



# A Smart Computing Framework Centered on User and Societal Empowerment to Achieve the Sustainable Development Goals

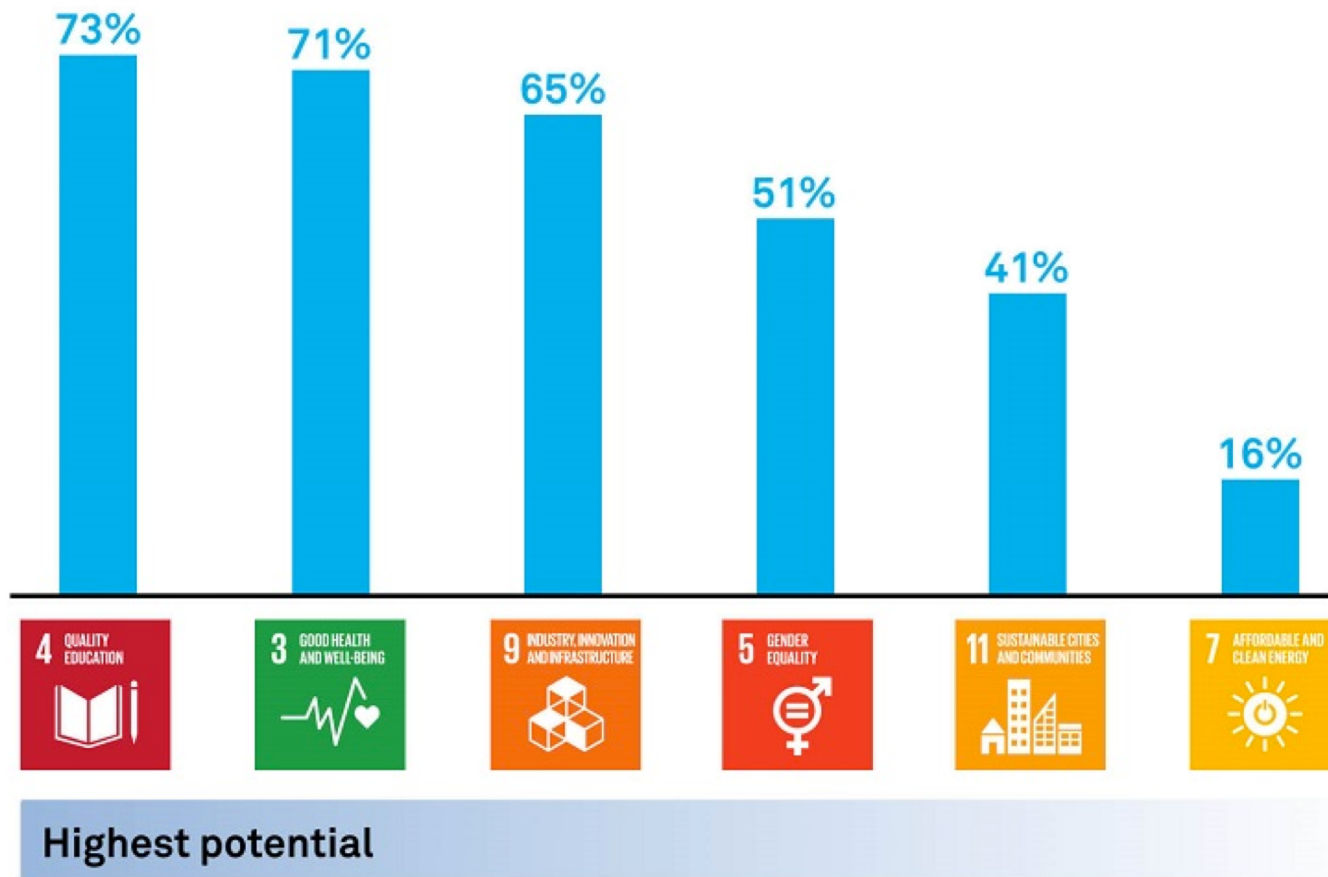
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Dr. Rodrigo N. Calheiros  
Prof. Sheryl Hendriks

February 2019



# Addressing SDGs using Information and Communication Technologies (ICT)

Highest correlations between SDGs and ICT



# Smart Computing

- Smart Computing is an effective method to integrate
  - computer hardware, software,
  - social media and communication networks
  - digital sensors, smart devices, Internet of Things (IoT),
  - big data analytics,
  - Artificial Intelligence (AI) to realize various innovative applications.



# Over Production problem in Sri Lanka

Troubled farmers erect tomato Pandol for Posen

Source: *Ada Derana*

Wednesday 15<sup>th</sup> June 2011



THE SUNDAY TIMES  
Sunday November 13, 2011



Leeks have dropped in price to Rs. 6 a kilo, good news for the consumer but disastrous news for the farmer

Leeks cultivators desperate as price drops to record low



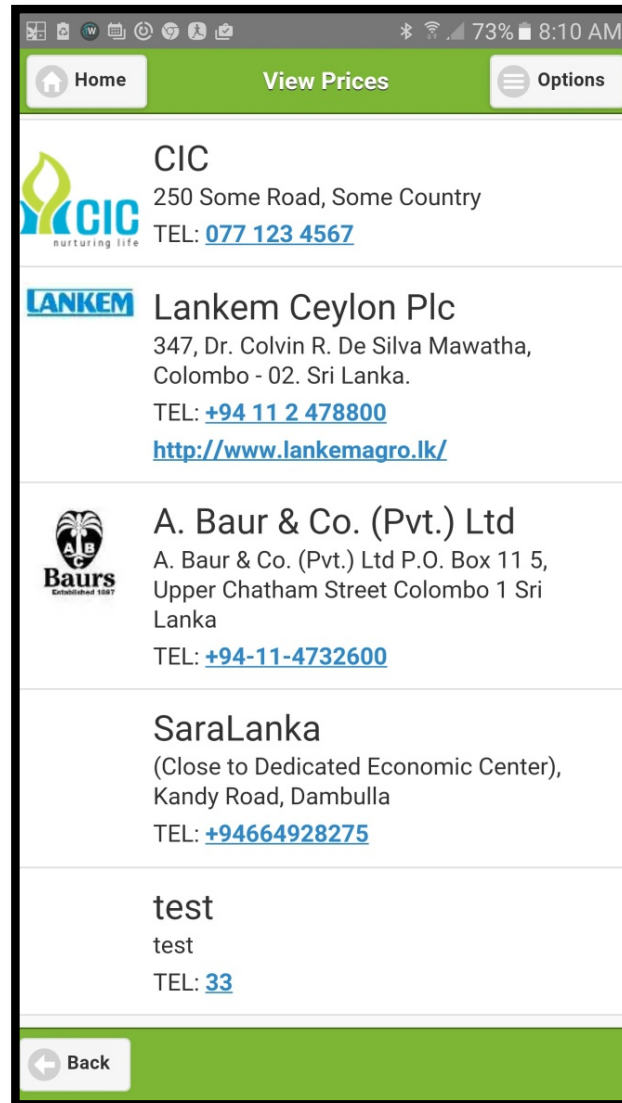
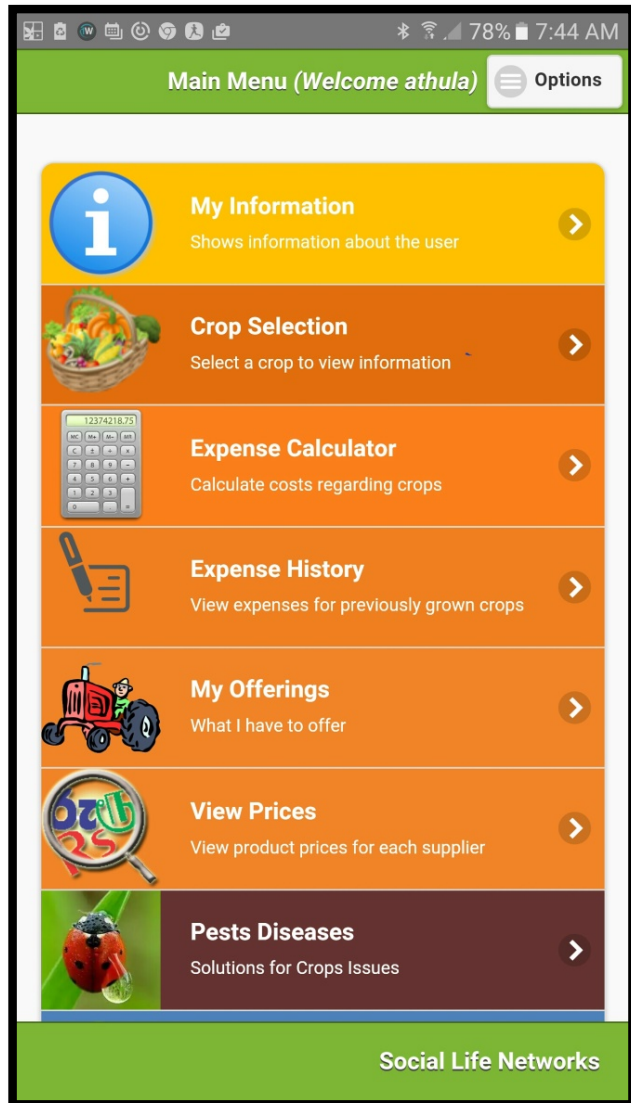
**N'Eliya carrot farmers in the dumps:**

**Bumper harvest, but prices low**

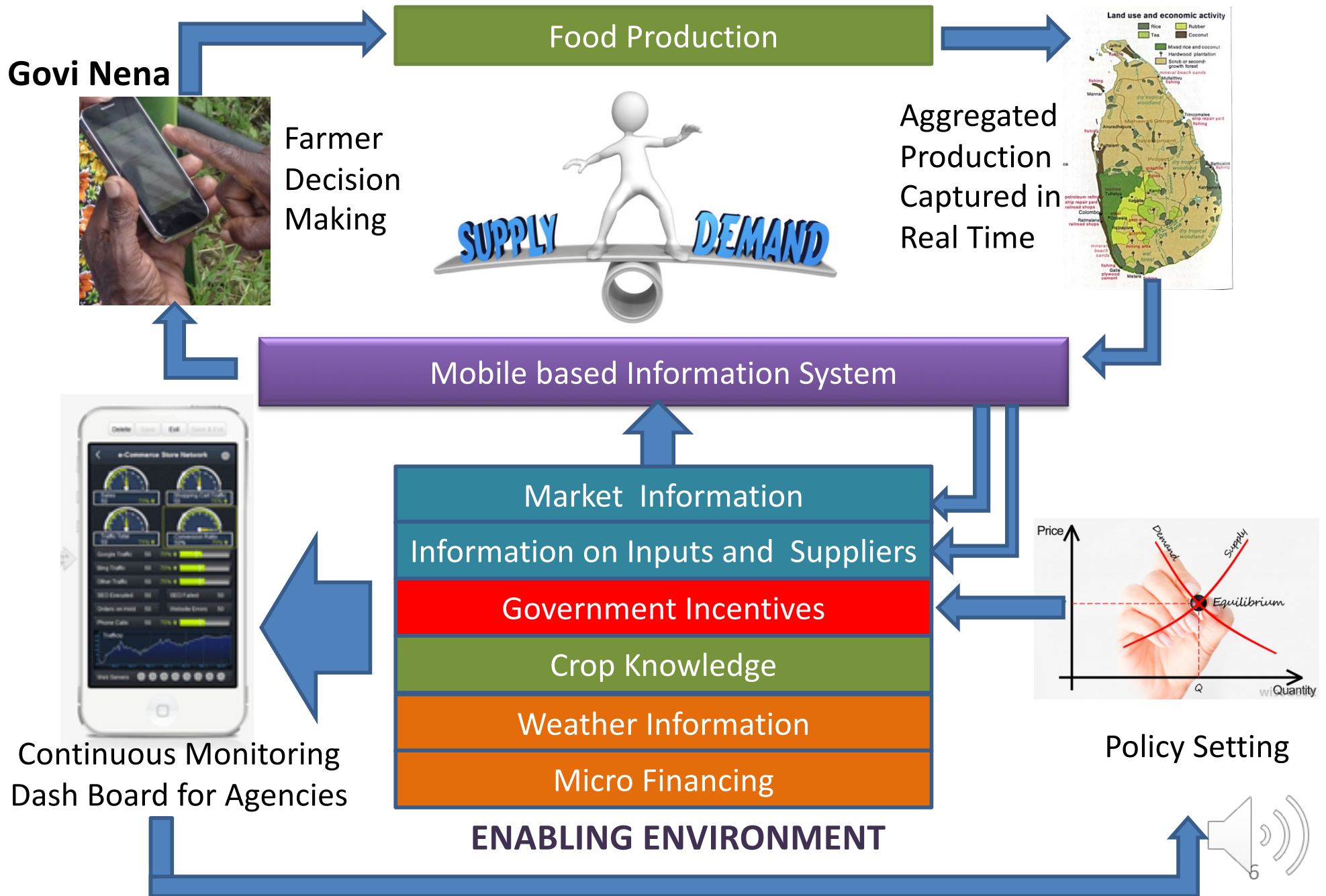
Source: *The Sunday Times*, April 22, 2012



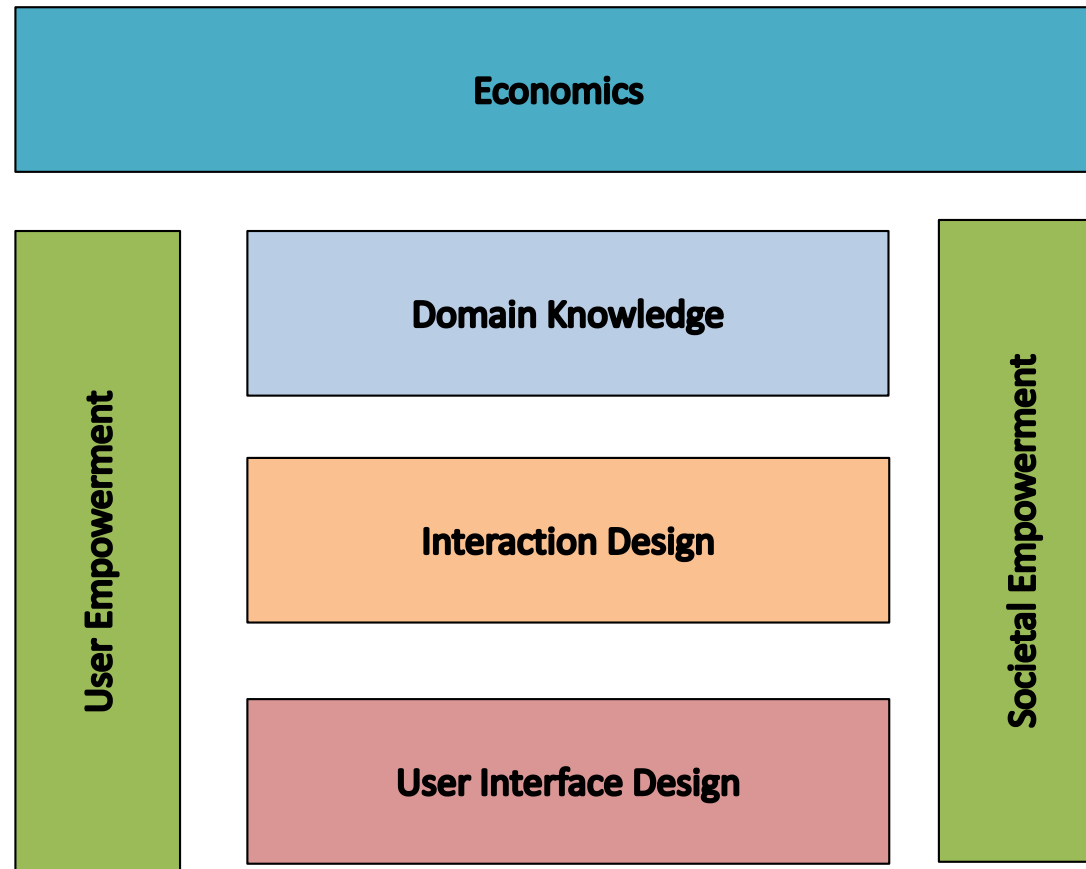
# Govi Nena Mobile Application



# Proposal to SL Government - Closing the Loop



# The Proposed Smart Computing Framework

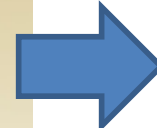


# Case Study: Hidden Hunger



26% of preschool children in Kenya are stunted, 37% in Nigeria and 28% in South Africa

This line is the median height of 9-year-olds worldwide





# Findings from University of Pretoria study



RM Research Matters



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## Research Programmes

The solutions to change the world can be found in the research we do today. This page contains some of the research projects showcased by the University of Pretoria. Click on the buttons below to find out more about how UP researchers are Making today matter.

### Food Security in Rural South Africa - Homegrown solutions for South Africa's hungry

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# Mobile based Information System for Africa



Geo coordinates

List of Crops that grow in the location

16 Questions to identify the food habits

Identifying missing micro nutrients in the diet

Identifying what food from the list of crops that grow in the location can address the identified micro nutrient deficiency

Information on nutritional value

Information on how to grow these crops

Recommended fruits and vegetables to be consumed



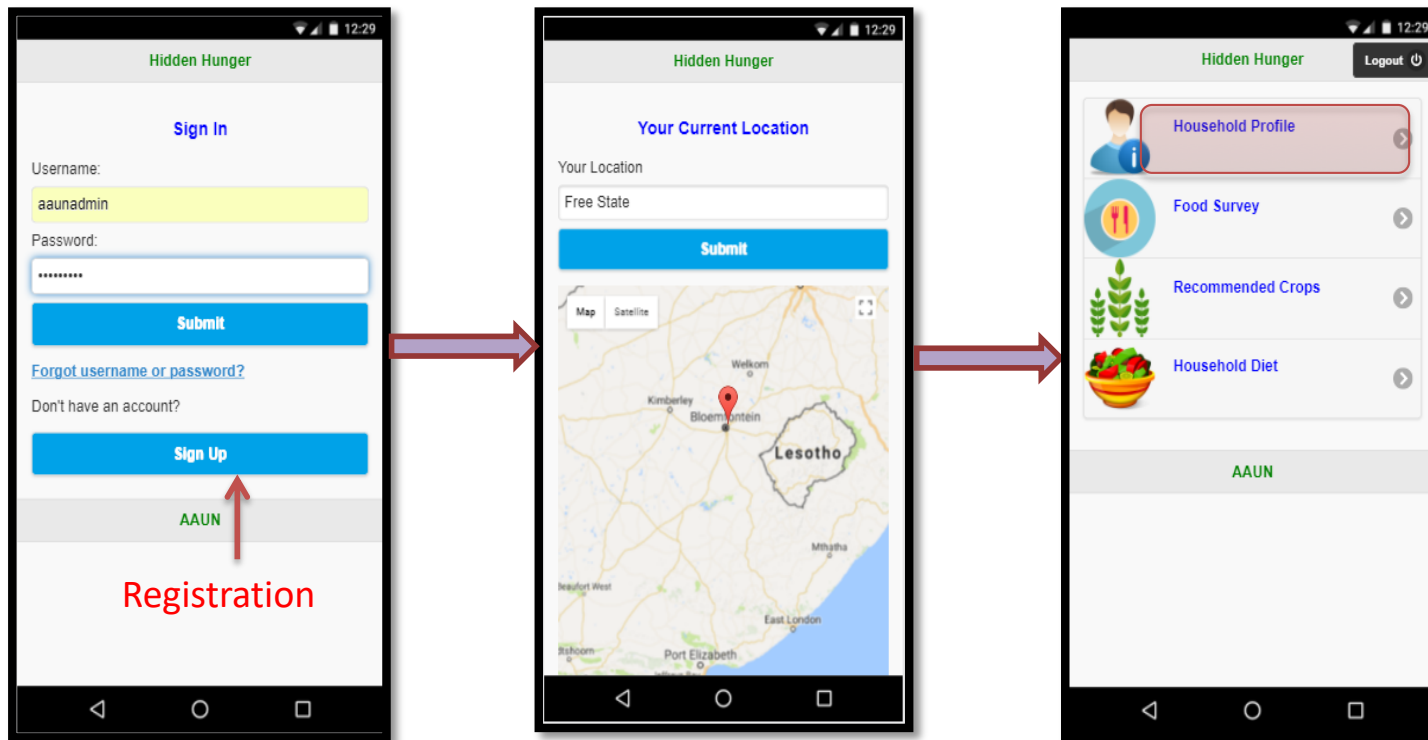
# Application Assumptions



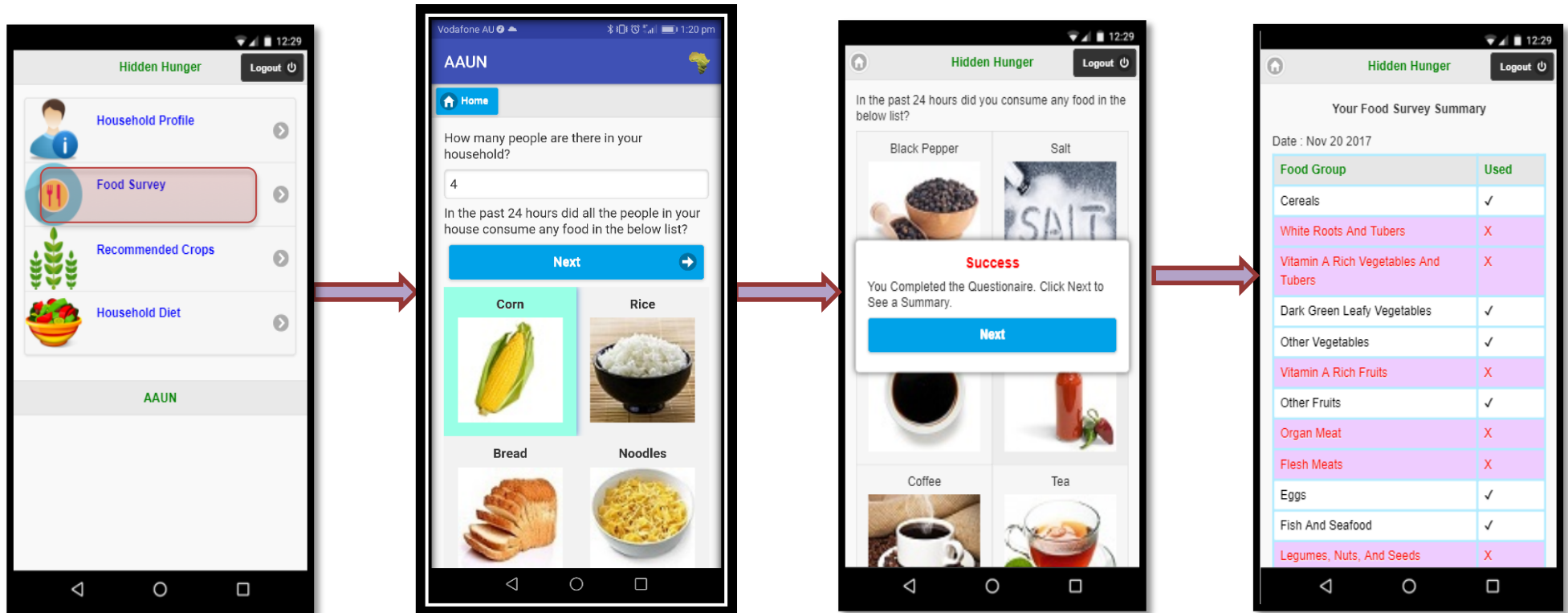
Item	Detail
Survey Target	Information is collected based on household (not per person) in a specific region (South Africa, Kenya, Nigeria)
Meals	Any food consumption or meal in a day
Time period	24-hours, Last Survey
Food groups	16 food categories
Crops	Local crops only mapping for vegetables in food categories



# Ustawi: Registration and Login



# Ustawi: Food Survey (24-hour recall)



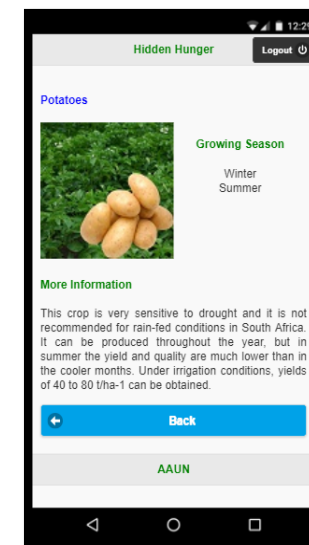
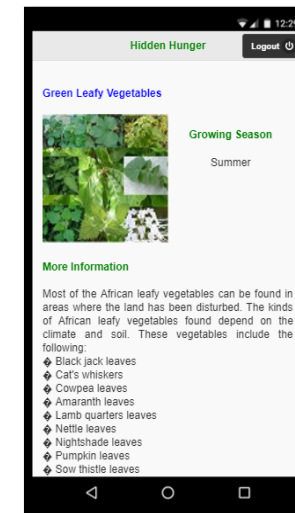
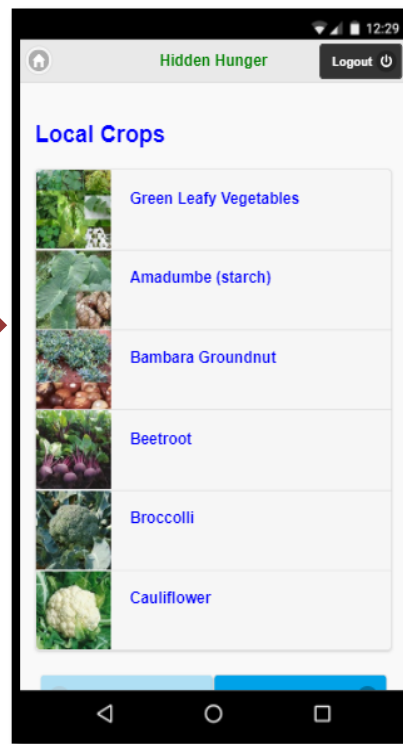
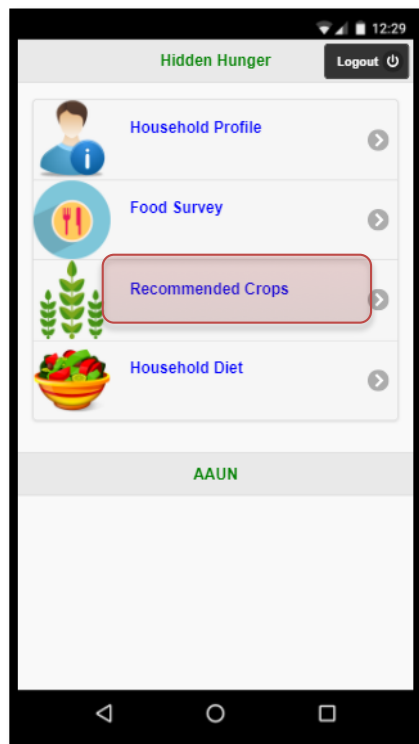
Your Food Survey Summary

Date : Nov 20 2017

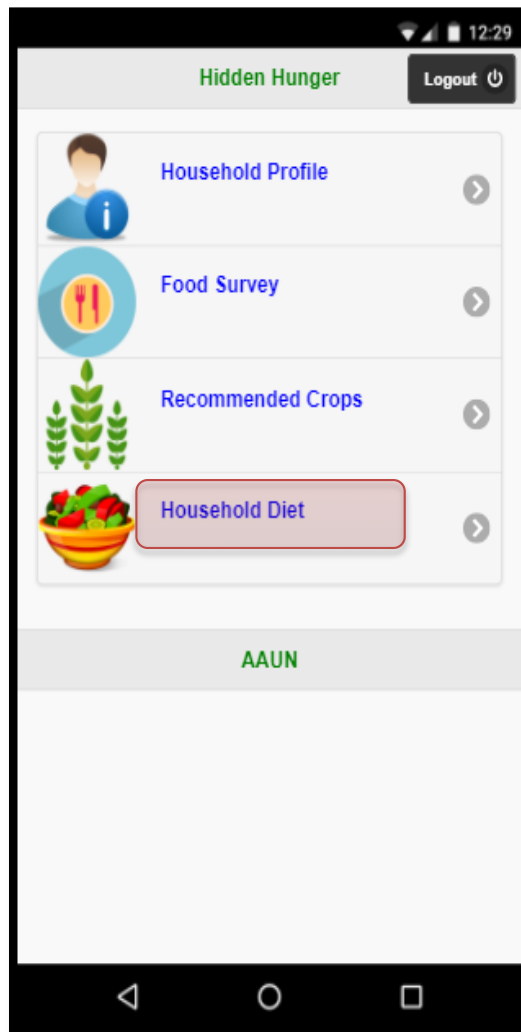
Food Group	Used
Cereals	✓
White Roots And Tubers	X
Vitamin A Rich Vegetables And Tubers	X
Dark Green Leafy Vegetables	✓
Other Vegetables	✓
Vitamin A Rich Fruits	X
Other Fruits	✓
Organ Meat	X
Flesh Meats	X
Eggs	✓
Fish And Seafood	✓
Legumes, Nuts, And Seeds	X



# Ustawi: Recommended Crops (Local Crops)



# Ustawi: Household Diet



# Ustawi: Data Analysis (back end)



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**Filter**

Date From

Date To

OR

Select No. Of Days

Last 24 Hours
▼

Food Groups

All
▼

Region

All
▼

Display

Date : Jan 28 2018 > All Food Groups > All Regions  
Total No. of Users: 2

Food Group	Households Consumed	Households Did Not Consumed
Cereals	50%	50%
White Roots And Tubers	50%	50%
Vitamin A Rich Vegetables	100%	0%
Dark Green Leafy Vegetables	50%	50%
Other Vegetables	100%	0%
Vitamin A Rich Fruits	50%	50%
Other Fruits	50%	50%
Organ Meat	100%	0%
Flesh Meats	0%	100%
Eggs	50%	50%
Fish And Seafood	0%	100%
Legumes, Nuts, And Seeds	100%	0%
Milk And Milk Products	0%	100%
Oils And Fats	0%	100%
Sweets	100%	0%
Spices, Condiments, Beverages	50%	50%

AAUN  
[User Management](#)  
[Logout](#)

16



# Evaluation



Two questions to answer:

## **1. Does the app address the hidden hunger problem?**

Feedback from experts: food, nutrition, and crop scientists

Their feedback provided evidence that the we are in the right track

However, adjustments in the original design were needed



# Evaluation



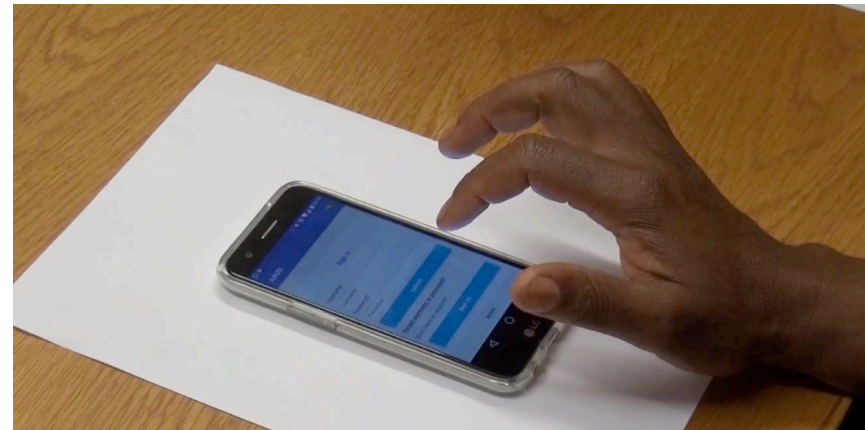
Two questions to answer:

## **2. Does the app promote change behavior in users?**

Usability study with 6 users (25 to 50 years old), 50% male, 50% female

Undertaking guided actions  
in the app

Positive feedback, with  
suggestions (some already implemented)



# Evaluation



“One [participant was] very excited as he has been planting potatoes and doing it wrongly. ”



# Project Team

16 Researchers from 4 countries from Australia and Africa



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UNIVERSITY



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YUNIBESITHI YA PRETORIA



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*...the first and the best*



**UNIVERSITY OF NAIROBI**

**AAUN** **AUSTRALIA AFRICA**  
UNIVERSITIES NETWORK



# Thank You



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