

## STRATEGY & IMPLEMENTATION PLAN

# ASARECA Knowledge and Information Hub (KI-Hub)



European Union





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# List of Abbreviations and Acronyms

<b>AI</b>	Artificial Intelligence
<b>AR4D</b>	Agricultural Research for Development
<b>ASARECA</b>	Association for Strengthening Agricultural Research in Eastern and Central Africa
<b>A-SRF</b>	ASARECA's Strategy and Results Framework
<b>BOD</b>	Board of Directors
<b>CAADP</b>	Comprehensive Africa Agriculture Development Program
<b>CGIAR</b>	The Consultative Group for International Agricultural Research
<b>CGIAR</b>	Consultative Group on International Agricultural research
<b>CPR</b>	Communication and Public Relations
<b>CTA</b>	Technical Centre for Agricultural and Rural Cooperation
<b>DED</b>	Deputy Executive Director
<b>EAC</b>	East African Community
<b>EAFF</b>	East African Farmers Federation
<b>ECA</b>	Eastern and Central Africa
<b>ED</b>	Executive Director
<b>FAAP</b>	Framework for African Agricultural Productivity
<b>FO</b>	Farmers Organizations
<b>GA</b>	General Assembly

<b>ICT</b>	Information and Communication Technology
<b>IT</b>	Information Technology
<b>KI-Hub</b>	Knowledge and Information Hub
<b>KIM</b>	Knowledge Information Management
<b>KMCS</b>	Knowledge Management and Communication
<b>KMUS</b>	Knowledge Management and Up-scaling Program
<b>M&amp;E</b>	Monitoring and Evaluation
<b>MIS</b>	Management Information System
<b>MMLT</b>	Markets, market linkages and trade (MMLT)
<b>NARI</b>	National Agricultural Research Institute
<b>NARS NFP</b>	National Agricultural Research System National Focal Persons
<b>OP</b>	Operational Plan
<b>PAAP</b>	Policy Analysis and Advocacy Program
<b>PCD</b>	Partnerships and Capacity Development unit
<b>SAFSN</b>	Sustainable agriculture, food security and nutrition
<b>SRO</b>	Sub-Regional Organization
<b>TIMPs</b>	Technologies, Innovations and Management Practices
<b>USD</b>	United States Dollars

# Executive summary

Cutting across the Eastern and Central African sub-region, the agricultural ecosystem yearns for a knowledge-based transformation. This ecosystem stems from governments, agricultural research and development institutions, agricultural extension agencies, education institutions, interest group and associations, wholesalers, the private sector, farmers etcetera.

ASARECA is motivated to facilitate this agricultural transformation through designing strategic actions and mechanisms including tools, techniques, processes and platforms to inform the generation and sharing of agricultural knowledge, innovation and learning for an inclusive and sustainable development.

This commitment is highlighted in ASARECA's Strategy and Results Framework (A-SRF), and Medium-Term Operational Plan I (MTOPI) deliberate move to establish and implement a Knowledge and Information Hub (KI-Hub) with the aim of facilitating equitable access to information and knowledge by different actors in the agricultural sector in the region.

The KI-Hub is principally designed to coordinate sharing, learning and influence action and policies.

The KI-Hub platform will be dynamic and agile to support the use and monitoring of impact to further boost ASARECA's efforts in dealing with a variety of information and stakeholder needs.

The KI-Hub Strategy was developed alongside an overarching Knowledge Management and Communication Strategy (KMCS), which in essence provides guidance as well as complement the KI-Hub Strategy with main focus on the technical or functional implementation of an essential component of the KMC Strategy.

In developing this KI-Hub Strategy, a review of the existing KI-Hub Strategy as well as an assessment of the existing Knowledge Management practices was undertaken. This process exposed, major implementation gaps and this include:

1. **The implementation gap:** The previous KI-Hub Strategy was hardly implemented due an existential threat to the Secretariat at the time.
2. **The integration gap:** Knowledge resources of members and stakeholders are not integrated and available.

3. **The collaboration gap:** Collaborative processes on thematic areas are facilitated mainly on project level, but ongoing facilitation of thematic collaboration (e.g. Communities of Practice - is missing).
4. **The technology gap:** More advanced tools, like semantic technologies and artificial intelligence applications, are not yet implemented to handle big amounts of knowledge and provide value added to the knowledge resources.

In responding to the above challenges and opportunities, this KI-Hub strategy focuses on three components to be implemented during the next five years. The three components addressed in this strategy include:

1. ASARECA Technology and Innovation Space integrated to the NARIs and complete with technology clearing mechanisms and procedures established.
2. Community Platforms and Think Tank for knowledge generation, sharing and collaboration established.
3. Knowledge graphs to ensure tailored search results to the end-user are developed, artificial intelligence solutions identified and deployed.

All in all, the implementation of the strategy seeks to improve the current situation by strengthening knowledge-sharing and learning among key actors, specifically on the wider level of professionals,

researchers, and stakeholders, in addition to the well-established collaboration on the senior management levels of the member organizations. The development of user-friendly content shall be subject to a wide number of contributors rather than limited to a small number of experts. Excellent facilitation of collaborative processes is therefore a paramount for the implementation of this strategy. This strategy seeks to make a significant step towards integrating content from member states and stakeholders, which will require not only technical advancements, but also the willingness of the members to share content openly on a common platform.

Artificial Intelligence Solutions are transforming our societies and change the way we use data, information, and knowledge. Technology leaders, like Google, Facebook, Amazon, Microsoft, are demonstrating on a daily basis the manifold benefits of AI-solutions, and users are rightly requesting such functionalities also in the organizational and sectoral context. The Knowledge Graph, as a key element of all controllable AI-solutions, is a strategic investment to be prepared for the next generation of AI-Solutions. Some of them, like semantic search or recommender systems are already well established and should be implemented within ASARECA within the next 1-2 years. Additional functionalities should be further developed based on more experience and with a strong ASARECA AI-Community, which shall prepare the member states for the next technology shift.

# **PART** **01**

## **ASARECA Knowledge and Information Hub (KI-Hub) Strategy**





# 01

# Introduction



## 1.1 Background

Transformation of agriculture in Eastern and Central Africa and also in the wider sub-Saharan Africa, will continue to require generation, dissemination and use of appropriately packaged knowledge, technologies, and innovations. While the identification and scientific foundation of successful Technology, and Innovation Management Practices (TIMPS) remains a critical element, it turns out that the transfer to the beneficiaries and the application in practice remains an unsolved challenge.

Despite huge amounts of knowledge resources already in existence and available in the internet in general, on ASARECA's website as well as on other agricultural websites, their application and implementation are unsatisfactory in agricultural research for development in the ECA region in general. The contextualization and management of knowledge flows in the local knowledge ecosystem, and strategies to reach the "last mile", are as critical as the existence of well-elaborated TIMPS.

The actors that must master this challenge are the

national/local stakeholders, with the NARIs as leading knowledge institutions, presumably best equipped to improve the situation. ASARECA's position is two-fold. On the one side developing and disseminating knowledge resources itself, specifically from research projects and programs, in which it is involved. On the other side a facilitator, convener and broker of experiences and knowledge resources of members and stakeholders.

In this process of brokering growing amounts of data, information, and knowledge, ASARECA has to make use of new technological innovations, like Artificial Intelligence Solutions, which allow to navigation and orientation for relevant Knowledge and Information. AI solutions make a technology leap giving the users the opportunity to even find knowledge that that they have not even known about. Semantic search and recommender systems are among the "killer-applications" of modern Knowledge Management which also lay the foundation for the success of many technology giants like google, amazon, Facebook and many others.



This strategy provides ASARECA with the way around and plan to further integrate knowledge resources of members and stakeholders through an ASARECA Technology and Innovation Space, quality assured by a Clearing House, to facilitate the exchange and collaboration in Communities, and to step into the sphere of AI-Solutions.

## 1.2 Vision and Mission

The vision of ASARECA KI-Hub is: A competitive agricultural system in the Eastern and Central Africa region.

The KI-Hub mission is to help bridge the knowing-doing gap in agricultural transformation processes by fostering equitable access to and utilization of agricultural research and development innovations.

## 1.3 Aims and Objectives

The aim of the KI-Hub is to contribute to the quality and effectiveness of ASARECA's engagement in AR4D. According to the 10-years Strategy and Results Framework 2019-2028 the main objective is "improved management and access to reliable and up-to-date knowledge and information for informed decision making and action" (targeted result of the theme 4: Knowledge and Information Management).

This target links with the targets of the other themes, which are "Enhanced support and advocacy for establishment of enabling policy environment,

functional markets and transformative institutions and institutional arrangements" (Theme 3: Enabling Policy Environment, Functional Markets and Transformative Institutions), "Enhanced support for development and scaling up of agricultural transformation technologies, innovations and management practices transformation technologies, innovations and management practices" (Theme 2: Agricultural Transformation Technologies and Innovations), and "Strengthened and integrated capacities and competencies to support agricultural transformation in the ECA sub region" (Theme 1: Transformative Capacity Strengthening and integration).

The specific objectives are to:

1. Establish and manage ASARECA Space as a repository and as a platform dynamically linking knowledge resources of members and AR4D Partner institutions
2. Establish and manage a Knowledge Clearing House to assure the quality of the knowledge exchange and the development and maintenance of regional data bases, system models and decision-support tools
3. Establish and manage functional platforms for communicating and exchanging knowledge and information.
4. Development of a knowledge graph and semantic applications to enhance the use of knowledge by means of controllable artificial intelligence solutions

## 1.4 Principles of ASARECA KI-Hub

The ASARECA KI-Hub is guided by the following key principles that have been designed to support and contextualize the strategic implementation of the hub activities in line with the organizations' broader planning and program management framework as outlined in OP2 document.

**Principle 1:** Thematic and programming interface: The KI-Hub will perform an important programmatic role in interfacing ASARECA's thematic areas, programs and partnerships. Implementation will be done in line with ASARECA basic principles of partnership, collaboration and promotion of regional perspective. ASARECA is not the sole custodian of all of the region's agricultural knowledge; rather, ASARECA will play a key facilitation/ convening role in ensuring equitable access and use.

**Principle 2:** Smooth management of KI-Hub implementation as change process. In order to ensure acceptance and smooth transition, ASARECA will build upon successful techniques already in use and encourage innovation. Support will be given to individuals and organizations to perform their role in actualizing the hub while capacity, awareness, lobbying and other forms of change management will be addressed to ensure the implementation is an

organized evolution through innovation.

**Principle 3:** Role of technology: The KI-Hub will rely on innovative deployment of technology in implementing its sharing, learning and influencing role. Tools, approaches, platforms and content will be based on cost-effective and appropriate technologies.

**Principle 4:** Empowering, enabling and connecting people, themes and organizations. The KI-Hub strategy recognizes the pivotal role that people (staff, researchers, farmers, youth, women, policy makers, academicians, and other agricultural value chain actors) – within ASARECA, in partner organizations, and NARI themselves – play in generating, disseminating, sharing and acting on knowledge in pursuit of ASARECA's objectives. Their information needs and capacity to participate in the hub is paramount.

**Principle 5:** Results-based orientation. The KI-Hub strategy is conceptualized as rigorous but practical and results-based phased process in which activities have been carefully chosen to yield priority results that are in line with ASARECA overall vision and mission. Implementation will be phased to promote continuous improvement and encourage learning from successes and failures.

# 02 The Baseline



## 2.1 Context, Challenges and Opportunities

It is evidenced that the agricultural sector in Eastern and Central African economies takes on nearly 81% of the total labor force, 47% of the total exports and 43% of the GDP and provide livelihoods to large proportion of the population most of whom are smallholder farmers [ASARECA/IFPRI, 2006; FAOSTAT, 2018].

This brings into context of a population of about 300 million people in the market ready for valuable knowledge across the ECA sub-region.

Likewise, the African Union (AU) has upheld the Agriculture sector as a core in the attainment of Africa's Agenda 2063 target for "A prosperous Africa based on inclusive growth and sustainable development" (Aspiration 1)<sup>[1]</sup>.

It is also highlighted by the World Bank's economists (December 2017) that the Agricultural sector still experienced a number of setbacks such as<sup>[2]</sup>: (1) "Use of modern technologies remains dismally low"; (2) "Land labor and capital markets remain largely incomplete"; (3) "Land is abundant and land markets are poorly developed"; (4) "Access to credit is limited"; (5). "Labor productivity in agriculture is low"; (6) "Women perform the bulk of Africa's agricultural tasks"; (7) Agroforestry is gaining traction; (8) "African agriculture is intensifying"; (9) "Seasonality continues to permeate rural livelihoods"; (10) "The majority of rural households are net food buyers"; (11) "Post-harvest losses are large (gaps in food handling, increase in shelf life, and value creation for higher productivity)"; (12) "Droughts dominate Africa' risk environment"; (13) "African Farmers are increasingly diversifying their incomes"; (14) "The young are leaving agriculture (low image and low income rewards especially for farmers)"; (15) "Household enterprises operate mainly in survival mode"; (16) "Agricultural Commercialization improves nutritional outcomes".

1 <https://www.worldbank.org/en/programs/africa-myths-and-facts>

2 <https://au.int/en/agricultural-development>

All these gaps point to the need to access appropriate information and knowledge for successful agricultural production and overall transformation. Knowledge on TIMPs, policies and standards is essential and available but not easily accessible to all people who need it. And this knowledge is scattered all over the ECA sub-region in different locations.

Therefore, as a regional facilitator, and convener for various partners and stakeholders, ASARECA requires a range of information and knowledge to address their needs. As a result, enhanced regional collective action is needed in agricultural research for development, extension and agricultural training and education to promote economic growth, fight poverty, eradicate hunger and enhance sustainable use of resources in Eastern and Central Africa.

To strengthen member participation and implementation of Knowledge Management and increase the use and benefits of the KI-Hub, the Secretariat shall take the lead to advocate for funding and resource mobilization e.g. for necessary technologies and infrastructures, as well as for capacity development.

ASARECA at 25 years has experienced and accumulated work that provide a basis for evolution to a KI-Hub for an inclusive AR4D in the region. These amounts of information, TIMPs, methodologies, regional learning events, nodes and processes infer for more structured, systematic, and tailored knowledge sharing approaches.

As a Sub Regional Organization, ASARECA has an overarching mandate, and public image to attract high level partners and stakeholders like African Union, EAC, COMESA, WB, IFAD, EU, and private sector. To continuously attract and work with such audiences, a good technological platform must be available.

A go-to platform for scientific outputs, for policy information, agricultural data, learning and innovation resources, extension resources, collaboration opportunities, and more. ASARECA also has a large network of expertise personnel with a diversified skills-set and background that can be transferred to other entities within the region. What better way to boost knowledge services and technical support but through the KI-Hub?

Lastly, the present generation and largest population, who are youths and highly literate, depend on technology, and they are capable of making use of it. The KI-Hub shall bring together the new generation of digital natives and those with long-standing experience and less digital skills.

## 2.2 Critical Gaps

The Assessment of the overall Knowledge Management and Communications that included a reflection of the Knowledge and Information Hub, revealed a number of gaps, which are condensed to the following critical overarching gaps:

### 2.2.1 Implementation gap

The KI-Hub Strategy planned with earmarked output targeted to be achieved during the past five years but to a large extent was not implemented. Depending on the availability of resources, it is good for a strategy to focus on few strategic but achievable outputs.

### 2.2.2 Technology gap

Current technological developments including semantic technologies, Artificial Intelligence, mobile communication, automatic translation, and others are not reflected in the previous strategy, since these technologies were new and at very infancy stages at that time.

### 2.2.3 Collaboration gap

Collaboration is very limited on the technical levels, the secretariat shoulders work, which in fact only through collaboration can be delivered. Here the active contribution and collaboration among the NARIs in fulfilment of the association goals and objectives are to be strengthened and clearly stipulated. MoUs and guidelines to perform certain tasks on behalf of the Secretariat need to be developed.

### 2.2.4 Sustainability gap

The agricultural sector as well as other sector, is driven by Project- based Financing, changing of policies or personnel or activities which may result in permanent loss of knowledge. Knowledge capture practices are established but insufficient in the work of ASARECA

(which includes the collaboration among the NARIs, not only at the Secretariat).

Knowledge loss is a common gap in most organisations, sometimes due to an abrupt halt of project financing, loss of a consultant or contract termination, and other system changes in policies or prioritization. This links with the weak structures for collaboration in key thematic areas, where solid and well facilitated Communities of Practice could act like a social knowledge base, which sustains knowledge beyond individual expertise.

### 2.2.5 Integration gap

KMC Approaches are not yet integrated. The Knowledge Management Functions are still in the process of defining their profile on a national level, and technologically the knowledge bases of the members are not integrated. It would be beneficial to align and integrate the KMC approaches – not only technologically. Although a high number of NARIs uses DSpace as a repository, the integration of content is yet to be implemented. The KI-Hub shall provide the infrastructure for sharing content on regional and continental level. Knowledge processes, including capturing and sharing, will benefit from alignment and integration.

### 2.2.6 KMC Capacity gap

ASARECA and most members do not have staff with dedicated Knowledge Management (KM) background.

Aspects of KM require systematic approaches, time and dedicated skills to achieve intended results. Staff knowledge and competence in KMC is lacking at some NARIs while others have a comparative advantage and could share their experiences more actively.

### **2.2.7 Accessibility and Usability gap**

Most publications and currently available knowledge products/publications benefit the scientific/research community. However, other key beneficiaries like farmers and extension officers may not easily access and use these materials due to technical, skills, and language barriers. This goes in line with a limited end user-orientation in the knowledge creation or generation.

## **2.3 Strategic response to the gaps**

Strategic Response to these gaps, the following key recommendations are provided to guide the implementation of the future Knowledge and Information Hub:

### **2.3.1 Participative strategy development.**

Programs, plans, and budgets that are developed jointly on a technical and political level reflect better the real needs and secure the contributions of the partners for a sustainable implementation. It creates ownership and a zeal to fully engage to achieve shared goals. Although consultants are able to contribute special technical and methodological knowledge and experiences, the development of strategies should be a

collaborative process and shall stay in the responsibility of the ASARECA staff and members.

### **2.3.2 Technology upgrade.**

Develop an integrative platform with major functions as a repository for knowledge resources and content management. Here, DSpace, Dkan and Drupal come into play. This platform shall enable interoperative functions, dynamically linking to the knowledge resources of all NARIs and AR4D Partners. Additionally, the development of a knowledge graph is a key to the future, supporting semantic AI-solutions. This will enhance the discovery and use of information and knowledge products by end-users. In the current environment of information explosion users face difficulties of getting information and knowledge products of their choice. Knowledge graphs and artificial intelligence solutions address this problem.

### **2.3.3 Collaboration shift**

As an association, ASARECA is mandated to facilitate collaboration, in which the NARIs can directly contribute to performing and achieving most of its key tasks. These communities require an excellent facilitation to achieve relevant output spanning from learning to innovation. Although Communities are not a new concept, often understood (and marginalized) as a no-brainer, and existing in many forms (networks, committees, working groups), the real effectiveness of collaboration is built on excellent community “facilitation”, like a successful project requires

project “management”. Great facilitators make the real difference between a loose network with limited impact and a high-performance community that can achieve far more than any of its individual partners.

### 2.3.4 Sustainability Focus

Link all projects with Communities forming a social body of knowledge for project related knowledge; implement knowledge capturing methods through the program or project life cycle and at all management levels.

## 2.4 Additional gaps in the previous KI-Hub strategy

The analysis of the KM themes in the precious documents shows that the list of knowledge products and services offered by the KI-Hub is incomplete and does not take into consideration present needs.

The knowledge products and services need structuring and alignment with the thematic areas. The following table gives an overview and recommendations for improvement:

**Table 1: Recommended KI-Hub Themes and K-products/services**

KI-Hub Strategy 2014	Ki-Hub Strategy 2020: Theme and K-products/k-services	Communication Assistant (Social Media)
Training resources, reports, technical and training manuals, geospatial data, research data, research papers, journal articles, policy briefs, books, pamphlets, brochures, position papers, newsletters, video documentaries.	Electronic Library	Publications; research papers; journal articles; reports; books, newsletters; posters; others.
	Technologies & n Innovations Space	The place where NARIs and AR4D Partners share there repositions.
	Agricultural Extension Resources	Apps including: agro-coach; plant-recommender; farm assessment tools; consulting services; pamphlets, brochures; videos; media content; impact stories; rallies/road shows.
	Policies and Strategies	Policy briefs; position papers; policies; legal documents.
	Agricultural Data and Statistics	Research data; geospatial data.
	Communities of Practice and Think-Tanks	Communities of practice on various platforms including Dgroups, Yammer, or other
	Learning and Development Centres	Training resources; technical and training manuals; webinars; knowledge talks; guidelines, SOPs, standards
	Contact Directory	Contacts



The structure of the KI-Hub shall distinguish the user needs. The provided structure is a starting point, but it shall remain flexible to serve the changing needs of users.

## 2.5 Additional Learning from like-minded institutions

The situation analysis of the KMC Strategy and of the KI-Hub included a comparison with KM Strategies and Knowledge Hubs of like-minded partners, which included IFAD, NARIs, with more detailed reference to KALRO, ILRI, FARA, CORAF, CCARDESA, CTA, and CABI. Learnings from these benchmarks have been described there in more detail.

For this strategy document, it is highlighted that:

1. Integrated approaches that address both presentation of knowledge products, and the processes of knowledge creation, sharing, applying, capturing are paramount. Therefore, the KMC Strategy should be an integral part of the KI-Hub Strategy.
2. Usability for the end-users, like farmers, is a key element which should be addressed with specific approaches of user-inclusion in the knowledge creation process. Communities of Practice, which include end-users are a great instrument to promote inclusion and end-user orientation.

3. Integration of Knowledge Products (downloadable objects, like publications or TIMPs) and knowledge services (knowledge with human interaction, like webinars, coaching) is essential, because significant amounts of users will not be able to apply knowledge or new technologies just by using a knowledge product/publication.
4. Linking or integrating content is essential, specifically partner institutions content (CG Space as a key reference), the governance and quality standards of such a space are essential and highlighted in this strategy (KI-Clearing House and Quality Standards).
5. The management of a Knowledge Hub and KM in principle require time and competence. Here, organisations should have dedicated and highly qualified staff to achieve their desired impact. This is so relevant for the use of technology, but also facilitation of Communities of Practice.

## 2.6 A Portfolio of existing structures and Hubs

The need for agility and interoperability presents as a major feature to inform systems and performance of knowledge management hubs. Whereas some NARIs have in-built and functional k-hubs, others stagger when it comes to human resource capacity to plan, build and improve knowledge hubs. These may need

to start at an initial levels of learning and using k-hubs. Therefore, priority should be given to building the national knowledge and information management capacities to perform with cutting-edge technologies, to facilitate local collaboration and partnerships, to innovation and contextualize knowledge to suit regional or national knowledge needs. For agriculture to become inclusive, innovative mechanisms of Knowledge Management must be built to address the context-specific needs of the local and national agricultural knowledge eco-systems.

ASARECA has also taken the lessons and experiences from its own implementation of knowledge management and that of partners and organizations like: CABI, IFAD, and like-minded institutions like CCARDESA, ILRI, CGIAR, ILRI, AFAAS, RUFORUM, NARIs and public bodies, like Ministries of Agriculture, Livestock and Fisheries (Min.ALF), National Agricultural Research Institute, National Agricultural Research Institutes (NARIs) and more. Consultations, both internally and externally, have been done during the development of this strategy. Other lessons have

been drawn from previous experiences and from other organizations.

Furthermore, the ECA region has a number of K-Hubs in existence but operating at different scales and mandates. Biosciences eastern and central Africa hosted at ILRI (BecAILRI) is perhaps the only one that operates directly on AR4D but with a special focus on biosciences. The BecA-ILRI Hub was established as part of the African Union (AU)/ New Partnership for Africa's Development (NEPAD) African Biosciences Initiative (ABI).

The Hub was developed in the framework of NEPAD's Centres of Excellence for Science and Technology and the Comprehensive African Agricultural Development Programme (CAADP), and in alignment with regional priorities set ASARECA. At country level, Kenya Agricultural and Livestock Research Organisation (KALRO) KI-Hub is probably the best in terms of having a wide variety and quantity of knowledge products as compared to other NAROs within the ECA region.

# 03

## A strategy and framework for ASARECA KI-Hub



The implementation of the ASARECA KI-Hub will be guided by fundamental values that govern current knowledge management programs ensuring the delivery of research outputs and impact: subsidiarity to distribute authority, responsibility and accountability between management levels, units, programs and partners; inbuilt institutional learning based on ASARECA monitoring, evaluation and learning framework; transparency is based on open communication and communication; and nurturing and maintaining broad partnerships to leverage, resources, capacities and knowledge bases. Whereas in previous approaches a focus was given to knowledge resources that have been produced by ASARECA or in cooperation with ASARECA. This current strategy focuses more on the integration and dissemination of knowledge resources of the members, who have by far more comprehensive resources and staff. The collaboration in Communities of Practice shall create the social backbone for the enhancement of trust, mutual understanding, alignment and cooperation of a growing number of communities.

The work in Communities shall be technically supported by widely known and easy to use technologies like DGroups. However, other platforms and technologies can

be used, when fulfilling the requirements for the specific community-purposes and when well facilitated.

In principle, all knowledge resources of the members and stakeholders shall be integrated on the ASARECA Space, DSpace and Dkan installation with adequate functionalities to host and link bigger amounts of data specifically from interoperable systems of members. It will be for the first time that the members can access at one spot all knowledge resources of all members once they are linked with the ASARECA Space. This will be a milestone for the positioning of ASARECA as a Knowledge Hub, and the amounts of available knowledge resources will increase dramatically.

However, the more data available, the more difficult to find what you need. Therefore, a third component is proposed to create more value from the knowledge resources and the community efforts. A semantic layer shall be developed to link the data, making searching easier and laying the foundation for various Artificial Intelligence Solutions, spanning from semantic search, recommender system, to chatbots or symptom checkers.

The proposed KI-Hub strategy has three components which together are expected to make a fundamental change for ASARECA's identity, performance and impact. The first two components in the current KI-Hub strategy were derived from the four outputs of the previous (2014) KI-Hub strategy.

This was necessary in order to take care of the overlaps of outputs in the previous KI-Hub strategy. The first component in the proposed KI-Hub strategy is derived from outputs 1 (Learning and innovation center for agricultural research (AR4D) established and operationalized); and output 4 (Technology and Information Clearing House established and operationalized). Output 2 AR4D –Think Tank established and operational) and 3 (Platforms for information exchange established and institutionalized) of the previous KI-Hub strategy have been combined to form component two in the proposed strategy.

The three components together with their associated sub-components and activities are described in the following sections.

## **Component 1: ASARECA Technologies Innovations and Management Practices Established and integrated with NARIS**

### **Rationale**

The existing knowledge hubs are largely identical and work at higher levels with translation of knowledge to the farmer (last mile). There have also been very minimal

impact assessments done to track the transformation caused by the existing knowledge hubs. Therefore, there is need to create synergies between different levels and hubs to capture and upscale successful initiatives. ASARECA KI-Hub will serve as repository for AR4D technology and information from the ECA sub-region. It will be a central place for coordination, collection, maintenance and access to AR4D data and information, including an inventory of TIMPs, produced from the work of other AR4D organizations within the ECA and beyond.

These AR4D organizations include NARIs, Universities and other research and education organizations, public bodies, civil society, business community, and development partners. Through negotiations, ASARECA will seek to partner with AR4D organizations for sub-regional sharing and access to their information.

### **Implementation Strategy**

ASARECA will enter into formal agreements (MoUs, contract agreements) with the AR4D organizations to coordinate the sub-regional information resources. Through the ASARECA Space, ASARECA will collect, collate and avail relevant data and information for AR4D in the ECA. It will ensure that data and information pass through established quality assurance systems and abide by the IPR policy.

As well as the inventory of ECA TIMPs, GIS maps will be availed, through the ASARECA Space, to map ongoing project locations in the ECA region to ensure complementarities and eliminate duplication.

The ASARECA Space will also link with existing online knowledge bases (NARIS, CGIAR, SROs, and development partners).

### **Sub-component 1: Design and implementation of DSpace platform**

DSpace is an open-source software and is widely adopted by many organizations in managing their knowledge products. This software uses the Dublin Core™ Metadata standard (ISO 15836) thus making the ASARCA KI-Hub adherence to the interoperability parameter and hence able to harvest content from other similar sources and vice versa. The DSpace software will be downloaded and customized to meet the required needs of all stakeholders. Dkan installation will also be integrated with DSpace to offset some of the deficiencies such as reports generation and data for the later software.

#### **Action 1.1: Engage stakeholders to agree on functionalities of the appropriate system**

Involvement of stakeholders in developing any system is a good practice which should be taken aboard by any IT expert. The development of ASARECA Space will also follow a similar route. In the initial steps of system development, ASARECA stakeholders will be invited to provide their comments before moving to another step.

#### **Action 1.2: Determine the specifications of hardware and systems requirement**

For any system to work well, there are minimal requirements that should be met. As a best practice,

hardware and systems requirements will be provided beyond the minimum level so as to allow future expansion.

#### **Action 1.3: Acquire hardware and software**

It is important to acquire hardware and software from reliable sources to ensure good functionality and durability. ASARECA will be guided to acquire the recommended hardware and software from reliable sources.

#### **Action 1.4: Installation and configuration of DSpace platform**

Upon acquisition of the required hardware, DSpace will be installed and configured in conformity to the ASARECA and stakeholders' requirements. The system will be integrated with Dkan and tested to assess its performance before full implementation.

### **Sub-component 2: A KI-Clearing House established as a network of partners for adherence and Quality control of ASARECA Space**

ASARECA stakeholders shall be engaged and consulted for participation in continuous quality control and quality assurance aspects tied to the ASARECA Space. A concerted number shall be selected and entered into a formal agreement for their professional collaboration. Together, they form the Knowledge and information (KI)-Clearing House, which is a relevant body enabling ASARECA to implement the KI-Hub and ensuring the quality of content. Representatives of all partners shall

be committed to common standards and a committee of representatives of all members shall guide and oversee, monitor and control the adherence to the standards (see sub-component 4).

### **Action 2.1: Partners engaged to take part in the network**

Partners who show interest in the ASARECA Space initiative will be formally invited. Formal invitation letters will be sent to all stakeholders by the ASARECA secretariat. The process for mutual agreement will then be initiated.

### **Action 2.2: MoU and other formal agreements made to institutionalize partnerships**

A Memorandum of Understanding shall be drafted and shared to all interested parties that is within the association and beyond. A consultative process shall be done to ensure that the MoU address all important aspects agreed by all parties to ensure smooth running and sustainability of the ASARECA Space. Among other characteristics in the MoU will be the responsibilities of all parties involved in implementing the ASARECA Space. Furthermore, MoUs will stipulate the data sharing approaches to be adhered by all members. Only stakeholders who sign the MoU will participate in the ASARECA Space collaboration and become members of the KI—Clearing House.

### **Action 2.3: Clear Policy developed to govern use of information and knowledge in the network**

Policies or operational guidelines are very crucial for a successful implementation of a digital repository like ASARECA Space. This is even more important

due to the fact that ASARECA Space will be governed by many stakeholders. A policy to facilitate the management, accessibility to and dissemination of knowledge and information products generated by ASARECA stakeholders will be put in places through a consultative process. Among other issues, policies and operational guidelines should stipulate IT solutions used by ASARECA members comply with established standards that will enhance interoperability aspects.

The KI-Clearing house policies will then be the basis for the standards and procedures to ensure quality of information and knowledge (see sub-component 4).

## **Sub-component 3: Populating ASARECA Space with knowledge products**

The major challenges faced by many organisations developing K-Hubs is that of populating such facilities with the required knowledge products. Most of the KI-Hubs normally do not grow to the expected pace. Various strategies/actions will be done to ensure sustainable growth of the ASARECA Space.

### **Action 3.1: Uploading of born digital knowledge products into ASARECA Space**

First priority will be accorded to uploading knowledge products which are available in digital format. The knowledge products currently hosted on ASARECA website and other partner organisations should be uploaded first before considering others. Also, ASARECA Space will be populated by harvesting content from members and partner institutions KI-Hubs.

### **Action 3.2: Identifying and collecting physical knowledge products in AR4D in ECA**

Among other reasons for a slow growth of KI-Hubs in the region, is the existence of none digitalized knowledge products. This is worsened by the cost implications tied to converting knowledge resources to digital form. Therefore, ASARECA will have to take an initiative of identifying knowledge products including TIMPS and other scholarly works for a digital conversion subsequent upload in the ASARECA space.

### **Action 3.3: Digitization of physical knowledge products for upload into ASARECA Space**

There is a high possibility that most of the NARIS within ASARECA network have most of their knowledge products in the physical form. Therefore, a significant budget will have to be set aside for converting all knowledge products available at ASARECA Secretariat as well as those in the NARIS wishing to participate in the project.

## **Sub-component 4: Use of standards and procedures to ensure quality of information and knowledge in ECA facilitated**

Among other aspects, it is important for the ASARECA space to ensure that all knowledge products available in this facility meet the desired quality. This is important for ASARECA Space users to build trust on this facility.

### **Action 4.1: Quality assurance systems and procedures in place**

The KI-Clearing House should set standards of quality

control for all content submitted in the ASARECA space. To ensure adherence to the set standards, there should be an established committee comprised of members from each participating institution. This committee will be responsible for overseeing all quality matters of knowledge products submitted in the ASARECA space.

### **Action 4.2: Standards for knowledge and information content agreed upon and used**

It is important to institute operating procedures regarding access, use as well as standards for content in the ASARECA Space. This will ensure uniformity of content (especially metadata) submitted from all member institutions.

### **Action 4.3: Operating procedure for information and knowledge access and use are put in place**

Operating procedures taking into account of all categories of users is important for easy use of the ASARECA space. Therefore, without such operating procedures, users will find it difficult to use the facility in question. It is thus important that operating procedures are developed before the launch of ASARECA space use by stakeholders.

## **Sub-component 5: Information and knowledge across platforms accessible**

Among the core purpose of developing the ASARECA space is to ensure wide usage of knowledge products generated within the ASARECA region and beyond. To ensure this happens several core actions will be done as elaborated under the following sections.



### **Action 5.1: Strategies for promoting ASARECA Space developed and put into use**

Various strategies will have to be put in place to promote ASARECA Space so that all users and potential user are made aware of the facility in question. All possible approaches of promoting the ASARECA Space including traditional and modern media should be instituted.

### **Action 5.2: Training and guide materials developed to increase the use of ASARECA Space**

Training and guidance materials will be developed to ease usage of the ASARECA space by various users. This will be done at the onset of the ASARECA Space and be available both physically and in digitally (online).

### **Action 5.3: User trainings are organized to empower users on how to upload and use content for use of the ASARECA Space**

Various training packages will be conducted so that all categories of ASARECA Space users are taken aboard and able to utilize this facility efficiently and effectively. Such trainings can also be done by bringing a group of users together using face to face or online modes. The first group of trainees may also be used to train others in future.

## **Component 2: Think Tank and Communities of Practice (CoPs or platforms) for knowledge generation, sharing and collaboration established and institutionalized**

### **Rationale**

Like in other sectors, the agricultural research community faces a myriad of challenges requiring coordinated efforts to solve them. Collaboration among researchers and other agricultural stakeholders provides an opportunity for joint problem solving. Some of the benefits of collaboration include: sharing of abilities with some degree of specialization; facilitation of creating uniform messages and materials; sharing of ideas and different perspectives about how to address complex issues; and coordinating of services and initiatives and complementarity of actions towards a common goal in order to avoid duplication of efforts.

In the traditional set up, the main approach for collaboration among ASARECA stakeholders has been face to face meetings and other communication means like email. The emerging IT development provides means for enhancing of collaboration among different stakeholders.

### **Implementation Strategy**

ASARECA will adopt various approaches to ensure improvement of collaboration among its stakeholders. These will be both electronic and face-to-face. Electronic mechanisms will comprise D-groups and social media (Facebook, twitter, you-tube) targeting the youth and face-to-face mechanisms (conferences, meetings, workshops, seminars, agricultural trade shows, and mass media) will ensure equal participation of all stakeholders. Capacity development will involve training, setup and maintenance of the infrastructure that supports the platforms for information exchange.

## Sub-component 1: Situation analysis of the available collaboration tools

There are a variety of collaboration tools available freely or on purchase. A situation analysis exercise will be conducted to determine the availability of such tools and how they can be put into use by ASARECA stakeholders. This process is important to lay appropriate strategies to promote usage of the available facilities as well as acquire those deemed important to enhance collaboration but they are not available in the cycles.

### Action 1.1: Assessment to characterize target audience and assess their knowledge and use of various collaboration tools

A baseline study will be conducted to establish the extent of awareness and use of various collaboration platforms by ASARECA stakeholders. This kind of knowledge is required to design proper promotion and training packages for all stakeholders. User preferences of various collaboration tools will also be done to establish where to invest more targeted effort to ensure maximum exploitation of the available facilities.

### Action 1.2: Develop Collaboration trainings to all user categories.

A general training package to sensitize users on the importance of collaboration methods and tools will be done. This is important to take aboard non-users of the collaboration tools.

## Sub-component 2: Collaboration tools identified and created for use by stakeholders

A list of potential and commonly used collaboration tools shall be developed and shared with the stakeholders. Members shall have a choice to select either free or purchasable tools for their acquisition.

### Action 2.1: Promote collaboration tools

There are instances where users do not use readily available collaboration tools due to inadequate awareness. Various strategies shall be developed for promotion of selected collaboration tools to targeted groups. This is expected to raise the extent to which these tools are put into use.

### Action 2: Build capacity on use of various collaboration tools

Training packages will be prepared for empowering ASARECA stakeholders to effectively utilize recommended collaboration tools. Both online and offline trainings will be done.

## Subcomponent 2: Creation of D-Groups

D-Groups is one recommended platform to facilitate Communities of Practice of ASARECA, but it should not limit itself to only D-Group. Other readily available tools can be considered in any specific context. D-Group platform can be very beneficial to facilitate communication among specific groups of people scattered in various places, and other Sub-Regional Organisations. However, it is not yet available at the ASARECA secretariat. It is recommended for ASARECA and other collaborators to adopt this facility.

### Action 2.1: Develop the D-group platform

The D-group platform will be created and made available

on the ASARECA website as one of the collaboration tools. Its functionality is to significantly improve ASARECA stakeholders' interactions and networking.

### **Action 2.2: Popularize/promote the D-group to stakeholders**

Various approaches will be instituted to ensure the D-Group functionality at ASARECA secretariat is widely known by all stakeholders. ASARECA can use face to face meetings, other social media tools and many other ways to market and promote adoption of this facility.

### **Action 2.3: Conduct user training for effective use of the D-groups**

Training of users on effective exploitation of the D-group functionality will be done along with other training packages. Both online and face to face training approaches will be adopted depending on the existing situation at a particular time.

## **Sub-component 3: Restructure the ASARECA Website to host various collaboration tools**

Institutional websites provide a one stop centre to portray the organizational image and products. The available ASARECA website will be revamped to make it more attractive as well as capture all the necessary information for stakeholders.

### **Action 3.1: Identification of links to be anchored on the website**

The ASARECA website will be populated with all

useful links deemed necessary. To start with, the identification of all useful links for the ASARECA Secretariat to decide which ones are preferred.

### **Action 2.2: ASARECA Website enriched with all the identified important links**

The revamped ASARECA website will have links to existing communities of Practice or networks (NARIS and partner) websites. The ASARECA Space will be among the highly visible links on the front page to boost its visibility.

## **Component 3: Knowledge Graph developed; Artificial Intelligence Solutions implemented**

### **Rationale**

The amount of data, information and knowledge available globally is continuously increasing. Finding and searching what is really relevant is becoming more difficult. Therefore, more advanced technologies are needed to structure data and link them intelligently with each other. Metadata and taxonomies already help to structure data; however, their expressiveness is limited to hierarchy and simple relations. Ontologies provide additional linkages beyond hierarchy and model the knowledge of a domain. Knowledge Graphs are Ontologies that include real content, example instead of "Organisation" is located in "country" it could be "ASARECA" is located in "Uganda".

The development of a knowledge graph is a task, which

can start with the integration of existing taxonomies, like AGROVOC. This provides a strong fundament for further development. Additionally, specific terms that are used by ASARECA can be added according to specific use-cases to cover the key questions and needs of the users. On the basis of this initial knowledge graph, semantic search functions can already be offered. Based on additional steps, like corpus analysis or the evaluation of search requests, the knowledge graph can be enriched and further developed on a regular basis to continuously improve the expressiveness of the knowledge graph and the functionality of semantic applications, like semantic search and recommender systems.

### **Implementation Strategy.**

It is recommended to start the development of a knowledge graph with a prototype, then start with initial semantic search functionalities and complement it with additional functionalities, like expert recommender systems, which will require more comprehensive data on experts than currently existing.

## **Sub-Component 1: Form an “AI Community of Practice”**

There are several IT-tools on the market, which can provide integrated functionalities for the development of k-graphs and creation of value through applications. PoolParty is one highly recommended proprietary solution and with a cost implication. However, there are alternative tool with lesser functionalities and impact. The development of a prototype based on PoolParty

includes the following steps.

### **Action 1.1: Develop the Rationale**

Create a convincing and inviting rationale to attract participants, clarify expectations and required resources, and secure management support. The rationale should be approved and supported by the management of ASARECA and promoted by other DGs (eg on Knowledge Talks).

### **Action 1.2: Mobilize for participation**

Actively and widely invite participants to join this community through newsletter, website, social media, communities and direct contacts, who deem experienced and interested in Artificial Intelligence. A core group of participants should be identified and committed to take responsibility for the implementation of the knowledge graph and AI-solutions. Benefits for their participation should be outlined, including learning opportunities, connecting with high-level experts, rewards (see award program), mutual learning and support.

### **Action 1.3: Implement and facilitate the Community.**

Follow the CoP-process for implementation. This shall include providing the technical installations, inviting recognized experts and members, develop a charter, agree on rules and principles, outputs and communication. Facilitate with a spectrum of participative methods and care for production of quality outputs. Regularly review the progress and get management approval for continuation on an annual basis.

## Sub-Component 2: Developing a prototype with an initial Knowledge Graph

There are several IT-tools on the market, which can provide integrated functionalities for the development of graphs and creation of value from them through applications. Pool Party is one highly recommended. Although, this is a proprietary solution and significant cost are expected to fully use it, we demonstrate a possible way by using this tool. In the case that it seems unaffordable, alternative ways shall be described, probably with less functionalities and impact. The development of a prototype based on PoolParty includes the following steps.

### Action 2.1: Lay the foundation

Workshop to define the scope and prioritized use-

cases, technical and functional description of features.

### Action 2.2: Test environment

Installation of a test environment to install the system at ASARECA's site or on a cloud server, analyzing data and review available data and data processing.

### Action 2.3: Data analysis and processing.

Develop the functional prototype as defined in the requirements and provide recommendations for full deployment and further development. This includes the integration of existing taxonomies (like Acrovoc and others) and creating the initial knowledge graph on the basis of an initial corpus analysis, which provides key concepts (terms) to be integrated in the knowledge graph.

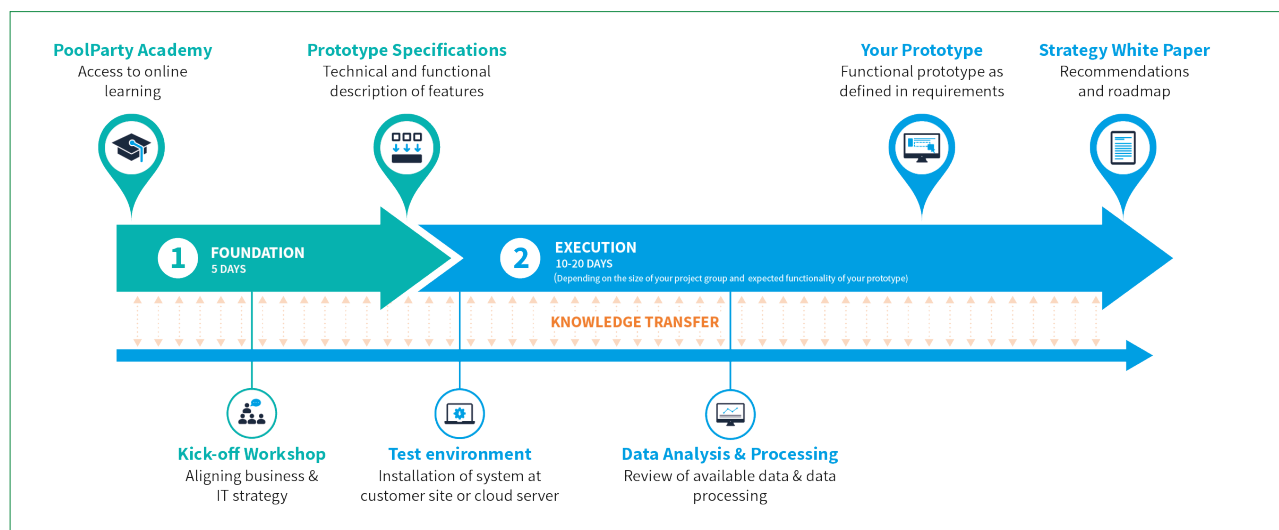


Figure 1: Process as proposed by Semantic Web Company (Pool Party).

### **Sub-Component 3: Develop semantic search.**

Semantic should be among the initial use-cases and based on a prototype, the search function requires improvement and expansion to wider use-cases. By continuously working on the extension of the knowledge graph, the functionality and benefit of it will increase.

#### **Action 3.1: Analyse, improve, and expand.**

The analysis of search requests and user behavior provides inputs for further development of the knowledge graph. Based on the continuous analysis of user-behavior and technology advancements, ASARECA may find additional use-cases and expand the knowledge graph for new functionalities.

#### **Action 3.2: Maintain the knowledge graph on a regular basis.**

The knowledge graph needs to continuously adopt to present and changing technologies, terms and concepts. Therefore, subject-matter experts need to regularly revise the graph supported by term-recommendations of the system.

### **Sub-Component 4: Develop Expert Recommender System and additional AI functionalities**

Although semantic search – like that of google – is one

obvious and relevant function; Expert Recommender System is also among the most recommended with impactful functionality to its members. Since cooperation, collaboration and integration are among the key priorities in the KMC Strategy, it should be of high value to better link members, experts, and stakeholders.

#### **Action 4.1: Capture data of individual experts.**

A data capture strategy should give recommendations on how to populate the expert repository of ASARECA. Additionally, linkages to eCapacities hosted by FARA can provide inputs for an expert database.

#### **Action 4.2: Build the expert recommender system.**

Based on capabilities frameworks, like that available in the eCapacities of FARADDataInformS, and additional meta-information of experts (like organizational affiliation, geographical location, education, membership in communities, roles, and more) the key elements of a recommender system can be developed.

Further, AI-Solutions, like Chatbots, training recommenders, symptom checker (for agricultural pests, etc.) shall be explored and developed one after the other. However, it is recommended to start small and grow the knowledge graph and the applications step-by-step.

# 04

## The KI-Hub Architecture



### 4.1 Overview

The following graph shows the proposed IT-Architecture of the KI-Hub:

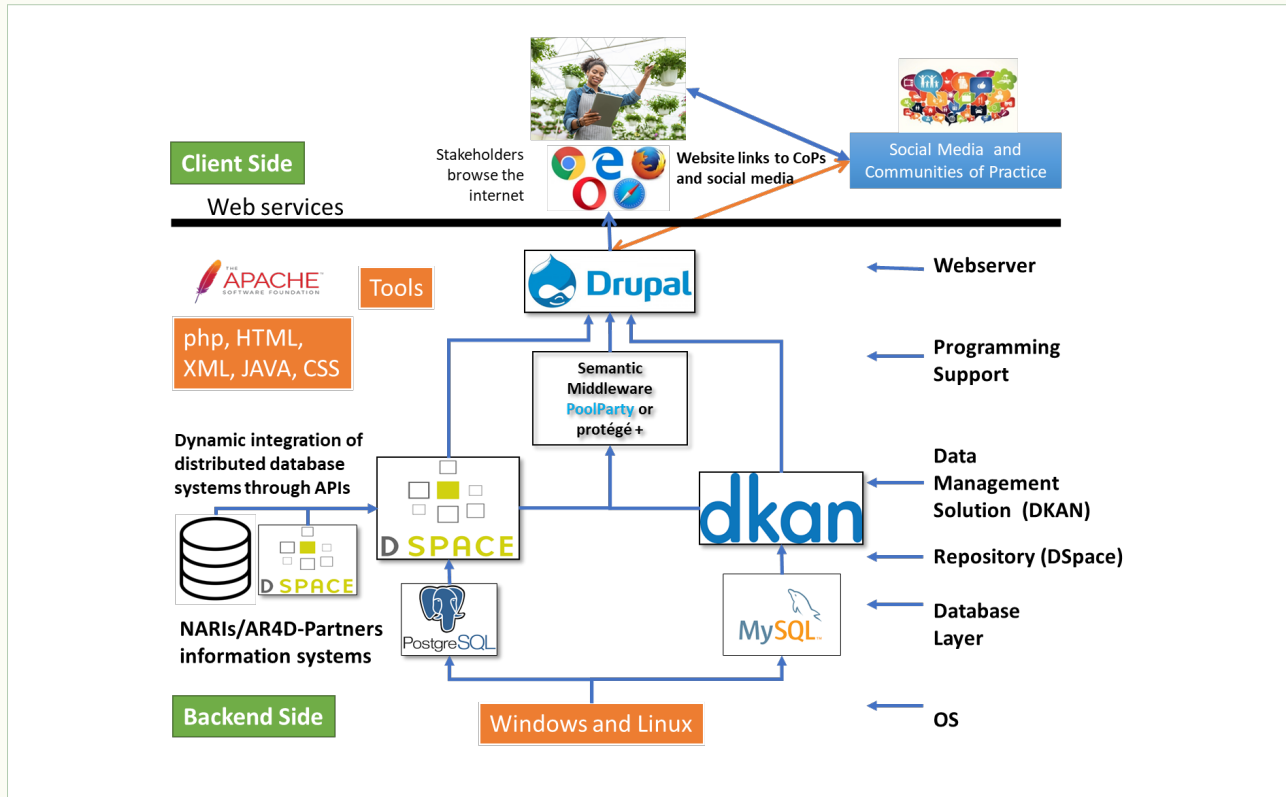


Figure 2: Proposed IT-Architecture of the KI-Hub



The **interface layer** is accessed by the clients through any browser. They access the hub via a customized Drupal web interface that integrates resources from DSpace and DKAN.

The **middle layer** links and organizes the knowledge resources. **DSpace** is a very robust platform that allows to capture items in any format – in text, video, audio, and data. DKAN is one of the most popular open data platforms. **DKAN** supports to simplify and streamline data migration, to manage diverse data sets, produce visualization graphs, charts, and reports. Drupal, DSpace and DKAN are core elements of the KI-Hub.

**Pool Party** is an optional semantic middleware enabling semantic search, recommender systems, and intelligent services to end-users.

The **backend layer** includes databases in various formats, which are linked with DSpace or DKAN. **DSpace** captures, stores, manages items with any formats hence a database that provides the necessary capacities that PostresgQL. **DKAN** manages complex databases using formal design and modeling techniques like Mysql.

### Drupal

Drupal is the current Content Management System and one of the most common open-source solutions for Content Management and Website Development. Drupal is well known and used also by the other

Regional Organisations as well as by FARA. There is expertise inhouse and no need to change it.

Budget: As an open-source software, there are no additional cost beyond customization.

### DSpace

Through DSpace, content of all NARIs and AR4D partners can be integrated, searchable, and accessible on one spot. Content of distributed database systems is dynamically integrated through APIs. When a decentralized database is updated, it automatically updates the ASARECA Space. Through APIs also other systems other than Dspace can be integrated and made accessible. There is no necessity to upload the content to ASARECA Space, but it is an option.

**Why DSpace-** it is by far the most common repository for scientific resource in African research: 70% of the NARIs and AR4D partners use it.

DSpace is open source and well known in the scientific community.

It is more robust than other tools (like invenio, eprince, etc.), easier to install and can be integrated with other DSpace-Installations easier with less mistakes.

All existing DSpace installations of the NARIs can have their own „collections “on ASARECA’s DSpace.

Budget: DSpace is an open-source tool, cost incur for hosting services and customization.

### DKAN

DKAN is one of the most popular Open Data Platforms. DKAN supports to simplify and streamline data migration, manage diverse data sets, produce visualizationgraphs, charts and reports.

DKAN integrates open data catalogue features into the existing CMS - Drupal. Datasets are treated as content that can unlock rich workflows. Drupal provides a user interface for many site management activities. Teams managing content only need to be trained on one system instead of two.

It is robust and easy to install and can be integrated with DSpace Installations.

Other regional and continental partners are using Drupal, DKAN and DSpace as a combination successfully.

Budget: As an open-source software, there are no additional cost beyond customization (considering that adequate web space for hosting is available).

### Semantic Middleware: PoolParty of open-source solutions

Semantic middleware is an optional but highly recommended feature that creates significant value added to the solid foundation of DSpace, DKAN, and Drupal.

PoolParty is the high-end software solution for advanced knowledge organisation, semantic search, smart recommender systems, virtual assistants and other intelligent solutions. PoolParty is the one of the best rated tool for knowledge graph development and most complete and secure Semantic Middleware on the Global Market.

Alternatively, there are Open-Source Software solutions that cover specialized elements of what PoolParty or other commercial tools offers. However, there is no one comparable complete, integrated solution. Cost for development, integration, customization may create comparable cost and include certain sustainability risks.

The knowledge graph can be jointly developed and used with other continental partners to increase the benefit, use, and share cost.

Budget PoolParty: As a high-end commercial software it includes licenses, consulting and implementation cost of min. 560,000+ USD for 5 years, depending on the solutions to be developed. Licenses and development cost could potentially be shared with continental partners when jointly used – for the benefit and quality for all partners.

## 4.2 The themes within the Knowledge and Information Hub

The knowledge products and services highlighted in the KI-Hub Strategy should be organised within a

limited number of **themes**, providing a structure for user-groups and use-cases.

- Electronic Library
- ASARECA TIMPS Space
- Agricultural Extension Resources
- Agricultural Data and Statistics
- Learning and Innovation Centre
- Communities of Practice and Think Tank
- Policies and Strategies
- Contacts Directory

1. **Electronic Library** addresses mainly scientific outputs, which are still at the heart of the research institutions.
2. **ASARECA TIMPS Space** is the major display space for ASARECA Technologies, Innovations and Management as well as the main access point to TIMPS from the NARIS and all Ki-Hub partners. It shall provide practical support to capacity development, but also help to enhance processes and increase performance.
3. **Agricultural Extension Resources** should address the pressing need to exchange resources for enhanced extension services and bridging the last mile.

4. **Policies & Strategies** shall help specifically ministries and policy makers to develop an enabling policy framework.
5. **Agricultural Data & Statistics** shall compile various data sets for various use-cases based on an open data approach – various stakeholders can create value from open data.
6. **Communities of Practice and Think Tank** are an essential theme to strengthen collaboration and co-creativity.
7. **Contacts Directory** provides quick information on persons critical to AR4D in the ECA sub-region and brief

### 4.3 Wireframe and Prototype

Both wireframe and prototype of the KI-Hub are developed in a separate document.

Detailed information on PoolParty, information on benefits, strategic relevance and implementation steps, as well as pros and cons of open-source software is also provided in a separate document.

# PART 02

## ASARECA Knowledge and Information Hub (KI-Hub) Implementation Plan



# 01

## Implementation Plan



A number of results are expected from the implementation of the ASARECA KI-Hub. All the results contribute to equitable access to agricultural information and knowledge within and outside ASARECA in ways that are cost-effective and shall advance the course of agricultural transformation in the ECA region. The logical frameworks provide complete details of the expected results. Such results recognize the fact that information and knowledge management through such a hub is but a “means to an end and not an end in itself”. Along the way, there are critical assumptions, uncertainties and pre-requisites that should be understood or addressed for the results to be achieved. A broad and direct result of implementation of the hub will be broadened use of better systems, platforms, instruments and tools (knowledge) to spur learning and sharing of existing and future agricultural information, technologies and innovations.

Over the five-year period of ASARECA second operation plan implementation (2021 to 2025) some clear but incremental gains will also be registered as contribution towards agricultural transformation. This will depend on evidence on continued relevance, efficiency, effectiveness and sustainability of the hub as

a vehicle for AR4D evidence base and use in achieving competitiveness, productivity and market-orientation. The results framework and work plan is provided for each component, sub-component and activity with objectively verifiable indicators.

### 1.1 Roles and responsibilities

#### 1.1.1 Who will do what?

Below a logical framework is provided for the KI-Hub Strategy. The goal and purpose of the framework are as described in the strategy, indicators are also provided and are a reflection of the ASARECA's four thematic areas and results.

The 3 components of the KI-Hub Strategy are the results of this overall logical framework. The implementation plan provides details of how these three components and sub-components will be put into practice. For each component the following information is given:

- A logical framework, comprising the purpose, results and activities, together with indicators at purpose and results level. The purpose of an individual sub-theme is thus equivalent to a result of the overall strategy.
- A description of each activity.

- A work plan with a schedule for each activity.
- An initial resource list indicating the main budget items for implementing.

All offices, units, programs, and projects within the ASARECA community will be involved in implementation of the KI- Hub Strategy. Roles and responsibilities of various parties in implementing the KI-Hub strategy are detailed in Table 2. However, three Units of the secretariat namely: Knowledge and Information Management unit (KIM); Information, Communication and Public Relations Unit (CPR); and Information Technology (IT) will play leading roles in implementing the KI-Strategy.

### **1.1.2 ASARECA Board of Directors**

This is an apex body of ASARECA, it will be an overall overseer of all components of the KI-Strategy implementation through the ASARECA Executive Director General and Deputy Director. The board shall approve all policies, guidelines, MoUs and other documents before they are put into use. This body shall also approve funds earmarked for the development, implementation and maintenance of the ASARECA KI-Hub.

### **1.1.3 The Knowledge and Information Management theme**

Based on the current ASARECA Staffing structure, the theme will take the lead in implementing all components of the ASARECA Space, supported by the Deputy Director's office, which also oversees the thematic area on knowledge management and all regards to its cross-

thematic responsibilities. The thematic team shall also oversee day to day management of the ASARECA Space. All new content uploaded in ASARECA Space will be approved for public view by the ASARECA Space in-charge who will be appointment from among officers of this Unit. The leader of the theme is the Deputy Executive Director, equivalent to a Chief Knowledge and Information Manager.

### **1.1.4 The Information, Communication and Public Relations function**

The ICPR function is principally responsible for effective corporate communication, public relations and management of the information systems. The function is headed by the Technical Communications Officer, who has steered the development of the Knowledge Management Strategy and the Ki-Hub. Due to limited resources to recruit and retain a specialized Knowledge Management Specialist, the unit will continue to coordinate the roll out of all activities (specifically on components 1 and 2) of the KI-Hub strategy that will also involve ASARECA member institutions and partners. When additional resources, the Secretariat could consider recruiting an operational Knowledge Management Assistant and Communication Assistant to support the Technical Communication Officer and free up the portfolio to focus on providing both strategic direction to both the Ki-Hub and the Communication functions.

### 1.1.5 Information and Communication Technology

The ICT function, which is currently under the Knowledge Management theme, will be responsible for day-to-day technical maintenance the KI-hub in close collaborating with the **Information, Communication and Public Relations function**. Due to financial constraints, the ICT function is currently supported by a consultant IT staff, who mainly focuses on systems administration.

With more resources coming in, the Secretariat should hire and ICT officer to play a leading role scanning the AR4D arena with a view to develop and implement start of the art AR4D ICT Solutions and innovations for the KI-Hub and Ki-Hub partners at the NARIS. The portfolio will also be responsible for capacity building at the Secretariat and among the partners to the KI-hub platform. More roles of the ICT Officer are stipulated under the section on Ki-Hub coordination, maintenance and communication.

### 1.1.6 National Agricultural Research Institutions (NARIs)

National Agricultural Research Institutions are key stakeholders in the implementation of the KI-Hub strategy. They are expected to play a leading role in populating the KI-Hub with information and knowledge generated in their countries. NARIs with an existing KI-Hub will allow their information and knowledge products to be harvested by ASARECA Space by employing the Application Programming Interfaces (APIs). Those without own KI-hubs will be provided with space from ASARECA Space for deposit of their knowledge products. All NARIs and other organisations contributing full content to ASARECA Space shall be responsible to ensure clearance with all copyright issues. With assistance from ASARECA, each NARI will embrace strategies to digitalize their information resources for availability in their Ki-hubs as well as ASARECA Space. Other roles of NARIs will be clearly stipulated in the MoU which will govern mutual collaboration with ASARECA.

**Table 2: Roles and responsibilities in KI-Hub Strategy implementation**

Roles and responsibilities	BoD	GA	ED	DED	KIM	IC&PR	IT	PIP	NAROs	OU
Output 1 ASARECA Space in place										
1.1 ASARECA Space technically installed & functional			✓	✓	✓✓✓		✓✓✓	✓✓✓		✓
1.2 Network of partners for the ASARECA Space developed	✓	✓	✓	✓	✓✓✓	✓✓		✓✓✓	✓✓	✓
1.3 Populate ASARECA Space with knowledge products			✓	✓	✓✓✓		✓	✓✓✓	✓✓	✓
1.4 Establish and communicate standards and procedures.	✓	✓	✓	✓	✓✓✓	✓✓	✓	✓✓✓	✓✓	✓
1.5 Promote and support use application of ASARECA Space.	✓		✓	✓	✓✓✓	✓✓	✓	✓✓✓	✓✓	✓
Output 2: Community Platforms established.										



Roles and responsibilities	BoD	GA	ED	DED	KIM	IC&PR	IT	PIP	NAROs	OU
2.1 Stakeholder knowledge, attitudes, and practices characterized.				✓	✓✓✓		✓	✓✓✓		✓
2.2 Enhanced use of various knowledge exchange tools.	✓	✓	✓	✓	✓✓✓	✓✓	✓	✓✓✓	✓✓	✓
2.3 Enhanced use of various collaboration platforms.			✓	✓	✓✓✓	✓✓		✓✓✓	✓✓	✓
2.4 A robust system for information exchange in place and in use.				✓	✓✓✓		✓✓	✓✓✓		✓
Output 3: Knowledge Graph and AI performing										
3.1 Community of Practice on Artificial Intelligence operational	✓		✓	✓	✓✓✓	✓	✓✓		✓✓✓	✓
3.2 Prototype developed.			✓	✓	✓✓✓		✓✓		✓✓✓	✓
3.3 Semantic Search functional.			✓	✓	✓✓✓		✓✓		✓✓✓	✓
3.4 Expert recommender system and additional AI functionalities.	✓		✓	✓	✓✓✓		✓✓		✓✓✓	✓

✓✓✓: Lead or major role; ✓✓: Significant role; ✓: Involved

BoD: Board of Directors.  
GA: General Assembly.  
ED: Executive Director's Office.

DED: Deputy Executive Director's Office.  
PMU: Programme Management Units.  
KIM : Knowledge and Information Management Theme.  
ICPR: Information, Communication and Public Relations Unit.

IT: Information Technology.  
OU: Other Units in the Secretariat (PCD, M&E, Planning, HR, Finance).  
PIP: Project Implementing Partners.  
NARI: National Research Institutions.

## 1.2 Data, information and knowledge sharing requirements

The essence of establishing ASARECA KI-Hub is to facilitate data, information and knowledge sharing practices among all stakeholders. This may only be feasible if all ASARECA stakeholders take into account the practice open access. Even though no single platform is recommended for individual NARIS and other partners of ASARECA in establishing their KI-Hubs, it advised that adoption of systems which comply with the International Data standards that

allow interoperability. This is to enable harvesting of content from one KI-Hub to another. This aspect should be clearly stipulated in the revised MoUs. The best practice should be to harvest metadata rather full-content from partners.

## 1.3 Working relationship with NARIs and other ASARECA partners

The working relationship between ASARECA, member institutions, and like-minded organisations should be for a mutual benefit. The ideal situation is working under

conditions stipulated in the MoUs. Similarly, ASARECA is expected to enter into agreements with regional and other partners through formulation of the appropriate MoU.

### **1.4 Engaging with farmers, extension system and others on the last mile**

Hitherto, technologies, knowledge and information emanating from various AR4D forums never reach farmers in the appropriate forms. This is blamed on inappropriate packaging, ineffective use of the intermediaries and weak enabling and dissemination channels. Farmers' concerns also do not get to policy, research and decision-making platforms appropriately. There continues to be a disconnection between science, policy, development partners, civil society and even extension with the needs of farmers and Farmers Organizations (FO).

One of the essential elements of the Knowledge management and Communication Strategy – supported by the KI-Hub, is to facilitate Communities of Practice, which provide an opportunity to include FOs in the dialogue, in the development of adequate knowledge products and services and to strengthen communication and collaboration. It is considered to be a primary role of the NARIs to facilitate dialogue with the farmers. However, also on regional level, farmers, farmer organisations, extension officers/services and other stakeholders who are working “on the last mile” shall be involved and contribute to the production of applicable and user-friendly products and the one side, but also to improve the overall knowledge ecosystem.

It will be important to assess how FOs and farmers can contribute to the knowledge as input to the hub and also to ensure that they benefit from the collective pool of knowledge that the hub will stock. The KI-Hub will promote linkages with regional bodies such as the East African Farmers Federation (EAFF) and other national umbrella organizations to realize the various initiatives like field level TIMPs promotion and strengthening of capacities of FOs. However, the focus is on involving users in Communities as the space for continuous communication, collaboration, co-creation, based on trust, mutual understanding, appreciation and recognition, and vision and passion.

### **1.5 Capacity Development**

Capacity development specifically in all regards to KM is a key component of the KMC Strategy. That portfolio described in KMCS can additionally be complemented by specific courses, webinars, learning videos and other multimedia knowledge products, which support the best use of the ASARECA Space, the Communities of Practice and other tools. Staff of ASARECA should be roles for the efficient use of the tools.

### **1.6 Hub coordination, maintenance and communication**

The hub will be coordinated and maintained by the KIM unit in collaboration with the IT unit working together with other units and thematic working areas. Specific knowledge and information generation and promotion will be part and parcel of ongoing thematic implementation.

The coordination and maintenance role of the central KI-Hub will include:

- Leadership and backstopping other programs, themes and organizations in the generation, collating and structuring of data, information and knowledge themes for validation and use in the KI-Hub.
- To provide internet connectivity, maintenance of dynamic portals, KI-Hub support and advisory service including facilitating CoP, and other virtual communication processes like videoconferencing and knowledge production processes services to users and contributors.
- Communities should also be established to perform specific roles in the KI-Hub, like the quality assurance, which can hardly be performed by the secretariat itself alone.
- Development and maintenance of relevant databases on KI-Hub functions and central management of AR4D knowledge products, learning and sharing activities and services.
- Development and maintenance of appropriate models and knowledge sharing models and platforms for facilitating KI-Hub functions.
- Capacity building and backstopping of individuals, units and partner organizations to fully perform their roles in the KI-Hub.
- Design, implementation and monitoring of specialized KI-Hub projects including research on modernization and continued relevance of KI-Hub to agricultural transformation in the ECA region.

## 1.7 Monitoring, Evaluation and Learning

In line with OP2 monitoring, evaluation and learning (MEL) framework, the KI-Hub implementation process will be aligned to the ASARECA Planning, Monitoring, Evaluation, Learning and Reporting (PMERL) System. The system has already set measurable targets with stakeholders including those for the KI-Hub and will be continuously developing and using relevant M&E tools, e.g., for data collection, collation, analysis, reporting and sharing. For specific KI-Hub outputs, themes and projects, specialized and relevant M&E frameworks be developed to support performance monitoring; baseline studies and guide other learning activities and processes.

Other M&E activities will be the development of key KI-Hub performance indicators, conducting and backstopping of baseline studies for information and knowledge sharing and learning as well as strengthening of NARIs capacity in M&E for KI-Hub functions including reporting and tracking of thematic knowledge and information management processes and knowledge issues in other cross cross-cutting areas such as gender, ESS, Change Management, Procurement. MEL will also include activities and capacity for gender disaggregated data quality assessment, validation and quality Assurance and reporting to support the KI-Hub.

## 1.8 Logical Framework for the KI-Hub Strategy

The logical Framework for the three components provides an overview of the components, sub-components, objectively verifiable indicators, and source, and describes the work plan for each component, subcomponent and activity.

**Table 3: Logical Framework Component 1**

	Intervention Logic	Objectively verifiable indicators of achievement	Sources and means of verification
Goal	ASARECA Space established and integrated with NARIS; KI-Clearing House established	<ul style="list-style-type: none"> <li>■ User satisfaction with ASARECA Space</li> </ul>	<ul style="list-style-type: none"> <li>■ Surveys</li> <li>■ Usage statistics</li> </ul>
Expected Results	<ol style="list-style-type: none"> <li>1. ASARECA Space platform established</li> <li>2. KI-Clearing House established</li> <li>3. ASARECA Space populated with knowledge products</li> <li>4. ASARECA Space standards and procedures established</li> <li>5. Information and knowledge across platforms accessible in ASARECA Space</li> </ol>	<ul style="list-style-type: none"> <li>■ Prototypes developed</li> <li>■ Functional ASARECA Space</li> <li>■ List of established partners</li> <li>■ Documented standards and procedures</li> <li>■ Knowledge products available in ASARECA Space</li> <li>■ Signed MoUs</li> <li>■ Acquired hardware and software</li> <li>■ Documented quality assurance measures in place</li> <li>■ Training manuals developed</li> </ul>	<ul style="list-style-type: none"> <li>■ Surveys</li> <li>■ Usage statistics</li> <li>■ Available prototypes</li> <li>■ Web analytics</li> <li>■ Reports</li> </ul>
Activities	<ol style="list-style-type: none"> <li>1.1 Engage stakeholders to agree on functionalities of the appropriate system.</li> <li>1.2 Determine the specifications of hardware and systems requirement.</li> <li>1.3 Acquire hardware and software</li> <li>1.4 Installation and configuration of DSpace platform.</li> <li>2.1 Partners engaged to take part in the network.</li> <li>2.2 MoU and other formal agreements made to institutionalize partnerships.</li> <li>3.1 Uploading of born digital knowledge products into ASARECA Space.</li> <li>3.2 Identifying and collecting physical knowledge products in AR&amp;D in ECA.</li> <li>3.3 Digitization of physical knowledge products for upload into ASARECA Space.</li> <li>4.1 Institute Quality assurance systems and procedures.</li> <li>4.2 Apply standards for knowledge and information content agreed upon.</li> <li>4.3 Put in place operating procedure for information and knowledge access and use.</li> <li>5.1 Develop and apply strategies for promoting ASARECA Space.</li> <li>5.2 Develop training and guide materials for use of ASARECA Space.</li> <li>5.3 Organise User trainings to enhance ASARECA Space.</li> </ol>	<ul style="list-style-type: none"> <li>■ Training sessions conducted</li> <li>■ Increased usage of the ASARECA Space</li> </ul>	

**Table 4: Work plan – Component 1**

Year	Year 1				Year 2				Year 3				Year 4				Year 5			
Quarter	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
<b>Result 1. ASARECA Space platform established</b>																				
1.1 Engage stakeholders to agree on functionalities of the appropriate system.																				
1.2 Determine the specifications of hardware and systems requirement.																				
1.3 Acquire hardware and software.																				
1.4 Installation and configuration of DSpace platform.																				
<b>Result 2. KI-Clearing House established.</b>																				
2.1 Partners engaged to take part in the network.																				
2.2 MoU and other formal agreements made to institutionalise.																				
<b>Result 3. ASARECA Space populated with knowledge products.</b>																				
3.1 Uploading of born digital knowledge products into ASARECA Space.																				
3.2 Identifying and collecting physical knowledge products in AR&D in ECA.																				
3.3 Digitization of physical knowledge products for upload into ASARECA Space.																				

#### Result 4: ASARECA Space standards and procedures established.

4.1 Institute Quality assurance systems and procedures.																			
4.2 Apply standards for knowledge and information content agreed upon.																			
4.3 Put in place operating procedure for information and knowledge.																			

#### Result 5: Information and knowledge across platforms accessible in ASARECA Space.

5.1 Develop and apply strategies for promoting ASARECA Space.																			
5.2 Develop training and guide materials for use of ASARECA Space.																			
5.3 Organise user trainings to enhance ASARECA Space.																			

**Table 5: Budget/resource list – component 1**

Item	Cost (US\$)
Acquire hardware and software	50,000.00
Installation and configuration of DSpace platform: consulting service	25,000.00
Uploading of born digital knowledge products into ASARECA Space	50,000.00
Collection and digitization of physical knowledge products for upload into ASARECA Space	500,000.00
Promotion and training	50,000.00
Total	625,000.00

**Notes:**

<sup>1</sup> Include costs for hosting and maintenance of the server

<sup>4</sup> Cost for Five Years covering all partner countries

**Table 6: Logical Framework – Component 2**

Intervention Logic		Objectively verifiable indicators of achievement	Sources and means of verification
Goal	Enhance collaboration among ASARECA stakeholders.	<ul style="list-style-type: none"> <li>User Satisfaction with collaboration tools</li> </ul>	<ul style="list-style-type: none"> <li>Surveys.</li> <li>User statistics.</li> </ul>
Expected Results	1. Situation analysis of the available collaboration tools conducted. 2. Collaboration tools identified and created for use by stakeholders. 3. D-groups created to enhance communication and collaboration. 4. ASARECA Website restructured to host various collaboration tools.	<ul style="list-style-type: none"> <li>Identified list of collaboration tools.</li> <li>D-Groups Established.</li> <li>Operational Website.</li> </ul>	<ul style="list-style-type: none"> <li>Reports.</li> <li>Functional D-groups.</li> <li>Functional website.</li> </ul>
Activities	1.1 User assessment to characterize knowledge and use of various collaboration tools. 1.2 Develop trainings to all user categories. 2.1 Promote collaboration tools. 2.2 Build capacity on use of various collaboration tools. 3.1 Develop the D-group platform. 3.2 Popularise/promote the D-group to stakeholders. 3.3 Conduct user training for effective use of the D-groups. 4.1 Identification of links to be anchored on the website. 4.2 ASARECA Website enriched with all the identified important links.	<ul style="list-style-type: none"> <li>Availability of collaboration tools.</li> <li>Training modules developed.</li> <li>Increase in usage of collaboration tools.</li> <li>Training sessions conducted.</li> <li>Available links.</li> <li>Web analytics.</li> </ul>	<ul style="list-style-type: none"> <li>User survey.</li> <li>Usage statistics.</li> <li>Reports.</li> <li>Existing tools.</li> </ul>



**Table 7: Work plan – Component 2**

Year	Year 1				Year 2				Year 3				Year 4				Year 5			
Quarter	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
<b>Result 1. Situation analysis of the available collaboration tools conducted.</b>																				
1.1 User assessment to characterize knowledge and use of various collaboration tools.																				
1.2 Develop trainings to all user categories.																				
<b>Result 2. Collaboration tools identified and created for use by stakeholders.</b>																				
2.1 Promote collaboration tools.																				
2.2 Build capacity on use of various collaboration tools.																				
<b>Result 3. D-groups created to enhance communication and collaboration</b>																				
3.1 Develop the D-group platform.																				
3.2 Popularise/promote the D-group to stakeholders.																				
3.3 Conduct user training for effective use of the D-groups.																				
<b>Result 4: ASARECA Website restructured to host various collaboration tools.</b>																				
4.1 Identification of links to be anchored on the website.																				
4.2 ASARECA Website enriched with all the identified important links.																				

**Table 8: Budget/resource list – component 2**

Item	Cost (US\$)
Acquire software	5,000.00
Installation and configuration: Consulting services	20,000.00
Promotion and training	25,000.00
Total	50,000.00

**Table 9: Logical Framework – Component 3**

	Intervention Logic	Objectively verifiable indicators of achievement	Sources and means of verification
Goal	1. Strategy Communicated and awareness created	User satisfaction with semantic search, recommender, and other AI-solutions	- user survey
Expected Results	1. Form an “AI Community of Practice” 2. Developing a prototype with an initial knowledge graph. 3. Data analysis and Processing. 4. Develop expert recommender system and additional AI functionalities.	<ul style="list-style-type: none"> <li>■ AI-Community established.</li> <li>■ Prototype developed.</li> <li>■ Analytics available.</li> <li>■ Semantic search functional.</li> <li>■ Expert recommender functional.</li> </ul>	<ul style="list-style-type: none"> <li>■ DSpace evidence</li> <li>■ CoP Report (annual)</li> <li>■ Prototype</li> <li>■ Analytics evidence (depending on the tool)</li> <li>■ Evidence of systems</li> </ul>
Activities	1.1 Develop the Rationale. 1.2: Mobilize for participation. 1.3: Implement and facilitate the Community. 2.1: Lay the foundation. 2.2: Test environment. 2.3: Data analysis and Processing. 3.1: Analyse, improve, and expand. 3.2: Maintain the knowledge graph on a regular basis. 4.1: Capture data of individual experts. 4.2: Build the expert recommender system.	<ul style="list-style-type: none"> <li>■ Rationale available</li> <li>■ Number of participants per country (min 1)</li> <li>■ User cases defined</li> <li>■ test environment established</li> <li>■ Data analysed.</li> <li>■ Analytics available.</li> <li>■ knowledge graph expressiveness</li> <li>■ number of expert profiles available</li> <li>■ recommender system functional</li> </ul>	<ul style="list-style-type: none"> <li>■ CoP Report</li> <li>■ CoP Report</li> <li>■ Report</li> <li>■ evidence from the tool</li> </ul>

**Table 10: Work plan – Component 3**

Year	Year 1				Year 2				Year 3				Year 4				Year 5			
Quarter	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
<b>Result 1. Form an “AI Community of Practice”</b>																				
1.1 Develop the Rationale																				
1.2 Mobilize for participation																				
1.3 Implement and facilitate the Community																				
<b>Result 2. Developing a prototype with an initial knowledge graph</b>																				
2.1: Lay the foundation																				
2.2 Test environment																				
2.3 Data analysis and Processing																				
<b>Result 3. Data analysis and Processing</b>																				
3.1 Analyse, improve, and expand																				
3.2 Maintain the knowledge graph on a regular basis																				
<b>Result 4. Develop expert recommender system and additional AI functionalities</b>																				
3.1 Capture data of individual experts																				
3.2 Build and maintain the expert recommender system																				

**Table 11: Budget/resource list – component 3**

Item	Cost (US\$)
Acquire software	300,000.00
Installation and configuration: Consulting services	100,000.00
Development future AI-Solutions	Depends, 100,000 min to be budgeted
Promotion and training	30,000.00
Total	530,000.00

- Regular maintenance by subject matter experts: about 1 day per quarter
- Internal staff: min. 1 day per month for maintenance and communication time for cooperation with consultants.

## 1.9 Risks and Risk Mitigation

ASARECA recognizes, that although the hub presents a strategic risk management option for many other AR4D and organizational risks, there are other unique risks associated with the implementation of the hub itself. The identification, analysis and mitigation of risks will be important aspects of the implementation strategy.

In the course of implementing the Hub, various degrees of risks shall arise. These risks may be influenced user-information and knowledge demand and application. The risks range from institutional, environmental, financial, legal, and political uncertainties as well as risks from the commodity and service nature of knowledge sharing and learning processes. The understanding, valuing and management plans for these risks are meant to be part of the overall hub implementation and ASARECA is actively incorporating risk assessment and risk management strategies. This is because partners have noted that being prepared to deal with probable or unanticipated risks is an important part of planning for the roll-out of the hub activities.

Some of the activities and implementation modalities already identified are part of the overall risk management efforts. Capacity building, awareness raising, change management and support, safety regulations and standards specification are largely meant to reduce the hub's exposure to different kinds of risks.

**Table 12: KI-Hub risk profile**

Risk	Risk Qualification	Risk mitigation measures
Lack of resources and support	<ul style="list-style-type: none"> <li>■ Lack of management support, financial resources to implement the KI-Hub</li> </ul>	<ul style="list-style-type: none"> <li>■ Management briefing of benefits for advanced planning and securing the financial resources.</li> <li>■ Building strongly on contributions of members and stakeholders, through contributions in Communities or in-kind contributions.</li> </ul>
Lack of motivation of partners to contribute	<ul style="list-style-type: none"> <li>■ The Hub is greatly influenced by the community spirit. Therefore, the lack of motivation, lack of recognition, lack of community will lead to frustration and collaboration fades out.</li> </ul>	<ul style="list-style-type: none"> <li>■ Excellent facilitation skills, functional it-platforms, management support, regular evaluation of progress CoP of facilitators, and a recognition program can mitigate the risks.</li> </ul>

Risk	Risk Qualification	Risk mitigation measures
Lack of Integration.	<ul style="list-style-type: none"> <li>Member states/NARIs refuse to integrate knowledge resources with ASARECA Space. Presents a limitation for promoting visibility and attracting various partners if not used by partners.</li> </ul>	<ul style="list-style-type: none"> <li>Involving the Board of Directors and the GA from the beginning, signing MoUs, starting fast with 1-2 NARIs to demonstrate the benefits.</li> </ul>
Knowledge Loss Risks	<ul style="list-style-type: none"> <li>Ongoing loss of knowledge, experience, commitment through fluctuation and limited knowledge capture and sharing processes, leads to permanent performance gaps.</li> </ul>	<ul style="list-style-type: none"> <li>Implement knowledge capture procedures and knowledge loss risk assessment on a regular basis.</li> </ul>
The KI-Hub loses focus of knowledge and information sharing, learning and influence	<ul style="list-style-type: none"> <li>Activities of the KI-Hub are carried out for its own sake and not for improved effectiveness, efficiency and achievement of the outputs.</li> </ul>	<ul style="list-style-type: none"> <li>Intentionally embedding activities of KI-Hub within the ASARECA work programs by carefully aligning them with strategic activities, thrusts, processes, result-based. Management and monitoring and evaluation as well as organizational performance, learning and staff performance appraisal.</li> </ul>
Appearance of new information and knowledge sharing tools, approaches and methods.	<ul style="list-style-type: none"> <li>Appearance of systems, tools and technologies leading redundancies, incompatibilities and need for updates, new capacities and processes. New systems may also not be available to users in good Time.</li> </ul>	<ul style="list-style-type: none"> <li>Continued but careful prioritization of technologies, knowledge, tools and selection of well-proven and generic toolsets to remedy uncertainties in new development.</li> <li>Proper training and awareness on new and emerging processes, tools and approaches.</li> </ul>
Continued fragmentation of or Little effort put in implementation of the KI-Hub as a seamless platform for sharing, learning and influence.	<ul style="list-style-type: none"> <li>Fragmentation of efforts, activities and processes of knowledge information and management causing loss of focus, duplication, and potential inefficiencies.</li> </ul>	<ul style="list-style-type: none"> <li>Placing KI-Hub and its facilitating role in sharing, learning and influencing at the heart of implementation and M&amp;E.</li> <li>ASARECA leadership has committed itself to the KI-Hub to ensure coordination for integration while ensuring focus, sound management and adequate resources.</li> <li>KI-Hub processes and activities are solidly managed as one system.</li> <li>Adequate measures to facilitate a supportive organizational culture will contribute to building a unity of purpose and a shared vision integral to KI-Hub implementation.</li> </ul>

Risk	Risk Qualification	Risk mitigation measures
Quality, authenticity and credibility of content	<ul style="list-style-type: none"> <li>Poor quality information and knowledge as content for the hub despite effective processes and tools.</li> </ul>	<ul style="list-style-type: none"> <li>Strong Community of Practice established to secure quality</li> <li>ASARECA quality assurance systems and standards to be invoked.</li> </ul>
Partnerships and collaboration	<ul style="list-style-type: none"> <li>Risks associated with partners losing interest in the joint knowledge management efforts, having different schedules or posing other collaboration related risks (credibility of hub and content, different knowledge management regimes and goals, etc).</li> </ul>	<ul style="list-style-type: none"> <li>Developing a community spirit on the level of middle management and professionals, complementing the community spirit through the TOP-Management level.</li> <li>Strong emphasis on Communities to strengthen partnerships. More focus on socialization, friendship, mutual support and community spirit complementing formals MoUs.</li> <li>Synchronizing hub activities with partner capacities, schedules, and technology generation and use strategies.</li> </ul>
Fading Leadership and management support/interest	<ul style="list-style-type: none"> <li>Internal and external management and knowledge/organizational governance challenges due to loss of support and institutional weaknesses.</li> </ul>	<ul style="list-style-type: none"> <li>ASARECA Knowledge Talks as an instrument to regularly reflect on Management level on KM progress, maintain interest and commitment, get inputs for further development.</li> <li>ASARECA management and governance organs to regularly review progress and take remedial action and reaffirm commitments to KI-Hub.</li> </ul>

Other risk management strategies target information and knowledge as risk-prone service and entities. Such risks will be addressed through knowledge management efforts to reduce risks associated with content, resources and their availability for use as affected by organizational restructuring, price changes, changes in terms of use, flexibility in contracts/MoU for quick move to use new opportunities. ASARECA is also aware of other operating risks relating to partnerships, need to maintain essential KI-Hub services in case of major disruptions, having a strong, defensible copyright compliance program and reasonable IPR policy. Other risks will deal with loss of functionality and content due to natural disasters such as fires and other acts of sabotage. The implementation plan (already existing in ASARECA) supports a bounce back or continuation of service offering through backups and salvaging of databases, equipment and other information and knowledge resources.

## Terms of Reference for Information Systems and Data Officer

### a. Overall Objective of the Position

The overall objective of this position is to support Information and Communication Technology (ICT) and Data Systems functions of the Knowledge and Information Hub (Ki-Hub) through **provision of back-end and front-end technical support for content generation, Data Systems development and operationalisation.** The assignment entails among other things; cloud servers management; data mining; artificial intelligence; capacity development for users; upgrade the Ki-Hub functionalities including interoperability of Hub with partners through creation and integration of APIs; upgrade of resources in the KI-Hub to include plug-ins for editorial functions, publication system, analytical tool, post format and sharing, download counter, backup facility, language setup, indexing, graphics and citation.

This ToR clarifies the scope of responsibility of the job holder including the desired qualifications, experience, and the desired deliverables.

### b. Responsibilities (job description)

The role may include capacity planning, installation, configuration, database design, migration, performance monitoring, security, troubleshooting, backup and data recovery, and overall IT support. The Database Associate will work with the Technical Communication Officer and in complement with the Systems Administrator with focus on the following functions:

- Website and/or Knowledge platform software application designing, building, or maintaining.
- Using scripting or authoring languages, management tools, content creation tools, applications and digital media.
- Directing or performing website or knowledge platforms updates.
- Developing or validating test routines and schedules to ensure that test cases mimic external interfaces and address all browser and device types.
- Designing website or knowledge platforms content, and guiding team members who produce content.
- Solve complex agricultural research for development problems through development and articulation of ideas, processes and applications.
- Maintaining an understanding of the latest Web applications and programming practices through education, study, and participation in conferences, workshops, and groups.
- Back up files from Web sites to local directories for recovery.
- Identifying problems uncovered by feedback and testing, and correcting or referring problems to appropriate personnel for correction.
- Evaluating code to ensure it meets industry standards, is valid, is properly structured, and is compatible with browsers, devices, or operating systems.



- Determining user needs by analyzing technical requirements.
- Integrating and working with various APIs.
- Constant communication with other colleagues in the business to develop and deploy their content - and ensuring there is a clear establishment of what can be created within what timeframe.
- Installing and configuring computer hardware, software, systems, networks, printers and scanners
- Monitoring and maintaining computer systems and networks
- Responding in a timely manner to service issues and requests
- Providing technical support across the company (in person or over the phone)
- Managing user accounts and logins
- Repairing and replacing equipment as necessary
- Management of recovery and failover of database.
- Testing new technology
- Training staff and students during their industrial attachment
- Testing and evaluating new technology.

### **c. Qualifications and other requirements**

- Masters degree in Computer Science; IT; Web development (especially Microsoft certified, Data Science, or related field).
- First degree in any of the above fields (Computer Science; IT; Web development (especially Microsoft certified, Data Science).

- Relevant professional experience of at least 3 years in a busy ICT Support and Web development environment involving development of ICT tools and platforms.
- Solid knowledge and experience in programming applications.
- Good knowledge in database theory, design and queries.
- Proficient in JavaScript, HTML, CSS.
- Knowledge of RDBMS (Microsoft SQL Server or My SQL).
- Proficient in Structured Query Language (SQL) such as PSM or transact SQL).
- Good understanding of distributed computing architecture such as Client Server Model.
- Good understanding of Operating Systems such as windows, Linux.
- Good understanding of hosting, storage and networking technologies.
- Ability to develop real time data collection instruments.
- Ability to provide accurate, high quality analytics and analysis of all ASARECA systems.
- Knowledge of programming language and technical terminology.
- Familiarity with REST and SOAP web services added advantage (API integration).
- Experience with versioning tools such as Git
- Portfolio links to websites you have done
- Knowledge of web applications including a CMS such as Wordpress, Joomla and Drupal.

## Terms of Reference for Knowledge Management Support Intern (Communications & Graphics)

### Responsibilities

The Intern/s will work under the direct supervision of the Knowledge Management Lead of ASARECA to perform the following key roles:

- Support strategic online communications planning and processes that contribute to ASARECA's mission and work to increase visibility of the organization and raise public awareness;
- Support the management of the Agricultural Research and Innovations initiatives and Communities for the ASARECA Region online presence on Dgroups, social media, including regular updates
- Monitor and analyze online conversations around priority and emerging issues with special focus on Agricultural Research for Development areas with the Region and beyond.
- Support the sharing of information on the various ASARECA online platforms, especially the corporate website.
- Produce appropriate graphics/visualization, branding and support the production of communication products and materials including infographics, videos etc
- Contribute to visual and digital communications, including photo gathering and editing, graphic creation and presentation, and other multi-media editing, including video and audio;

- Assist the Knowledge Management and Communications unit in the organization of events; etc
- Read research documents and tease out relevant information for digital dissemination in various formats; including infographs.
- Support the daily management of the various Communities of practice via Dgroups as well as online meetings

### Technical skills

Demonstrable advanced knowledge in graphics including the use of Adobe creative tools, such as Illustrator, In Design, Premiere Pro and/or related tools;

- Efficient user of Microsoft Office tools (Word, PowerPoint, Excel, etc.);
- Website management, Web-design and coding knowledge (HTML 5, CSS, or PHP) is an advantage;
- Experience with social media for developing marketing and promotion strategies;
- Experience with TV/video production, including script-writing and/or camera work is an advantage.

### Education

Bachelor's degree in communications, media studies, journalism, public relations or marketing. Practical experience will be an advantage.





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