

Terms of reference (ToRs) for the procurement of services below the EU threshold

Integrating Artificial Intelligence in niceSSM	Project number/ cost centre: 14.0156.1-005.00
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0. List of abbreviations

AVB	General Terms and Conditions of Contract (AVB) for supplying services and work 2018
ToRs	Terms of References
niceSSM	Network for Information on Climate Ex-change for Sustainable Soil Management
ICT	Information and Communication Technology
ProSoil	Soil Protection and Rehabilitation for Food Security in India
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
BMZ	German Federal Ministry for Economic Cooperation and Development
NABARD	National Bank for Agriculture and Rural Development
AI	Artificial Intelligence
ML	Machine Learning

1. Context

a. Brief information on the project

The initiative “One World, No Hunger” has been initiated by the German Federal Ministry for Economic Cooperation and Development (BMZ) in 2014. It addresses a wide variety of topics in the field of agriculture, food and nutrition security and rural development. The global programme “Soil Protection and Rehabilitation for Food Security” has been commissioned under this initiative and is implemented in five countries: Benin, Burkina Faso, Ethiopia, Kenya and India.

In India, the “Soil Protection and Rehabilitation for Food Security in India (Pro SOIL)” is integrated into the Natural Resource Management Portfolio of GIZ. The project, “Pro SOIL” aims to implement sustainable approaches to the protection and rehabilitation of degraded soils, including soil fertility, in selected areas of India. In total, an area of 43.000 ha which has previously been under watershed development programmes is being covered in the five districts of Maharashtra (Ahmednagar, Amravati, Dhule, Jalna and Yavatmal) and two districts of Madhya Pradesh (Balaghat and Mandla). Three NGOs, BAIF Research Development Foundation, Watershed Organization Trust (WOTR) and Foundation for Ecological Security (FES) are building the capacities of smallholder farmers to protect and rehabilitate their soils and to invest in soil fertility management. The chemical soil properties are being tested and IT-based advisory services provided directly to farmers. These advisory services will include recommendations regarding the selection of crops and fertilizer recommendations, among others.

The steering of the project is jointly carried out by GIZ and the National Bank for Agriculture and Rural Development (NABARD) in India. The project furthermore aims to set up knowledge networks between science and practice to share good practices. Out of these dialogues, recommendations are to be generated on how to furthermore promote the stronger practice of soil protection, rehabilitation and soil fertility management.

NICE (<https://nicessm.org/>) is a tablet and web based knowledge management system developed for the project CCKN-IA (Climate Change Knowledge Network for Indian Agriculture).

ProSoil has adopted NICE system as ICT tool in the project, for knowledge management purposes and as monitoring system. NICE has been developed and updated to version-2 in year 2016. For the adoption of NICE system in Pro-Soil, a 3rd version in November 2017 was developed with additional features to focus majorly on monitoring activities.

Later in 2017 the application was adopted by ProSoil Project for Soil based advisories and cover 153,000 ha of land using the digital advisory tool. The application was renamed as per project objective as niceSSM (https://nicessm.org)

The NICE online web platform allows various knowledge providers from various domains of agriculture science sharing knowledge in a decentralized way across a number of subject domains to address local needs. The system is iterative and allows a multimodal two-way communication, between the expert network and linked farmers to meet the specific needs on a real time basis. The NICE application is combined with a tablet application capacitating extension cadre to function as last mile technology interface with farmers. The project revitalizes existing extension system, capacities and monitoring systems for effective development, dissemination and facilitates farmer adoption on extreme weather events.

NICE is capable to handle multiple Indian languages for content creation for multiple domains and bridges the last mile through multiple modes, whether it is on tablets, through SMS, Web, social media communicators or / and facilitates interaction through human interfaces. It is able to aggregate information on weather, climate contextualized Agro-advisories, disaster relief and can be customized to any needs. In addition, it holds a monitoring and reporting function (Version-3), through which demand based dynamic reports can be generated.

GIZ in partnership with MANAGE (www.manage.gov.in) which is an Autonomous body under Government of India, Ministry of Agriculture, Department of Cooperation. MANAGE has hosted separate server in their premises to run NICE system for other states and projects other than Pro-Soil project locations. (<https://nicesm.org>) The intent is that NICE has to be hosted on their Live and Staging servers and whenever there is an update, it should be copied to MANAGE servers as well

b. Objective for Tender

The application has been scaled out to 53,000 ha of land and further motive to cover 100,000 ha of land, this has led to 500,000 farmers additional to be registered. Already under synergy the application has been adopted by various Government and public partner and registered around 3 lacs farmers.

This huge amount of farmer to be addressed required huge amount human resources as scientist to produce content and respond to farmer queries.

Such humongous objective can not be addressed manual and hence project has focused to use Artificial Intelligence to create content and automatically respond to the farmers query in time.

The objective of this consultancy assignment is to engage services of consulting company to support in bringing Artificial Intelligence in the application at various aspects and support in larger scaleout.

Description of Assignment:

The assignment will divided in two parts:-

1. Necessary upgrades in niceSSM
niceSSM has been designed and coded since 2014, the versions of various frameworks and Database used that time has been upgraded to many new higher levels, to meet todays requirement on AI to function, these changes may be required
 - 1.1. Mongo DB upgrade from current version 3 to Version 4.4
 - 1.2. Upgrade Groovy
 - 1.3. Upgrade Grails from ver 2 to version 4
 - 1.4. Upgrade JAVA from version 8 to version 11
 - 1.5. Implement Database Sharding
 - 1.6. Improve notifications for app update, add crops, close crop with yield at season end
2. AI/ML/Automation use cases
 - 2.1. Convert SSM compendium to SMS and one pagers
 - 2.2. Convert Contingency Plan to SMS and one pagers
 - 2.3. Prepare automated SMS to be ready to be sent based to relevant location, crop stage/time applicable
 - 2.4. Prepare reschedule chart for reusable content
 - 2.5. Create dissemination pool, content ready for dissemination in one click
 - 2.6. Create auto responder for queries using Bot
 - 2.7. Identify, search answer for already solved similar query and share with query raiser
 - 2.8. Use Natural language processor to solve queries
 - 2.9. Import data from other systems using API and convert in usable content
 - 2.10. Create inference about situation in farm from queries raised by farmer and nearby location to provide additional information and support

- 2.11. Reduce duplicacy, reuse created content in different language to save effort in creating additional content
- 2.12. Create Image database to solve issues raised by farmers and diagnose problem themselves
- 2.13. Fetch data automatically related to weather, market prices, government schemes, subsidy etc
- 2.14. Create automate weather advisory based on weather predictions received specially focused to pest and disease attacks
- 2.15. Creating more channels and options for feedback
- 2.16. Enhance user experience
- 2.17. Farmer log their purchase such as seeds, fertilizer, this enable to create inference for advisory

Note: The organisation should adhere to General Data Protection and Privacy laws to ensure not to share any personal information in any query or response and also consent before sharing personal data including photo, video etc.

2. Tasks to be performed by the contractor

Responsible for following services:

1. Upgrade niceSSM as suitable for Artificial Intelligence integration (See point 1 in Description of Assignment)
2. Apply Artificial intelligence and Machine learning as per Description of assignment
3. Apply AI data modelling
4. The contractor must ensure compliance with the local law and privacy formalities: While enhancing the niceSSM tool, the principles of general data protection law, such as purpose limitation, data economy and transparency must be considered. The requirements of general data protection law, such as the obligation to provide proof and deletion upon request, must be anticipated in a way that a time-limited processing and storage of the data shall be ensured. Access to the backend is granted only to very limited user groups. The storage and transmission of sensitive and/or personal data must comply with current encryption standards. A description of the newly integrated process about the extent to which personal identifiable data is processed and what is done to protect the privacy needs to be integrated in the data protection declaration
5. Submit all bills and invoices for third party purchase. GIZ will not pay directly for any purchase or procurement. All costs need to be included in financial proposal under reimbursable costs.
6. Ensure for applications up and running during development, testing and handover of the assignment
7. Handover supporting documents on updates and all source codes
8. Closure report

Data Modelling- Current AI developments seems to focus mostly on big data, forgetting the value of observing small samples. If a model can be derived it can provide the most efficient path from question to answer. Even when the model is not completely perfect it can still get us closer to an answer.

While there is a lot of focus spent on the generic layer many existing systems follow relatively unstructured or “home-made” ways of dealing with domain models and reasoning over the domain layer. Instead, it is important that software engineers start thinking of what a complete AI system looks like and what are the other tools coming from AI research and related fields that can help. This is exactly where model-driven AI helps. For example work from **ontologies**, **inference** and **planning** can all help us build a better system.

In a more general sense, we need to think about the entire system as made up from a variety of sub-systems. Some sub-systems will be data-centric while others will depend on explicit models.

The vendor may require additional consultancy on Data modelling as sub-contracting, this will be allowed in the contract and need to mention on the proposal

Certain milestones, as laid out in the table below, are to be achieved by certain dates during the contract term, and at particular locations:

Task	Frequency	First attempt
Agreement on Time schedule		
Roles definitions and communication strategy		
Road map on niceSSM application upgrade		
Road map on Artificial Intelligence integration		
AI Modelling (External resources)		
Testing		
User acceptance testing		

Period of assignment: From **5th Nov 2020 until 4th Apr 2021**.

3. Concept

In the bid, the bidder is required to show how the objectives defined in Chapter 2 are to be achieved, if applicable under consideration of further specific method-related requirements (technical-methodological concept). In addition, the bidder must describe the project management system for service provision.

Technical-methodological concept

Strategy: The bidder is required to consider the tasks to be performed with reference to the objectives of the services put out to tender (see Chapter 1). Following this, the bidder presents and justifies the strategy with which it intends to provide the services for which it is responsible (see Chapter 2).

The bidder is required to present the actors relevant for the services for which it is responsible and describe the **cooperation** with them.

The bidder is required to present and explain its approach to **steering** the measures with the project partners and its contribution to the results-based monitoring system.

The bidder is required to describe the key **processes** for the services for which it is responsible and create a schedule that describes how the services according to Chapter 2 are to be provided. In particular, the bidder is required to describe the necessary work steps and, if applicable, take account of the milestones and contributions of other actors in accordance with Chapter 2.

The bidder is required to describe its contribution to knowledge management for the partner and GIZ and promote scaling-up effects (**learning and innovation**).

Project management of the contractor

The bidder is required to explain its approach for coordination with the GIZ project.

niceSSM Upgrade:

- Setting up timeline and milestones
- Discussion with GIZ Technical expert on requirement
- Preparing plan as per priorities for each Sprint
- Allocation of single point of contact for the activity

AI Integration:

- Setting up timeline and milestones
- Discussion with GIZ Technical expert on requirement
- Preparing plan as per priorities for each Sprint
- Allocation of single point of contact for the activity

The bidder is required to draw up a **personnel assignment plan** with explanatory notes that lists all the experts proposed in the bid; the plan includes information on assignment dates (duration and expert days) and locations of the individual members of the team complete with the allocation of work steps as set out in the schedule.

Backstopping

The bidder is required to describe its backstopping concept. The following services are part of the standard backstopping package, which (like ancillary personnel costs) must be factored into the fee schedules of the staff listed in the bid in accordance with section 5.4 of the AVB:

- CMMI Level 2 certification and ISO certification
- Service-delivery control
- Managing adaptations to changing conditions
- Ensuring the flow of information between GIZ and field staff
- Contractor's responsibility for seconded personnel
- Process-oriented technical-conceptual steering of the consultancy inputs
- Securing the administrative conclusion of the project
- Ensuring compliance with reporting requirements
- Providing specialist support for the on-site team by staff at company headquarters
- Sharing the lessons learned by the contractor and leveraging the value of lessons learned on site

4. Eligibility of the consulting firm

The eligibility of the consulting firm will be assessed on the following criteria:

- **Turnover and number of employees:** Average annual turnover of 100,000 Euro for the last three financial years¹ with minimum 10 employees as at 31.12 of the previous year.
- **Reference projects:** The Consulting firm submits reference projects with a minimum commission value of 20000 Euro. At least 2 references of projects completed in field of Knowledge Management, Open Source or niceSSM application and 2 references in developing applications in Artificial Intelligence, Machine Learning, CRM or Data Model.
- **Technical Experience:**
 - o Minimum two years' experience in developing applications on Open Source Technology for Web and Mobile applications using MongoDB for development projects
 - o Minimum two years' experience in developing Knowledge Management application in the agriculture sector for grass root level beneficiaries.
 - o Minimum One years' experience in Data Modelling for integration AI for applications working in Government sector, especially in Agriculture field
 - o ISO certification 9001 for Quality Management Systems and CMMI level 3 certification
 - o Minimum two years' experience in developing or integration AI in content Management systems.

5. Personnel concept

The bidder is required to provide personnel who are suited to filling the positions described, on the basis of their CVs (see Chapter 8), the range of tasks involved and the required qualifications.

The below specified qualifications represent the requirements to reach the maximum number of points.

Team leader

Tasks of the team leader

- Overall responsibility of maintenance and helpdesk responsibility (quality and deadlines)
- Coordinating and ensuring communication with GIZ, partners and others involved in the project
- Personnel management, in particular identifying the need for short-term assignments within the available budget, as well as planning and steering assignments and supporting local and international short-term experts
- Regular reporting in accordance with deadlines

Qualifications of the team leader

- Education/training (2.1.1): General qualification ('Diploma'/Degree) in Computer Science
- Language (2.1.2): Good business language skills in English
- General professional experience (2.1.3): 10 years of professional experience in the IT sector
Specific professional experience (2.1.4): min 2 years experience in Artificial Intelligence
- Leadership/management experience (2.1.5): 5 years of management/leadership experience as project team leader or manager in a company

¹ Last but four financials can be included in case of invitation to tender held within six months of end of last financial year

- Regional experience (2.1.6): 5 years of experience in projects in PAN India preferably in state of Madhya Pradesh and Maharashtra
- Development Cooperation (DC) experience (2.1.7): 2 years of experience in DC projects such as GIZ
- Other (2.1.8): Should have worked as project lead for grass root level application, preferably farmer related application
Must have experience minimum 1 year on Data Modelling

Web Application Expert (software Engineer)

Tasks of expert 1

- Support in upgrading niceSSM web application
- Support in implementing AI part in niceSSM codes for the web application
- Monitor and resolve any bug or issues in the web applications

Qualifications of expert 1

- Education/training (2.2.1): General qualification ('Diploma'/Degree) in Computer Science
- Language (2.2.2): Good business language skills in English
- General professional experience (2.2.3): 8 years experience in web applications development
- Specific professional experience (2.2.4): min 2 years experience in developing knowledge management systems on open source technology
4 years of professional experience in the software development/HTML/Web Application coding softwares
- Leadership/management experience (2.2.5): -Not Applicable-
- Regional experience (2.2.6): 2 year Pan India work experience
- Development Cooperation (DC) experience (2.2.7): 2 years of work experience in organisation such as GIZ
- Other (2.2.8): Should have experience in developing open source application for Knowledge Management Systems for beneficiaries at grass root level

Soft skills of team members

In addition to their specialist qualifications, the following qualifications are required of team members:

- Team skills
- Initiative
- Communication skills
- Sociocultural competence
- Efficient, partner- and client-focused working methods
- Interdisciplinary thinking

Mobile Application Expert (software Engineer)

Tasks of expert 2

- Support in upgrading niceSSM Mobile application
- Support in implementing AI part in niceSSM codes for the Mobile application
- Monitor and resolve any bug or issues in the mobile application

Qualifications of expert 2

- Education/training (2.3.1): General qualification ('Diploma'/Degree) in Computer Science
- Language (2.3.2): Good business language skills in English
- General professional experience (2.3.3): 8 years experience in Software development
- Specific professional experience (2.3.4): 4 years in Open Source and Android tool kit
4 years of professional experience in JSON Parsing, Payment Gateway, Phonegap
Knowledge of web services such as XML, JSON, REST

- Leadership/management experience (2.3.5): -Not Applicable-
- Regional experience (2.3.6): 2 year Pan India work experience preferably in Madhya Pradesh and Maharashtra
- Development Cooperation (DC) experience (2.3.7): 2 years of work experience in organisation such as GIZ
- Other (2.3.8): Should have experience in developing/maintaining open source application for Mobile on Knowledge Management Systems

Soft skills of team members

In addition to their specialist qualifications, the following qualifications are required of team members:

- Team skills
- Initiative
- Communication skills
- Sociocultural competence
- Efficient, partner- and client-focused working methods
- Interdisciplinary thinking

Web Application Expert (Artificial Intelligence)

Tasks of expert 3

- Propose AI integration roadmap for web application
- Prepare use case and stories where ever applicable
- Consult with Web App Dev while integrating changes
- Test the integration changes and present report
- Monitor and resolve bug and issues

Qualifications of expert 3

- Education/training (2.4.1): General qualification ('Diploma'/Degree) in Computer Science
- Language (2.4.2): Good business language skills in English
- General professional experience (2.4.3): 5-8 years experience in Web application development
- Specific professional experience (2.4.4): min 2 years experience in Artificial Intelligence/Machine learning application development
- Leadership/management experience (2.4.5): -Not Applicable-
- Regional experience (2.4.6): 2 year Pan India work experience preferably in Madhya Pradesh and Maharashtra
- Development Cooperation (DC) experience (2.4.7): 2 years of work experience in organisation such as GIZ
- Other (2.4.8): Certification in Artificial Intelligence is preferred. Knowledge of Python is preferred

Soft skills of team members

In addition to their specialist qualifications, the following qualifications are required of team members:

- Team skills
- Initiative
- Communication skills
- Sociocultural competence
- Efficient, partner- and client-focused working methods
- Interdisciplinary thinking

Mobile Application Expert (Artificial Intelligence)

Tasks of expert 4

- Propose AI integration roadmap for mobile application
- Prepare use case and stories wherever applicable
- Consult with Mobile App Dev while integrating changes
- Test the integration changes and present report

- Monitor and resolve bug and issues for the mobile app
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Qualifications of expert 4

- Education/training (2.5.1): General qualification ('Diploma'/Degree) in Computer Science
- Language (2.5.2): Good business language skills in English
- General professional experience (2.5.3): 5-8 years experience in Web/Mobile application development
- Specific professional experience (2.5.4): min 2 years experience in Artificial Intelligence/Machine learning application development
- Leadership/management experience (2.5.5): -Not Applicable-
- Regional experience (2.5.6): 2 year Pan India work experience preferably in Madhya Pradesh and Maharashtra
- Development Cooperation (DC) experience (2.5.7): 2 years of work experience in organisation such as GIZ
- Other (2.5.8): Certification in Artificial Intelligence is preferred. Knowledge of Python is preferred

Soft skills of team members

In addition to their specialist qualifications, the following qualifications are required of team members:

- Team skills
- Initiative
- Communication skills
- Sociocultural competence
- Efficient, partner- and client-focused working methods
- Interdisciplinary thinking

AI Modelling

6. Costing requirements

Assignment of personnel

Team leader: On-site assignment for 30 expert days

Expert 1(Web App Expert): Assignment in country of assignment for 35 expert days
 Expert 2(Mob App Expert): Assignment in country of assignment for 20 expert days
 Expert 3(Web App Expert-AI): Assignment in country of assignment for 40 expert days
 Expert 4(Mob App Expert-AI): Assignment in country of assignment for 25 expert days

7. Inputs of GIZ or other actors

GIZ and/or other actors are expected to make the following available:

- ProSoil Project Technical Expert-IT as contact person with the vendor

8. Requirements on the format of the bid

The structure of the bid must correspond to the structure of the ToRs. In particular, the detailed structure of the concept (Chapter 3) is to be organised in accordance with the positively weighted criteria in the assessment grid (not with zero). It must be legible (font size 11 or larger) and clearly formulated. The bid is drawn up in English (language).

The complete bid shall not exceed 15 pages (excluding CVs & other company documents to be submitted as per grid for assessing eligibility of firms).

The CVs of the personnel proposed in accordance with Chapter 5 of the ToRs must be submitted using the format specified in the terms and conditions for application. The CVs shall not exceed 4 pages. The CVs must clearly show the position and job the proposed person held in the reference project and for how long. The CVs can also be submitted in English (language).

If one of the maximum page lengths is exceeded, the content appearing after the cut-off point will not be included in the assessment.