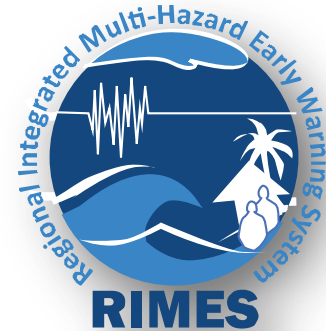




## Stakeholder Consultation Workshop for Development of National Framework for Climate Services in India (NFCS-India) 5-6 October 2023

# Climate Services for Disaster Risk Reduction



**Anshul Agarwal**  
Team Leader – Hydromet Department  
RIMES, Thailand  
5<sup>th</sup> October, 2023

- Established in April 2009
- Institutional development process supported by ESCAP
- Registered with the United Nations
- Intergovernmental, owned and managed by its Member States



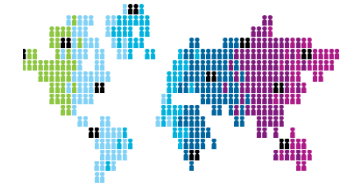
# RIMES

**Regional Integrated Multi-Hazard Early Warning System for Africa and Asia**





# RIMES



## Regional

48 Member and Collaborating States in Asia, Africa, and the Pacific



## Integrated

links science with applications and generators with users of early warning information



## Multi-Hazard

started with earthquake and tsunami, and expanded to include hydro-meteorological hazards



## Early Warning

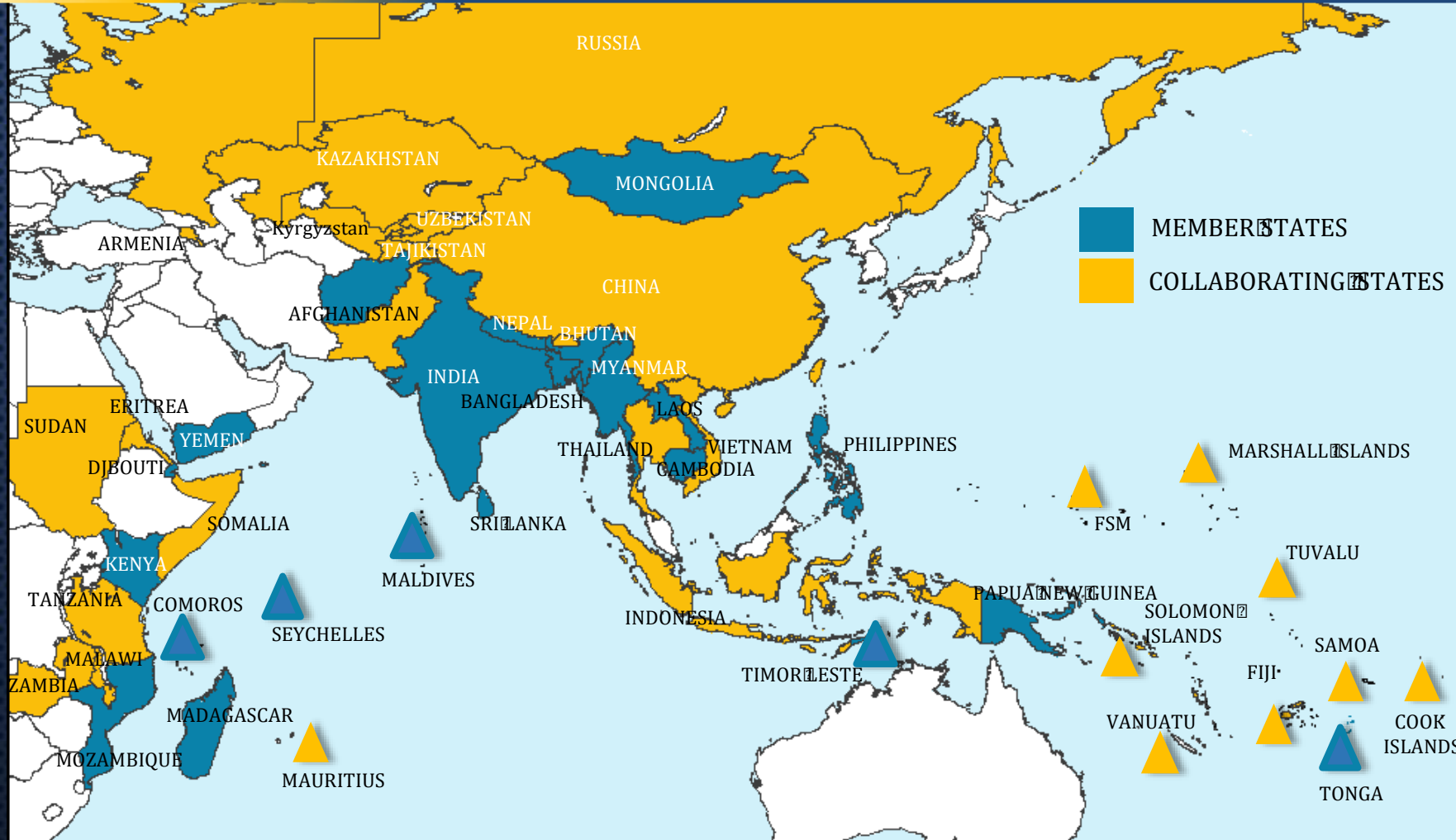
with mandate to provide early warning services for enhanced preparedness for, responses to, and mitigation of natural hazards



## System

consists of regional technical support unit, connected to national and local systems.

# RIMES 48 MEMBER AND COLLABORATING STATES





## Member States : 22 Countries

Afghanistan, Bangladesh, Cambodia, Comoros, Djibouti, India, Kenya, Lao PDR, Madagascar, Maldives, Myanmar, Mongolia, Mozambique, Nepal, Papua New Guinea, Philippines, Seychelles, Somalia, Sri Lanka, Timor-Leste, Tonga, Yemen.

## Collaborating States : 26 Countries

Armenia, Bhutan, China, Cook Islands, Eritrea, Fiji, FSM, Indonesia, Kazakhstan, Kyrgyz Republic, Malawi, Marshall Islands, Mauritius, Pakistan, Russian Federation, Samoa, Solomon Islands, Sudan, Tanzania, Thailand, Tajikistan, Tuvalu, Uzbekistan, Vanuatu, Vietnam, Zambia

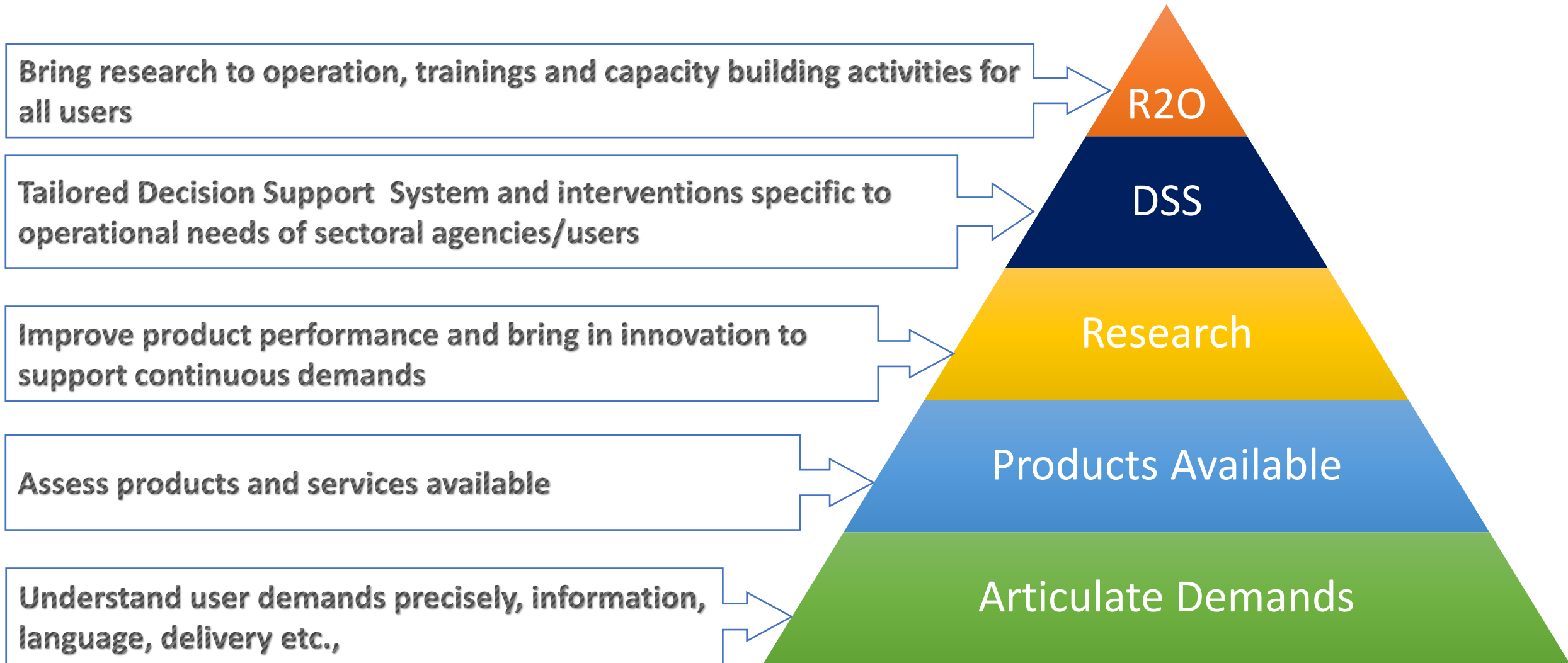
-  **Program Unit**, Thailand
-  **Council Chair\***, India
-  **Secretariat**, Maldives
-  **Climate Application Centers** –  
Bangladesh, Sri Lanka, Nepal
-  **Sub-regional Hubs** - Papua New  
Guinea, Madagascar, Armenia  
and Kenya



\* Represented by the Secretary, Ministry of Earth Sciences

- Collaborations with IMD, INCOIS, NCMWRF, IITM to take the state of the art forecast products for various applications in India and other countries in South Asia, Africa and Pacific. Also take services of experts for providing training and capacity building services for low capacity countries.
- SASCOF – 3 sessions every year; FOCUS System; CSUF sessions
- Establishing regional observations outside India which help to obtain observations for verification
- GFCS Implementation in South Asia – Piloting Climate Outlook Forum in India (forum organized in BHU Varanasi)
- Pilot project on application of seasonal and sub-seasonal forecast at farmer's field level: channeling the information from Global/National sources to reach the farmers
- Forecast Application for Risk Management in Agriculture (FARM) School – Tamil Nadu, Bihar
- DSS for Agriculture Sector – Piloted in Tamil Nadu and adapted at National level
- DSS for Disaster Risk Management – Tamil Nadu and Odisha states

# User Perspective: Addressing the Demands – A Bottom–up approach



# DSS for Disaster Management



பேரிடர் மேலாண்மை  
**TNSMART**

Tamil Nadu System for Multi-hazard potential impact assessment, Alert, emergency Response planning and Tracking



En த

தகவல் பகரலை

பாதிப்புக்குள்ளாகும் பகுதிகளின் விவரம்

மழையின் அளவு

நீர்தேக்கங்களின் அளவு

வானிலை முன்னறிவிப்பு

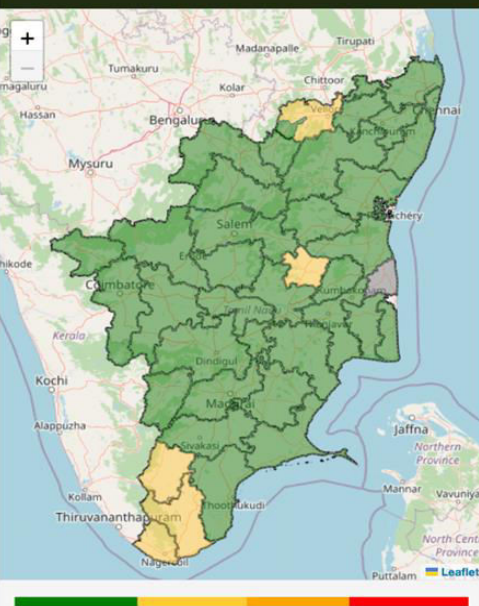
செய்ய வேண்டியவை & செய்யக்கூடாதவை

புகார் பதிவு

TNSMART கருக்கம்

உள்ளுமைய

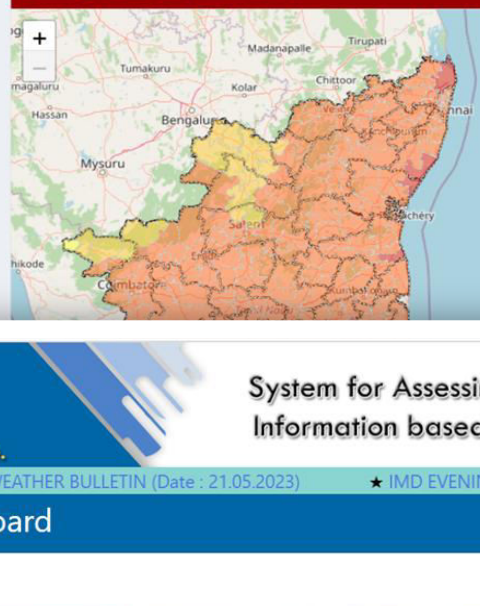
அடுத்த 3 மணி நேரத்திற்கான வானிலை நிலவரம்



இன்றைய மழையின் நிலை (04-Oct-2023)



இன்றைய வெப்பநிலை (04-Oct-2023)



Tamil Nadu: TNSMART System for Multi-Hazard potential impact Assessment and Emergency Response Tracking

ਬਚੋ  
Stay Alert! Stay safe.

System for Assessing, Tracking, and Alerting Disaster Risk Information based on Dynamic Risk Knowledge (SATARK)



★ IMD MIDDAY WEATHER BULLETIN (Date : 21.05.2023)

★ IMD EVENING WEATHER BULLETIN (Date : 21.05.2023)

★ Five days Forecast and Warning for Odisha (Date : 21.05.2023)

Dashboard

Home

Current Alerts

**Heatwave**

Severe Alert : 2 Blocks  
Heatwave Alert: 222 Blocks  
No Heatwave Alert: 88 Blocks

[More Info](#)

**Rainfall**

Severe Rainfall: 0 Blocks  
Moderate Rainfall: 3 Blocks  
Low Rainfall: 34 Blocks

[More Info](#)

**Coldwave**

Extreme Caution: 0 Blocks  
Caution: 0 Blocks

[More Info](#)

**Lightning**

Severe Alert: 0 Blocks  
Moderate Alert: 0 Blocks  
Low Alert: 0 Blocks

[More Info](#)

Hazard Calendar of Odisha

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec



Odisha: SATARK System for Assessing, Tracking, and Alerting Disaster Risk Information based on Dynamic Risk Knowledge



# Objective

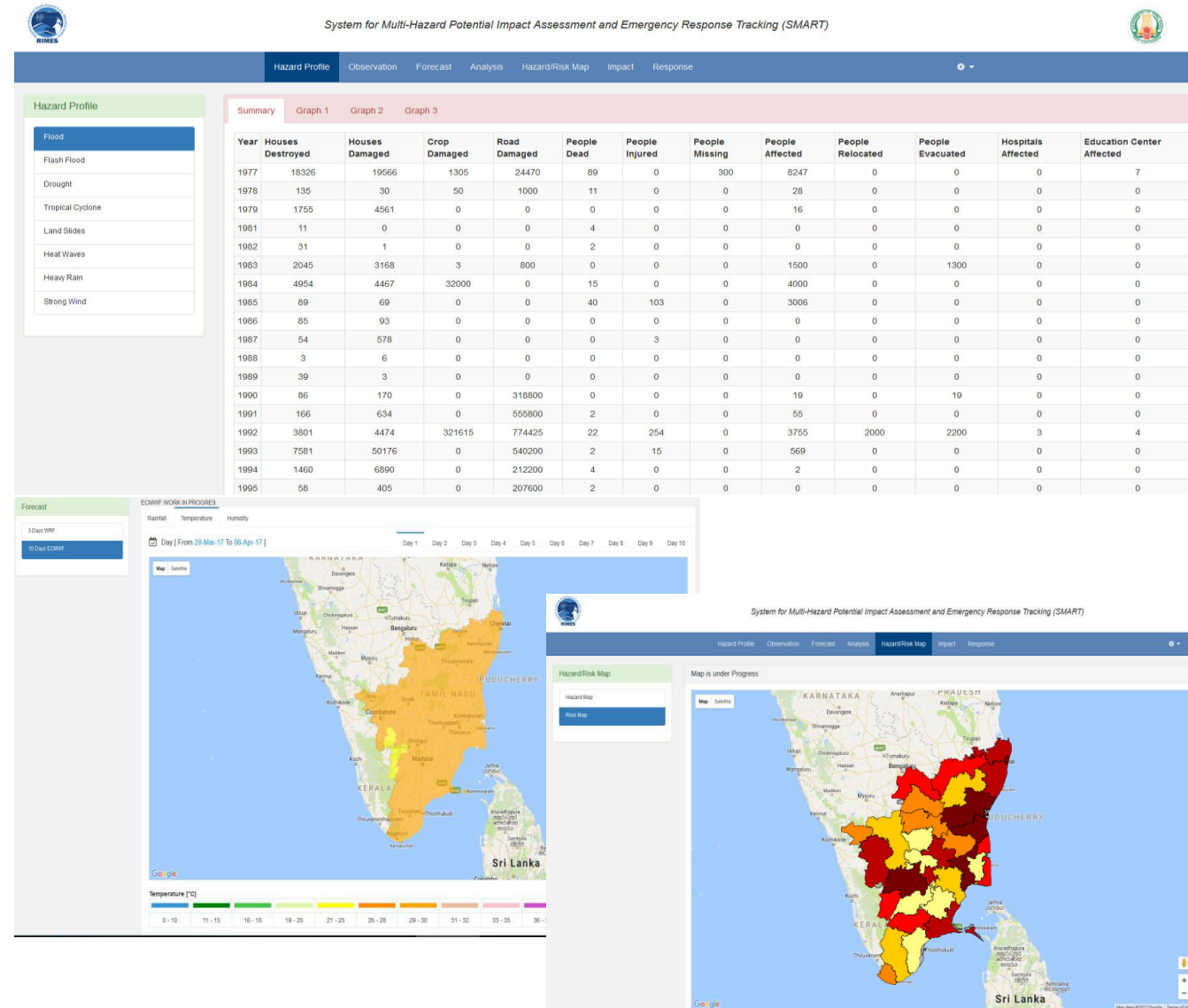
- To develop an operational information-driven decision-support system:
  - **For** policy makers, disaster managers and communities
  - **To** manage disaster risks holistically
  - **By** transforming different range of forecast data into actionable, impact-based early warning information
- Utilizes cutting-edge technological advances to facilitate decision-making during all phases of the Disaster Management- Early Warning, Preparedness, Emergency Response, Mitigation and Recovery

# Vision

- Make TNSAMRT and SATARK as one stop solution for all information generation, processing, analysis and dissemination
  - Integrate tools, data, best practices available in the platform
- Focus and Integrate the most critical and priority hazards and impact based forecast generation process
- Support Establishment of a technical wing for SDMA to support, for operational support, during emergencies, work on further development, understand and integrate sector specific demands, dynamic risk assessments
- Bring innovative technology and redundant communication system to maximize the reach to last mile.
  - CAP (Common Alert Protocol), Cell broadcasting, App based alerts
  - Strengthen the block level EOCs (Emergency Operation Centre) and ensure use and receive feedback and as well as Realtime data from the ground.

# DSS for Disaster Management

- Integrated platform for Disaster response
- Block level Disaster profiles
- Assessment of historical disaster events
- Real time monitoring of weather parameters
- Short- medium range forecast and extreme event alerting
- Analysis – Evaluation of forecast performance
- Generation of risk information based on weather forecast at different time scales
- Integration of response and resource allocation options



# Modules in TNSMART

14 modules for strengthening preparedness, response, recovery and mitigation

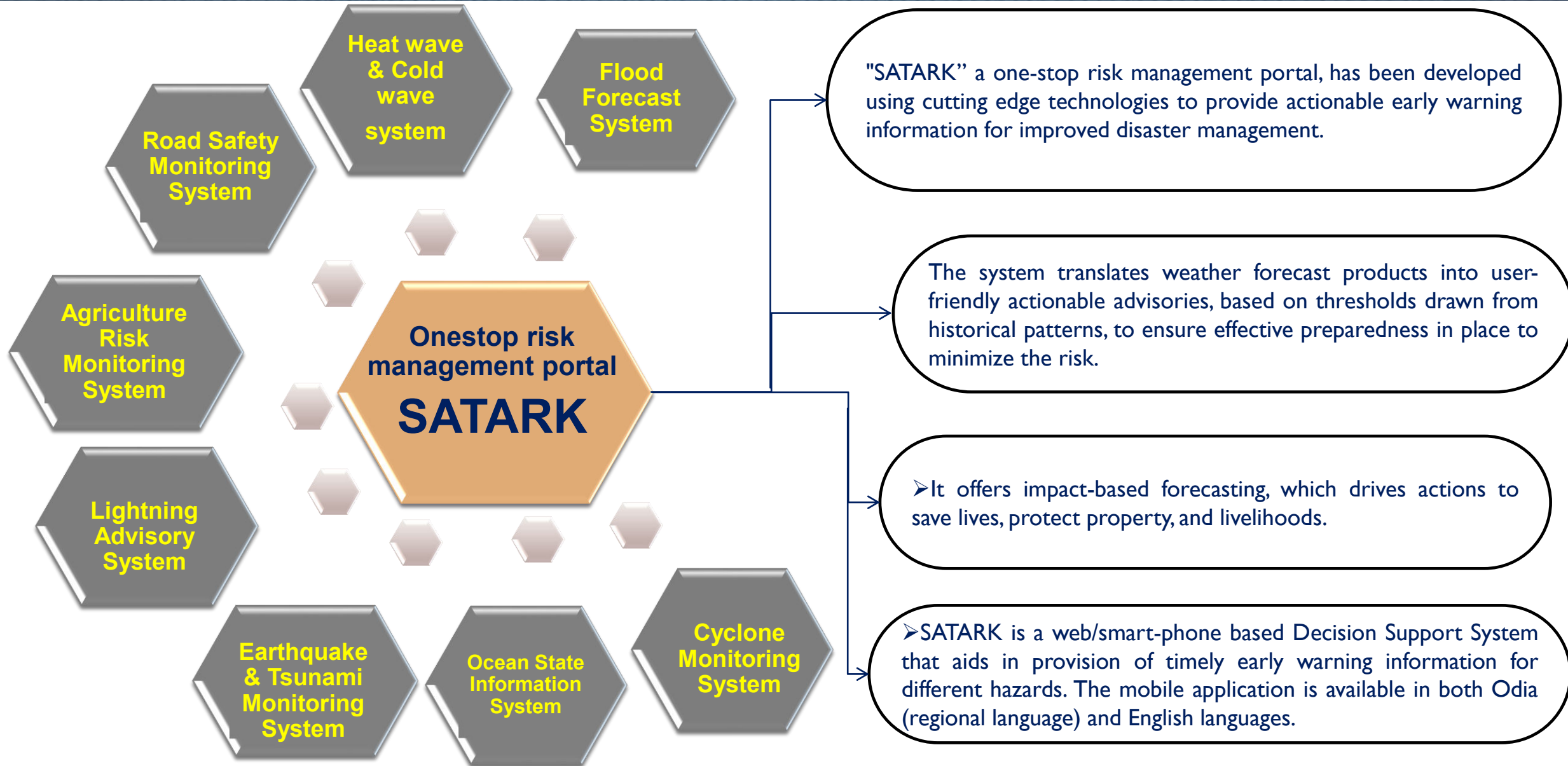
The screenshot displays the TNSMART web application interface. At the top, there is a header with the Tamil Nadu State Emblem on the left, the text 'பேரிடர் மேலாண்மை TNSMART' and 'Tamil Nadu System for Multi-hazard potential impact assessment, Alert, emergency Response planning and Tracking' in the center, and the Tamil Nadu State Emblem on the right. Below the header, there are language selection buttons for 'En' and 'த' (Tamil), and a 'Logout' button.

The main content area is divided into four columns representing different functional areas:

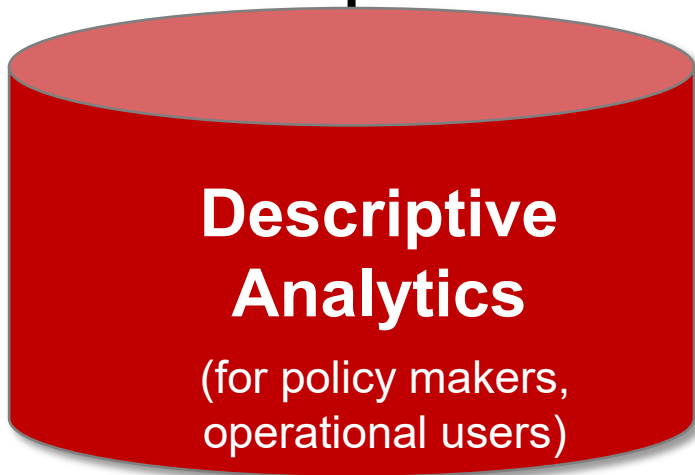
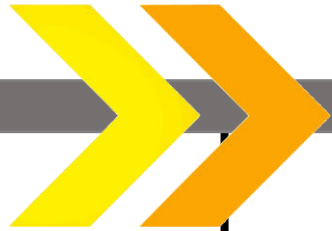
- Preparedness (Blue header):** Contains five modules: Database, Forecast, Flood, Drought, and Lightning.
- Response (Orange header):** Contains four modules: Complaint registry, Risk communication, Response planning, and Response tracking.
- Recovery and Mitigation (Green header):** Contains three modules: Tracking Risk reduction, Report generation, and Statistics.
- Integrated modules (Yellow header):** Contains four modules: MIS, Apdamitra, Losses and damages, and Daily data.

A descriptive paragraph below the header states: "TNSMART (Tamil Nadu System for Multi-hazard potential impact assessment, Alert, emergency Response planning and Tracking) is a web-based system to utilize weather forecast products to assess potential impacts, and evaluate and disseminate impact management options with a robust data management system for managing and processing weather, disaster risk, and emergency response resources data."

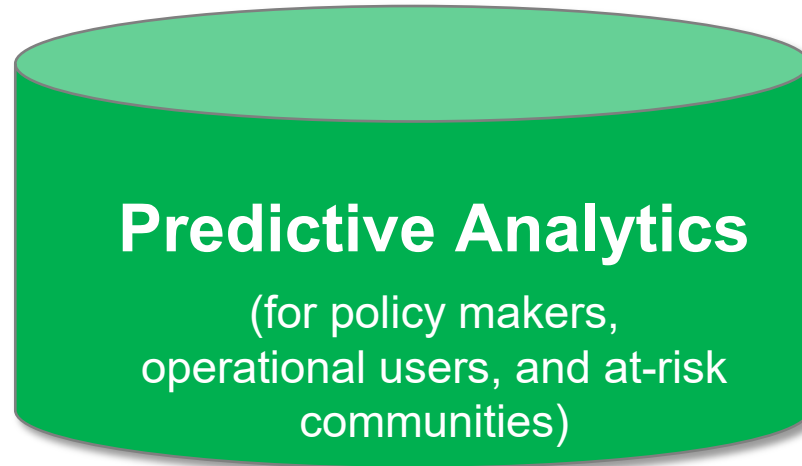
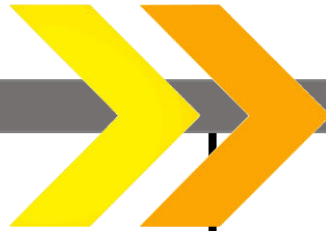
# Modules in SATARK



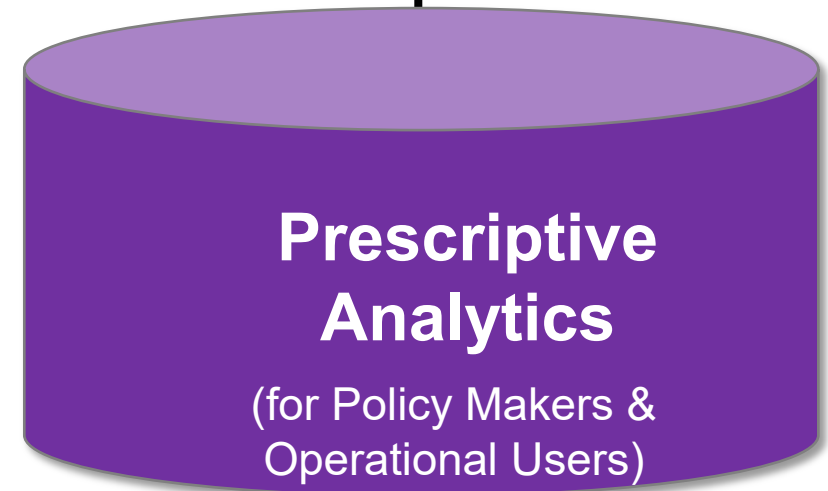
# Data Analytics



**Using historical data**  
*(risk pattern analysis)*




**Predicting risks and trends**  
*(integrating historic and forecast data)*





**Potential impact outlooks with risk management options**

# WEB & APP INTERFACE



Stay Alert! Stay safe.

## System for Assessing, Tracking, and Alerting Disaster Risk Information based on Dynamic Risk Knowledge (SATARK)

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### Hazard Calendar of Odisha


Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec




Agriculture Monitoring System




Ocean Monitoring System




Flood Monitoring System




Road Accident System



Cyclone Monitoring System



Earthquake Information

SATARK



★IMD EVENING WEATHER BULLETIN ★Five

Weather Forecast More

Today 22 May

# 40°C

## No Rain



📍 Bhubaneswar, Khordha
 📄

Weather

Lightning

Heatwave

Flood

Ocean

Road Accident

Snakebite

Report

Statistics

Earthquake

Cyclone

Agriculture

Today

📍 Bhubaneswar, Khordha

Home

Feedback

Settings

# FORECAST PRODUCTS

- Integrates forecast products from India Meteorological Department (IMD), ECMWF, RIMES, INCOIS
- The forecast products like Heavy Rainfall, Temperature, Humidity, Cloud cover, windspeed, Ocean State are used for assessing the potential risk in various hazard module

- The IMD GFS model forecast is being used for the **value addition process**. The map shows the Block level forecast along with the assigned day's wise temperature normal. By using the free hand tool, data can be edited for all blocks in a quick session. The generated advisory can be viewed.
- IMD Now cast information** with 3hr lead time for stations and districts is also available.

The dashboard features a navigation menu on the left with options like Home, Disaster Impact Profile, Value Addition Graphical, Weather Forecast, Forecast Verification, Exposure, Users Feedback/Report, Contacts, Nowcast, and Flash Message. The main content area displays the 'Hazard Calendar of Odisha' with a table of hazards, their occurrence times, and locations. Below the table is a 'Choose Module to Proceed' button and a link to 'See Today's and Next 10 days Weather Forecast'. At the bottom, there are nine icons representing different monitoring systems: Heatwave and Coldwave Advisory System, Ocean State Information System, Earthquake Monitoring and Tsunami Risk System, Agriculture Risk Monitoring and Management System, Flood Monitoring System, Cyclone / Storm Surge Monitoring System, Lightning Advisory System, Road Accident Monitoring System, and Snakebite Monitoring System.

Hazard?	When - It Occurs?	Where - It Occurs?
Heatwaves	April - June	Widespread over the state
Floods	Monsoon season (July-September) and during cyclone seasons	Along the major rivers and the tributaries
Cyclone	October-November and April-May	Bay-of-Bengal, East coast of India
Lightning	April- September	Widespread over the state
Drought	Months to even multiple seasons	Widespread over the state

The interface shows a map of Odisha with numerous block-level data points. A table on the right provides detailed forecast data for selected blocks. The table includes columns for Block Name, Normal Max. Temp., Fcst. Max. Temp., and Change Alert. The data shows that for several blocks, the forecasted maximum temperature exceeds the normal maximum, resulting in a 'Severe Heatwave' alert.

Block Name	Normal Max. Temp.	Fcst. Max. Temp.	Change Alert
Sarasakana	35.1	35	No Heatwave
Bangriposi	35.1	45	Severe Heatwa
Besoi	35.1	43	Severe Heatwa

The Nowcast interface displays a map of Odisha with a legend indicating four levels of warning: No warning (green), Watch (yellow), Alert (orange), and Warning (red). The map shows that several districts are currently under a 'Watch' or 'Alert' condition.



# Four stages of a continuous, cyclic process for developing and delivering services

The four stages of a continuous, cyclic process for developing and delivering services are:

(1) User engagement and developing partnerships

(2) Service design and development

(4) Evaluation and improvement

(3) Delivery





Thank You!!

