Decoding the Ecosystem of Agriculture for the Next Green Revolution: Opportunities and Challenges

By

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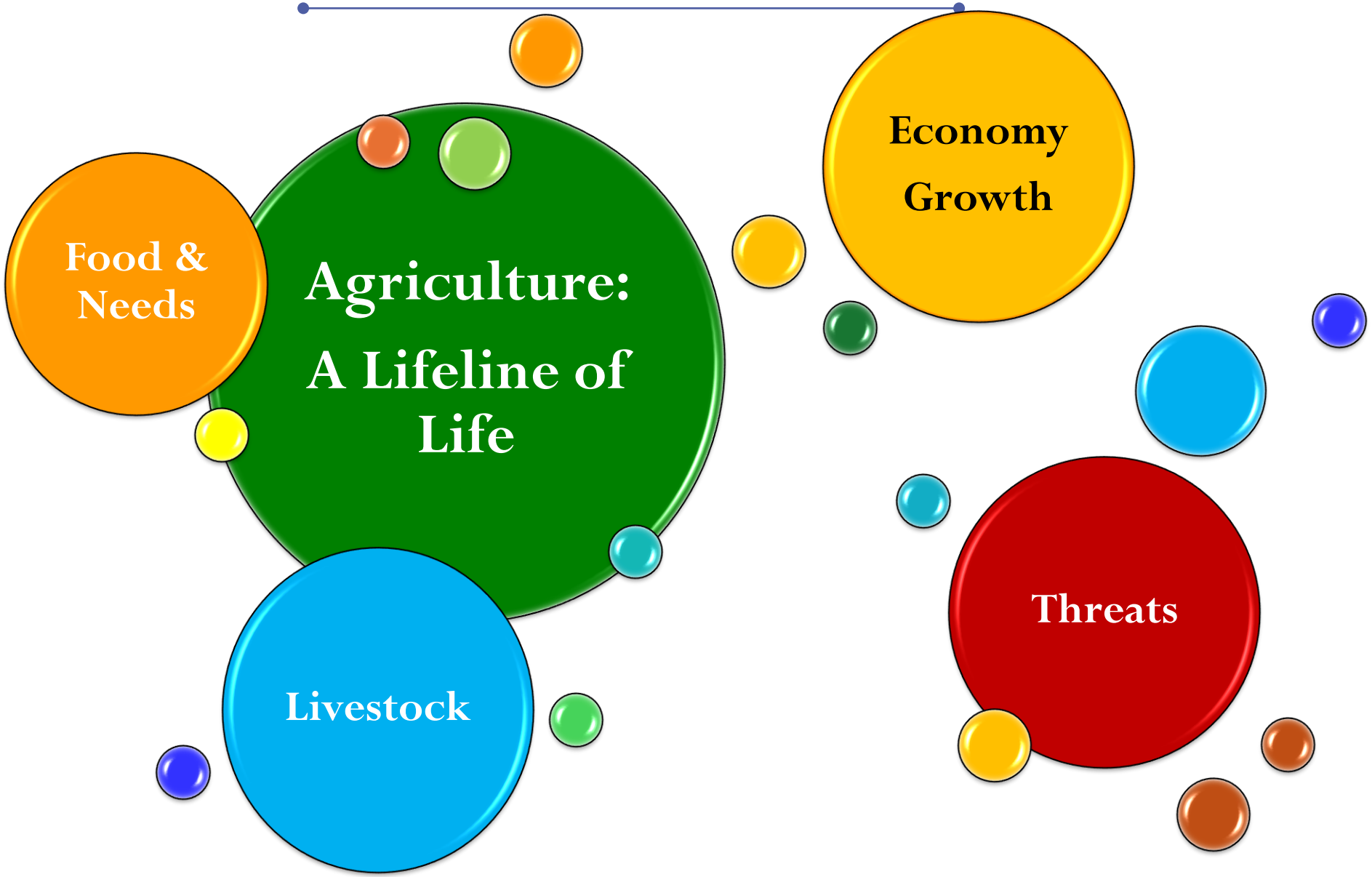
Contents

- Digital Agriculture
- Opportunities
- Success of Digital Agriculture
- Challenges
- Digital Agro Field:TIH-IoT

Agriculture: A Lifeline of Life!!!



Digital Agriculture for Sustainability

Livestock & Aqua-farming

Decision support AI/ML

Drones & Robots

Agri-Storage

IoT & Sensors

Precision Farming

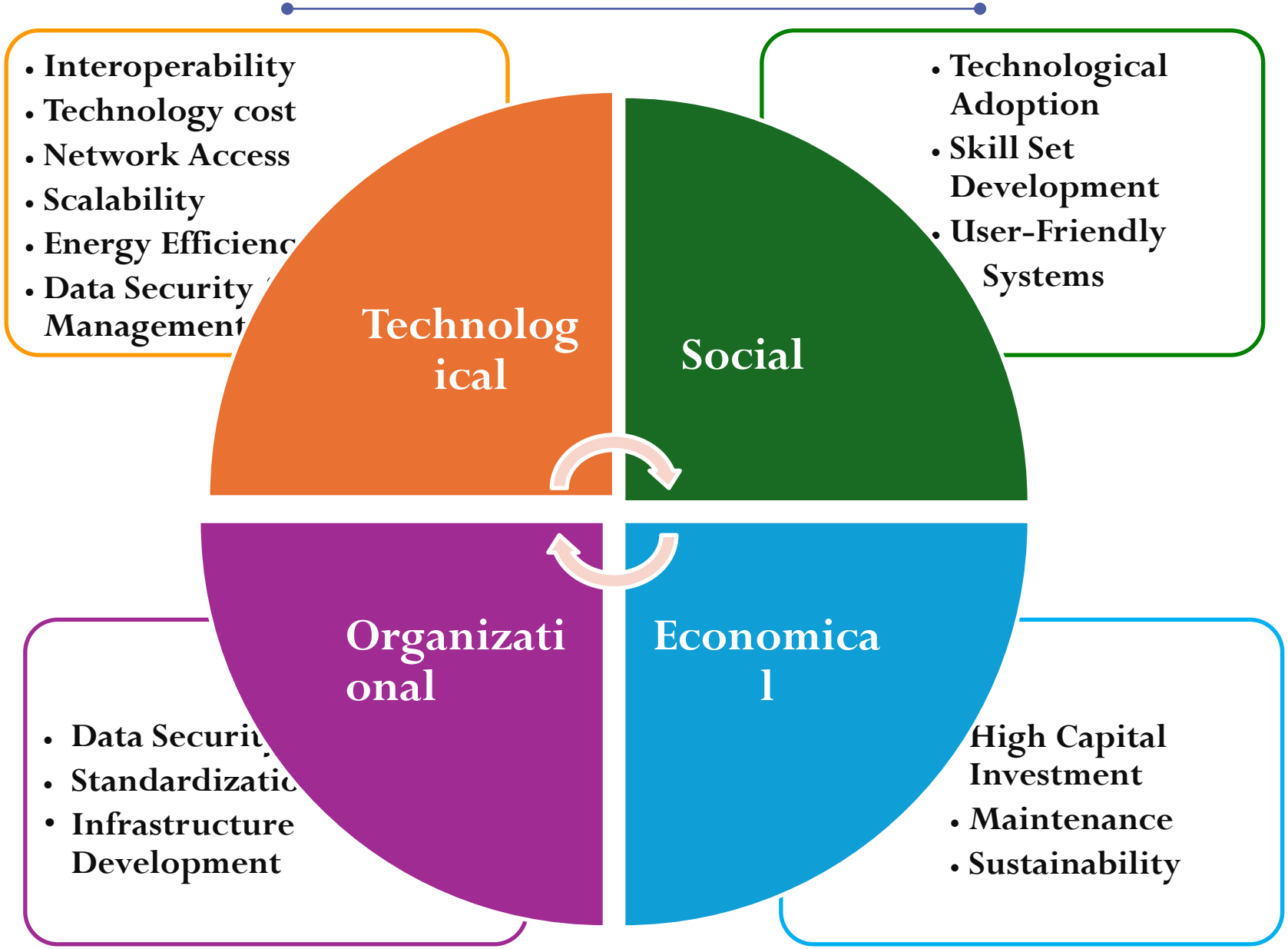
Why IoT and AI/ML for Smart Agriculture?

Success Lies in Customer's Satisfaction

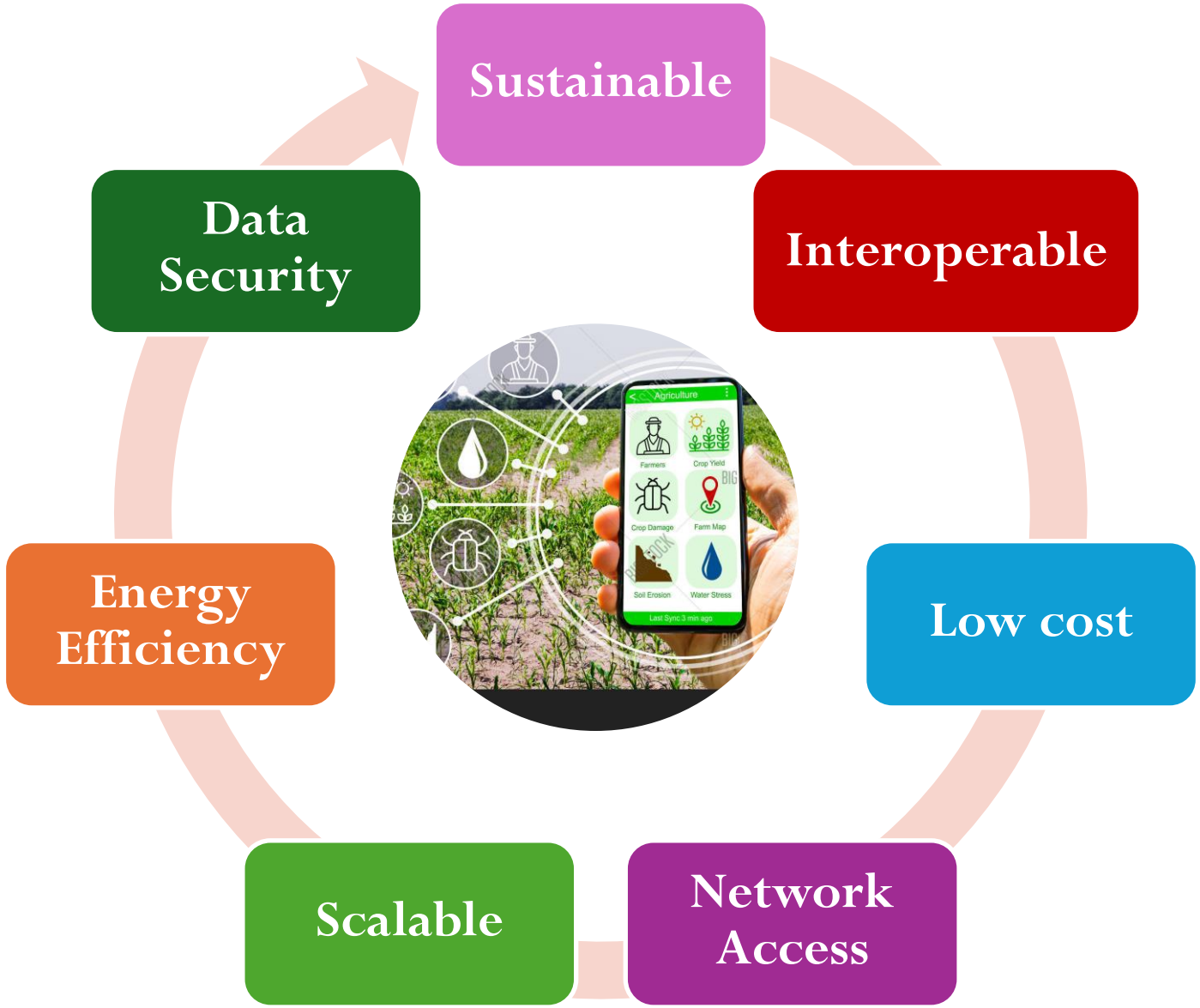
Adaptable

Accessible

Challenges in the Adaption of IoT for Agriculture



Sustainable Technology for Sustainable Agriculture



An ecosystem of IoT & AI/ML

Things

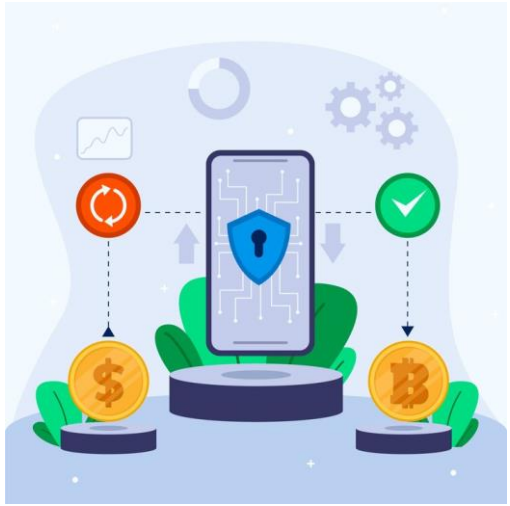
Communication Network

Cloud

Data storage
Data
Analytics

User Apps
&
Decision
Support
System

Sustainable Technology: Technology Advancements...



Secure Digital Payment

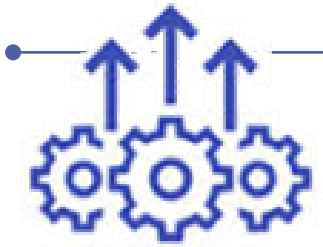
Advancements in Communication

AI/ML Progress

Industry 4.0

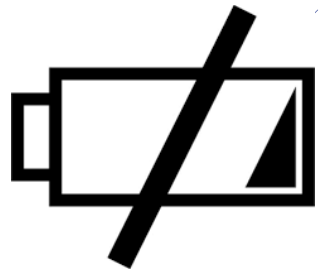
Design Requirements of Things

Miniaturized



Efficient

Energy efficient



Battery-less

Accurate

Reliable

Cost-effective

Self-identification

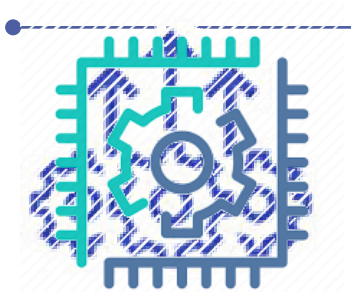
Self-testing

Self-diagnosis

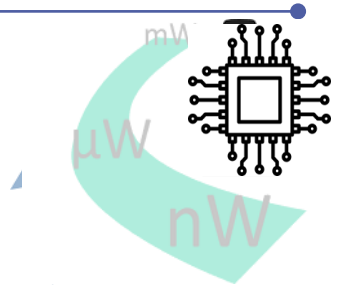
Self-troubleshooting

Advanced Design Solutions for CPS

System on Chip
Miniaturized

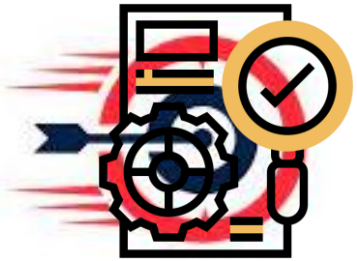


Advanced processor
Efficient



Ultra-low-power
Energy efficient
devices

Battery harvester
Energy harvester



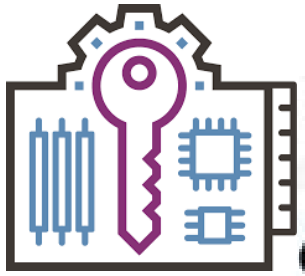
Accurate
Calibration

Certified
Reliable
Hardware

Digital sensors/ SoC
Cost-effective

MAC/IP protection
MAC/IP protection

Processor &
Hardware
Self-testing



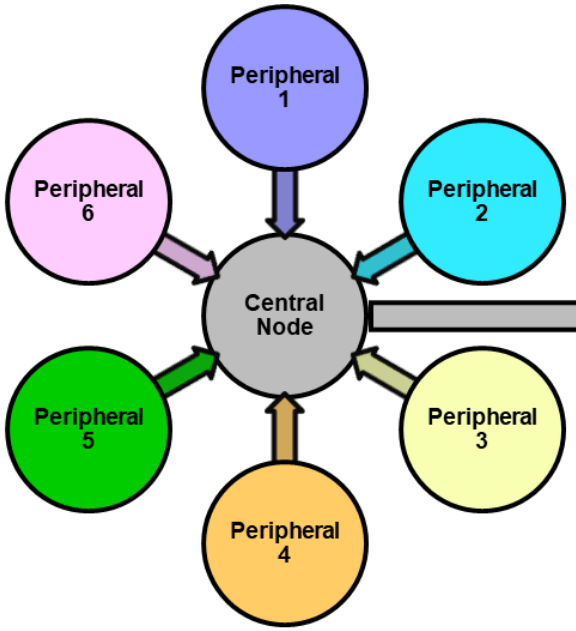
Hardware
Safety

Self-diagnosis
Functional
Safety

NABL
Self-troubleshooting
Certified

SAgriS –Smart Agri Storage Monitoring System

SAgriS Device



Communication Network

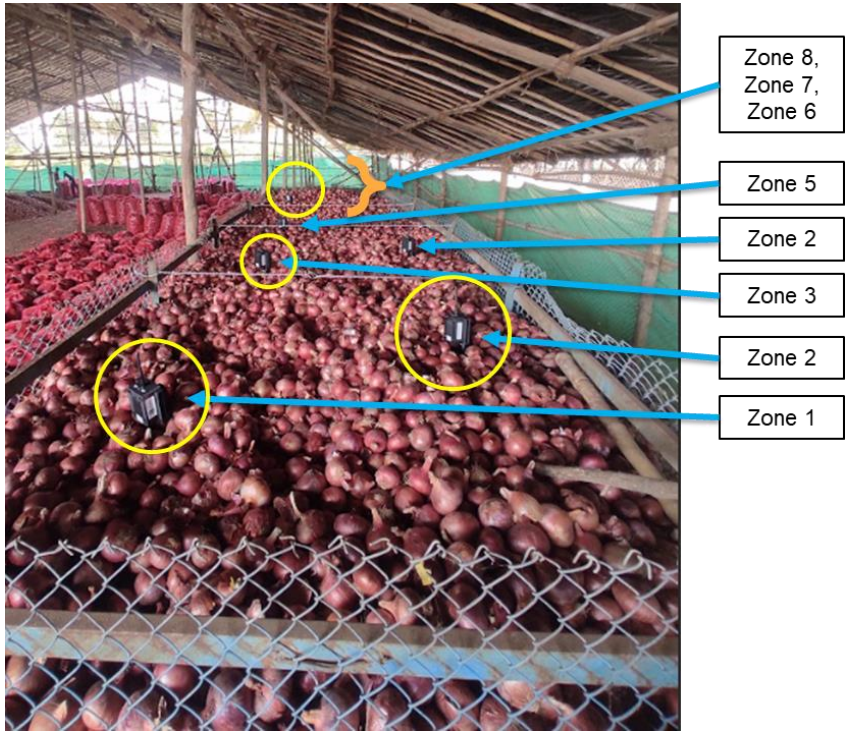
Cloud Server

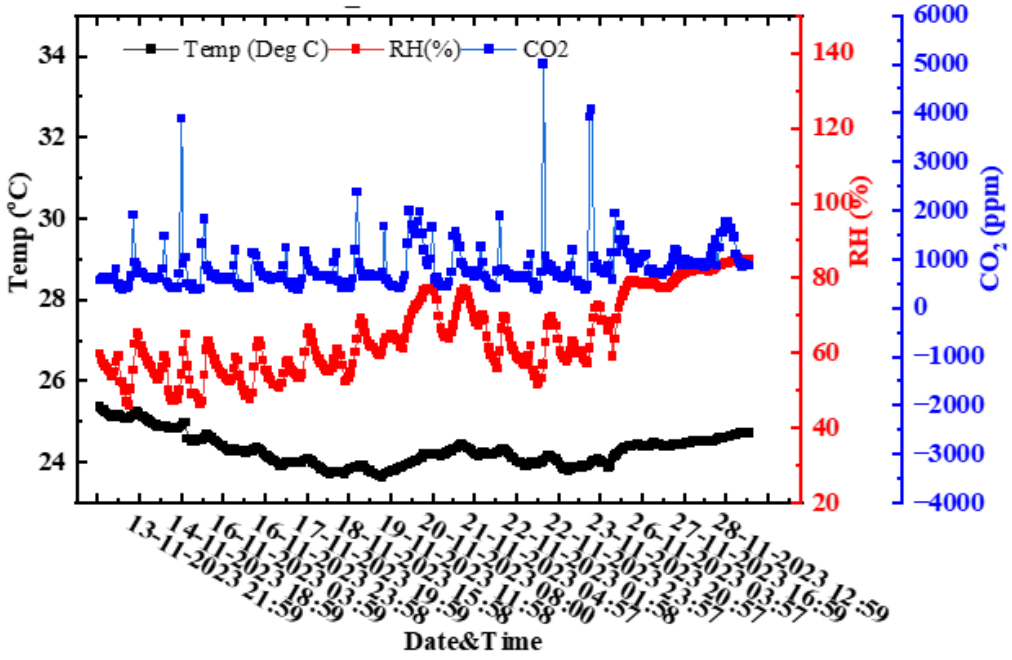
Mobile App

- Communication efficiency
- Energy-efficient
- Ease of operation: Handy, modular, robust
- Low-cost

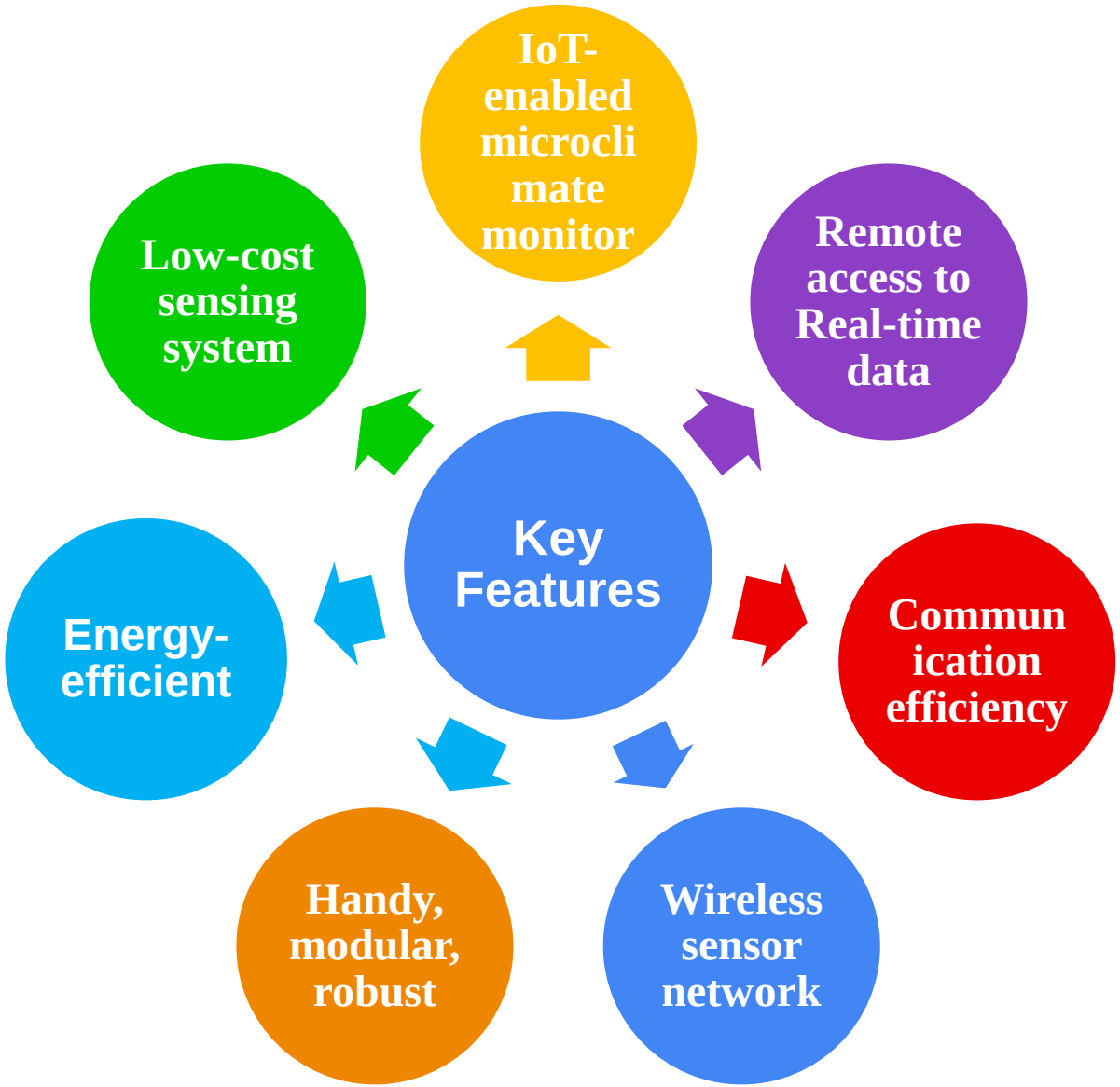
SAgriS –Deployment at Abhona, Nasik

SAgriS Device





SAgriS –An Efficient IoT System



Challenges Ahead

Sensor Accuracy

- Soil-specific sensor calibration
- Repeatability across the sensors

Variability Agriculture Practices

- Crop, Soil, Climate
- Diverse geography
- Development of wide algorithms

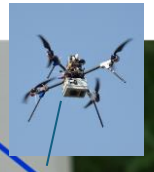
Big Data Management

- Crop-specific/ Soil-specific calibration algorithm
  Crop & Geography-specific models
- Storage & Mapping of Advisories for Diverse farming practices

Digital Agro Field – TIH IoT

Drones for imaging applications for crop health monitoring

Drones for spraying applications



Aerial Robots

15%-20% reduction in fertilizer
40%-50% reduction in pesticides
40%-50% reduction in irrigation

10%-20% reduction in wastage of crop

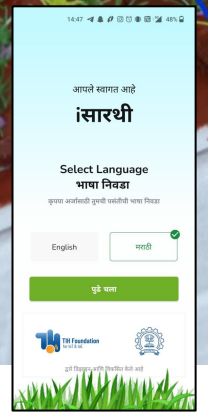
Smart storage

SAgriS

Agristation for weather, crop and soil monitoring

SAMBHAV

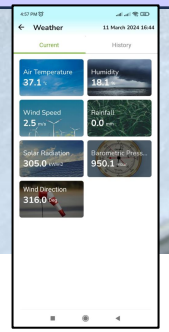
SOHAM



iSARATHI

5%-10% increase price due improved yield quality

Data Analytics for mobile app

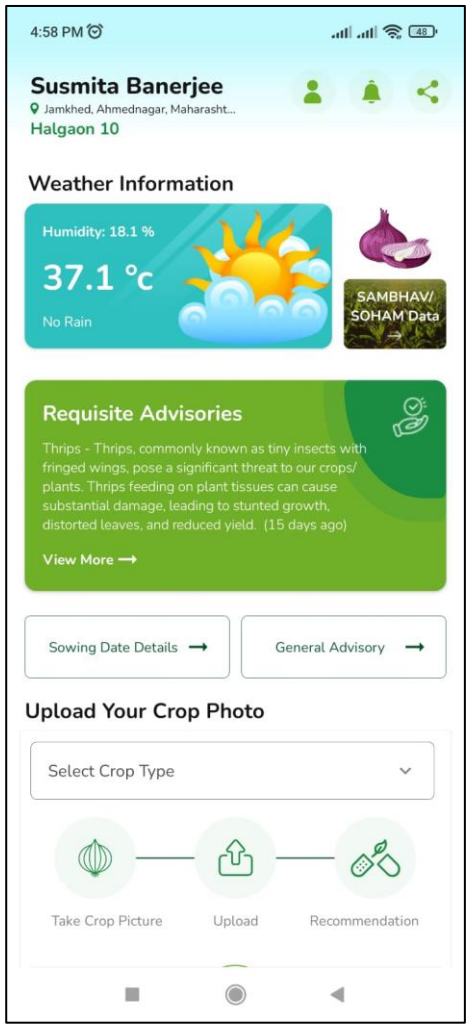


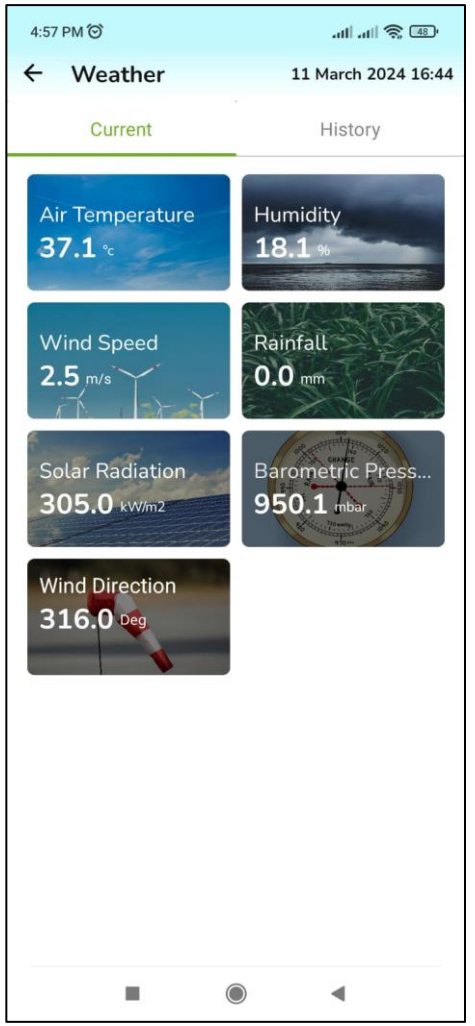
50%-70% reduction in harvesting cost

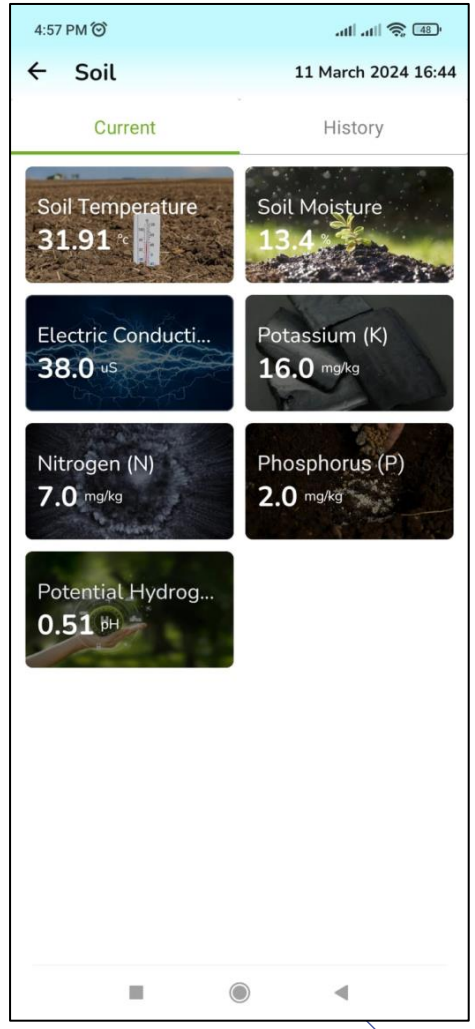
Mechanization and Automation

SAMBHAV – Soil, Weather and Crop Parameters

SAMBHAV: An IoT-based Energy Autonomous Smart AgriStation that offers comprehensive monitoring of the entire farm ecosystem

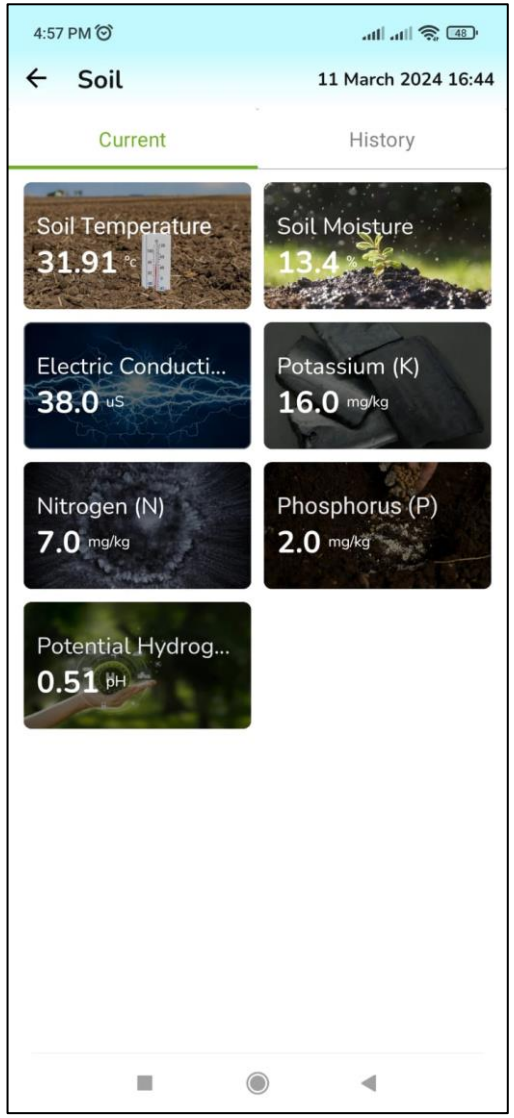


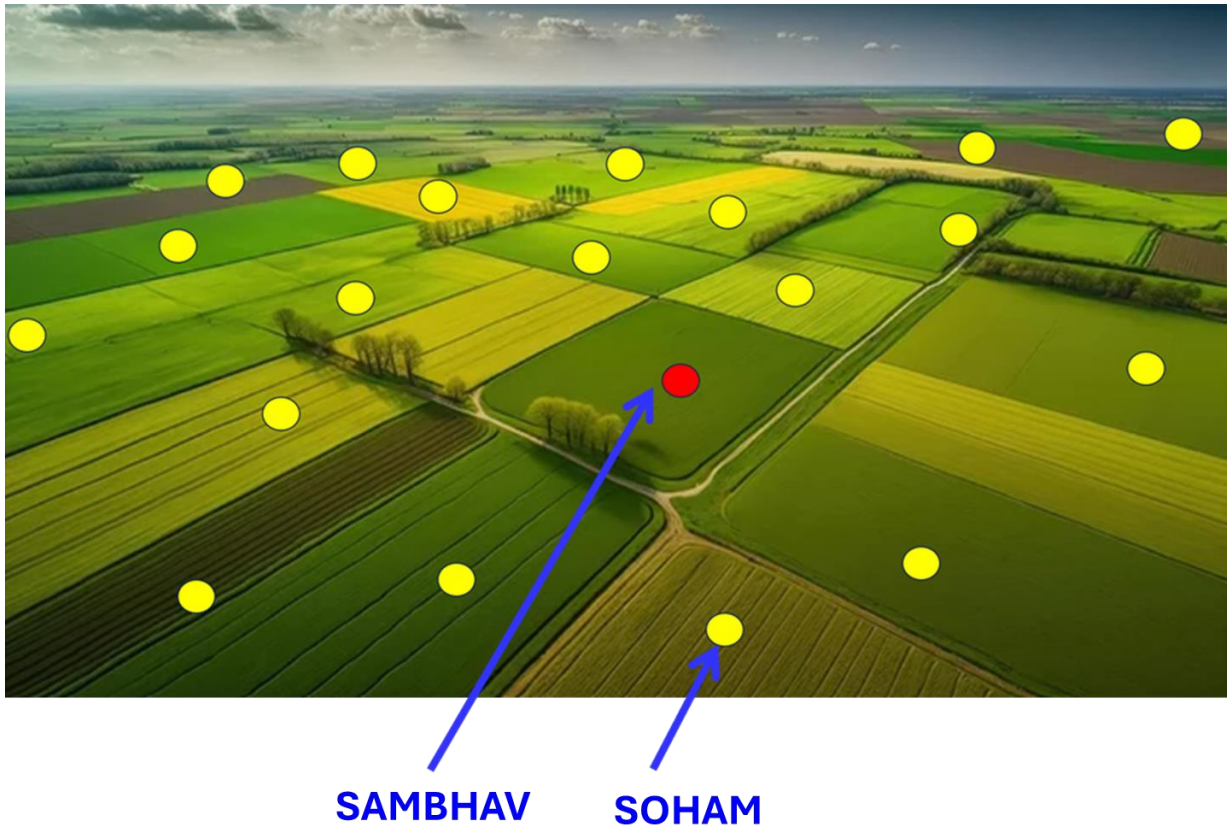




SOHAM – Soil and Crop Parameters

SOHAM: A LoRaWAN based smart AgriStation for monitoring crop and soil health

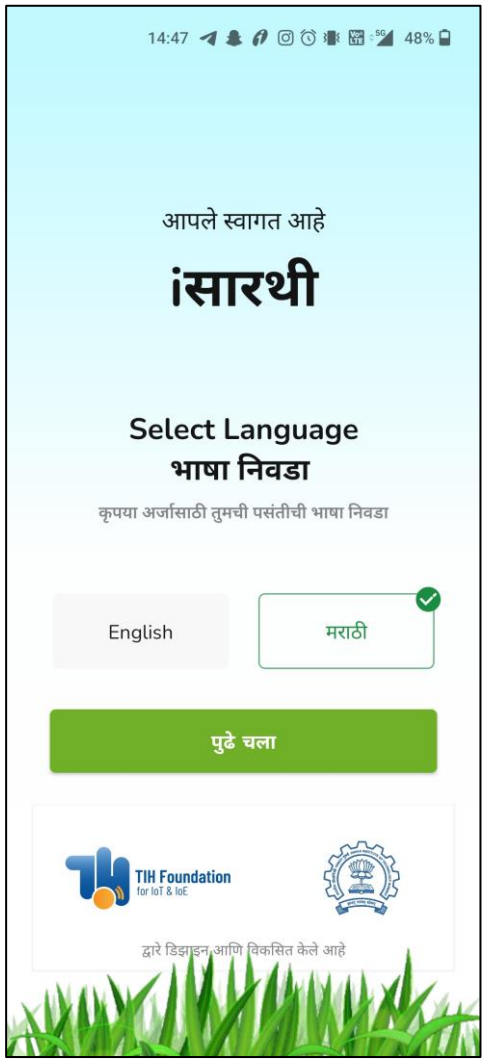


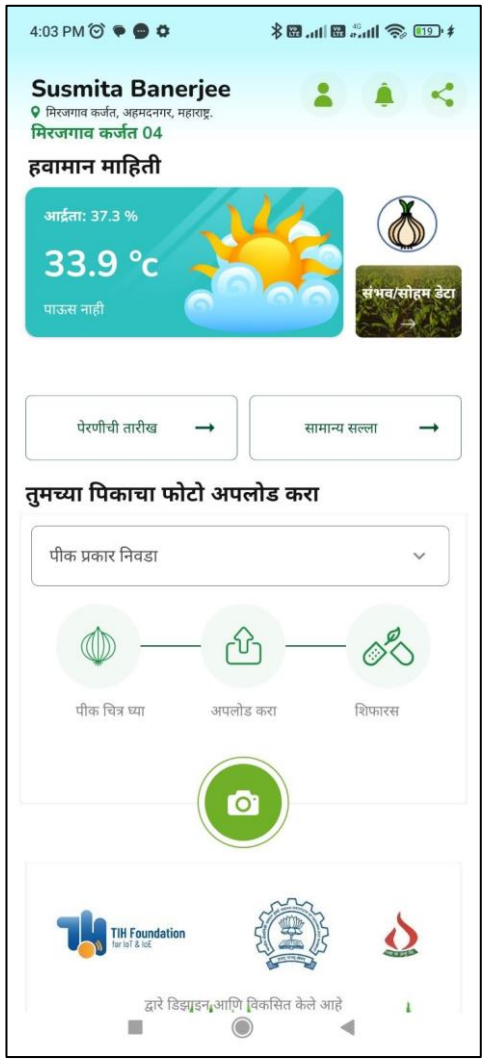


Deployment Plan

iSARATHI Mobile App – Decision Support System

iSARATHI App: An Intelligent **Agricultural** System for End-to-End Crop Management





Field Deployment of SAMBHAV and SOHAM

ICAR- DOGR, Pune

Panoli, Ahmednagar

JalgaonSupe, Pune

Demonstrations to the Farmers, Jalgaon

Kaledhon, low rainfall region in Satara

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- Advance
- Accessible
- Adaptable