other Research Istititutions, to private and public users.

TT is the movement of data, designs, inventions, materials, software, technical knowledge or trade secrets from one organisation to another or from one purpose to another. The TT process is guided by the policies, procedures and values of each organization/University involved in the process.

**TT can be categorized into three basic types:**

1) Technology push which takes place when a University or company ***patents*** its invention and ***licenses*** it to other companies.
2) Market pull-which is when new technologies are developed in response to demand for a product or service.
3) Technological spillover- where firms can acquire information created by others without infringement.

## Benefits of TT- Everyone wins

- Public benefit.
- Community engagement.
- Corporate engagement.
- Attribution and recognition.
- Translation of academic discoveries for greater good.
- Support for regional economic growth and development.
- Revenue generation.

- **Another important function of TT is to help scientists to gather pre-seed Research & Development (R&D) funding (Max Planck Innovation, 2015) and to reduce the asymmetric information or "information failure" problem by sorting unprofitable from profitable innovations.**

- **Efficient intellectual property (IP) management** gives a business an **advantage over its competitors** and is key to market dominance. Market know-how is therefore a valuable business asset which must develop to create new IP assets, which in turn gives the business a competitive edge in the marketplace.

It is therefore essential for every University **to build an IP protection strategy to manage and protect the results of any intangible assets,** including the **creation of an in-house IP department or TT Office (TTO),**

- specialising in the **protection of the assets,**
- **supporting innovation and**
- **development**

**IP Assets include:**

1. **Patents & Utility models,**
2. **Trademarks**
3. **Copyright**
4. **Industrial Designs**
5. **Geographical Indications**
6. **Trade secrets**

# Patent

- Protects new and Inventive solutions.
- A patent is an exclusive right granted for an invention which is a product or a process.
- The product or process should provide in general, a new technical solution to a problem of any industry.
- The exclusive rights are territorial and patent protection is granted for a limited period, generally 20 years.

# Requirements for patentability

- Novel/new– must have some new characteristic which is not known in the body of existing knowledge in its technical field (prior art).– The invention should not be described in any publication published anywhere in the world.
- Inventive – The new product or process should not be obvious to a skilled person with average knowledge of the technical field.

- Industrially applicable- Invention must be useful/ have utility.
- The subject matter must be accepted as patentable under the national patent law. (scientific theories, mathematical methods, plant or animal varieties, discoveries of natural substances, methods for medical treatment are examples of things that are not patentable).

## Utility Model

- A Utility Model just like a Patent also protects inventions/innovations but for a shorter period. The main difference between a Patent and Utility Model is that the requirements for granting a Utility Model are less stringent than for Patents.
- A Utility Model is commonly referred to as a “Petty Patent”. In practice, protection for utility models is often sought for innovations of a rather incremental character which may not meet the patentability requirements. The term of protection for utility models is 10 years.

## Utility Model con't

- For **example**, the ball pen is an existing invention but you observe that when exposed to air the quality of ink decreases so you have come up with the cover and that cover is the **utility model** - a development to an existing invention, or for pen you have created the eraser and that is also an improvement or part of.

# Who protects the intellectual property?

- Employer/University/Funder
- Inventors, designers, developers and authors can protect the ideas they have developed, for instance by means of copyright or patents. The aim is to prevent others from wrongly profiting from their creations or inventions. It also gives them an opportunity to earn back the money they invested in developing a product

## Trademarks

- These are signs, symbols, labels, logos, names, slogans that identify and distinguish goods and services. They are on every product. The idea is that everyone is manufacturing that particular product or doing that particular service, so there is necessity to allow users to distinguish.
- Registration is required to guarantee protection.

## Trademark cont'd

- TM may be any word, symbol, slogan, logo, sound, smell, colour, drawing, symbol, letters, numerals or a combination thereof.
- TM must be distinctive.
- Not deceptive or misleading to customers.
- Not violate public order or morality.

## Copyright

- Protects literary and artistic works
- Last for the lifetime of the author plus fifty years after his/her death
- Protects: songs, books, poems, publications, art pieces, sculptures, arrangements of music, mobile apps etc.
- Copyright subsists from the moment the work is created.

# Industrial Designs

- Design is the unique outer appearance of a product. Industrial designs are what make an article attractive and appealing Designs can be seen everywhere: bottles, shoes, clothing, cars, cups.
- Protect the appearance of a product.
- Lasts for a total of fifteen(15) years depending on renewal
- Protects; Shapes, colour, texture, patterns etc
- Registration is required to protect the object.

## Geographical Indications

- Protect the unique characteristics that products derive from their geographical location.
- Protection is indefinite dependent on renewal
- Allows producers in a region to gain value through the unique qualities that can only be attributed to the region eg. Soil quality, PH climate etc.

# Trade Secrets

- Protects information that is important to the success of the business but is not publicly known for the purpose of maintaining a competitive advantage.
- Protection is indefinite as long as the information is not disclosed.
- Protects: recipes, formulas, client lists, growing conditions, methods of doing business (Coca Cola formula has been protected the special taste of Coca-Cola for more than 130 years only

# ROLE OF A UNIVERSITY IP UNIT/DEPARTMENT OR TTO

- Before creating a specialised IP department, a business must first ascertain **what is required of such a department**.
- An IP department specialises in a multitude of issues, but its general role within a University is **centred around**:
- **Identifying** and **Ordering** the **business's existing IP rights**
- **Advising** on securing **IP Rights** and **Protections**
- **Identifying** solutions to minimise costs, including the **costs of IP:**

  - Registration
  - Applications
  - Renewals and,
  - Reducing Management Costs
  - **Negotiating** and **Drafting**
  - Licences and,
  - Rights Transfer Agreements

## STRUCTURE AND ORGANIZATION

The structure and organization of TTOs can affect its overall performance and can vary among universities. Since TTOs deal with both academic research and industry, they consist of a diverse set of individuals, including:

- Scientists;
- Lawyers;
- Analysts;
- Licensing Experts;
- Financial Experts; and
- Business Managers.

By having individuals (particularly different scientists, engineers, and analysts) with varying sets of expertise in research, TTOs attempt to more effectively assess, protect, and profit from the research developments taking place in multiple disciplines throughout the university (wikepedia)

TTOs can by classified into three different types or models of operation:

- Internal: existing as an integrated part of the university and controlled by university administration.
- External: existing as an independent company that does not operate under the control of university administration.
- Mixed: having components of both internal and external TTOs.

# SITUATION ANALYSIS

## Global Context

- In recent decades, almost all research universities in the US and Europe have established **Innovation and Technology Transfer Offices** (**ITTO**s) to commercialize their IP.
- In the US, the **Association of University Technology Managers** (**AUTM 2013**) reports that the annual number of patents granted to U.S universities rose from less than 300 in 1980 to 5,145 in 2012, while licensing of new technologies has increased almost six-fold since 1991.
- Annual licensing revenue generated by US universities rose from $160million in 1991 to $2.6 billion in 2012.
- *University based startup companies numbering 705 were launched in 2005 alone; while 6,834 new firms based on university owned intellectual property have been created since 1980.*

## NATIONAL CONTEXT

According to the 2017-2017 Global Competitiveness Report, Uganda is ranked 77$^{th}$ with regard to Innovation and 104$^{th}$ in terms of ***Intellectual Property Protection*** (***IPP***).

- The 2019 Global Innovation Index ranks Uganda at 102 out of the 129 countries compared to Kenya, Rwanda and Tanzania ranked at 77, 94 and 97 respectively. The country's expenditure on R&D was only 0.4 percent of GDP, business expenditure on R&D was 0.01 percent and the country logged about 250 patent applications with only 2 registrations.
- Todate, the level of IP registration in Uganda remains low, compared to other countries.

## JUSTIFICATION

- The Vision 2040 has set a target of 6000 patents registered per year by the year 2040.
- The National Development Plan III (2020/2021 – 2024/2025) has set a target of 50 Intellectual Property Rights registered per year by the year 2025 through various interventions including strengthening the Intellectual Property (IP) value chain management.
- Institutions of Higher Learning are expected to produce a large percentage of these patents on the basis of the research and knowledge activities they undertake.
- Policy Objective 3(c) of the National IP Policy aims to adapt and exploit IP driven technology transfer and commercialization through strategy that purposes to establish institutional Technology Transfer Offices (TTOs) for effective and sustainable transfer, adaptation and exploitation of technologies.

# RENs' facilitating role in the transfer of academic knowledge to the industry

# Panel

# Interaction