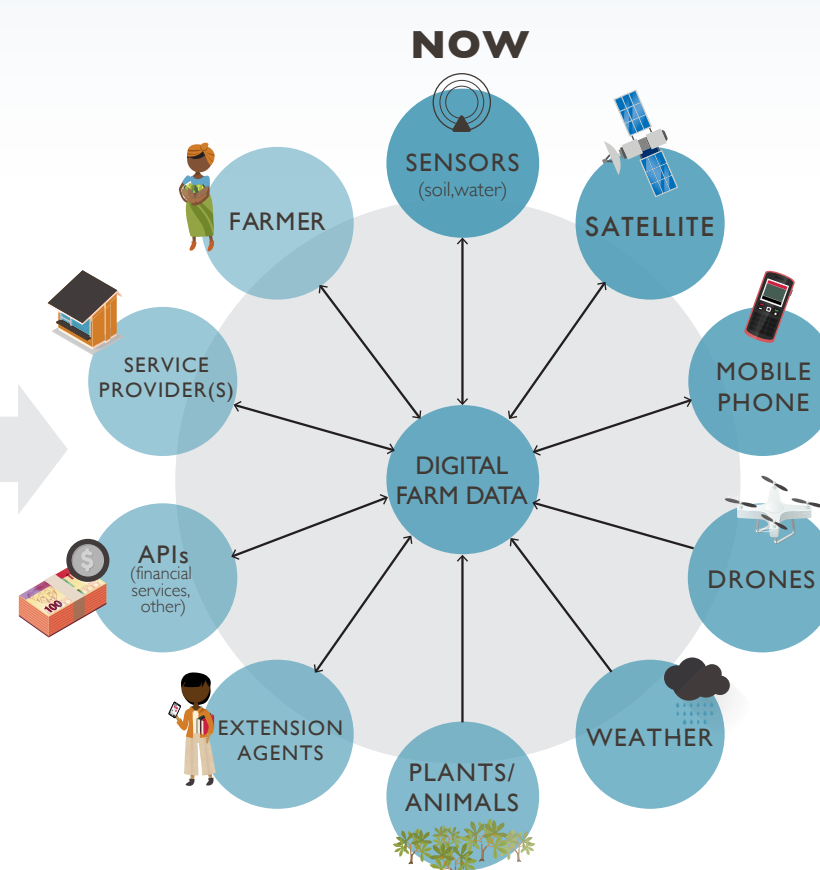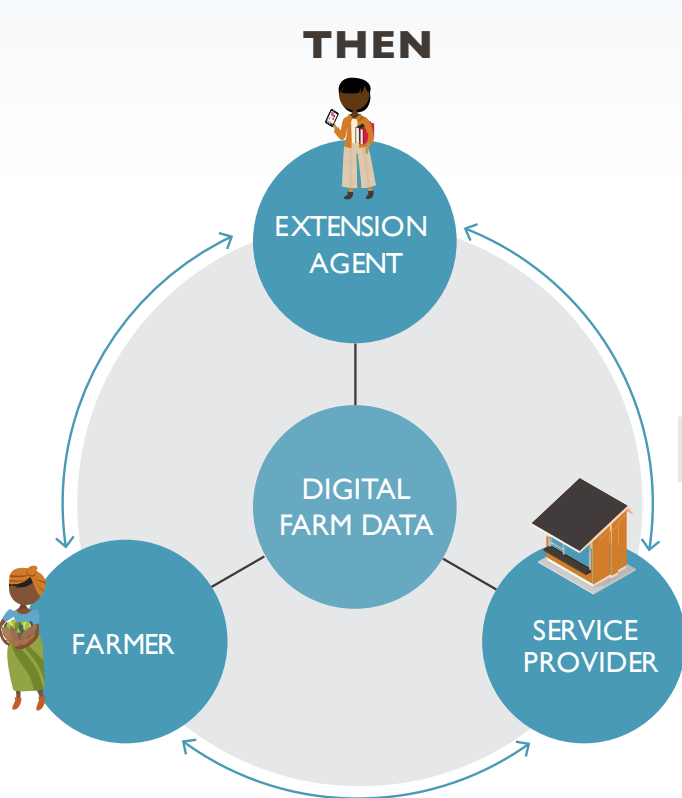# DATA-DRIVEN AGRICULTURE

The Future of Smallholder Farmer Data Management and Use

More than **500 million** smallholder farms worldwide play a significant role in food production and genetic diversity of food supply. Mobile technology, remote-sensing data and distributed computing and storage capabilities are changing how smallholder farmers are identified, understood and supported.

DIGITAL FARMER PROFILES: THEN AND NOW

A digital farmer profile is a profile that can capture comprehensive data on a farmer and their farm. It can be developed over time, provide real-time data flows between farmers and stakeholders, and it can be accessed simultaneously by multiple service providers such as financial service providers, input suppliers, agro-processors and farmer cooperatives.

THEN

- EXTENSION AGENT
- DIGITAL FARM DATA
- FARMER
- SERVICE PROVIDER

NOW

- FARMER
- SENSORS (soil/water)
- SATELLITE
- SERVICE PROVIDER(S)
- MOBILE PHONE
- DIGITAL FARM DATA
- APIs (financial services, other)
- DRONES
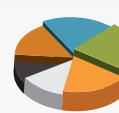- EXTENSION AGENTS
- PLANTS/ ANIMALS
- WEATHER

As digital management of farmer profile data becomes the norm, the farmer becomes only one of many sources of that data, and only one of its many users.

DATA GENERATORS: SERVICE PROVIDERS

Service providers who collect data on and from smallholder farmers fall into four main models.

The type of service provider does not necessarily determine *what* data they collect, *how* they collect it, or *how* it is used, but service provider models are an important starting point for understanding farmer profile data management.

1. **RESEARCH ENTITIES**
2. **GOVERNMENT / NGO EXTENSION SERVICES**
3. **PROJECT MANAGEMENT/ TECHNICAL ASSISTANCE**
4. **COMMERCIAL SERVICE PROVIDERS (B2B AND B2C)**
   B2B=Business to Business
   B2C=Business to consumer

DATA CAPTURE, ANALYSIS AND USE

Digital data capture is the starting point for developing a digital farmer profile ecosystem. Leveraging the three methods of data capture below increases the accuracy of profiles.

1 PEOPLE FACILITATED
(i.e., extensions agents, researchers)

Paper Surveys
Digital Surveys
Human-centered Design
(Qualitative)

2 MOBILE PHONE

Phone-based Capture
SMS
OBD
IVR
Call Center

Passive Mobile Capture
GPS
Phone Usage
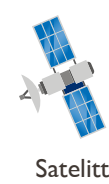Transactions

Mobile Phone Applications
Registration
Usage
Chatbots
Crowdsourcing
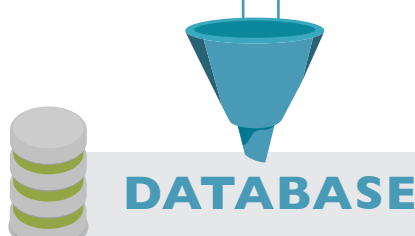
3 REMOTE SENSING OR CAPTURE

Sensors
Satellite
Drones
Weather

National ID
Registry
Land Management

Registry
Facebook
Phone Data
Other Datasets

DATABASE

OBD=Out-bound dialing
IVR=Interactive Voice Recording
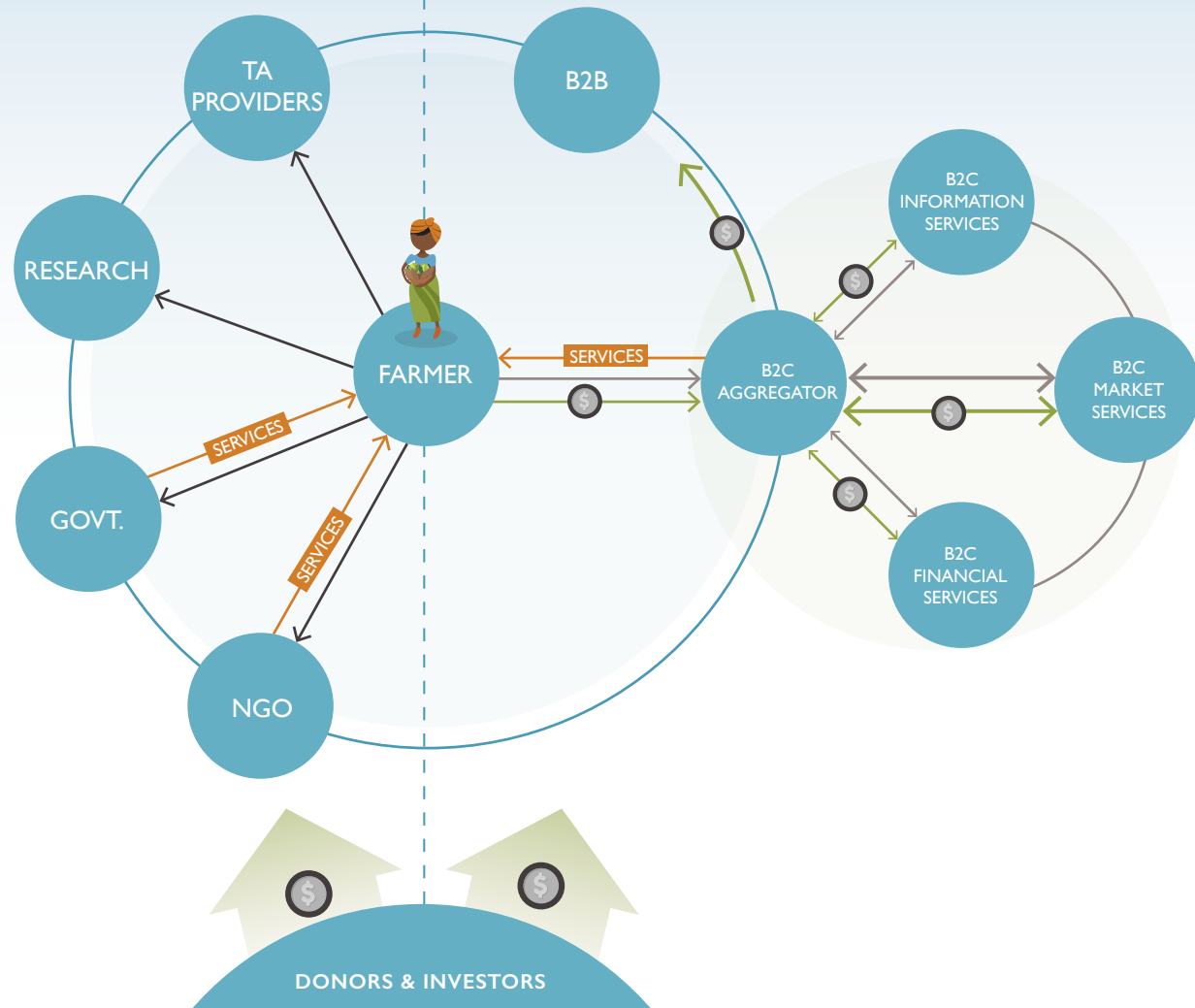API= Application Programming Interface

Farmers need to make decisions in *critical moments.* The aggregation of information from their profile data, remote-sensing data, satellite and weather data makes this possible. Big data is one promise that can bring fragmented data, resources and service providers together to support a farmer's ecosystem.

DATA AND REVENUE FLOWS

Changing methods of data capture are giving rise to new configurations within service provider models.

NGO / GOVERNMENT

- TA PROVIDERS
- RESEARCH
- GOVT.
- NGO
- FARMER

COMMERCIAL

- B2B
- B2C INFORMATION SERVICES
- B2C AGGREGATOR
- B2C MARKET SERVICES
- B2C FINANCIAL SERVICES
- SERVICES

DONORS & INVESTORS

Today, farmers provide data to service providers in exchange for support services. In the future, farmers might monetize their own data.

All service providers should consider how to compensate farmers for their data. This can be a pathway to farmers' financial sustainability and protect their privacy.

KEY CONSIDERATION

When assessing how to leverage farmer profile data USAID staff and Feed the Future partners should consider:

- How are smallholder farmers defined?
- What is the landscape of service provider models?
- What is the technology environment for supporting digital capture, analysis and timely use of data?
- What data is commonly collected, what are the gaps and is data being shared?
- Are there farmer profile data sources that can be leveraged to build dynamic farmer profiles?

- What farmer archetypes have been created by programs and can they be leveraged by other service?
- What is the policy and legal environment for data sharing, consumer protection and privacy?
- How is data shared post-project?
- What may be the utility of the projects' data assets for other service providers?
- What investments by USAID and other donors can support the development of a digital data ecosystem for farmer profiles?