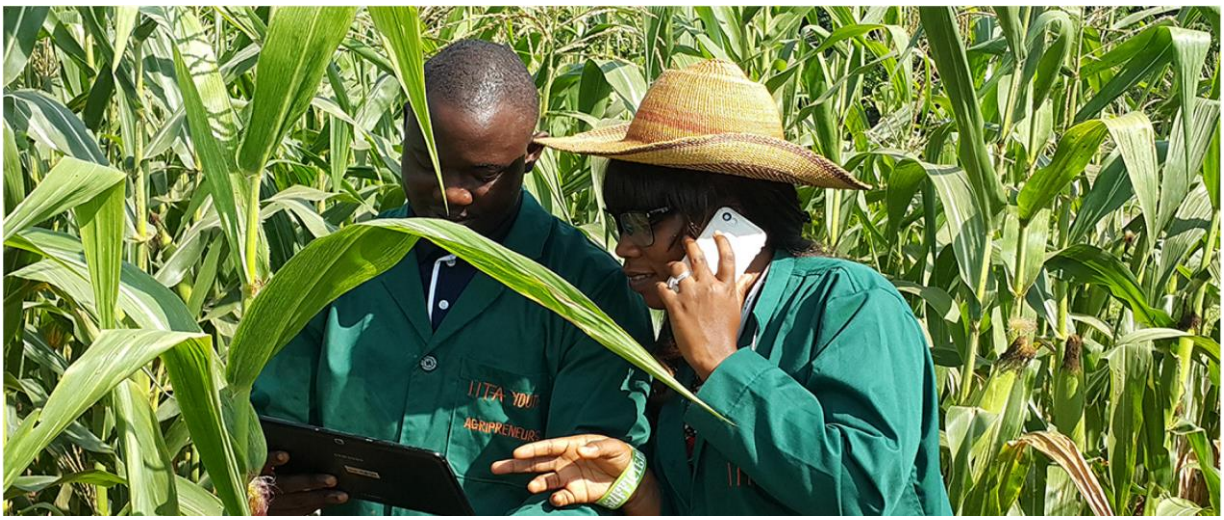
ICT Integration: Smart Way to Transforming African Agriculture



Background

In the last one decade alone, Information and Communication Technologies (ICTs) have quickly emerged as frontline tools for transforming agricultural systems in sub-Saharan Africa. Governments, developmental organizations, and the donor community are increasingly depending on ICTs to unleash the potential of rural economies and bridge value chains for enhanced profitability.

IITA has been at the forefront of using ICTs for research management and knowledge sharing, including extension, scaling out, e-learning, collaboration, and agricultural services enhancement. Sharing and delivery of knowledge and products for adoption by intended end-users are critical to achieve research and development outcomes. The use of ICTs to facilitate awareness creation, promote behavioral change among knowledge users, e.g., farmers or processors, and facilitate adoption of technologies could determine the level of success of delivery efforts. Hence, digital delivery and knowledge sharing provide IITA the leverage to showcase its expertise and experiences in this field.

IITA has explored the use of ICTs for precision agriculture, digitalization of the research process, knowledge sharing, and service delivery through tailor-made digital tools, data repositories, and web platforms. Many of these developments emanated from various projects and their uses were designed to fit the project purpose and for a narrow scope despite the potential for broader applications.

A recent baseline survey on use of ICTs and mobile apps conducted by the Working Group (WG) in IITA revealed the use of over 50 ICT applications developed in-house (Annex 1). High usage of ICTs by the IITA community is not surprising, but many of these developments were uncoordinated, resulting in some redundancies and poor awareness about the state of development and progress outside the project structure, underuse of high potential apps beyond the intended scope, and data fragmentation. This exercise underlined the fact that many developers and users are working in isolation, and that there is a need to integrate and coordinate such efforts within the institution as it provides IITA the leverage to showcase its expertise and experiences in this field, among several other benefits.

The Working Group prepared this concept brief to improve the coordination, collaboration, and communication among the various developers of ICTs currently in use for **research, development,** and **delivery** at IITA. This is expected to enhance synergy between the ICT applications, reduce redundancy, and expand reach of digital delivery of solutions to farmers and end- users for increasing impact. *[Note: The management information systems (MIS) under IT Unit are not covered in this document focused on research and delivery applications].*

Enhancing delivery and knowledge sharing using ICT applications: Scope and objectives

1. Development of an 'IITA Digital Ag Service (IDAS)' strategy and platform:

Develop a strategy and create a framework for delivery of research knowledge using digital tools, platforms, and approaches for IITA to ensure widescale adoption and impact. The goal is to position IITA as the go-to partner for innovative solutions to agricultural challenges in sub-Saharan Africa, and the hub for digital solutions for the agricultural sector. The IDAS platform will integrate a broad spectrum of ICTs in use for research, development and delivery, and knowledge sharing (Fig. 1). IDAS is expected to improve the efficiency of service delivery, visibility, simultaneous promotion of complementary apps, harmonize front- and back-end service support, nurture new ideas, create avenues for interoperability of databases using API's for big data generation, and machine learning for trends, analytics, data visualization, data-driven decisions, and forecasting.

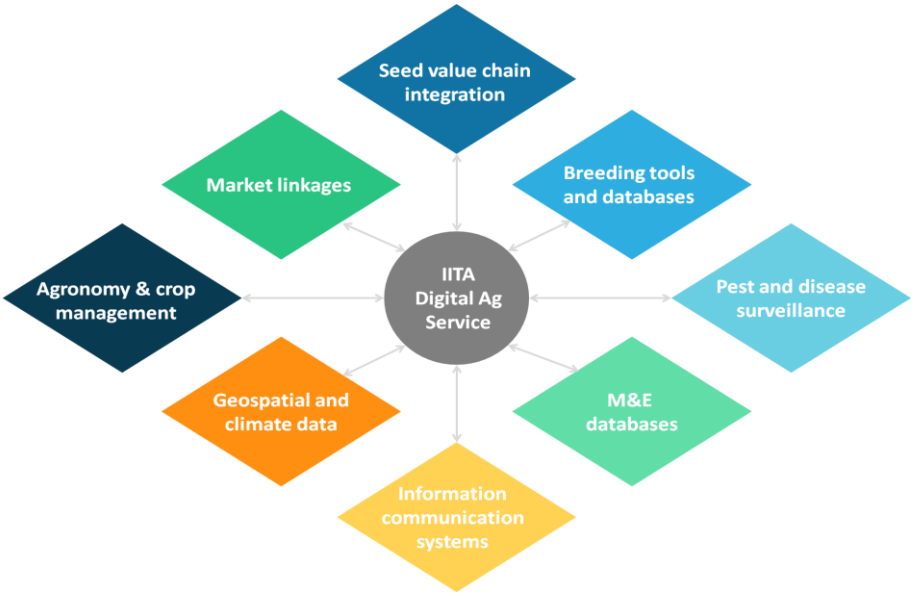


Fig. 1. Integration of apps for enhanced use, visibility, interoperability, and maintenance

2. Digitalization of agricultural services and extension: Develop suite of ICT packages for targeted digitalization schemes (e.g., seed sector reforms using the SeedTracker, Fig. 2), and promote and modernize service delivery and extension. The COVID-19 pandemic has primed government and nongovernment agencies in Africa, to adopt digital technologies and processes for efficiency and overcome infrastructure barriers to deliver information and services to end-users. IITA has unique ICTs, experience, and understanding of the needs of farmers and end-users (e.g., research, extension and advisory services) to design and develop user-centric digital services that meet the requirements of organizational goals.

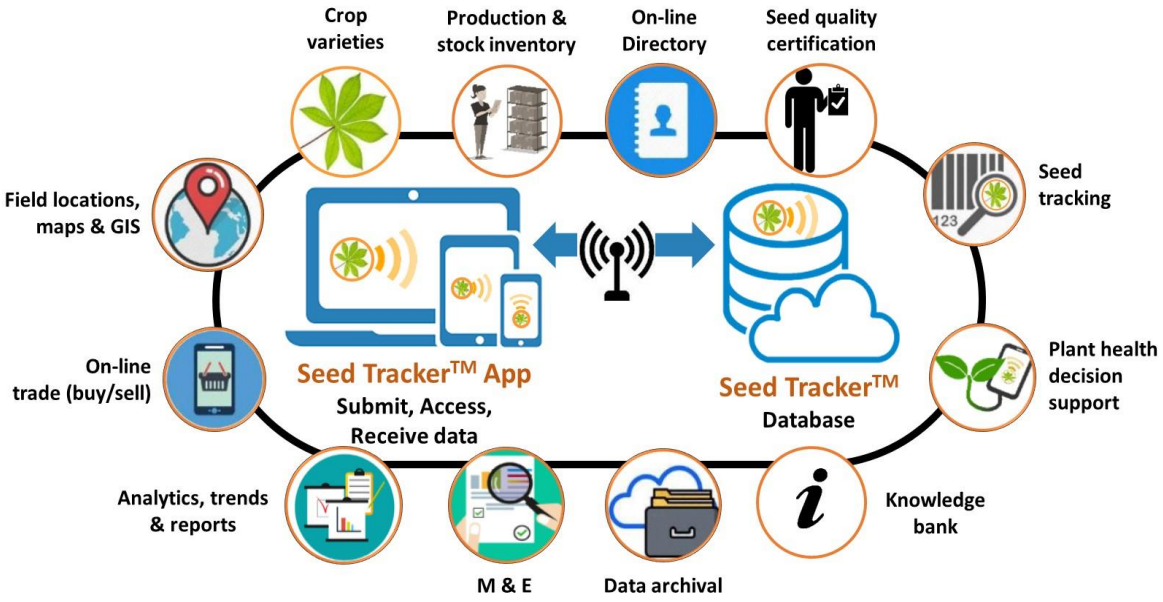


Fig. 2. Digitalization of seed value chain, seed certification, and national seed inventory using SeedTracker app, showing how we can modernize service delivery, knowledge sharing, and extension.

3. Smart service delivery to farmers: Design digital advisory services to enable users to access crop advisory information. IITA has tailored ICTs for crop management advisory service delivery to farmers and farmer organizations, and extension agents in government and nongovernmental organizations through smartphones (e.g., development of a package of best agronomic practices for ready dissemination to end-users using AKILIMO, Fig. 3). Combining the use of ICTs with mass media or traditional media, such as radio/Internet radio, videos and mobile projectors further expands the reach of ICTs to end-users.

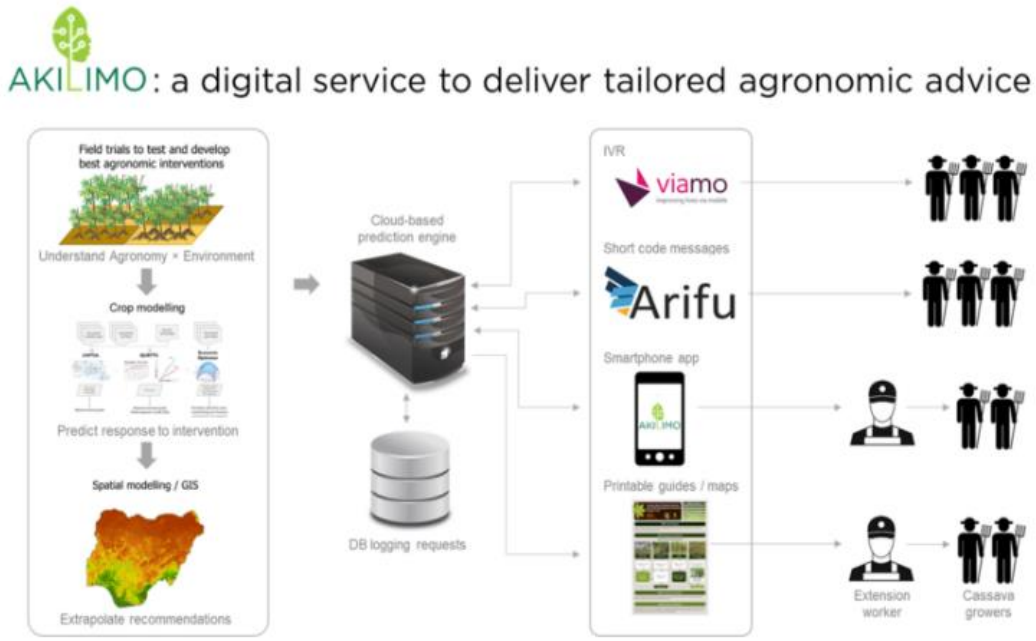


Fig. 3. Tailored agronomic advice to farmers using AKILIMO app.

4. Promote e-learning to deliver knowledge: Develop an e-learning platform on IDAS to promote remote learning and skill building. ICTs offer a new way to enhance education and facilitate capacity building among players in the agricultural space, ranging from secondary school children being introduced to agriculture to value chain actors, agrodealers, to extension workers and trainers, to youth "agripreneurs" and women entrepreneurs. IDAS will support the delivery of research-based knowledge. This involves working with the formal school system in introducing agriculture subjects and providing opportunities for exposure and experiential learning; providing mechanisms for bringing youth or women entrepreneurs together to learn about agribusiness using an online educational platform; and bringing training courses on agriculture to users via a digital learning portal (Fig. 6). Integrating IITA knowledge resources with ICTs is a powerful and cost-effective way to enhance learning and knowledge and skills acquisition.

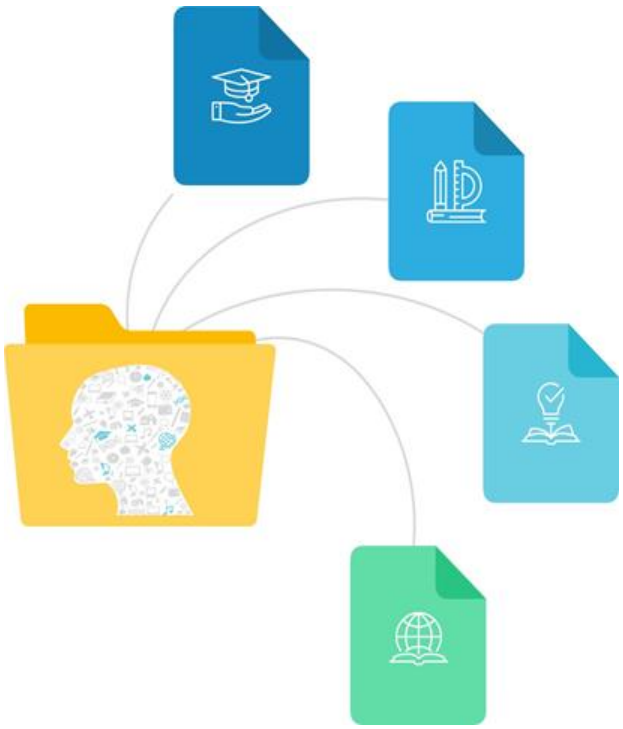


Fig. 4. E-learning offers a powerful and cost-effective way to develop capacity

5. Expand ICT footprint: Promote digital applications within IITA research and delivery portfolios. Many projects in IITA seek solutions to constraints in research management, data collection, data management, archiving and knowledge management, knowledge sharing, e-learning, communication, technology delivery, extension, and other needs. Many of these activities use conventional methods, third-party applications, or new ICTs developed for managing research, development, and delivery activities. This objective involves developing and promoting the strategy to use standard digital tools available at IDAS for specific applications to enhance the digital footprint and outreach of IITA applications. Through collaboration among the Digital Delivery Working Group, IT, Scaling out team, Knowledge Center, and the community of practice, IDAS will become the central platform for enhancing and developing new ICTs required for future applications and offer strategic advice to users aiming to develop new applications (Fig. 5) (e.g., development of a 'Nutrition app' for making recommendations on use of crops and varieties to address hidden hunger). Existing IT infrastructure provides the required backbone for the various apps with room for upgrades and expansions.

Fig. 5. Collaboration to promote ICTs and development of new apps with the support of IT Unit

6. Establish and coordinate ICT Community of Practice (iCOP):

Create a multidisciplinary iCOP to align ICT developers and users to improve tool development and promote digital tools for data-driven precision agriculture, stimulating innovation and capacity development for ICT use across the agricultural value chain. The ICT practitioners include apps developers and users at IITA and are spread across hubs and in some cases work with partners in other continents. The establishment of iCOP bridges the digital divide, improves harmonization, and strengthens the position of IITA ICTs.

Fig. 6. iCOP to promote ICT footprint in IITA and partner countries

Implementors and partners

- Developers and information architects from IT, Development and Delivery, Communication Office, Data Management, Capacity Development Office, P4D Directorate, various R4D and P4D projects, Corporate Services, Research Support, and Finance.

- Partner-developers in various R4D and P4D projects from other organizations

Resource mobilization for digital delivery

Knowledge sharing and digital extension together are one rich area that presents opportunities for collaboration and resource mobilization, especially with the current challenges under the COVID-19 pandemic. The times call for greater use of digital tools in the agricultural space and approaches with restrictions on physical and face-to-face interaction and the need to reach bigger audiences in a shorter time. IITA's combined expertise and experience in this area provides a fertile ground for developing grants and proposals that provide solutions to agricultural challenges and that could attract donor funding, nontraditional partnerships, and alignments with governments for enhancing agricultural transformation in sub-Saharan Africa.

Status of progress

Two interproject workshops were organized to promote complementary ICTs to NARES and state extension services in 2019. A first attempt was made to improve coordination and develop complementarity between and among ICT tool applications and users through a workshop titled 'Smart Tools for Smart Farming' held at IITA-Ibadan on 1 November 2019. This workshop brought together IITA teams and collaborators to showcase various apps developed in IITA.

The second was a workshop organized in December 2019 that introduced IITA-developed digital tools to extension workers, media, and collaborators working in the same digital space and agricultural solutions or topics.

Together, these workshops enhanced visibility to various ICTs in use at different levels of a value chain. This also served to catalyze the practitioners and spurred the coming together and establishment of a working group that would develop the beginnings of a strategy on digital delivery and knowledge sharing, and undertake a benchmark survey to determine the digital tools available and who are involved in the in-house development of such tools.

The next step is to evolve the working group into an institute-wide ICT Community of Practice (iCOP) to bridge interest groups to realize objectives specified in this concept for greater efficiency and impact.

Annex 1. Summary of apps by applications

- Seed and product value chain integration and market access
  - Seed Tracker
  - Business Connector
  - e-market
  - GoSeed eCommerce
- Crop management and agronomy
  - AKILIMO
  - Herbicide calculator
  - IBSTI/ESI
  - Mwanga
  - Shade tree advice tool
  - Stepwise
- Breeding tools and databases
  - BTracT
  - CloneTracker
  - ViTSel
  - BMS
  - CassavaBase, Yambase, Musabase
  - Genebank inventory management
- Pest and disease surveillance
  - NURU
  - ICT4BXW
  - Crop Disease Surveillance
  - FAW Scouting and Management
- Geospatial information and climate database
  - GIS Weather Information System
  - Geospatial Data Repository
- M&E platform
  - MEL
- Institutional research databases
  - West Africa Trial site map application
  - DSpace (Bibliography)
  - CKAN (Research data repository)
  - Soils4Africa
- Management Information Systems
  - PAR, HURIX, Oracle applications used for administration management (financials, human resources, facilities management, etc.)
- Information and Communication Tools
  - Radio IITA, IITA website, Knowledge portal (knowledge management and knowledge sharing platform), IITA iReport, and IITA News
- Project-specific websites for knowledge sharing
  - P4D, AflaSafe, IITA GoSeed, BASICS, YIIFSWA, Soils4Africa

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