

Terms of Reference

Assignment/Project Title: Proof of Concept Development for National Agri Stack under Digital Agri Mission for Ministry of Agriculture & Farmers Welfare, India

Assignment Duration: ___12_ months

Assignment Type: Firm (National)

A. BACKGROUND

Agriculture in India along with its allied sectors is a significant contributor to India's Gross Domestic Product (GDP) and is also the largest livelihood provider. According to the Economic Survey 2020-21, GDP contribution by the agriculture sector is likely to be 19.9% in 2020-21, increasing from 17.8% recorded in 2019-20. Over the years, the government has taken major steps to aid and enhance the agriculture sector with proven farming technologies and supportive policies. The recent evolution of digital technology in farming will further accelerate growth by ensuring higher crop yields and enhance sustainability by reducing water consumption and the use of agrochemicals.

In September 2021, the Indian Government announced the initiation of the Digital Agriculture Mission 2021–2025, which aims to support and accelerate projects based on new technologies, like AI, block chain, remote sensing and GIS technology and use of drones and robots. Promoting rural development and food security is one of the priority operational areas for ADB's strategy 2030. ADB will support efforts to improve market connectivity and agricultural value chain linkages to help member countries increase agricultural productivity and food security by boosting farm and nonfarm incomes, promoting the adoption of advanced technologies and climate-smart agricultural practices, and supporting the improvement of natural resource management standards. As of April 2022, Asian Development Bank (ADB) has supported nearly 50 projects amounting to 2 billion USD across sectors of Agriculture, Natural Resources and Rural Development. ADB is actively promoting use of digital agriculture in its projects.

As one of the core ingredients of the Digital Agriculture Mission, a national 'Agri Stack' is being envisioned by the Indian government, which will act as a digital foundation to make it easier to bring various stakeholders together to improve agriculture in India and enable better outcomes and results for the farmers by using data and digital services. It is an effort to bring together high-quality data and to make this data easily available to the stakeholders that need it, so that they can create new services using the data. Evolved from the thinking of the InDEA 2.0 Architecture by MeitY, Agri Stack is being built by the Ministry of Agriculture & Farmers Welfare (MOAFW) in an open manner, with a federated structure – keeping States at the centre of the design, ensuring participatory and inclusive design to ensure the sector evolves collectively to help shape the next decade of agriculture in India.

B. OBJECTIVE OF THE ASSIGNMENT

The national Agri Stack aims to make it easier for farmers to get easier access to cheaper credit, higher-quality farm inputs, localised and specific advice, and more informed and

convenient access to markets. Agri Stack also aims to make it easier for governments to plan and implement various farmer and agriculture focused benefit schemes.

The Agri Stack seeks to achieve the following broad objectives: -

- Enable digitally driven agricultural ecosystem for the welfare of farmers
- Create a set of databases, rules, governance structures and guidelines that enable the effective sharing of data pertaining to agriculture, across all stakeholders in the agriculture value-chain, nationwide
- Build national digital infrastructure layer for the agriculture sector, following open-source technology for other digital applications, systems, portals and solutions to be integrated
- Break silos and curate agriculture related data available with the Governments-State and Central departments, to be leveraged for farmers' benefit and for better governance in an authenticated, mandated and secured way
- Build and maintain National level core registries, to act as a single source of truth pertaining to Farmers, Farm-plots and Crops Sown – aggregating these from States' registries
- Create a digital farmer-centric ecosystem, to enable fair and improved access and choice
- Simplify and consolidate farmers' access in agriculture related benefits/schemes delivery with quick identification and authentication of the farmers
- Create data opportunities for scheme convergence between Ministries and State Governments to better serve the Indian Farmers
- Adopt collaborative and participatory approach with the States, by enabling them with relevant frameworks/reference applications (i.e., applications that the Centre will provide and which they can use or copy and adapt) and Standard Operating Procedures

ADB will engage firm to support MOAFW for Conceptualization, Design and Development of Proof of Concept (POC) for National Agri Stack under Digital Agri Mission. The firm shall provide a team of key experts comprising of : (i) Product Design Specialist, (ii) Application Development Specialist, (iii) Solution Architecture Specialist, (iv) Digital Infrastructure Specialist, and (v) Implementation Delivery Specialist.

C. SCOPE OF WORK

The major scope of work under the assignment is Conceptualization, Design and Development of a POC for the initial version of a National Agri Stack and to prepare a working prototype of the National Agri Stack covering the Unified Farmer Service Interface (UFSI), and 3 core registries, i.e., Farmer Registry, Farmland Plot Registry (using geo-referenced village maps), and Crop Sown Registry.

The UFSI is a combination of standardised data schema, data, APIs and a consent layer that enables seamless interoperability of various public and private IT systems in the agriculture ecosystem across the country.

The UFSI is envisaged to play the following role:

- Act as a centrally standardised set of APIs and registry schemas in the agri ecosystem (like the eKYC and demoAuth APIs for Aadhaar)
- Enables Registration of the Farmers, Farmland Plots, and Crops Sown
- Provides standardised master data sets for agricultural data such as crops, seeds, pesticides, fertilisers, etc. – which need to be standardised nationwide

- Enables Registration of Service Providers, public and private
- Acts as a Repository of all the applicable standards, API's and formats

The UFSI and Agri Stack will enable authorised service providers to build use-cases using the Agri Stack Registries and APIs, thereby accelerating and making it easier for such providers to get access to ground and field-level data that today is difficult to obtain.

The team will be required to:

- Assist / simulate 3 states running different state level implementations of the 3 core registries to interoperate / synchronise with the Central Registries using a UFSI (Universal Farmer Service Interface) as an interoperable data-exchange layer.
- Build an API layer to provide access to the external world via a consent-driven architecture to the three core registries.
- Demonstrate a POC journey from the Central Agri Stack Portal to access the 3 core Registries (Farmer, Farmland Plot, and Crop) of the Central Agri Stack
- Demonstrate consent models for sharing Farmer data with authorised service providers
- Demonstrate the process of authorising service providers on an IT / API Sandbox with sample data from 3 States

The team is expected to carry out the activities, including but not limited to, existing solution study, gap analysis, conceptualization and designing covering the below:

- Setting up of the central Agri-Stack registries (Farmer, Farmland Plot, and Crop Sown) & associate databases with appropriate levels of integrity and security, and processes for updating and managing the registries
- Setting up of a UFSI (Universal Farmer Service Interface) data bridge between 3 simulated/real state registries/state sandboxes [Readiness of the States will not be the responsibility of the Consultants]
- Setting up of a consent layer to enable explicit consent-based access to data
- Setting up of an API layer to enable access to Digital Channels and External Partnership integrations
- Setting up of a reference Digital Channel (Web) to enable registration and query of data served by the Agri-Stack as approved by the consent manager
- Setting up consent layer to enable consented data fetch from various ecosystem participants

D. Technical Specification

In terms of contextualizing 'Ecosystem Thinking' approach explained in **IndEA 2.0 report** to Agriculture Sector, the envisaged digital infrastructure will be built to provide a foundational support for the Agricultural ecosystem to develop and evolve. It will be enabled by Open APIs, Open Data, Open Source and Interoperability.

To support this approach, AgriStack central core platform will be developed **using open-source technologies/tools/framework**. Precise recommended technology stack will be shared at the time of starting work.

E. OUTPUTS

The firm will produce the following outputs:

- Central Agri-Stack registries (Farmer, Farmland Plot, and Crop Sown) & associate databases (crop, seed, pesticides etc.) with appropriate levels of integrity and security, and processes for updating and managing the registries
- UFSI (Universal Farmer Service Interface) data bridge between 3 simulated/real state registries/state sandboxes, with consent layer to enable explicit consent-based access to data, and API layer to enable access to Digital Channels and External Partnership integrations
- Digital Channel (Web) to enable registration and query of data served by the Agri-Stack as approved by the consent manager
- Integration with with Digital Public Goods apps (DigiLocker, APISetu etc)
- AgriStack Sandbox, Portal, and Mobile App
- Knowledge document on conceptualization of a scalable architecture and creating a National Agri Stack beyond the Proof of Concept.
- Concept note and feasibility reports for pilot testing and nationwide rollout of the Agri stack.
- A breakdown of required interim outputs and product milestones shall be finalized in consultation with the MOAFW designated Nodal Officer and ADB.

F. INPUTS TO BE PROVIDED BY THE CLIENT

Ministry of Agriculture & Farmers Welfare (MOAFW) would designate the nodal officer and team of experts to work with consultant on AgriStack development. Consultant would be required to actively work with the nodal officer and the designated team to develop the AgriStack. As and when required, MOAFW shall facilitate discussions and engagements with state and central government agencies collaborating on the project. ADB would facilitate discussion or access to information with MOAFW nodal officer and the designated team.

G. TERMS AND CONDITIONS

1. **Duration:** 12 months from date of contract signing.
2. **Contract type:** The contract type is lump sum inclusive of reimbursable expenditure.
3. **Payment Schedule**

Team Report	Timeline	Payment Percentage
Inception Report- Including : (i) Existing System Study, High Level Gap Analysis and Solution Blueprint, (ii)High-level project implementation milestones and goals for implementation & program management of integration of multiple states to the central core registry (iii)High Level System Requirement Study (iv) Detailed Deployment and Infra Architecture Document including Interoperability Guidelines and Specifications for UFSI (v) Infrastructure Assessment Report - Existing System Study Central Govt + Gap Analysis)	T + 4 weeks	10%
Interim Report - Including : (i) Functional Requirement Specification Document including message specifications and user journeys., (ii) Infrastructure Assessment Report	T + 10 weeks	20%

<p>- Existing System Study Pilot State Govts (iii) Detailed System Requirement Design, including (iv) Detailed Integration guide for multiple states and further enhancements to the architecture to ensure seamless scale-up of integration with multiple states (v) Detailed project plan with governance of multiple sub-tracks for each area of Infra, Solution Design and Application Development + Governance tracker for completion of integration with POC states.</p>		
<p>Draft Final Report – Including : (i) Detailed Design Document including function points, wireframes and test case scenarios, (ii) Infrastructure Implementation Plan Document (iii) Application implementation, System Integration testing, System Integration testing and production release (at least beta stage implementation of registries, UFSI, Agristack sandbox, portal and mobile apps) (iv)High Level Solution Architecture Document (v) Standardized Implementation Plan and Operational SOPs for additional states to go live, (vi) Draft concept note and feasibility reports for pilot testing and nationwide rollout of the Agri stack.</p>	T + 20 weeks	40%
<p>Final Report - Including: (i) User acceptance testing and detailing future Product Roadmap and Knowledge Report for ADB, (ii) Infrastructure Standard Operating Plan Document (iii) Training/User manuals, post go live SOPs (iv)End-state developer documentation for production APIs use via the API gateway sandbox. (v) Transition SOPs from a post go live to steady state operations & State Integration Playbook for ensuring complete participation, (vi) Final concept note and feasibility reports for pilot testing and nationwide rollout of the Agri stack, (vii) Final knowledge dissemination workshop report, (viii)summary of all the activities undertaken by the firm including report on capacity building and training activities</p>	T + 48 weeks	30%

H. INTELLECTUAL PROPERTY RIGHTS

The final product will be the property of the MOAFW and ADB. The firm shall not use the product for their own publicity purposes, nor license the product to be used by others, without the written consent of the MOAFW and ADB.

While sharing the final source codes with the Bank in a portable drive, the Consultant shall submit an undertaking stating that the MOAFW and ADB will have all the user rights (Copyrights) for all the materials, solutions, software, video and audio or any such materials which are developed as part of this project. This may include development files as well.

I. REPORTING

Consultant will report to the ADB and the designate nodal officer by the Digital Agriculture Division of MOAFW. Coordination with other members of the team will be undertaken as required. Consultant will also attend weekly/fortnightly meeting with ADB team to discuss progress and get issues resolved.

J. TEAM COMPOSITION:

i. Firm Experience:

The consulting firm is expected to:

- a) be an IT/ITES company registered in India, and operational for at least 20 years, as on the date of submission of the response.
- b) have experience in managing population-scale eGovernance & Digital Infrastructure Projects for Indian Government with rich domain expertise in the fields of Open Digital Ecosystems via High-Scale Gateway and Registry applications and should be actively working on a national scale project in Open network in any sector such as ecommerce, mobility, financial services etc.
- c) have the capability to demonstrate and apply the use of consented-architecture for data sharing, preferably the Account Aggregator framework for facilitating farmer loan use-cases.
- d) have proven capability to handle scalable projects with services being availed by citizens across each state and union territory of India.

ii. Team Requirements:

SI No.	Position	No. of Experts	Qualification and Experience	Individual Person Months	Total Person Months
1	Product Design specialist	1	<ul style="list-style-type: none">▪ The Product Design Specialist shall have Bachelor's degree in Engineering or Computer Science or Information Technology AND Post-graduate degree in Engineering or Computer Science or Systems Software or an MBA/ MCA or MBA/ MCA equivalent.▪ The specialist should have 20 years of experience in designing digital products/solutions or digital transformational projects leveraging various components of the IndiaStack for Individuals, Enterprises or Government clients in India.	6.5	6.5

SI No.	Position	No. of Experts	Qualification and Experience	Individual Person Months	Total Person Months
			<ul style="list-style-type: none"> ▪ Work experience across multiple sectors like Payments, Mobile Money, Digital Financial Services and should have been involved in conceptualizing and implementation of technology solutions powering Rural Digital Enablement at scale shall be an advantage. ▪ The specialist should have understanding and hands-on experience working with new Digital Technology Stacks like UPI, AEPS, ONDC, Beckn Protocol, ODE Gateways and Registries in the Indian context is required. 		
<p><u>DETAILED ACTIVITIES</u></p> <p>The Product Design specialist shall lead the team and will be responsible for:</p> <ul style="list-style-type: none"> ▪ Leading the discussions and coordinating with MOAFW, participating state governments and ADB. ▪ Overall coordination and project management for the Proof of Concept Development for the National Agri Stack. ▪ Review of existing preparatory work and information on Agri Stack to prepare existing system + gap analysis reports. ▪ Conceptualization and Design of a scalable model and creating a solution design document along with a proposed phased approach of additional developments envisaged in relation to the National Agri Stack over and above the Proof of Concept as a proposed product roadmap. ▪ Leading preparation of documents for Business Requirement, Solution Design and Future Roadmap with inputs from other team members. ▪ Oversee the development and delivery of POC with completion of test scenarios, user access testing. ▪ Design training and capacity building program for relevant stakeholders. ▪ Lead the training and capacity building workshops. ▪ Prepare a concept note and feasibility reports for pilot testing and nationwide rollout of the Agri stack. 					

SI No.	Position	No. of Experts	Qualification and Experience	Individual Person Months	Total Person Months
2	Digital Infrastructure specialist	1	<ul style="list-style-type: none"> ▪ The Digital Infrastructure specialist shall have Bachelor's degree in Engineering or Computer Science or Information Technology, and Post-graduate degree in Engineering or Computer Science or Systems Software or an MBA/ MCA or MBA/ MCA equivalent. ▪ The specialist should have 15 years of experience in system integration, infrastructure management, data center management for digital products/solutions or digital transformational projects around India stack for enterprises or government clients in India. ▪ Work experience should include solution designing, setting up and management of a highly virtualized environment with variety of data centre technologies including cloud services. ▪ Experience in handling national-level population scale projects and centralized infrastructure with high availability, accuracy, time criticality, business continuity and security shall be an advantage. 	4	4
<p><u>DETAILED ACTIVITIES</u></p> <p>The Digital Infrastructure specialist shall support the team and will be responsible for:</p> <ul style="list-style-type: none"> ▪ Support Team leader for development of Proof of Concept Development for National Agri Stack ▪ Prepare Infrastructure Assessment Document incorporating the existing solution study, gap analysis ▪ Prepare Infrastructure Design document including infrastructure covering compute, storage, system administration and support, network, security and operations hosting national infrastructure 					

SI No.	Position	No. of Experts	Qualification and Experience	Individual Person Months	Total Person Months
			<ul style="list-style-type: none"> ▪ Provide the Infrastructure Architecture for the National level Agri Stack Central Core, assuming an open-source, cloud-based, cloud-agnostic technology stack that enables portability between any of the MEITY empanelled cloud vendors in the country ▪ Assist, oversee and direct the Cloud System Integrator (to be procured separately by the MoAFW) in their deployment of the required cloud infrastructure for the POC ▪ Prepare Standard Operating Document for AgriStack Infrastructure for states and MOAFW ▪ Provide Infrastructure requirement inputs for concept note and feasibility reports for pilot testing and nationwide rollout of the Agri stack ▪ Prepare detailed infrastructure requirement reports for pilot and national level roll out of AgriStack at state and MOAFW 		
3	Application Development specialist	1	<ul style="list-style-type: none"> ▪ The Application Development specialist shall have a Bachelor's degree in Engineering or Computer Science or Information Technology. Post-graduate degree in Engineering or Computer Science or Systems Software or an MBA/ MCA or MBA/ MCA equivalent shall be an advantage. ▪ The specialist should have 15 years of experience in development, testing and maintenance of application software along with application, network and system security, project management, Disaster Recovery Site Management, Capacity planning and IT management for digital products/solutions or digital transformational projects around India stack for enterprises or government clients in India. ▪ Work experience should include India's Identity Stack including Aadhaar Authentication and e-KYC, e-Sign, etc. 	6	6

SI No.	Position	No. of Experts	Qualification and Experience	Individual Person Months	Total Person Months
		<p><u>DETAILED ACTIVITIES</u></p> <p>The Application Development specialist shall support the team and will be responsible for:</p> <ul style="list-style-type: none"> ▪ Support Team leader for development of Proof of Concept Development for National Agri Stack ▪ Study existing systems and prepare Functional Requirement Specification document, and develop Low Level Design document for the AgriStack ▪ Finalize the design environment for application development in consultation with the team and stakeholders ▪ Develop the all core applications for POC ▪ Complete the system integration and user acceptance testing ▪ Finalize the production release versions of the applications ▪ Prepare training/user manuals ▪ Support the training and capacity building workshops ▪ Setup Prototypes, Wireframes, Test environments, Test Tools, Simulators as required during the project lifecycle 			
4	Solution Architect specialist	1	<ul style="list-style-type: none"> ▪ The Solution Architect specialist shall have Bachelor's degree in Engineering or Computer Science or Information Technology, and Post-graduate degree in Engineering or Computer Science or Systems Software or an MBA/ MCA or MBA/ MCA equivalent. ▪ The specialist should have 15 years of experience in development, testing and maintenance of application software along with application, network and system security, project management, Disaster Recovery Site Management, Capacity planning and IT management for digital products/solutions or digital transformational 	4	4

SI No.	Position	No. of Experts	Qualification and Experience	Individual Person Months	Total Person Months
			<p>projects around India stack for enterprises or government clients in India.</p> <ul style="list-style-type: none"> Work experience should include India's Identity Stack including Aadhaar Authentication and e-KYC, e-Sign, etc. 		
<p>DETAILED ACTIVITIES</p> <p>The Solution Architect specialist shall support the team and will be responsible for:</p> <ul style="list-style-type: none"> Support Team leader for development of Proof of Concept Development for National Agri Stack. Select and deploy appropriate open-source technologies suitable for a national level architecture for Agri Stack, including for the UFSI, and the Registries, as well as the Consent Layer and other components. Deploy the required APIs onto an API sandbox. Ensure that the various open source technologies interoperate with each other. Be responsible for infrastructure sizing of the production environment and share an infra architecture / pre-requisites to transition the release into production seamlessly. Drive the performance engineering and tuning of the architecture by ensuring designed architecture is for scale and devising plans to run load tests in the target environment post POC launch. Complete the system integration and enable the interoperability of the various APIs. Create solution architecture documentation for the deployment and infra architecture and ensuring the entire solution implementation and all integrations done follow the logic as per design construct 					
5	Implementation Delivery specialist	1	<ul style="list-style-type: none"> The Implementation Delivery specialist shall have Bachelor's degree in Engineering or Computer Science or Information Technology, and Post-graduate degree in Engineering or Computer Science or Systems Software or an MBA/ MCA or MBA/ MCA equivalent. The specialist should have 15 years of experience in development, testing and maintenance of application software along with 	5	5

SI No.	Position	No. of Experts	Qualification and Experience	Individual Person Months	Total Person Months
			<p>application, network and system security, project management, Disaster Recovery Site Management, Capacity planning and IT management for digital products/solutions or digital transformational projects around India stack for enterprises or government clients in India.</p> <ul style="list-style-type: none"> ▪ Work experience should include India's Identity Stack including Aadhaar Authentication and e-KYC, e-Sign, etc. 		
<p><u>DETAILED ACTIVITIES</u></p> <p>The Implementation Delivery specialist shall support the team and will be responsible for :</p> <ul style="list-style-type: none"> ▪ Support Team leader for development of a Proof of Concept Development for the National Agri Stack. ▪ Design a project plan for implementation of the overall project including project implementation milestones. ▪ Ensure timely development of the application software delivery in line with the solution specifications and co-ordinating the infra and application elements to ensure the release is done in a timely manner. ▪ Handhold the integration and enabling of interoperability of various APIs between multiple states and the Center and building an implementation playbook. ▪ Eventually streamlining SOP of state integrations in consultation with various other project consultants. ▪ Impart Training Capacity to States. 					
TOTAL					25.5