

# Planning for Sustainable Space Program in Bhutan

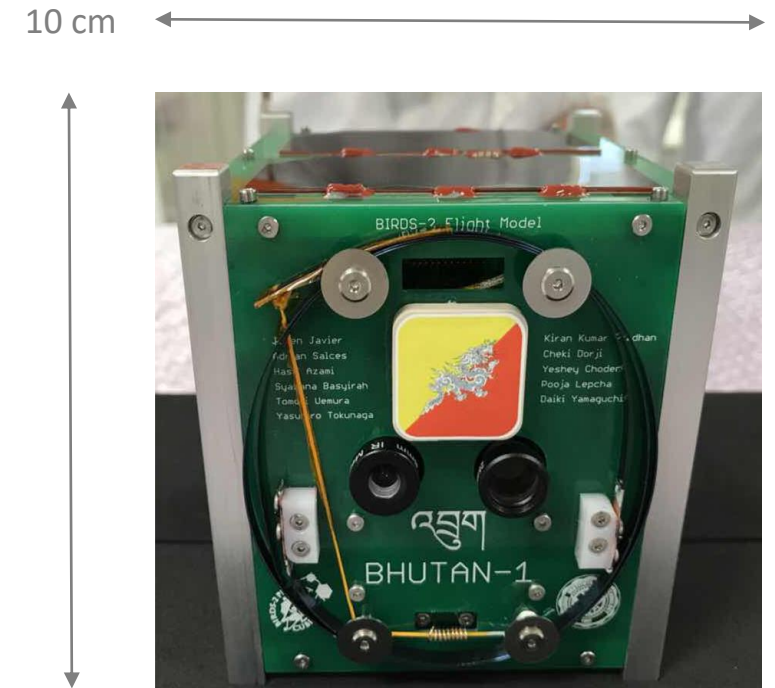


*Yeshey Choden*

Masters 2 Student  
Cho Lab  
Space Engineering International Course  
(SEIC)  
Kyushu Institute of Technology  
Japan

# Background

Bhutan's first satellite:	BHUTAN-1
Released in space from ISS:	29 <sup>th</sup> August, 2018
Developers:	4 Bhutanese engineers
Place:	Kyushu Institute of Technology, Japan
Objective:	Capacity development
Parent organisation:	Division of Telecom & Space Ministry of Information & Communications Royal Government of Bhutan



How can we ensure the sustainability of space program in Bhutan?

Research question

# Space for Development Profile (SDP)

- Initial assessment of a country's strengths and weaknesses with respect to space development
- Using open source data

## 4 pillars of SDP:

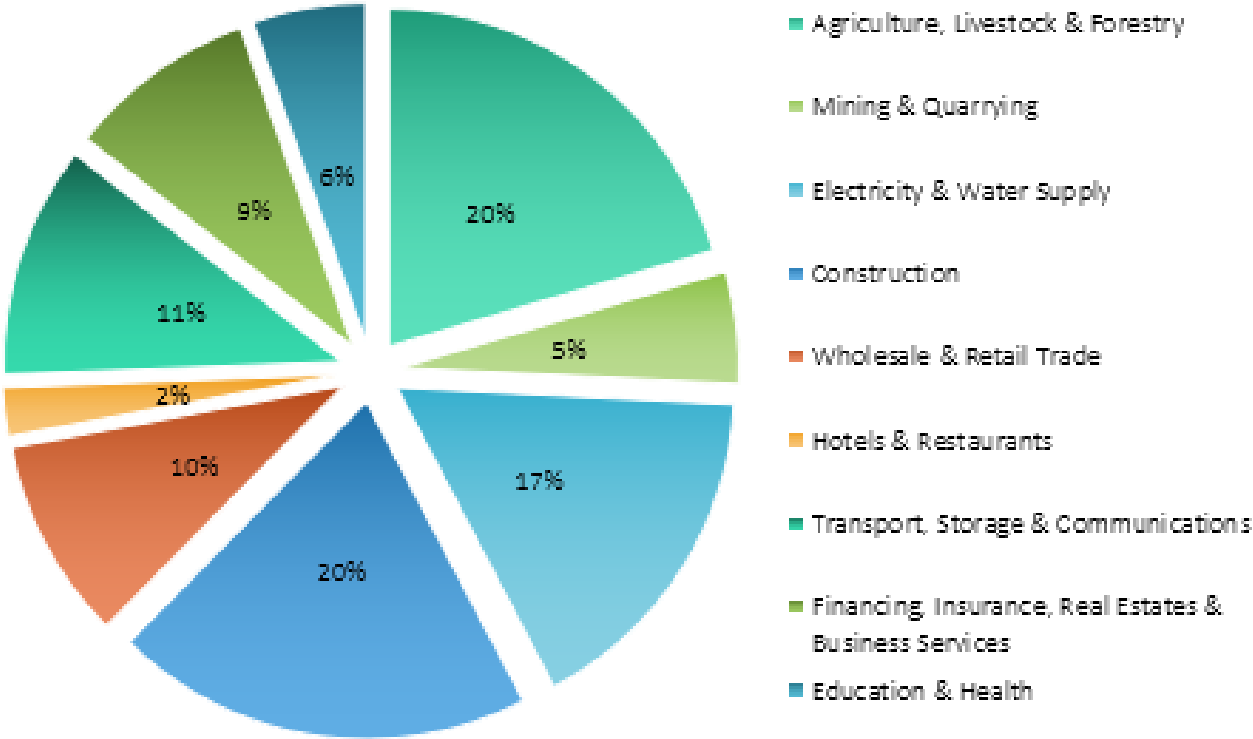
- People (Space Society)
- Infrastructure (Space Accessibility)
- Industry (Space Economy)
- Policy/Funding (Space Diplomacy)

## SDP for **BHUTAN**

- ✓ General Information
- ✓ Space related information
- ✓ Bhutan and the SDGs

# SDP for BHUTAN

GDP composition percentage by major economic activity that can be impacted by space science and technology, 2016



**Out of 13 major economic activities, 9 have the potential to be impacted by space science and technology**

# Planning in Bhutan

- Bhutan follows a five-year socio-economic development planning cycle called '**Five Year Plan**' (FYP)
- Currently, the 12th FYP is being implemented from 1st July, 2018 to 30th June, 2023
- It is developed based on a series of extensive consultations with all relevant stakeholders, including individuals, government agencies, local governments, private sector, Civil Society Organizations, political parties etc.
- It has drawn on inspirations from the Royal Addresses, constitutional obligations, issues and challenges highlighted during the 11th FYP mid-term review and as raised by many during the consultative meetings, and **Bhutan's commitment to internationally agreed development goals**

**Five Year Plan  
(FYP)**



**National Key Result  
Areas (NKRAs)**

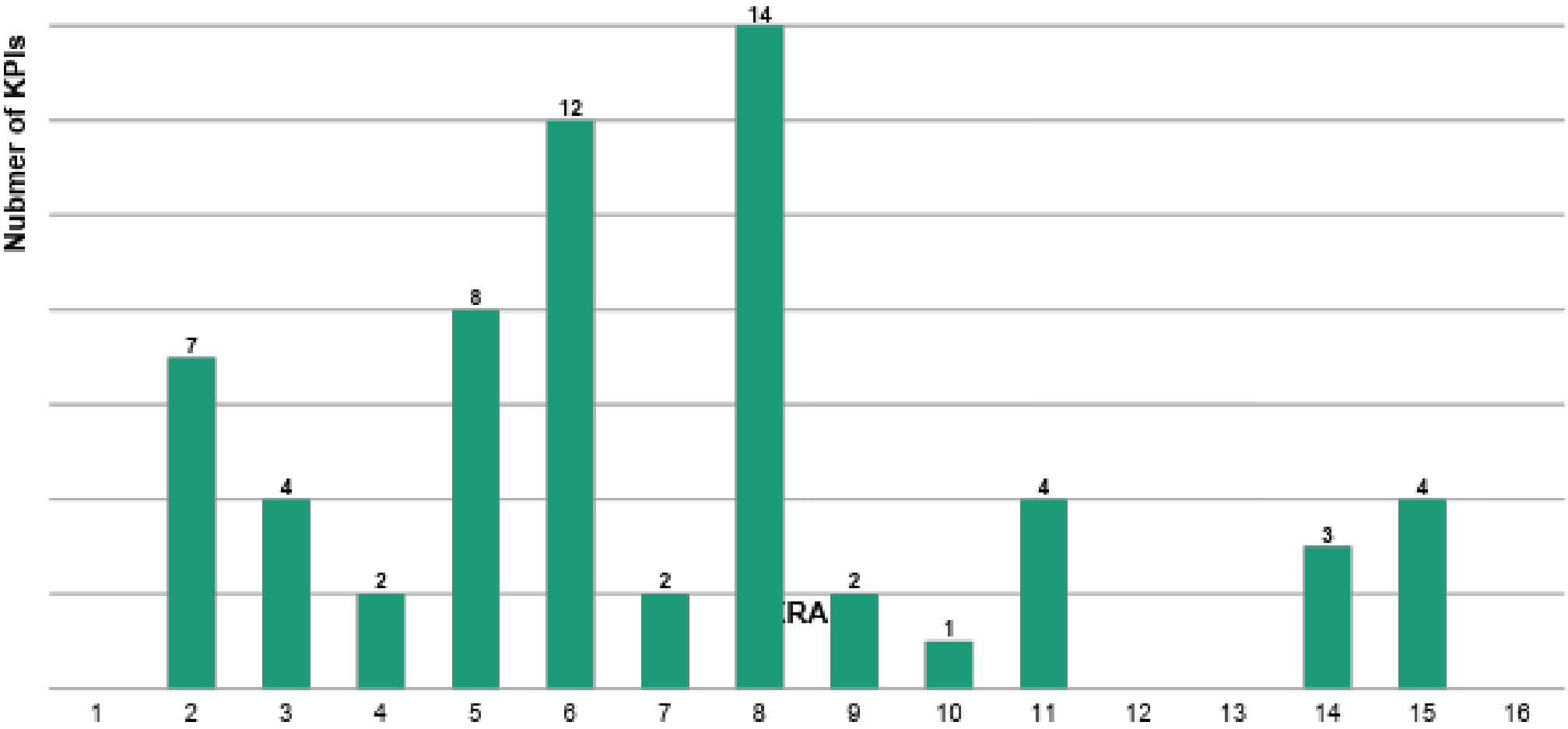


**Agency Key Result  
Areas (AKRAs)**

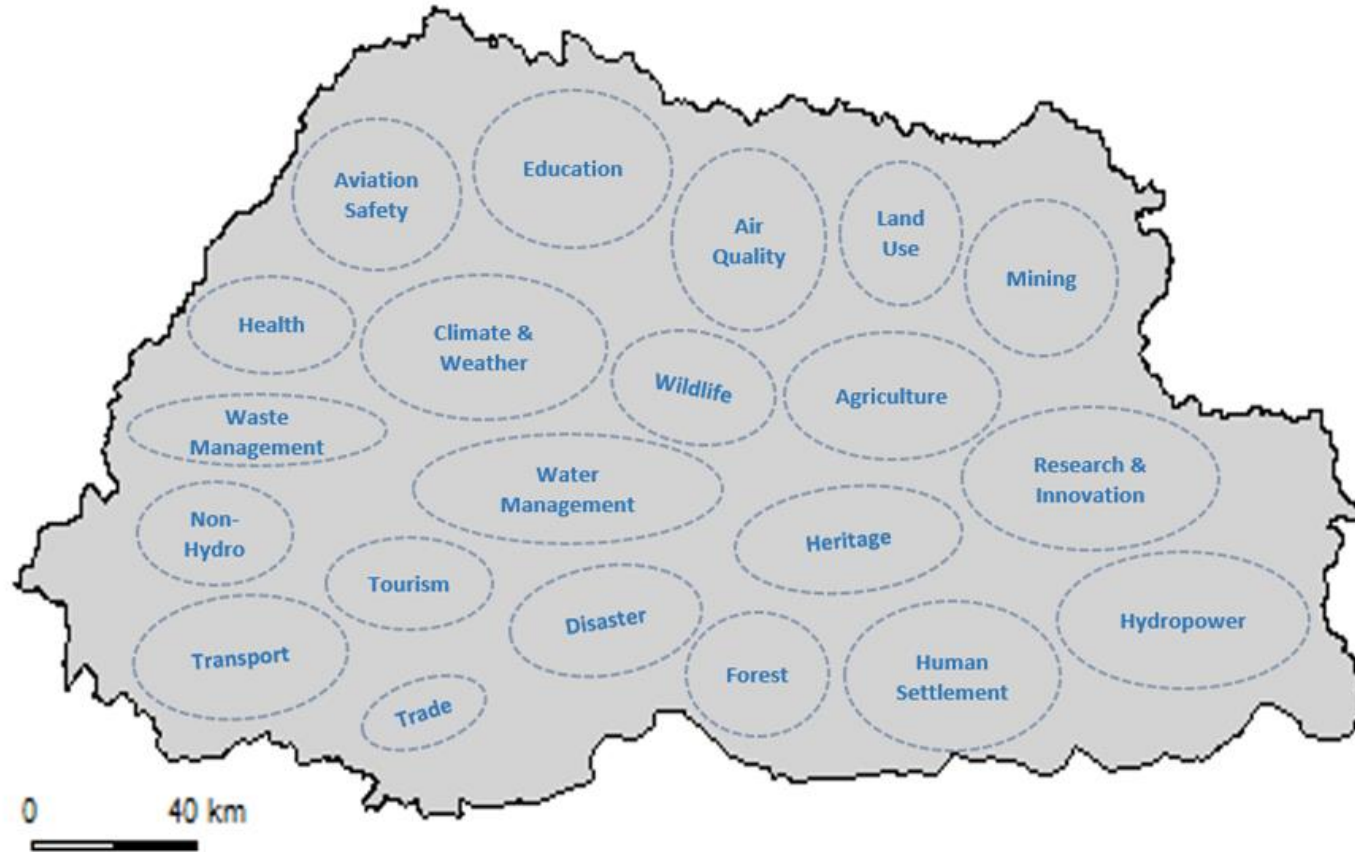


**Key  
Performance  
Indicators (KPIs)**

# No. of KPI per NKRA that have the potential to be impacted by space science and technology



# Thematic categorization



Sl.no.	Themes	Number of KPIs
1	Agriculture	8
2	Water Management	8
3	Disaster	6
4	Hydropower	4
5	Air Quality	4
6	Human Settlement	3
7	Land Use	3
8	Climate & Weather	3
9	Education	3
10	Health	3
11	Mining	2
12	Non-Hydro	2
13	Research & Innovation	2
14	Heritage	2
15	Wildlife	2
16	Forest	2
17	Aviation Safety	2
18	Waste Management	2
19	Tourism	1
20	Trading	1
21	Transport	1



# Agriculture

- One-third of Bhutan's population rely on farming as the prime source of livelihood
- Agriculture, livestock and forestry sector constitute 20% of the country's GDP
  - ✓ Identified 2 KPIs for crop yield estimation namely for rice and maize
  - ✓ Agency Key Result Area (AKRA): "National Food Self- Sufficiency Enhanced"
    - ✓ NKRA 8: "Water, Food and Nutrition Security (Water Security)"

**Accurate crop yield estimation provides valuable information for assessing food self-sufficiency and guide food supply**

# Agriculture KPIs in 12<sup>th</sup> FYP

## NKRA 8: Water, Food and Nutrition Security (Water Security)

AKRAs	KPIs	Baseline	Target	Data Collection Methodology	Responsible Agency
National Food Self-sufficiency Enhanced	Rice self-sufficiency (The indicator measures the volume of rice produced in the country as a proportion of requirement for national consumption)	45%	60%	Survey Data Source: SSR Report, MoAF	Ministry of Agriculture and Forests
	Maize self-sufficiency (The indicator measures the volume of maize produced in the country as a proportion of requirement for national consumption)	84%	92%	Survey Data Source: SSR Report, MoAF	Ministry of Agriculture and Forests

# Project Proposal

## **Objective**

to develop a sustainable and low-cost mechanism for estimation and forecast of rice and maize production in Bhutan by using remote sensing satellite data in the 12th FYP period (2018-2023)

## **Desired outcomes**

Mechanism for estimation and forecast of crop yield developed at low cost

The mechanism developed is sustained by institutionalization and capacity development

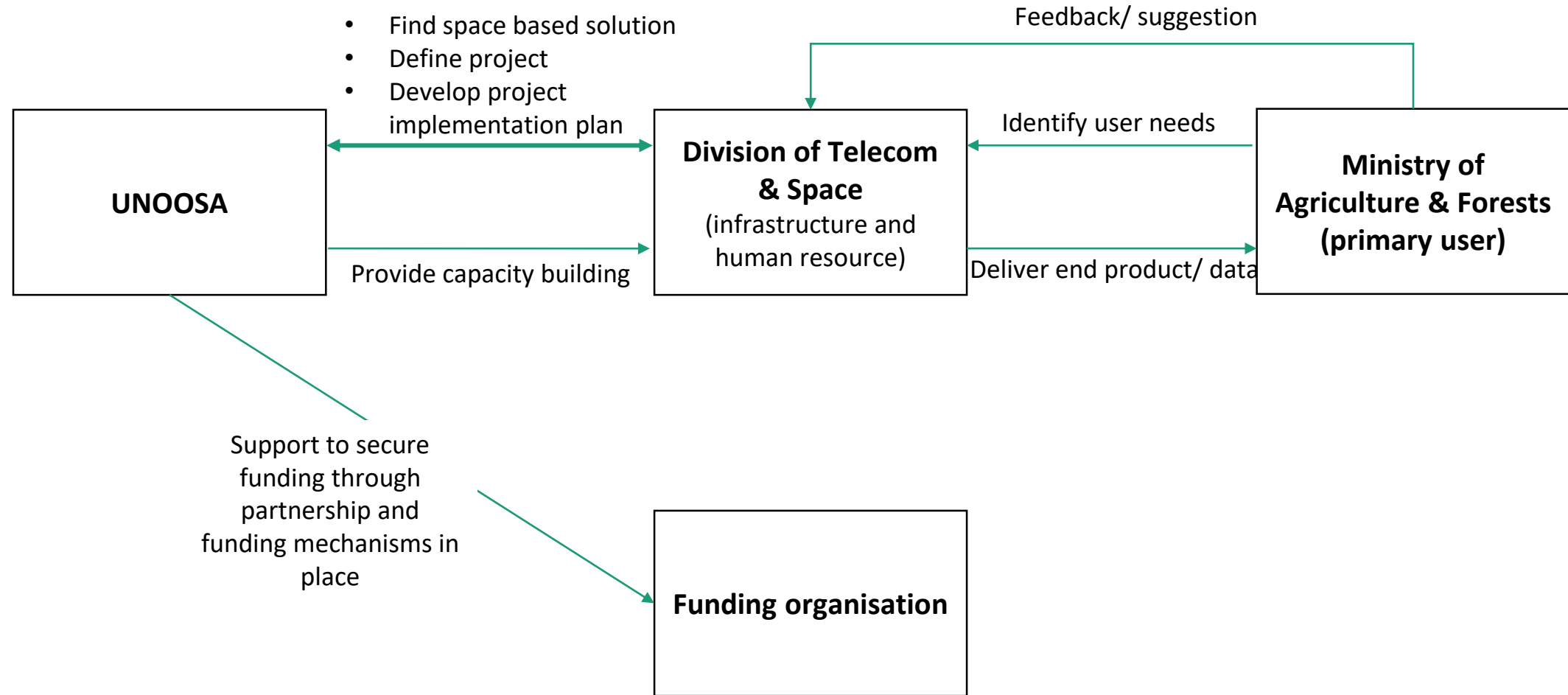
# Key Activities

- Analyse users' data needs through consultation
- Identify space science and technology based solution
- Develop project implementation plan
- Secure funding
- Procure required infrastructure
- Develop capacity for data acquisition, processing, analysis and distribution
- Acquire data
- Develop data processing chain
- Deliver product/ data to users
- Validate product/ data with field survey data
- Refine data processing chain based on user feedback

# The user(s) and any other known interested parties

User	Remarks
<b>Primary User</b>	
<b>Ministry of Agriculture and Forests</b>	<p>To assess food self-sufficiency in the country</p> <p>To develop strategies/ plans/ projects/ technologies to enhance food self sufficiency</p> <p>To monitor food production in the country</p>
<b>Secondary Users</b>	
<b>Ministry of Economic Affairs</b>	<p>To determine the contribution of agriculture towards the country's GDP</p> <p>To determine the dynamics of export and import of agriculture and other consumables</p> <p>To determine tariff and taxation for goods and services</p>
<b>Gross National Happiness Commission</b>	To plan for the next FYP
<b>Farmers</b>	<p>To estimate revenue generated</p> <p>To plan for future crop cultivation</p>
<b>Agro-manufacturing industries</b>	To design and plan for agriculture processed food manufacturing

# Interface



Thank you