White paper

Cisco Connected Agriculture

Transforming farming ecosystems

Agriculture, the economic lifeline of India

India is one of the few countries in the world where over 60% of the population is engaged – directly or indirectly – in agriculture-related jobs. One of the interesting reasons for this is the tropical climate and the sheer variety of soil that is conducive to the production of everything from food grains to vegetables & fruits, to clothing yarns to organic food. The farming population of India operates on roughly 179.8 million hectares of arable land, spread across the length and breadth of the country. Since Indian agriculture operates at such a massive scale, it is no surprise that this sector is right at the top for its contribution to the country's GDP.

In a world that is paralysed by a global pandemic, India is striving to catapult its agriculture into the next decade with a lot of vision and planned execution of initiatives across the various facets of agriculture. Firstly, India aims to double farmer income by 2022. To achieve this, India plans to utilize advances in irrigation to enable 'more crop per drop' in an increasingly water-scarce world. In order to achieve these goals, India recognizes the need for future-ready technology interventions that will help farmers become tech-savvy entrepreneurs, armed with data across all dimensions of farming, from field to market. But this is a daunting task.

Challenges in Indian agriculture

Agriculture in India presents a strange paradox. On one hand, it contributes to a huge percentage of the GDP, but on the other hand, the sector deploys abysmally low resources for land, liquidity, labour and digitization. Even worse, less than 1% of all the farming in India is assisted by something as basic as a tractor. The staggered nature of farms in India has resulted in 87% of all farmland being less than 3 acres, with 40% of it engaged in contract farming. In terms of business, the total contribution to the GDP of the agriculture sector has come down from 17.5% in 2015 to around 16.5% in 2019. A direct result of this is low farmer incomes, among the lowest in the world. This 'scarcity in abundance' paradox screams out the need for urgent digitization and tech-enablement. In other words, re-thinking and re-aligning of priorities across the three stages of the Indian agriculture supply chain – farm to market to consumer.

Technology for agriculture – unlimited possibilities

Fundamentally, input costs need to be lowered. Technology interventions should ideally ensure that across irrigation, seed quality, warehousing, food processing, farm markets, crop insurance and non-crop output, value maximization needs to be achieved, with minimal inputs. There is a pressing need to augment basic farm technology with IoT-driven solutions across the whole nine yards of agriculture. This can be done if India is able to successfully deploy AI-driven tools across the agriculture supply chain. From IoT sensors for soil quality, weather friendliness, natural calamity alerts, water level disparities and warehouse stock management, intelligent technologies such as remote sensors and data analytics tools can go a long way in optimizing the Indian agriculture supply chain. In turn, by enabling farmers with accurate data, demand-supply irregularities can be arrested in real-time, paving the way for better farmer incomes and less wasteful stocks. The good news is that India has made a humble start in this direction.

AI-enabled tools are today helping Indian farmers get real-time information on their smart phones about soil quality and water levels, to help them optimize their irrigation plans. Data collected from IoT sensors and satellite images help assess crop details, water levels, potential yield of the crop, etc., helping farmers make insight-driven decisions. By opening the innovation floodgates to start-ups and private organizations, India is attempting to connect its farmers to optimal quality pesticides, seeds, besides educating them on irrigation best practices. But there's a long way to go.

Cisco offers a comprehensive suite of solutions across four pillars:

1. Integrating IoT with mechanized farming equipment (like tractors and automated ploughing machines)
2. Deployment of condition monitors and sensors (such as soil and weather)
3. Precision farming with integrated devices and apps (driven by AI and ML)
4. Agri market intelligence and connect (market pricing and demand dynamics)

Cisco solutions for smart agriculture

With an aim to optimize farm-to-market processes, increase farmer revenue and re-align the farmer-government-industry supply chain, Cisco leverages a wide range of modern technologies like big data, data science, field sensor management, satellite data processing, GIs, among others. By deploying an agriculture platform or command center of sorts, Cisco enables companies to integrate an analytics domain, collaboration tools, app and web portals, and a highly secure, cloud-enabled data center network. Thus, by creating an IoT ecosystem, Cisco is able to provide a comprehensive and integrated solution with the aim of transforming agriculture yield and profits, end-to-end.

Cisco has collaborated with SatSure, a deep tech space applications start-up that specializes in spatial decision intelligence and farm intelligence. SatSure is an alumnus of Cisco's corporate accelerator program Cisco LaunchPad, and together, Cisco and SatSure, have kickstarted an agri-tech revolution of sorts by helping various State governments solve their own unique challenges in the field of smart agriculture.

Cisco LaunchPad propels high potential deep-tech startups and runs in line with Cisco's goal of developing solutions that bring value to businesses and the society at large, through collaboration. The joint success that SatSure and Cisco LaunchPad have crafted together is a testimony to how the corporate accelerator plays a catalytic role in helping businesses tap opportunities mutually through innovation.

India's agri-tech revolution, powered by Cisco and SatSure

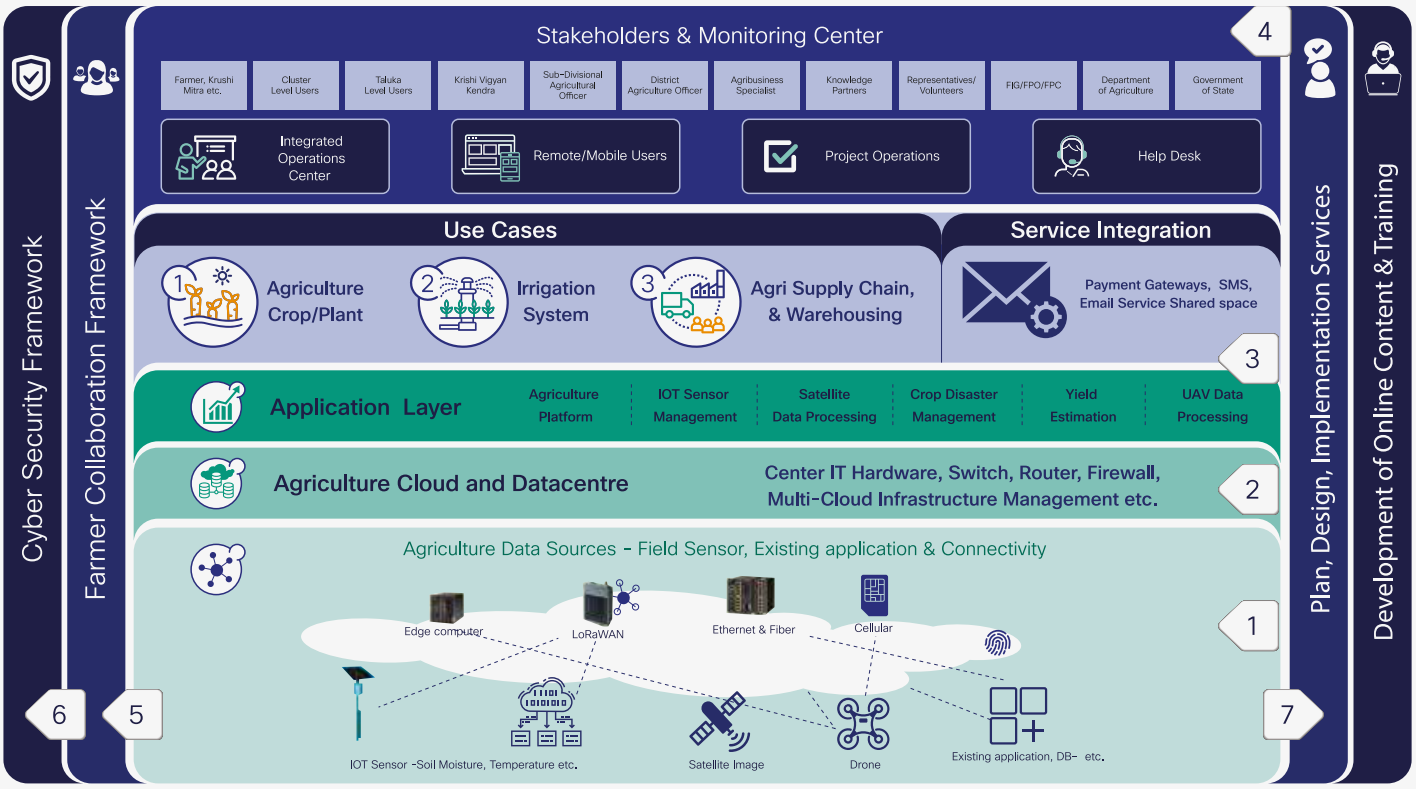
Enabling precision farming

For one of the large southern states of India, SatSure in partnership with Cisco is offering remote crop monitoring services using satellite imagery and AI. Intelligent crop planning and sowing, smart crop health management, precision farming and yield analytics, digital transformation of the value chain and data-driven agricultural practice are a few of the many areas where SatSure, powered by Cisco's always-on network connectivity, is extending support to the farming community across the state.

The SatSure agriculture solution stack, tested and validated with Cisco's IoT solutions, consists of three main layers: a sensor layer, a cloud-based platform, and deep analytics from machine learning and deep learning algorithms. By deploying IoT devices at strategic field and farm locations, SatSure is enabling states to decode – in real-time – satellite data collected from space and generate insights that empower farmers to carry out precision farming. With the combined horsepower of IoT and remote sensing, the SatSure solution rides on Cisco's LoRaWAN and IR829 gateway infrastructure to provide a holistic solution for intelligent farming.

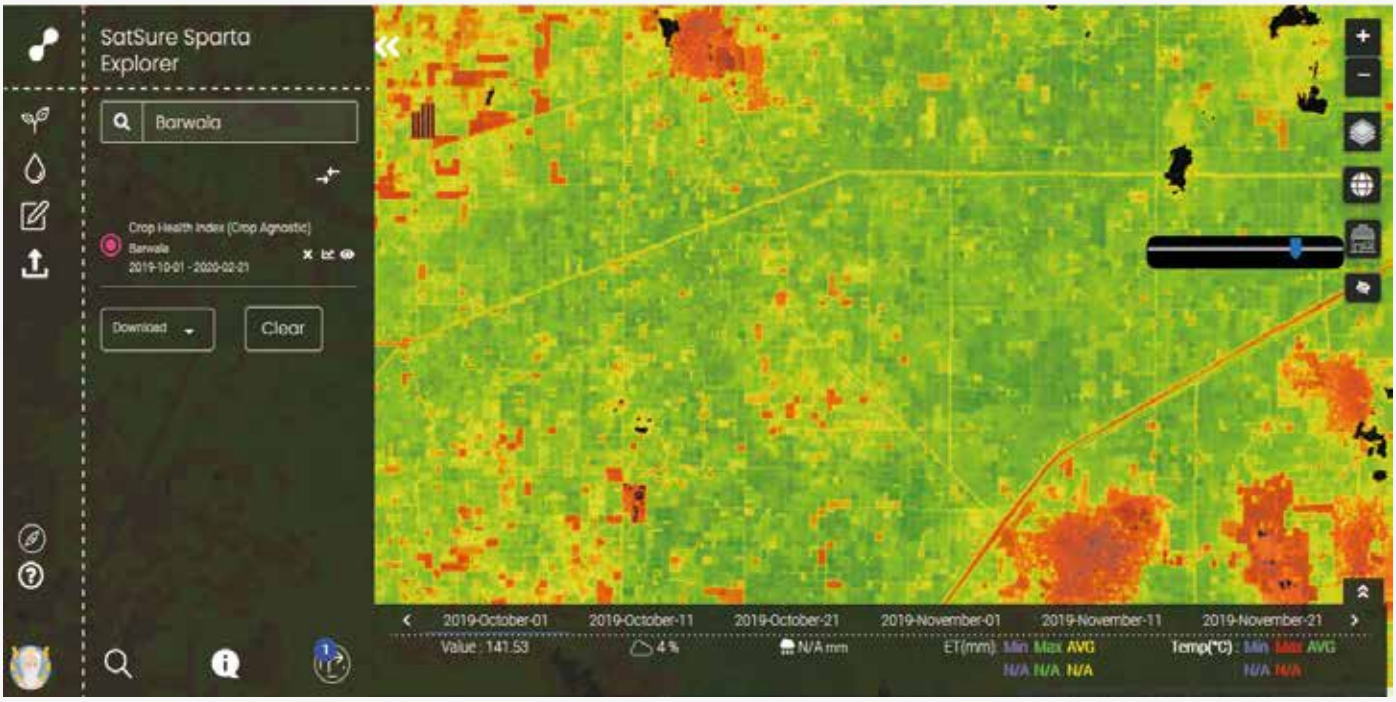
An innovative agriculture framework

Several new-age digital trends are coming together to address agriculture challenges in India. For instance, the Cisco solution framework is an innovative decision intelligence framework for stakeholders to make optimized decisions for improved farm management, in turn leading to higher farm output. Below are the functional and digital building blocks of this framework.



Multi-level sensor data intelligence

Smart agriculture initiative undertaken at a district-level government body in another South Indian state further projects how the establishment of a real-time monitoring center can bring considerable value to agriculture. Focussed on rice and shrimp farming, this coastal town placed multiple sensors for everything from crop performance, harvest progression, relative humidity, wind speeds, soil pH, wind direction, among others. Specifically, for shrimp farming, special sensors for dissolved oxygen and disease outbreaks were additionally deployed. Data from these sensors were collated across three intuitive dashboards, first at the farm location, second at the panchayat office and the third at the agricultural department of the government. Additionally, mobile apps were provided to farmers, data from which was monitored and managed at Village Knowledge Centers, and the monitoring headquarters at a government school. This elaborate deployment leverages the power of big data, field sensor management, data science intelligence, and a unified, collaborative platform, built from ground-up.



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The final word

By combining the intelligence of satellite monitoring and sensor management, Cisco and SatSure are bringing to India, an unbeatable amalgamation of technologies that are set to power Indian agriculture into the next decade, a massive step for the country to become a $5 trillion economy. The abundance of scale is finally being leveraged for better yields, lesser overheads and a re-imagined supply chain that benefits farmers, and the marketplace. And with Cisco LaunchPad bridging the gap between Cisco and start-ups leveraging cutting-edge technology and innovation, possibilities are widening up in the agriculture space and beyond. We are truly at the cusp of an agri-tech revolution and India is just getting started.