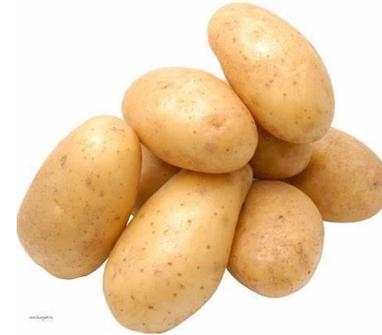
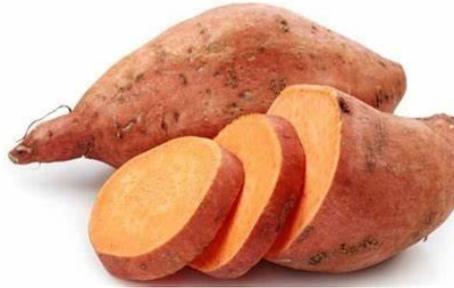


# KEPHIS-CGIAR Germplasm Hub for RTB



Morag Ferguson

CtEH Webinar  
14<sup>th</sup> November 2023

**Crops to End Hunger (June 2023 to Dec 2024)**



## Importance of Roots, Tubers and Bananas

- **Food security:**
  - High yielders in terms of calories produced per hectare
  - More than 300 million people below the poverty line in developing countries depend on RTBs for food and income
- **Climate resilient:** Many RTB crops can be grown with few inputs and often under harsh conditions, yet respond well to intensification
- **Nutrition security:** Often rich in key nutrients such as provitamin A
- **Poverty alleviation:** Frequently grown and/or marketed by women for income generation
- **Processed food products and industrial applications:** High-quality flours for porridge, blending or confectionary, weaning foods, starch, animal feed, biodegradable packaging, ethanol production

# Contribution of RT&B crops to food intake

kilocalories (kcal) per capita per day (2017)



Country	Population (000s)	Grand total kcal	RT&B foods kcal	% RTBs foods
DRC <sup>a</sup>	62,523	1605	916	57
Ivory Coast	24,437	2730	970	36
Ghana	29,121		1,430	47
Nigeria	190,873		622	25
Rwanda	11,981		1,046	47
Uganda	41,167	2144	659	31
<b>TOTAL/AV</b>	<b>360,102</b>			<b>40.5</b>

810m people by 2050 (UNDP, 2019)

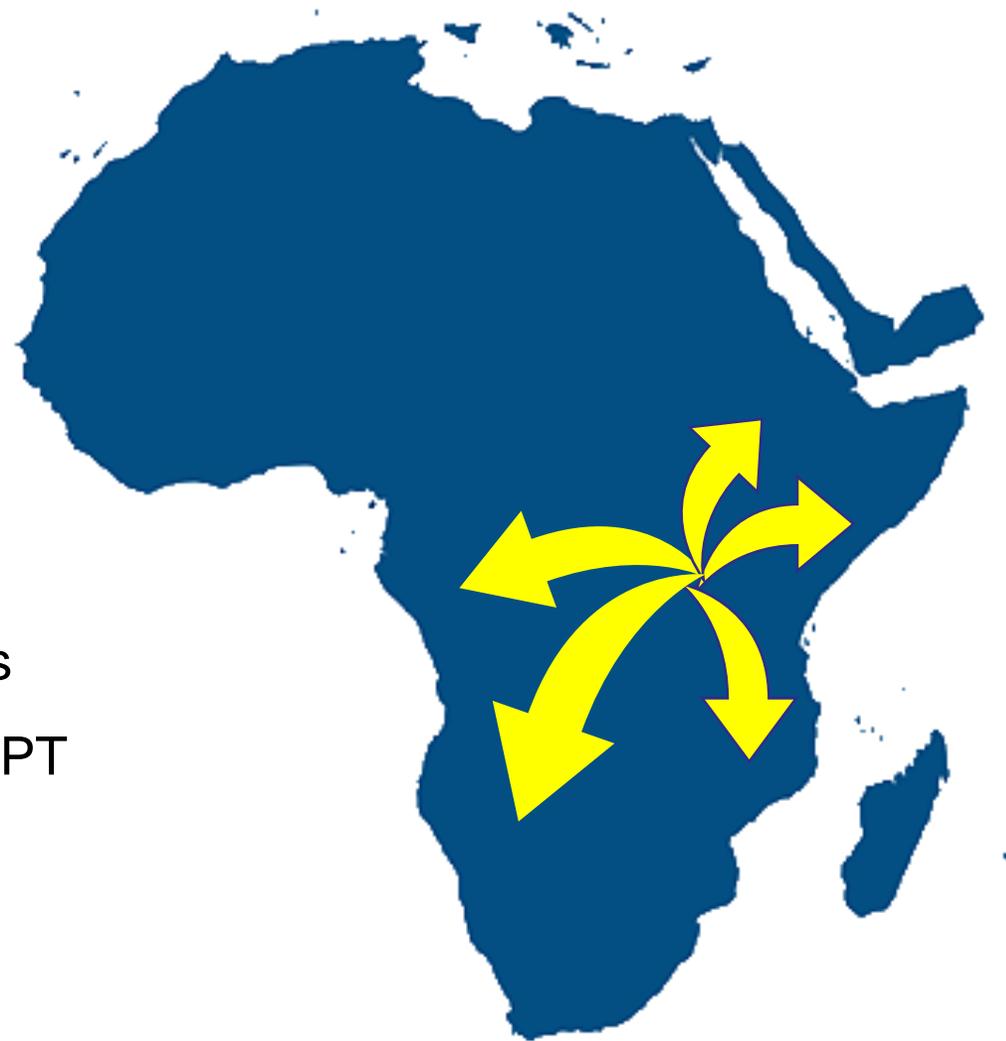
<sup>a</sup> DRC 2008. Source: FAOSTAT, New Food Balances. Last Update: February 19, 2020

From: Thiele et al. Overview. In: Root, Tuber and Banana Food System Innovations. Eds. Thiele et al. (2022). Springer, Switzerland, pp.554.

The number of people involved in RT&B-dominated agri-food systems could more than double in the next 25 years

# Expedite the testing and release of new varieties

- Get best germplasm to farmers as quickly as possible
- Less-resourced breeding programs leverage stronger breeding programs
- Get more countries involved in the testing of mid-stage breeding material (AYT or UYT)
- Enable selections to be made by NARS under local conditions, local preferences and local market segments
- Breeders seed will be bulked early, varieties will enter NPT early and reach farmers relatively quickly



# Challenges to germplasm movement



- Clonal propagation means **pathogens** are carried over from one season to the next, building up over time
- Once infected it is **time-consuming** to eliminate the pathogen
- Pathogen infection or the potential for infection **delays regional distribution** of planting material
- **Low multiplication** rates further reduce regional distribution of planting material

## Established partnership for over 20 years



# KEPHIS-CGIAR Germplasm Hub for RTBs

Funding from Crops to End Hunger (CtEH); GIZ

- **Centralized facility**, within a NARES (KEPHIS), that can operate at scale and provide RTB germplasm services reliably to CG/NARES crop networks and serve as a center of excellence and training
- **Stronger CGIAR-NARES breeding networks** where downstream functions are operated by NARES and regional capacity is developed to maintain and distribute elite germplasm
- **CGIAR backstopping** support, with a gradual transition from a service provider to more a consumer of services through building of NARES capacity



Australian Government  
Australian Centre for  
International Agricultural Research

BILL & MELINDA  
GATES foundation



Federal Ministry  
for Economic Cooperation  
and Development



USAID  
FROM THE AMERICAN PEOPLE



## Services offered:

- Receiving germplasm from breeding programs
- Internationally accredited diagnostics
- Pathogen elimination
- *In vitro* facilities
- Tracking systems
- Genotyping for QC
- Regional distribution
- Network nodes with capacity to receive germplasm

# High-level project initiation meeting with KEPHIS management, 3<sup>rd</sup> March 2023



Ian Barker, Senior Director of Strategy, Delivery and Scaling  
at OneCGIAR, visits senior managers at KEPHIS HQ

# Project Initiation Meeting, ILRI, 11<sup>th</sup> April 2023

20<sup>th</sup> June contract signed to enable implementation



# Project Management Plan

## Eight modules

1. Building design and planning (Morag Ferguson)
2. Building implementation (Morag Ferguson)
3. Equipment (Alex Malome)
4. Systems Development (Trushar Shah)
5. Operational Business Plan (Srini Rajendran)
6. Partnerships (Morag Ferguson / Srini Rajendran)
7. Capacity Building (Jan Kreuze)
8. Project administration (Morag Ferguson)



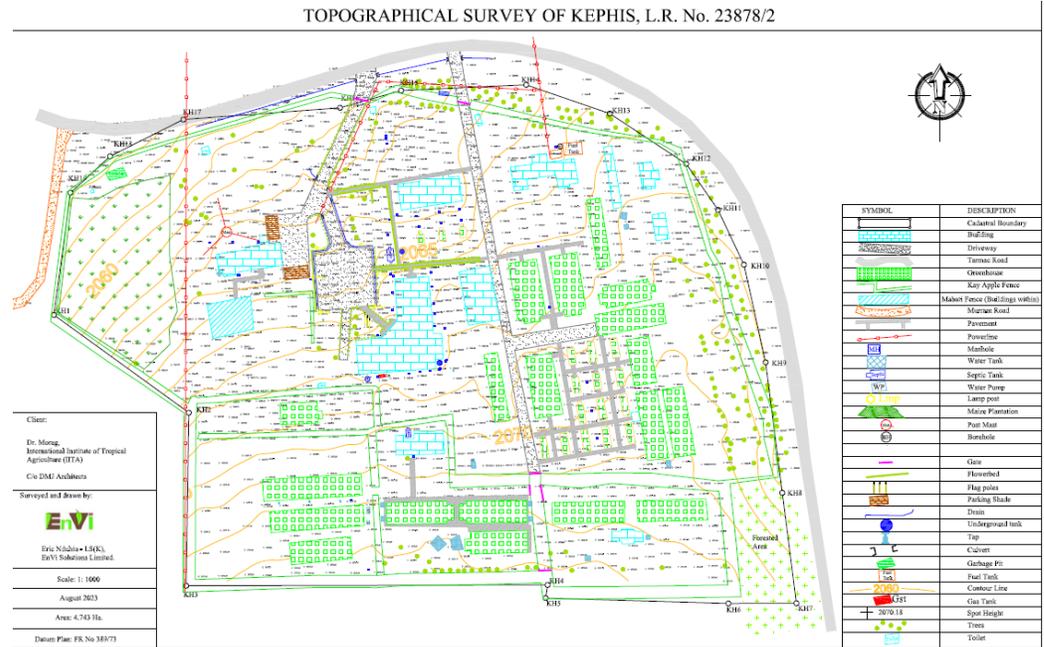
# 1. Building design and planning



Site selection and topographical survey

Site is the Plant Quarantine and Biosecurity Station, Muguga

Regional quarantine station



# 1. Building design and planning cont.

## Scoping architectural service providers

Obtained proposals from four architectural firms in Nairobi:

- DMJ Architects
- WAZO Collectives
- Ndovu Builders
- Adeola Construction

Consortium package with Architects, Engineers (Structural, Civil, Services) and Quantity Surveyor services

Mutual consensus between IITA, CIP and KEPHIS to go with **DMJ Architects**. This has also been approved by BRI.

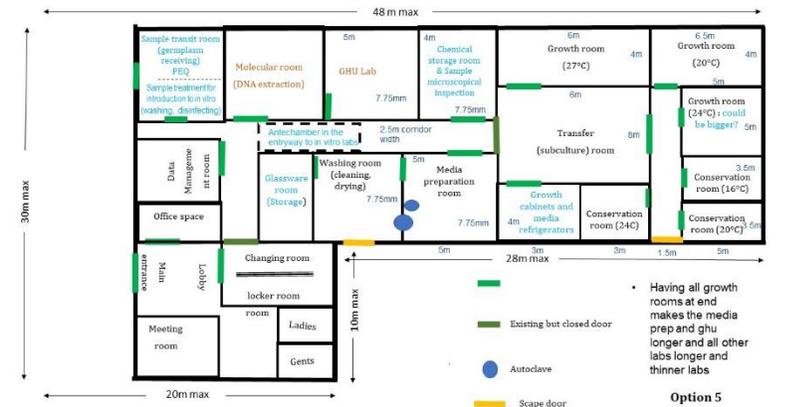
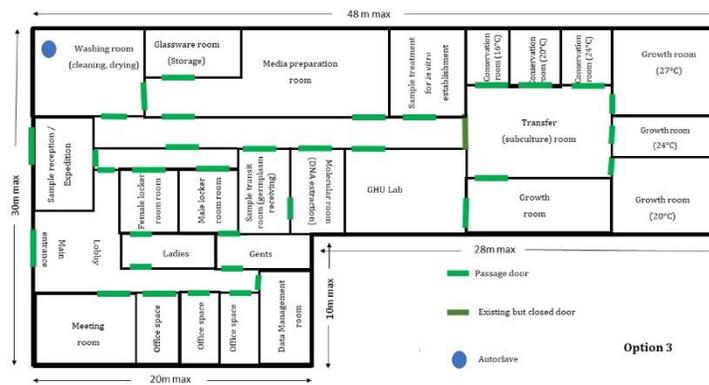
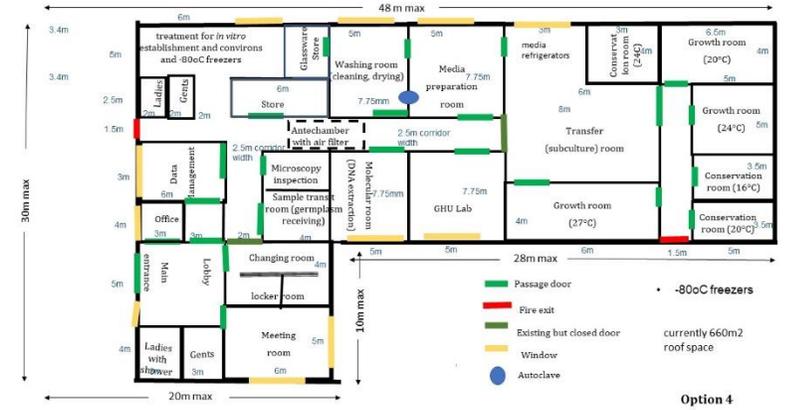
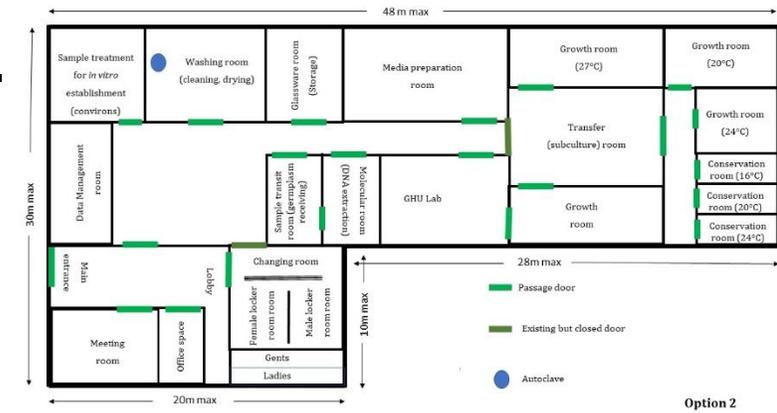


# 1. Building design and planning cont.



Consultation with teams from KEPHIS, CIP and IITA  
Feedback particularly from women employees

Initial support from Bandao Russo, through BRI

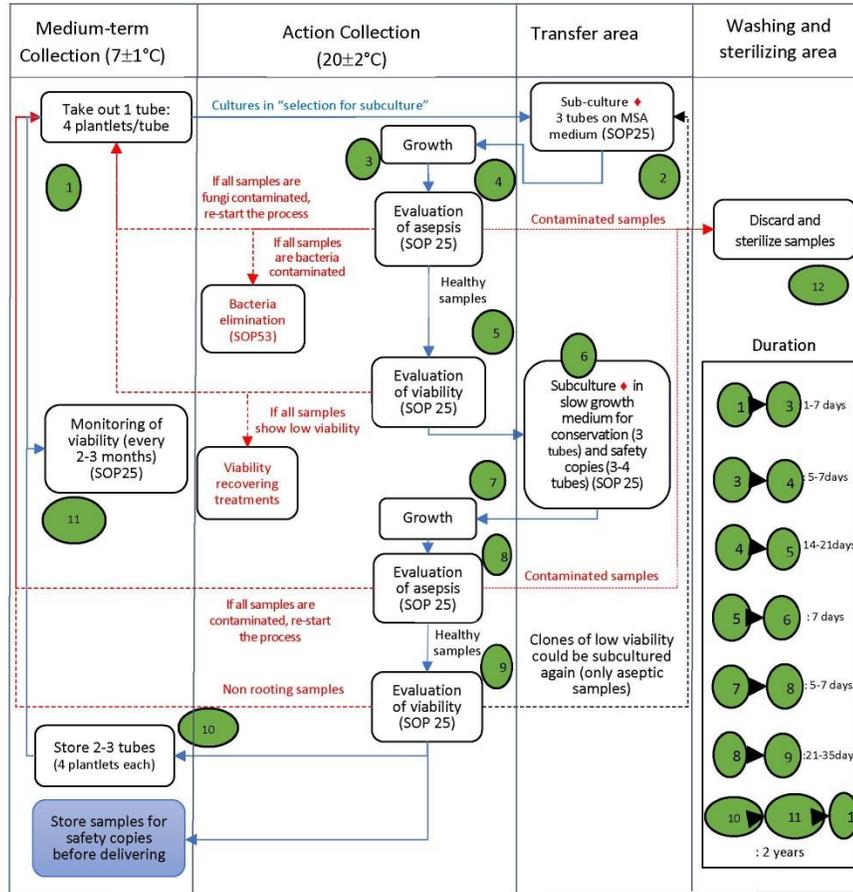


# 1. Building design and planning cont.



Workflow of Potato *In Vitro* Conservation at CIP <sup>(1)</sup>

(1) Panta, A.; Solis, R.; Cruzado, J.; Allcaco, J.; Manrique, N.; Azevedo, V. 2022. Workflow of potato *in vitro* conservation at CIP. In: Genebank: *In vitro* conservation of potato / Conservación *in vitro* de papa CIP-SOP025, v.2.1. CIP-SOP025.



## Designs based on workflows

- Sweet potato
- Potato
- Cassava
- Banana
- Yam

Aim for 90% electricity demand to come from solar power

# 1. Building design and planning cont.

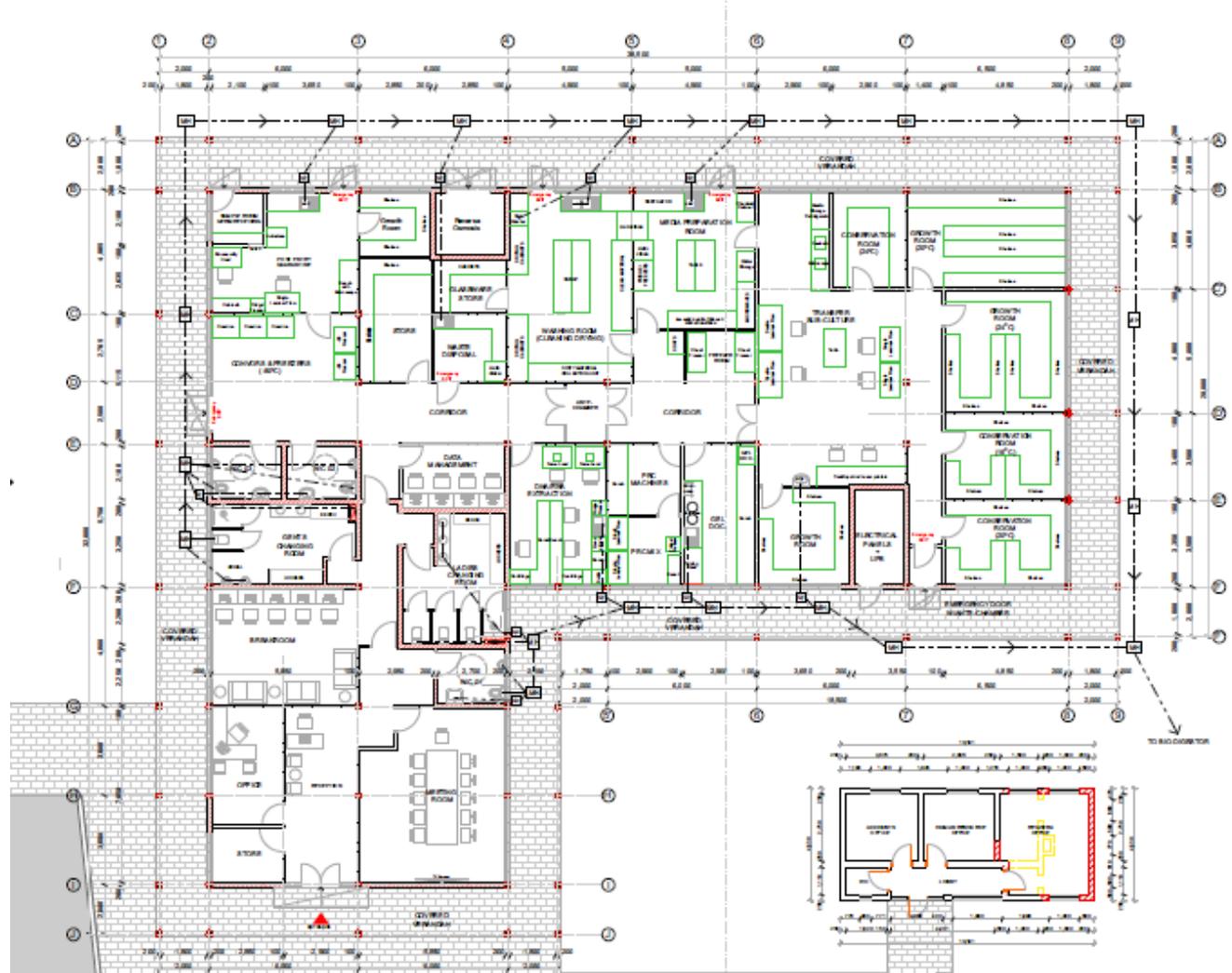


# 1. Building design and planning cont.



Final adjustments nearly complete

Engaged with service and structural engineers.  
Break ground in January for Dec. 2024 completion.



# 1. Building design and planning cont.

## Solar power

- Major operational costs at KEPHIS is electricity (USD5,000 per month). This takes resources away from other areas of work that should be supported.
- Aim for 90% of electrical demand to come from solar power
- Engaged 'ROAM' to provide a 'lock and key' solution
- Installed a power logger in existing lab to determine energy consumption patterns at the site to guide requirements
- Projected energy needs are 200kWh at peak consumption.
- Equivalent to power produced by an array of 348 solar panels which are 2.4mx1.2m each producing 570W.
- This needs an area of roughly 1,000m<sup>2</sup> (0.25 acres)
- Solar farm vs. utilization of the roof space, or a combination



# 1. Building design and planning cont.

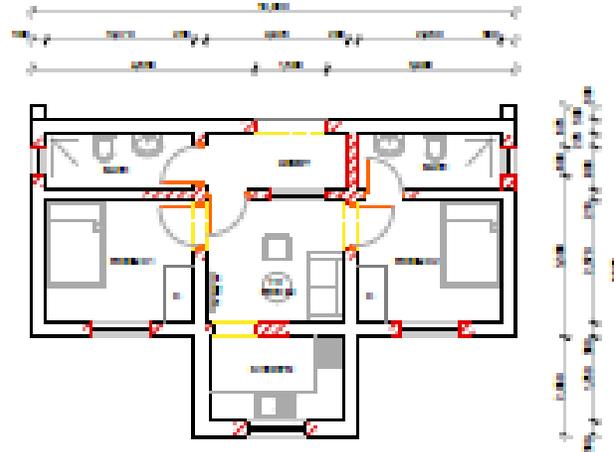


## Out-buildings:

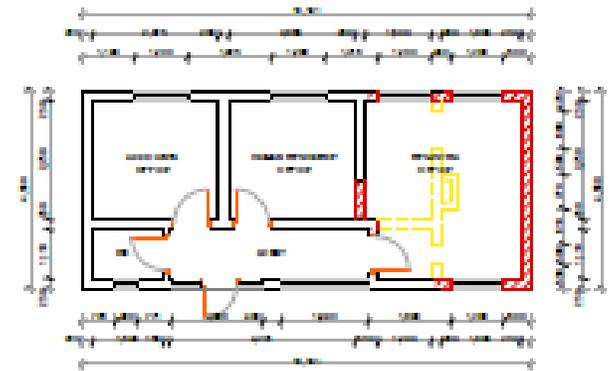
1. Need to re-locate caretaker's housing by renovating an alternative space
2. Rennovate existing caretakers housing into admin / finance offices
3. Request to refurbish the staff canteen and women's restroom
4. Budget



Plans for canteen and women's restroom



Alternative space for caretakers' house



Repurposing and refurbishing existing caretakers' house

# 1. Building design and planning cont.

- Required to align with:
  - Ministry of Agriculture and Livestock Development
  - Ministry of Public Works

24<sup>th</sup> – 25<sup>th</sup> August 2023, Machakos, funded by KEPHIS



### 3. Laboratory equipment

- A list of equipment developed during concept stage
- Major equipment located on floor plan of building and listed by room
- Finalising equipment list into local and international purchase
- CIP initiated ordering process in Sept. 2023

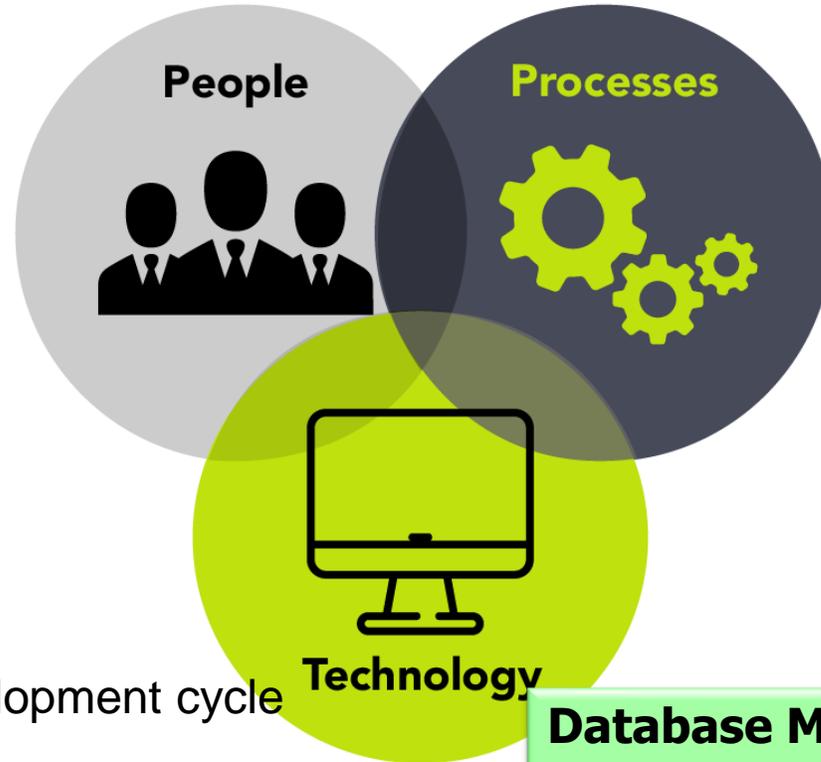


# 4. Systems Development



Co-ordinated by **Trushar Shah** (IITA), implemented by **Margaret Karanja** in collaboration with three KEPHIS staff

- Digitalisation
  - Skilled
  - User friendly
  - Batch processing
  - Capacity building
  - Support
  - Roles / responsibilities
- IT infrastructure
  - Database schema
  - Performance efficiency
  - Modular system / development cycle
  - Scale / scope
  - Integration with other systems / existing systems
  - Printers / labels



- Map the workflow and dataflow
  - Diagnostics
  - Clean(ing) material
  - Tissue culture / invitro
  - Genotyping / QC?
  - Distribution
- Standardisation
  - Vocabulary
  - Ontologies
  - SOPs
  - Metadata standards
  - Minimum information

## Database Management

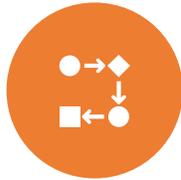
1. Bridgite Mueni
2. Sospeter Gachamba
3. Elizabeth Ngundo



# 5. Operational Business Plan



Coordinated by Sridhar Rajendran (CIP)



POTENTIAL BUSINESS MODEL WILL BE IDENTIFIED - CREATE, DISTRIBUTE AND COMMUNICATE VALUES THROUGH BUSINESS MODEL CANVAS



UNDERSTANDING THE CUSTOMER SEGMENTATION AND THEIR NEEDS TO BE REFINED



MINIMUM VIABLE PRODUCT (MVP) WILL BE DEVELOPED



VALUE PROPOSITIONS WILL BE IDENTIFIED BASED ON CUSTOMERS' NEED



CHANNEL MANAGEMENT (DISTRIBUTION SYSTEM)

1. Millicent Mburu- HQ finance office
2. Gabriel Omollo- Accountant Muguga station:
3. Maureen Mwangangi: Head of Tissue culture lab at Muguga



## 6. Partnerships

- KEPHIS-CGIAR partnership underpinned by MoU:
  - Broad MoU signed September 2023
  - Project-specific (more detailed discussions defining partnership)
- Jointly managed by KEPHIS and CGIAR (reflected in name)
- Backstopping in:
  - Protocols (SOPs)
  - Purchasing
  - Networking with potential clients (NARES breeding networks)
  - Germplasm
  - IT systems



## 7. Capacity Development



- Training at CIP, Lima, Peru, September 15<sup>th</sup> to 30<sup>th</sup> 2023
- Two participants from KEPHIS
  - *in-vitro* clonal crop introduction
  - Diagnostics
  - Phytosanitation
  - Genotyping
  - Data analysis/management
  - Distribution
  - Quality control

Presentation to Potato Breeding Network May 2023 as a start to sensitization of breeding networks



# Thank you for listening

