Rural Digital Transformation for Small Hold Farmers

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Microsoft
Microsoft Mission

“Empower every person and every organization on the planet to achieve more.” - Satya Nadella
# Solving Big Problems

## Internet Access

49% of the world is offline.

## Energy Access

1.3 billion people worldwide lack access to electricity.

"With no internet access, there is no cloud access." - Satya Nadella

Source: ITU, 2016; World Bank, 2016
Microsoft Airband Initiative Overview

**Mission**
In partnership with internet access providers and energy access providers and other local entrepreneurs, deploy technologies and business models that help billions more people affordably get online and achieve more.

**Objectives**
- Incubate seed stage partnerships and projects
- Develop enabling ecosystems
- Commercialize scalable technologies and deployments

**Areas of Focus**
- **Internet Access**
- **Energy Access**

**How**

**Commercial Partnerships**
- Rural America
- International
- Hardware innovation

**Grant Fund**
- Annual grant awards

**Focus on Key Enabling Verticals**
- Education
- Healthcare
- Agriculture
- Small business
TV White Spaces: One Tool in the Connectivity Toolkit

What is TV white space?

- Unused spectrum such as traditional UHF and VHF broadcast spectrum
- Regulators allow wireless access devices to transmit on these unoccupied channels as long as they do not interfere with TV broadcasters and other licensed users.

Who does it benefit?

- Seniors
- Librarians
- Families
- Teachers
- Students
- Business Owners
- Executives
- Farmers
- Entrepreneurs

How does it work?

- Network operators can cost-effectively deploy wireless networks that deliver fast, reliable, and affordable internet access in rural and underserved communities
- Leverage schools, libraries, or other anchor institutions with high-capacity connections to extend broadband solutions
- TVWS signals can travel over long distances, and penetrate natural and man-made obstacles to cover entire rural communities
- TVWS signals penetrate through more walls and obstacles, enabling whole home media distribution
Meet Ann

- Small hold farmer in rural Kenya
- Reliant upon rainfed agriculture to support her family
- Like most farmers across Africa, faces challenges including:
  - unreliable rainfall
  - low crop yields
  - high energy costs (primarily diesel)
  - lack of access to modern farming technology
  - no access to financing
- These factors contribute to a cycle of poverty: 75% of the world’s poorest people are members of small hold farming families, and African farmers are the lowest-yielding farmers in the world
SunCulture
Solution

- Pay-As-You-Go, Solar-Powered Water Pumping and Drip Irrigation
- Data Usage:
  - Payment & Credit
  - Remote Monitoring
  - Predictive Maintenance
  - Weather updates via SMS

RainMaker2 with ClimateSmart™ solar pump system
Rainmaker

**Personalized Irrigation Recommendations**
ClimateSmart™ gives real-time, weather-based recommendations for irrigation by SMS

**Remote Monitoring with Predictive Maintenance**
Detects issues and use of Microsoft™ Machine Learning Tools & artificial intelligence to predict maintenance requirements

**Li-on Battery Backup**
Deep cycle Lithium Ion battery with ClimateSmart™ software that enables remote monitoring with predictive maintenance

**Multi-Purpose Usage**
Charge your mobile phone, power 2,400 lumen home lighting kit, and other SunCulture DC appliances

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**4x Sprinklers & Fittings**
- ClimartSmart™ Solar energy system with Li-ion battery & MPPT charger
- Powerful brushless motor solar water pump with 10 year lifetime
- 300W panel or 160W foldable panel
- 100 meters of 25m PN10 pipe

**ClimartSmart™ Electrical Cable**
- Four sprinklers + fittings
- 50 meter of electrical cable
- 4x 600 Lumen LED light bulbs each with 5m cable and switch
- 3 years warranty
Impact

2-5x yield increase & harvest security
Increased irrigation translates into substantially increased yields and perhaps more importantly removes the risk of a failed harvest due to insufficient rain. Farmers can increase the proportion of commercial vs. subsistence output.

Transition to more valuable crops
With more water, farmers can move from growing low value crops (e.g. maize, potatoes) to higher value crops (e.g. kale, tomatoes, spices, tea tree).

Grow during dry season
Water access allows farmers to grow crops in the dry season, which not only increases yearly output, but allows them to sell at much higher prices.

Increase land cultivated
Irrigating land manually from wells limits the surface of land that can be cultivated. Water access solves for that and allows smallholder to cultivate more of their land.

1.5x+ milk production
Giving cows enough water can double output with immediate effect, & most customers report yield increases of at least 50% which, with 3 cows, is c.$67 of additional income per month.

New economic activities
With a greater availability of water, and certainty of water access, farmers can invest in additional livestock, or invest in the means to add additional value to their output.

Less time spent getting water
Customers report spending 17 hours per week accessing water prior to getting our products. 17 hours that can now be spend on farm improvements, new income generating activities and family life.

Domestic use & quality of life
Customers report a significant increase in quality of life from having sufficient water for domestic use and health benefits from no longer physically drawing water. Access to electric light (instead of kerosene) also benefits quality of life and children’s education.
**AgOptimized™: ‘More Data, Better Farms’**

AgOptimized leverages intelligent hardware, IoT, big data and artificial neural networks to produce hyperlocal weather forecasts, provide farmers with irrigation, fertilizer and pest control recommendations and predict which farmers will repay loans on time.

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**Soil & Weather Sensors**

AgOptimized Soil and Weather Sensors measure moisture, fertility, temperature, luminosity and humidity, and wirelessly network to ClimateSmart for upload to IoT Hub.

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**IoT Hub**

Data is then uploaded to IoT Hub for analysis by Tempesta Hyperlocal Weather Forecast System and AgOptimized Decision Agriculture System for predictive SMS irrigation, fertilizer and pest control alerts powered by Microsoft Azure Artificial Intelligence.

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**Decision Agriculture**

AgOptimized Decision Agriculture System sends farmers SMS advice on weather based irrigation timing + usage + dry run alert. Over time, it will also inform them of optimal planting, fertilization, irrigation and pest management.
Ann today...

Ann’s livelihood and productivity have increased:

- 17 hours per week in saved time now spent with family, community, and church
- Arable increased 2x
- Income has risen 5x
- Increased livestock holding + milk yield
- Moved into larger home on property with running water, and biogas for cooking