Second UNWGIC India Evolving Geospatial Ecosystem: Dialogue with Global Stakeholders

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Telangana State Remote Sensing Application Center (TRAC)

Geospatial Databases Created	**Web based Geographic Information Systems**	**Monitoring Disasters / Major Programmes**

Geospatial Databases Created

➢ Terrain Condition:- Topography, Land use

➢ Natural Resources :- Soil, Ground Water

➢ Assets :- Public Utilities & Amenities

Web based Geographic Information Systems

➢ Administrative & Electoral Management

➢ Road Network Development

➢ Minerals and Mines Development

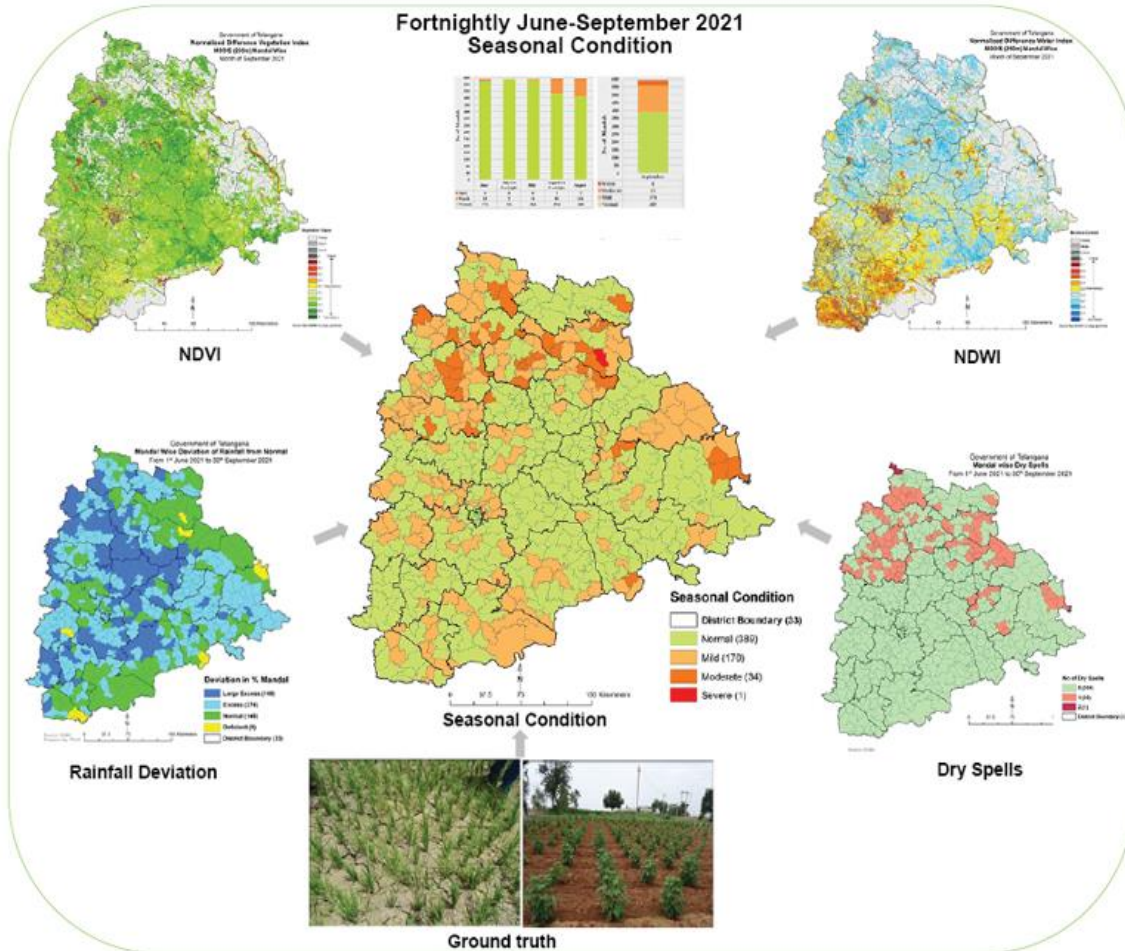➢ Cadastral Data Management

➢ Ease of Doing Business
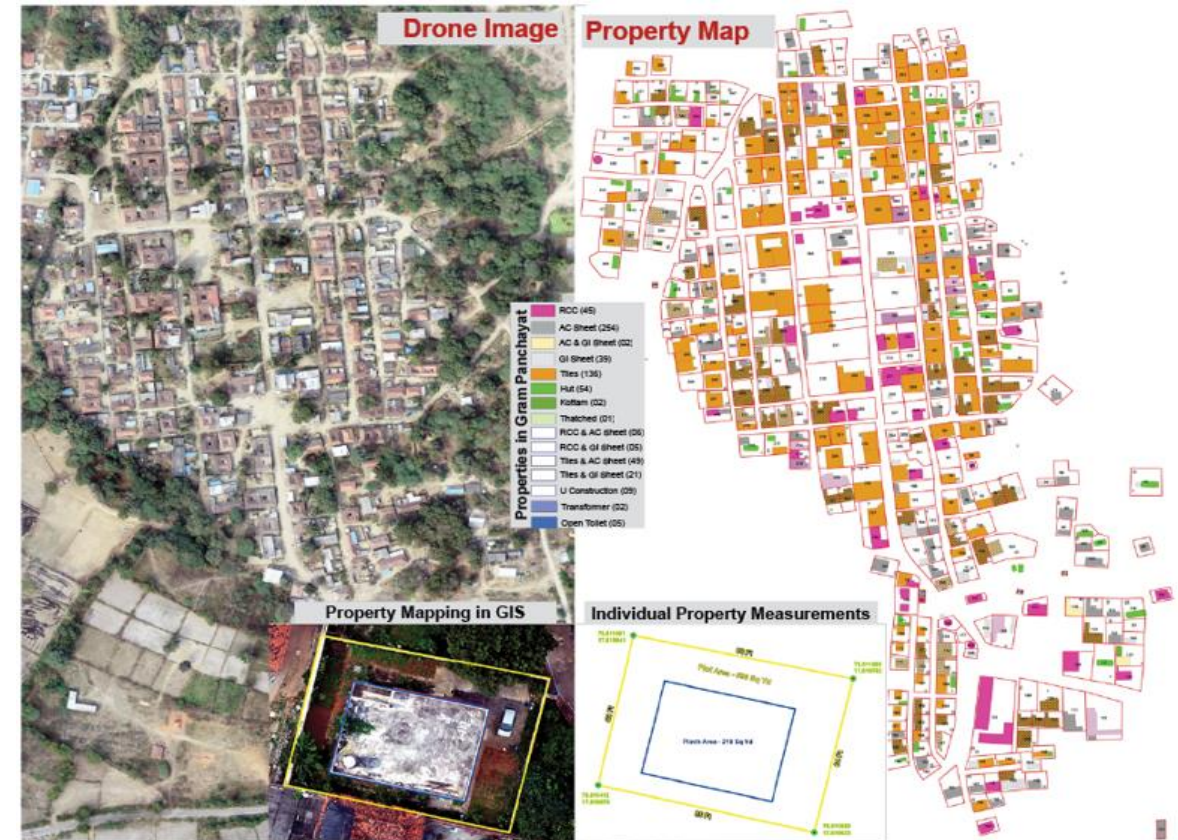
Monitoring Disasters / Major Programmes

➢ Agricultural Drought

➢ Agricultural Output of Major Crops

➢ Common Areas of Irrigation Projects

➢ Degraded & Waste Lands Reclamation

➢ Monitoring of Watersheds of the State

Telangana State Remote Sensing Application Center (TRAC)

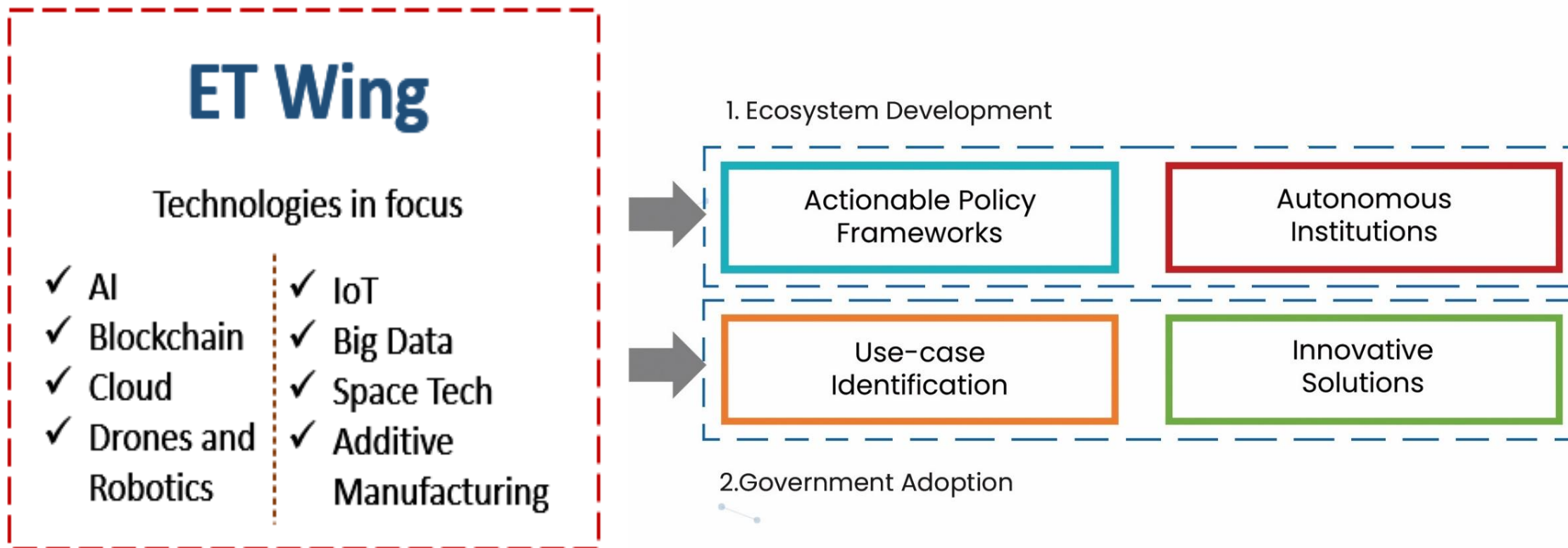## Agricultural Drought Monitoring

Property Survey using Drone Technology

We have adopted a New Approach…

Achieving Telangana's vision to become a leader in Emerging Technologies

Two-Pronged Approach

ET Wing

Technologies in focus

- ✓ AI
- ✓ Blockchain
- ✓ Cloud
- ✓ Drones and Robotics
- ✓ IoT
- ✓ Big Data
- ✓ Space Tech
- ✓ Additive Manufacturing

1. Ecosystem Development

- Actionable Policy Frameworks
- Autonomous Institutions

- Use-case Identification
- Innovative Solutions

2. Government Adoption

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Actionable Policy Frameworks

In consultation with industry, academia, start-ups, and other stakeholders, policy frameworks are formulated that lay down the state's strategic initiatives classified into key pillars of initiatives and focus areas.
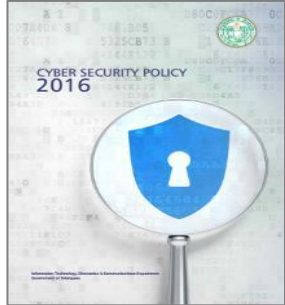
Cyber Security Policy

With a vision to achieve a safe & resilient cyber space for all, the policy focuses on legal regulatory frameworks, compliance, business development and more.
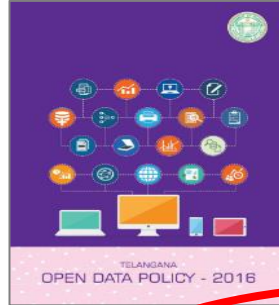
Open Data Policy

While acknowledging the potential of data, this policy was released for making government datasets publicly available to enable innovation & transparency

IoT Policy

It was released with a vision of positioning Telangana as a test bed for IoT solutions & create atmosphere for thriving of IoT businesses and manufacturing units.

e-Waste Management Policy

With e-Waste increasing alarmingly, it focuses on awareness, organizing the sector, and creating a vibrant e-Waste refurbishing and recycling ecosystem in the State

Drone Framework

Realizing the potential of drone industry, it set forth a vision to create a vibrant ecosystem to accelerate adoption and the economic growth.

Blockchain Framework

Blockchain has the potential to disrupt almost all industries, hence the policy set forth a vision to make Hyderabad as one of the top 10 blockchain cities of the world.

AI Framework

With AI becoming part of every facet of our lives and creating impact, it put in motion initiatives to establish Telangana as a global hub for AI & foster social innovation.
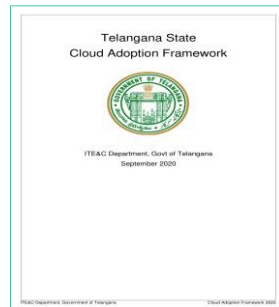
Cloud Adoption Framework

Taking cognizance of the advent of advanced and affordable cloud services, an assistive framework and mandating G.O. were released to drive cloud adoption in government.
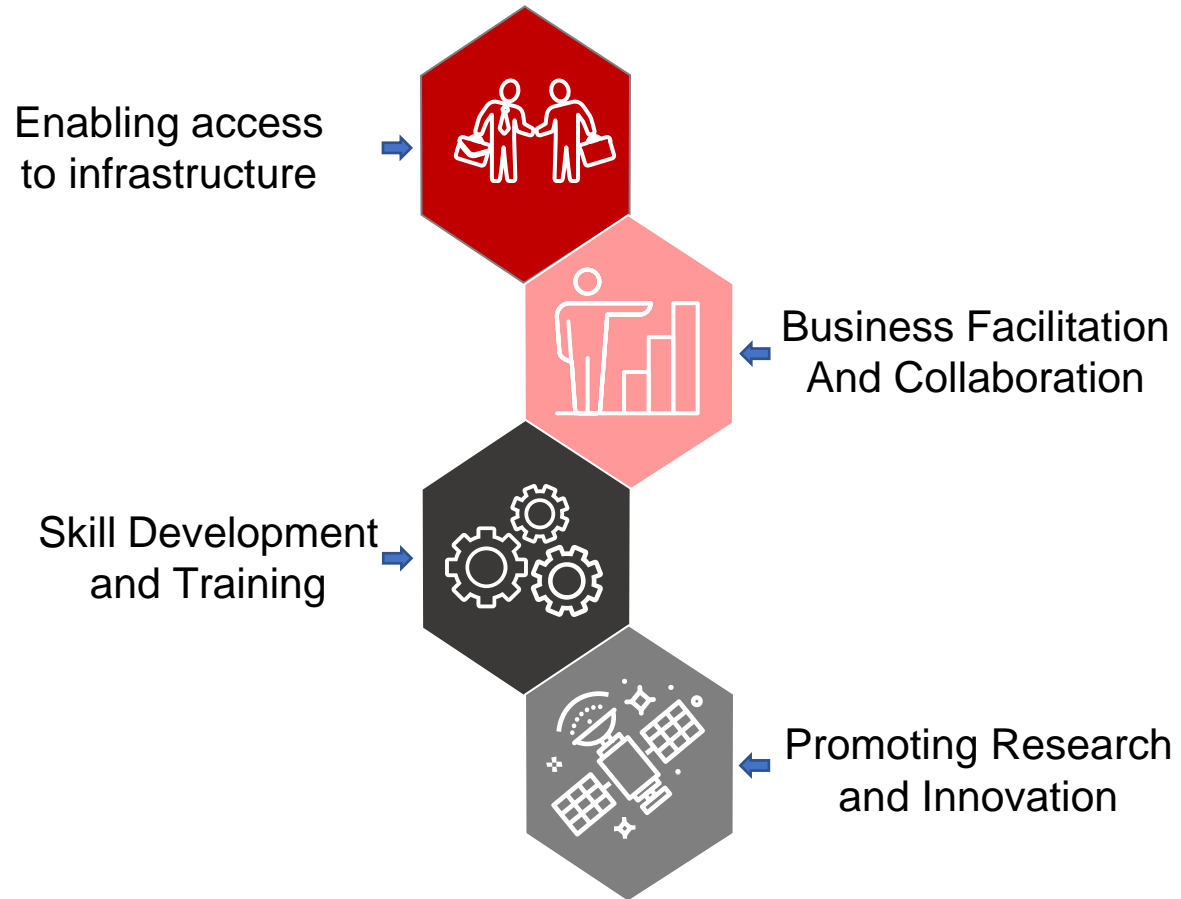
SpaceTech Framework

With SpaceTech now solving real-life problems on earth, it focuses on supporting industry to establish TS as a globally recognized one-stop destination in SpaceTech.

SpaceTech Framework

Key Pillars

- Enabling access to infrastructure
- Business Facilitation And Collaboration
- Skill Development and Training
- Promoting Research and Innovation

Focus Areas

- Agriculture and Insurance
- Urban Planning and Development
- Disaster Management
- Environmental and Natural Resources
- Internet and Communication
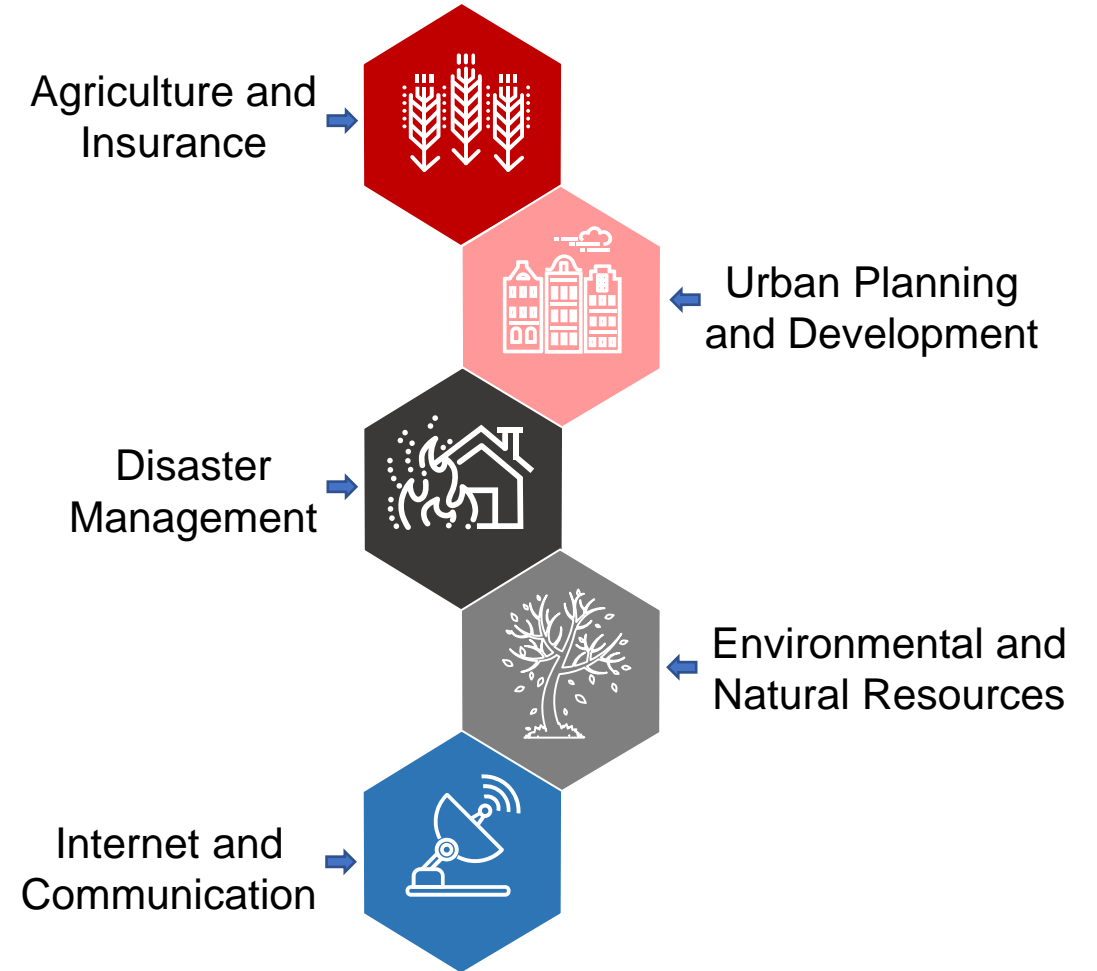
Conceptualizing Comprehensive Technology Ecosystems

Data Enablement

AI Ready Dataset Creation
- Ground Data Collection
- Digitization of datasets

Data Management Policy
- Regulatory Support for Departments
- Introduce consent management

Data Exchanges (DEx)
- Both Personal & non-personal data
- Both Govt. and Private data

High-Quality Data for Solutions

Innovation
(AI, ML, Blockchain, Drones…)

Incubation, Scientific Validation, & Product Development
- T-Hub
- T-AIM

Commercial Pilots
- Pilot projects engaging startups

Sustainable Large-Scale Deployment
- Full Scale deployment post Pilot implementation and Impact assessment

End user Adoption and Benefits

Govt. Programs and Regulations for Scale-Up

Focused Wings in Departments

Emerging Technologies Wing
ITE&C Department

Departmental Digital Initiative Wings

Gov Tech Projects

35+

Active Projects across technologies, domains, partners, and scale

Out of which…..

10+

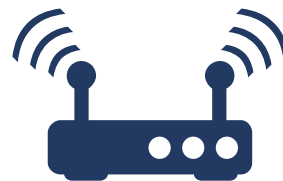Active Projects consume data captured from various satellites, drones and govt data sets

Technologies

15+ in AI   **10+ in Blockchain**

7+ in Drones   **3+ in IOT and others**

Domains

- ✓ Agriculture
- ✓ Mobility
- ✓ Healthcare
- ✓ Environment
- ✓ Financial Transaction

- ✓ E-Governance
- ✓ Supply chain
- ✓ Law enforcement
- ✓ Municipal Admin
- ✓ Energy

Innovation Network

T-Hub

» Empowers startups to scale up faster and create business value.
» Elevates innovation for corporations.
» Builds a culture of innovation that keeps its partners ahead.

Telangana State Innovation Cell (TSIC)

» Promotes a culture of innovation and entrepreneurship in the state.
» Promotes innovation in Government departments and organizations.
» Builds a culture of innovation from the school stage.

Telangana Academy for Skill & Knowledge (TASK)

» Enhances skilling synergy among institutions of Government, industry & academia.
» Improves employability quotient.
» Enables entrepreneurship development.

T-Works

» Makes hardware prototyping faster, cheaper, simpler.
» Provides access to consumables,
» prototyping equipment and community. Caters to entrepreneurs, hobbyists, and artists.

Research & Innovation Circle of Hyderabad

» Facilitates taking research to market.
» Links research institutions, academia and industry with venture capitalists, angel investors and incubators.

Innovation in Multimedia, Animation, Gaming & Entertainment (IMAGE)

» Infrastructure & amenities to support the AVGC (animation, visual effects, gaming and comics) industry.
» Growth engine for tech exports and employment generation.

WE Hub

» Empowers women entrepreneurs.
» Makes Government schemes accessible through policy operationalization and research.

EMERGING TECHNOLOGIES
ITE&C DEPARTMENT

» Drive adoption of emerging technologies in government department. (govt as-first-buyer)
» Build a robust emerging technologies ecosystem in Telangana.

National Center for Additive Manufacturing (NCAM)

» Promotes additive manufacturing and 3D printing ecosystem.
» Encourages prototyping of new products
» Provides access to infrastructure.

Innovative Projects using Emerging Technologies in Agriculture

Field Segmentation

To increase sustainability and resilience of agriculture landscape to environmental Stress	→	Detailed inventory of farmland required	→	Implementation partner- Google Using satellite images to generate ownership-based boundaries for farmed areas.

Data In Climate Resilient Agriculture (DiCRA)

1. World's first Digital Public Good on Climate Resilient Agriculture

2. Curated by 9 organizations and 100+ volunteering data scientists

3. Provides Open Access, Open Data, Open Software and Open AI

4. Plug & play for any geography in the world. Scaling fast to 5 states in India and 2 countries in Latin Amercia
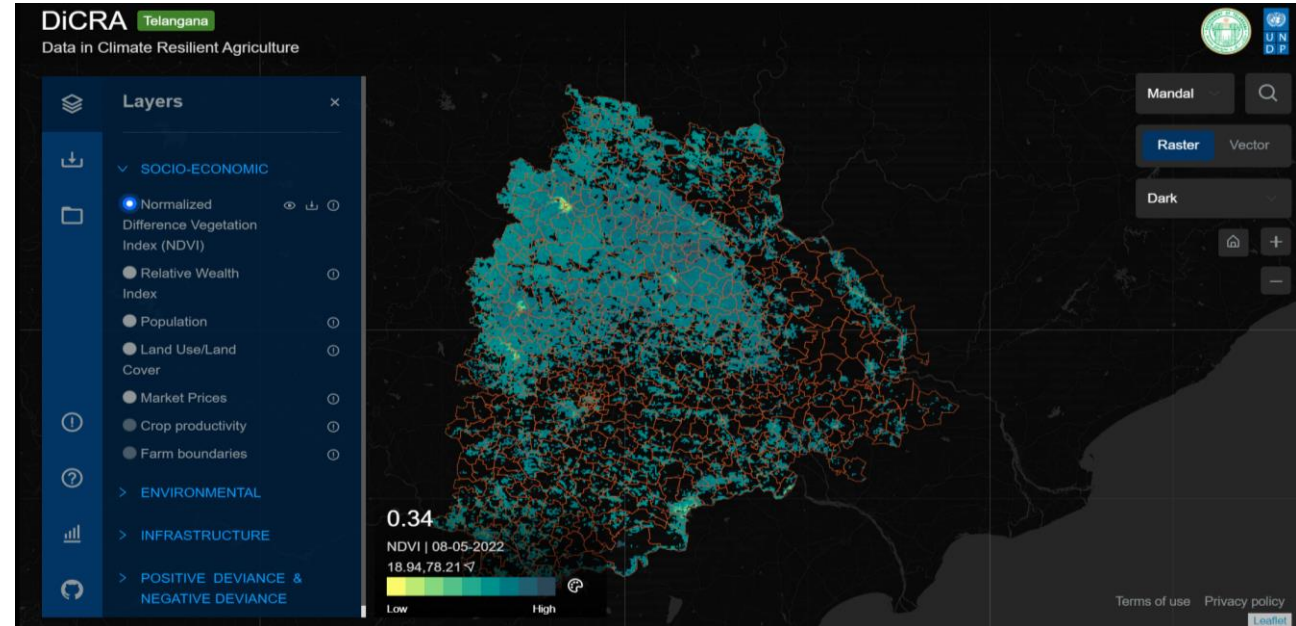
## Data In Climate Resilient Agriculture (DiCRA)

Value Proposition

- Climate change causes upto 15-18% reduction in annual agriculture incomes in India, adversely impacting small and marginal farmers
- Climate Resilience in Agriculture is more important with rising temperatures and erratic rainfall

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- Climate resilience with measurable parameters like: Soil Organic Carbon, Soil Moisture, Crop Fires, Paddy cultivation, Crop Diversity, Agroforestry etc.
- Data Powered Positive Deviance (DPPD) – measures which farms/habitations have positive trends to learn and replicate
- Provides Geospatial Intelligence - Which of the 21,000+ habitations of TS are resilient, which ones are vulnerable?
- Decadal trends - key evidence against long-term goals in agriculture
- Useful for Targeted Investments ; Generation of Best Practices
- *More Value for Money for Governments*

High Crop Diversity, Better Soil Health, Low risk of crop failure, Less GHG emissions, Increased production of Oil Seeds are long-term goals chased by Indian agriculture
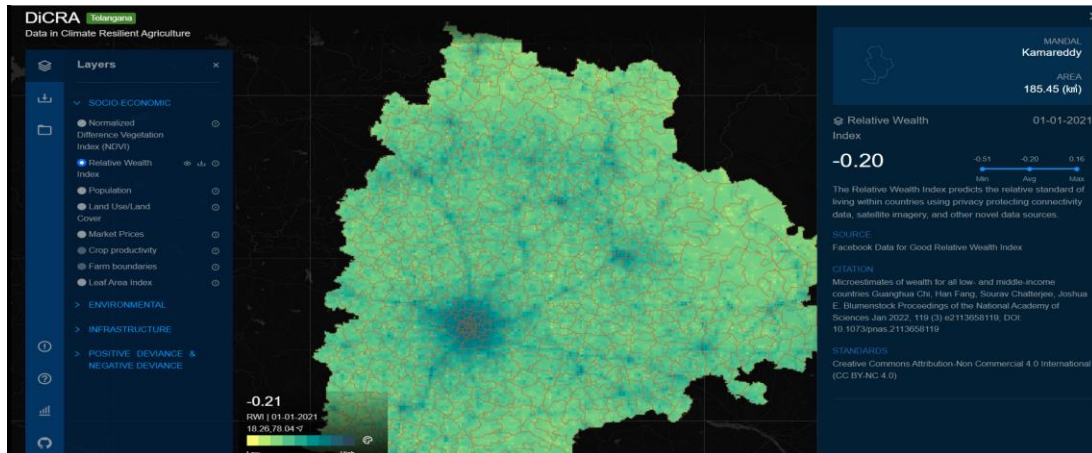
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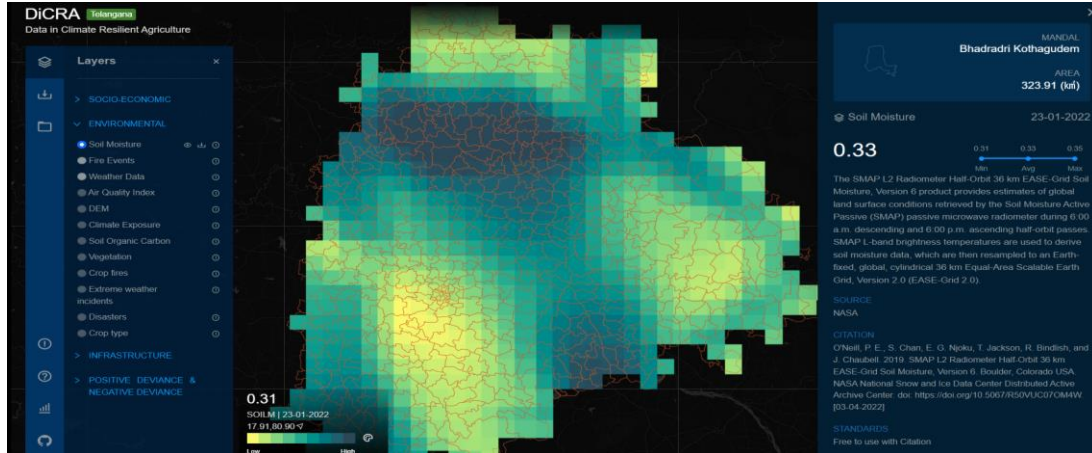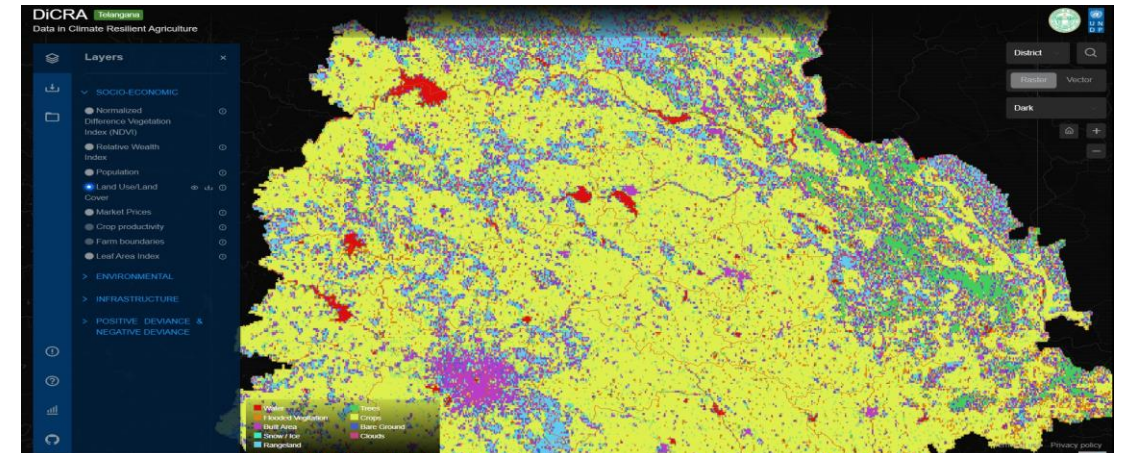

Soil Moisture
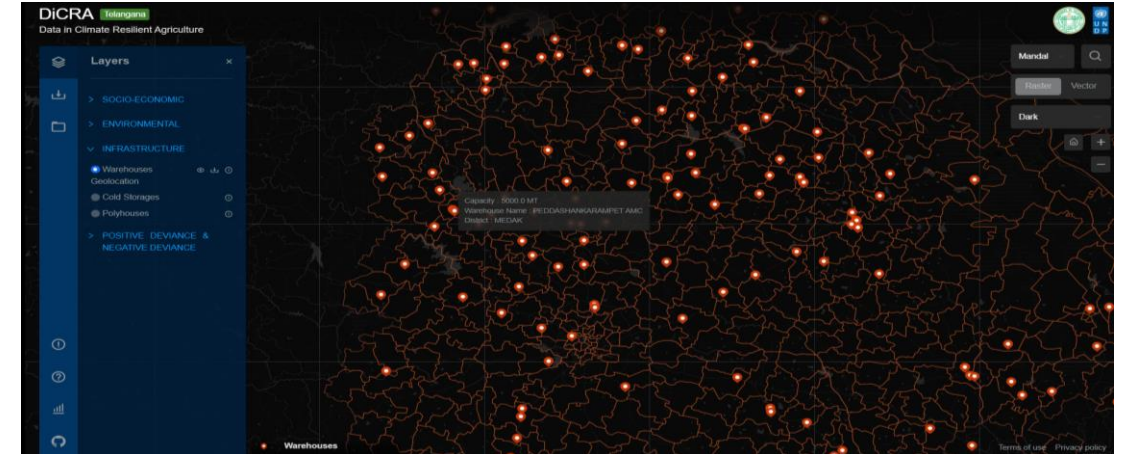
Warehouses

Relative Wealth Index

Land Use and Coverage

Crop Classification using Artificial Intelligence Datasets

Satellite Images from Sentinel-2 will be collected and marked with ground truth data collected

Crops prioritised- Cotton, Paddy, Maize, Red Gram, Chillies, Groundnut, Bengal Gram (Chana).

| Phase		Description
Phase 1 & Phase 2		Ground truth data of crop classification to be collected across geographical areas identified
Phase 3		High Quality Test and Training AI datasets prepared for data challenge using satellite images
Phase 4		Organizing and hosting of a data challenge
Phase 5		Inception of usecases and development of an implementation concept to bring AI models into use

Smart Credit for Farmers
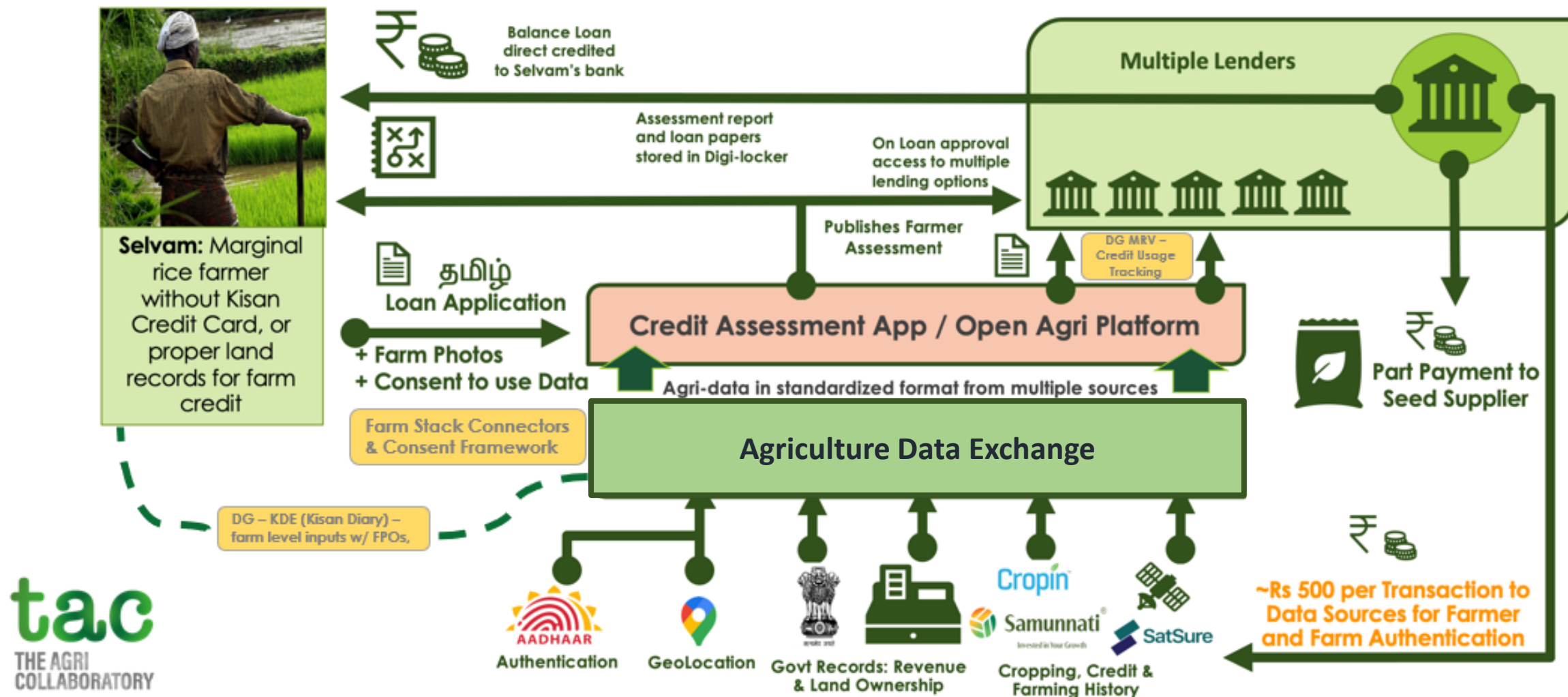
Soil nutrient estimation using high resolution remote sensing imagery

Background

Soil health is the foundation of productive farming practices

Current Condition-

Fertilization is often done blindly or mechanically to obtain a higher yield

Results in-

- Improper fertilizer utilization
- Economic Loss
- Environmental pollution
- Improper nutrient content in plants

Efforts undertaken-

Soil nutrient mapping with ground-based surveys

But the effort is-

- Difficult
- Time consuming
- Expensive

Solution

Hyperspectral remote sensing imagery for estimating spatial distribution of soil nutrient

Approach-

1. Creation of a data library from drone based hyperspectral images for a small region

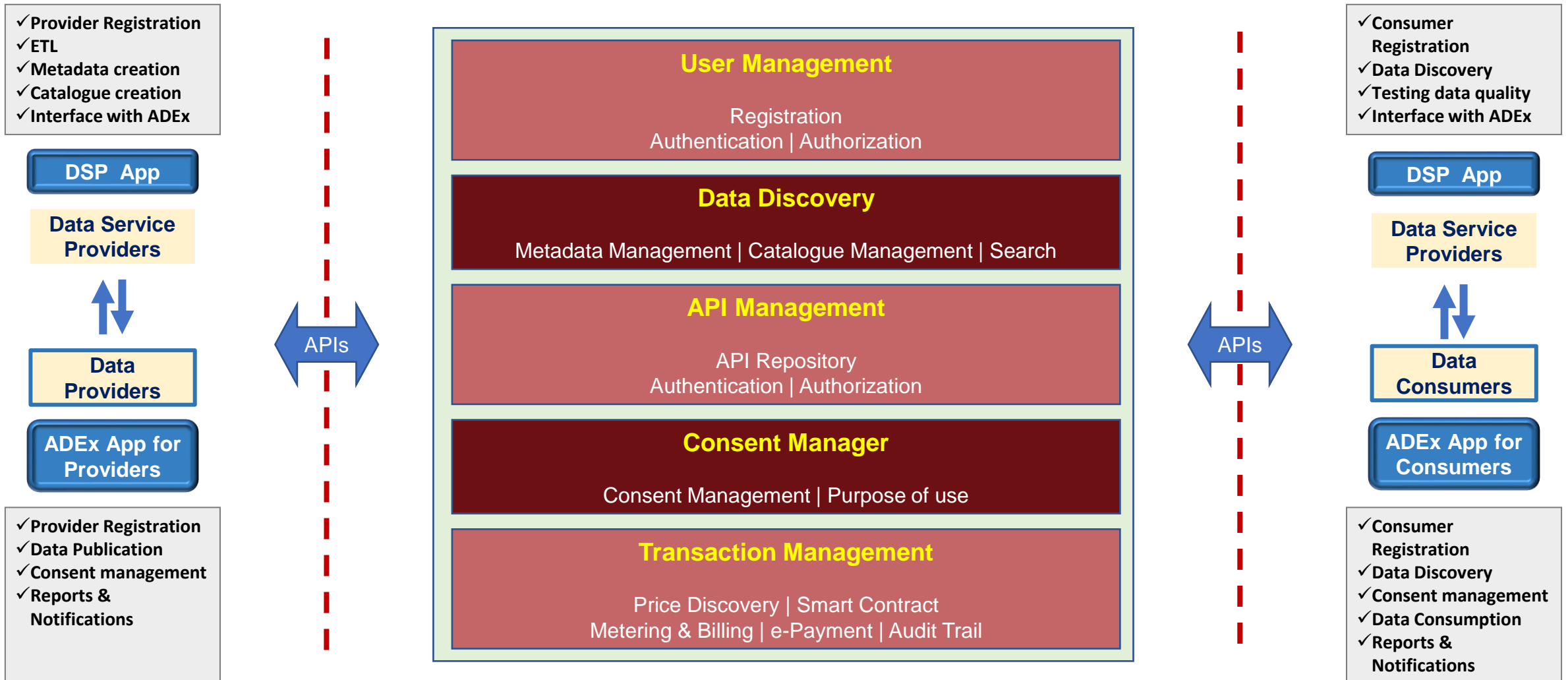2. Capturing corresponding ground-truth data for soil nutrients

3. Collected datasets used to build Machine-Learning Models to correlate the hyperspectral data with soil nutrients

4. Generating soil maps and scaling up the mapping

Agriculture Data Exchange

✓**Provider Registration**
✓**ETL**
✓**Metadata creation**
✓**Catalogue creation**
✓**Interface with ADEx**

DSP App

Data Service Providers

Data Providers

ADEx App for Providers

✓**Provider Registration**
✓**Data Publication**
✓**Consent management**
✓**Reports & Notifications**

APIs

User Management

Registration
Authentication | Authorization

Data Discovery

Metadata Management | Catalogue Management | Search

API Management

API Repository
Authentication | Authorization

Consent Manager

Consent Management | Purpose of use

Transaction Management

Price Discovery | Smart Contract
Metering & Billing | e-Payment | Audit Trail

APIs

✓**Consumer Registration**
✓**Data Discovery**
✓**Testing data quality**
✓**Interface with ADEx**

DSP App

Data Service Providers

Data Consumers

ADEx App for Consumers

✓**Consumer Registration**
✓**Data Discovery**
✓**Consent management**
✓**Data Consumption**
✓**Reports & Notifications**

Thank You!

We believe that technology is an enabler that can transform lives

...

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Agricultural Risk Management and Advisory

Datasets

- Sentinel-1 SAR

- Sentinel-2 satellite imagery at 10m and 30m spatial resolution

- Landsat-8 satellite imager at 10m and 30m resolution

- News reports for water unavailability, potential pest attacks or diseases if any

Usecases

Crop Area Estimation

Sowing and Harvesting Progress Monitoring

Crop Health and Moisture Condition

Crop Yield Prediction and Smart Sampling

Pest Prediction