

Integrated digital tools for accelerating agricultural transformation in sub-Saharan Africa

In the last decade information and communication technologies (ICTs) have fast 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 agricultural value chains for enhanced profitability.

Using digital tools in the farm is now beginning to be a common sight in African countries.



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.

IITA believes that sharing and delivery of knowledge and products for adoption by intended end-users using digital platforms 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 contribute to the success of delivery efforts.

IITA has used 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 R4D projects and were designed to fit the project purpose with a scope for broader applications.

A workshop titled 'Smart Tools for Smart Farming' held at IITA-Ibadan, Nigeria in November 2019 attempted to improve coordination and develop



complementarity between and among ICT tool applications and users. This workshop brought together IITA teams and collaborators to showcase various apps developed in IITA.

A follow-up workshop was organized a month later to introduce 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 the visibility of various ICTs used at different levels of the agricultural value chain. They also served to catalyze the coming together of practitioners and the establishment of a working group that would develop the beginnings of a strategy on digital delivery and knowledge sharing for IITA.

These workshops emphasized the need to integrate and coordinate such efforts as it provides IITA the leverage to showcase its expertise and experiences in this field, among several other benefits.

A Working Group on Digital Delivery was formed 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 the reach of digital delivery of solutions to farmers and end-users for increased impact.

The Working Group undertook a survey to determine the available digital tools and the talents involved in the in-house development of such tools. This baseline survey revealed the use of over 50 ICT applications and mobile apps developed in-house (Table 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.

The Working Group also came up with a strategy document that outlines several elements to enhance delivery and knowledge sharing:

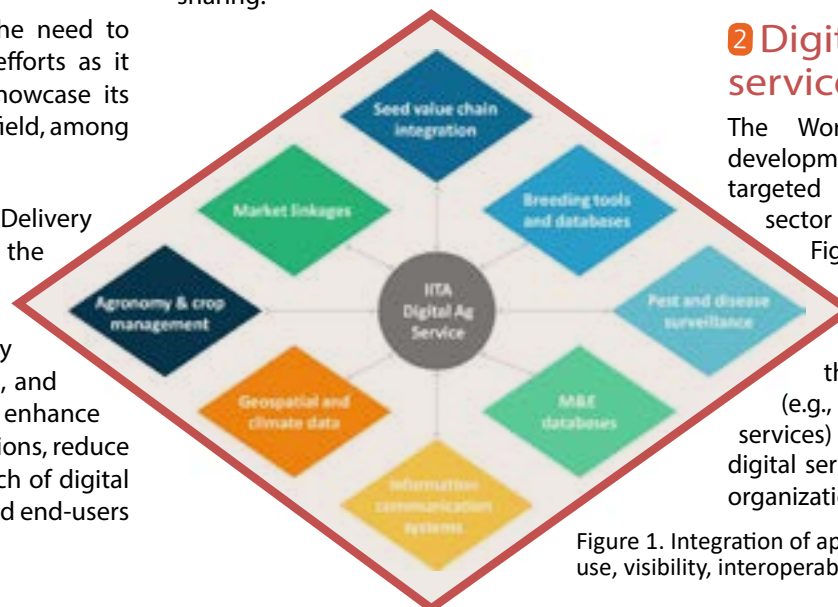


Figure 1. Integration of apps for enhanced use, visibility, interoperability, and maintenance.

1 Develop digital strategy and platform

A draft strategy was formulated and a framework created for delivering research knowledge using digital tools, platforms, and approaches to ensure widescale adoption and impact. Tentatively called IITA Digital Agriculture Service (IDAS), the 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 APIs for big data generation, and machine learning for trends, analytics, data visualization, data-driven decisions, and forecasting.

2 Digitalize agricultural services and extension

The Working Group will oversee the development of a 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. IITA's strengths lie in its 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.

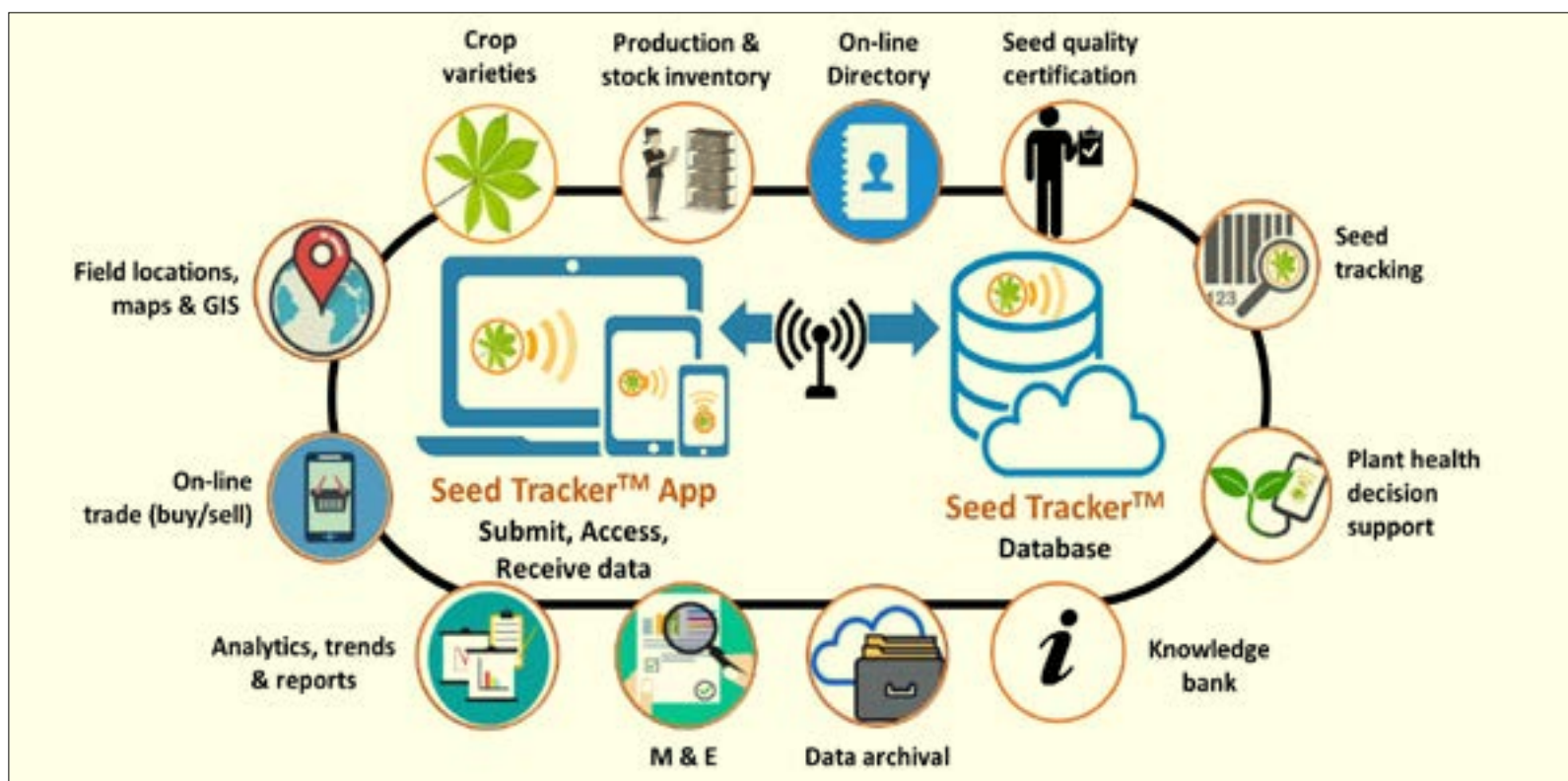


Figure 2. Digitalization of seed value chain, seed certification, and national seed inventory using SeedTracker app, showing how we can modernize service delivery, knowledge sharing, and extension.

3 Deliver smart service to farmers

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, see related story on page 25, this annual report). 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 these ICTs.

4 Promote e-learning to deliver knowledge

Part of the plan is to develop an e-learning platform on IDAS to promote remote learning and skill building. IDAS offers 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. 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. Integrating IITA knowledge resources with ICTs is a powerful and cost-effective way to enhance learning and knowledge and skills acquisition.

5 Expand digital footprint

This involves developing and promoting the use of standard digital tools available in IDAS for specific applications to enhance the digital footprint and outreach of IITA applications. Through collaboration among the Working Group on Digital Delivery, IT, Scaling out team, Communication and Knowledge Center, and the various communities 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 (e.g., 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.

6 Establish and coordinate ICT Community of Practice

Within IITA, a multidisciplinary unit will be created to align researchers, ICT developers and users, communicators, and content generators 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 Working Group will evolve into an institute-wide ICT Community of Practice (iCOP) to bridge interest groups within IITA and realize the objectives discussed above for greater efficiency and impact.

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.

Table 1. Summary of apps by application

<ul style="list-style-type: none"> • Seed and product value chain integration and market access <ul style="list-style-type: none"> ○ Seed Tracker ○ Business Connector ○ e-market ○ GoSeed eCommerce • Crop management and agronomy <ul style="list-style-type: none"> ○ AKILIMO ○ Herbicide calculator ○ IBSTI/ESI ○ Mwanga ○ Shade tree advice tool ○ Stepwise • Breeding tools and databases <ul style="list-style-type: none"> ○ BTracT ○ CloneTracker ○ ViTSel ○ BMS ○ CassavaBase, Yambase, Musabase ○ Genebank inventory management ○ Soils4Africa • Pest and disease surveillance <ul style="list-style-type: none"> ○ NURU ○ ICT4BXW ○ Crop Disease Surveillance ○ FAW Scouting and Management • Geospatial information and climate database <ul style="list-style-type: none"> ○ GIS Weather Information System ○ Geospatial Data Repository • M&E platform <ul style="list-style-type: none"> ○ MEL • Institutional research databases <ul style="list-style-type: none"> ○ West Africa Trial site map application ○ DSpace (Bibliography) ○ CKAN (Research data repository) • Management Information Systems <ul style="list-style-type: none"> ○ PAR, HURIX, Oracle applications used for administration management (financials, human resources, facilities management, etc.) • Information and Communication Tools <ul style="list-style-type: none"> ○ Radio IITA, IITA website, Knowledge portal (knowledge management and knowledge sharing platform), IITA iReport, and IITA News • Project-specific websites for knowledge sharing <ul style="list-style-type: none"> ○ P4D, AflaSafe, IITA GoSeed, BASICS, YIIFSWA

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