AgTech Ecosystem in Telangana State, India - Accelerating emerging technologies for disruption

An Overview on Agriculture Data Exchange (ADEx)

Rama Devi Lanka,
Director Emerging Technologies & Officer On Special Duty,
Information Technology, Electronics & Communications Department
Government of Telangana, India
osd_itc@telangana.gov.in

3rd February 2022
Agenda

❑ Context: Telangana’s Vision of a Data Economy

❑ Agriculture Data Exchange (ADEx)
  ❑ AgriTech use-cases: AI as the unifier
  ❑ Approach for ADEx

❑ Digital Public Good for Data-Driven Policy with UNDP
The state’s vision of data economy dates to 2016.

- **2016:**
  - Official Open Data Policy for govt. data
  - 1st ICT Policy – Included Open Data, AI, etc.
- **2017:**
  - AI Framework – Data Exchange Platform
  - Launched Open Data Portal – Dedicated Team
- **2020:**
  - Data Exchange (DEx)
  - Agri Data Exchange (ADEx)
- **2021:**
  - 2nd ICT Policy – Data Economy
- **2022:**
  - - Agri
  - - Health
  - - Mobility
  - - Smart City
Agenda

- Context: Telangana’s Vision of a Data Economy

- Agriculture Data Exchange (ADEx)
  - AgriTech use-cases: AI as the unifier

- Approach for ADEx

- Digital Public Good for Data-Driven Policy with UNDP
The comprehensive mapping of the AgriTech landscape by the state government...

Landscape Review

- Research and Innovation Circle of Hyderabad (RICH) engaged the vibrant AgriTech community: tech businesses, startups, incubators etc. for compiling a list of available solutions.
- 83+ startups participated.
- 90+ emerging technology-based solutions were documented and screened.

Various solutions were identified across the crop cycle:

1. Crop Planning
2. Crop Protection
3. Irrigation Management
4. Nutrient Management
5. Farm Automation
6. Farm Advisory
7. Post Harvest Management
8. Crop Insurance and FinTech
9. Marketplace
10. Traceability
... and further deliberations under Saagu Baagu led to identification of 30 use-cases, most of which involve AI.

**Intelligent Crop Planning**
- Pre-season Forecast of Demand, Supply & Prices
- Macro Crop Planning @ National & State levels
- Dynamic Sowing Windows for major crops
- Plans for Priority crops (Import-substitution, High-value & High-Nutrition)
- Pre-season guidance to input suppliers, credit & Insurance

**Smart Farming**
- Rapid Soil Analysis & eSHC
- Pest Prediction & Control
- Controls on application of inputs
- Smart micro irrigation
- Drone-based application of fertilizers & pesticides
- Smart Insurance
- Smart FaaS
- Fintech
- Uberization
- eNWR
- Digital Extension
- Smart CCE, Yield Prediction

**Farmgate to Fork**
- AI, IoT-driven Smart Market
- Market Intelligence
- Farmer to Online Retail Network
- Hyper-local Connect (Farmer 2 Consumer)
- B2B Platform
- Aggregation
- Quality Assessment
- Traceability
- Smart Logistics (Domestic & Export markets)

**Data Governance**
- Agri Data Exchange
- Pilot on Agri Master Data
- Pilot on Agri Registries
- Pilot on Agri Directories
Agenda

- Context: Telangana’s Vision of a Data Economy

- Agriculture Data Exchange (ADEx)
  - AgriTech use-cases: AI as the unifier
  - Approach for ADEx

- Digital Public Good for Data-Driven Policy with UNDP
The Agri Data Exchange (ADEx) is being conceptualized to unlock the AI innovation in agriculture and improve farmer’s lives.

Why ADEx?

1. Agricultural **data is confined** to the enterprise that collects or generates it. Hence its potential value remains undiscovered.

2. There is **no structured way of sharing** the agricultural information, much less in an automated and rights-protected manner.

3. **Accessing** agricultural data for innovation is deterrent because of the **tedium, cost, effort and time taken**.

4. There is **no single point of reference** to get data required from multiple sources for creating integrated and innovative services.

Objectives of ADEx

1. To **connect** the providers and consumers agricultural information in a consent-based and secure manner.

2. To provide for efficient **discovery** of agricultural data required for innovation & research

3. To convert 1-1 data transfers to N2N data exchange, and thereby create a **force multiplier** effect.

4. To accelerate the evolution of the national digital agriculture ecosystem through open standards, open protocols and open APIs in **data management**.

5. To help intensify the use of **emerging technologies** through ease of accessing data.

6. To provide safeguards for **protection** of personal data

7. To enable the data providers to specify the terms and conditions for **sharing** of data and the purpose and period for which the data can be used by the consumer.

8. To establish **transparency** in all processes relating to data exchange.

9. To establish mechanisms for addressing **grievances** and complaints of the users
To have a user-driven thought process, certain priority use-cases have been identified...

| Description of the Use case                                      | Specificity | Data-driven | Data-intensive | Value addition | Potential Demand | Status of database | Scope for 4IR Tech / Innovation | Overall Rating |
|-----------------------------------------------------------------|-------------|-------------|----------------|----------------|------------------|--------------------|-------------------------------|----------------|----------------|
| 1. Weather & soil-based advisories on sowing                    |             |             |                |                |                  |                    |                               | 74 %           |
| 2. Hyper-local weather & soil-based sowing advisories           |             |             |                |                |                  |                    |                               | 80%            |
| 3. Weather & soil-based advisories on pest prediction/mitigation|             |             |                |                |                  |                    |                               | 92%            |
| 4. Hyperlocal weather & soil-based advisories on crop health mgt|             |             |                |                |                  |                    |                               | 92%            |
| 5. Soil health management, e-Soil Health Reports                |             |             |                |                |                  |                    |                               | 100%           |
| 6. Precision agriculture - Prescription-based application of inputs |             |             |                |                |                  |                    |                               | 80%            |
| 7. Uberized farm machinery services                             |             |             |                |                |                  |                    |                               | 68%            |
| 8. Traceability for export products and organic produce         |             |             |                |                |                  |                    |                               | 92%            |
| 9. Quality testing for pricing, consumer assurance              |             |             |                |                |                  |                    |                               | 80%            |
| 10. Crop area estimation                                         |             |             |                |                |                  |                    |                               | 68%            |
| 11. Yield estimation                                             |             |             |                |                |                  |                    |                               | 80%            |
| 12. Hyper-local connect (farmer-to-consumer)                    |             |             |                |                |                  |                    |                               | 86%            |
| 13. Smart Insurance                                             |             |             |                |                |                  |                    |                               | 86%            |
| 14. Smart credit                                                |             |             |                |                |                  |                    |                               | 80%            |

The above use cases have been filtered out of the IDEA and AI4AI initiatives
... and have been mapped with key data-sets to understand the challenges holistically.

<table>
<thead>
<tr>
<th>Hyperlocal Weather Advisory</th>
<th>Pest Management</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Farmers</strong></td>
<td><strong>Farmers</strong></td>
</tr>
<tr>
<td>✓ Farmer Information –Name, Age, Address</td>
<td>✓ Farmer Information –Name, Age, Address</td>
</tr>
<tr>
<td>✓ Identify proof</td>
<td>✓ Identify proof</td>
</tr>
<tr>
<td>✓ Address Proof</td>
<td>✓ Address Proof</td>
</tr>
<tr>
<td><strong>Land</strong></td>
<td><strong>Land</strong></td>
</tr>
<tr>
<td>✓ KhasraNumber</td>
<td>✓ KhasraNumber</td>
</tr>
<tr>
<td>✓ Location –Geo tagged</td>
<td>✓ Location –Geo tagged</td>
</tr>
<tr>
<td><strong>Weather and Geo Spatial Data</strong></td>
<td><strong>Crop Data</strong></td>
</tr>
<tr>
<td>✓ Time series data on weather</td>
<td>✓ Area under cultivation</td>
</tr>
<tr>
<td>✓ Precipitation</td>
<td>✓ Crop sown</td>
</tr>
<tr>
<td>✓ Temperature</td>
<td>✓ Variety</td>
</tr>
<tr>
<td>✓ Humidity</td>
<td></td>
</tr>
<tr>
<td><strong>Ground Data</strong></td>
<td><strong>Weather and Satellite Data</strong></td>
</tr>
<tr>
<td>✓ Crop sown</td>
<td>✓ Satellite Imagery for crop stage</td>
</tr>
<tr>
<td>✓ Soil Health, through sensors</td>
<td>✓ Weather Data</td>
</tr>
<tr>
<td>✓ Productivity Data, trends for particular crop</td>
<td></td>
</tr>
<tr>
<td>✓ Major Pests and diseases in particular geography</td>
<td></td>
</tr>
<tr>
<td><strong>Ground Data</strong></td>
<td><strong>Pest Data</strong></td>
</tr>
<tr>
<td><strong>Pest Data</strong></td>
<td><strong>Pest Data</strong></td>
</tr>
<tr>
<td>✓ Soil Data</td>
<td>✓ Pest Image</td>
</tr>
<tr>
<td></td>
<td>✓ Previous Pests History for library</td>
</tr>
</tbody>
</table>
With discussions in working groups anchored by WEF, the functional Architecture of ADEx Ecosystem is mostly ready.

- Provider Registration
- ETL
- Metadata creation
- Catalogue creation
- Interface with ADEx

**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

- Consumer Registration
- Data Discovery
- Testing data quality
- Interface with ADEx
Agenda

- Context: Telangana’s Vision of a Data Economy

- Agriculture Data Exchange (ADEX)
  - AgriTech use-cases: AI as the unifier
  - Approach for ADEX

- Digital Public Good for Data-Driven Policy with UNDP
GoTS has partnered with UNDP to jointly initiate the NextGenGov ‘Data for Policy’ initiative on Food Systems.

To actively promote strategies such as
- Anticipatory governance, Policy experimentation,
- Community-centric design, digital public goods, open innovation,
- Capture transformative effects created by emerging technology innovations
- Facilitate knowledge exchanges and multidisciplinary research collaborations through national, regional and global networks, for smarter and sustainable food systems.
Thank You!

We believe that technology is an enabler that can transform lives

Rama Devi
Director, Emerging Technologies & OSD
ITE&C Department, Govt of Telangana
Osd_itc@telangana.gov.in
9849907639