

## Term of References (TOR)

### for technical consultant to design and develop mobile application

**Date:** 27<sup>th</sup> June, 2022

**Project:** Creation of an irrigation mobile application for Jordan (WaFIRR)

**Funded by:** Food and Agriculture Organization of United Nation

**Hiring institute:** National Agricultural Research Center (NARC)

**Consultation period:** 4 months

<b>Term of References</b>	Technical consultant/ developer to design and develop mobile application for irrigation management
<b>Purpose of consultancy</b>	<p>National Agricultural Research Center is considered as the scientific arm of the Ministry of Agriculture and the only specialized governmental agricultural research institution at the national level, to constitute a national umbrella for applied agricultural research and governmental agricultural consultations. For many decades, NARC has implemented applied scientific research in many areas, most notably plant production, plant protection, animal production, veterinary medicine, climate change, non-traditional water use in irrigation (grey water and other treated wastewater), water harvesting, genetic engineering, biotechnology, biodiversity, selection of species and strains, and diagnosis of plant and animal pests and diseases.</p> <p>NARC is looking to hire an application developer with Android and iOS background experience, to develop a mobile web application for irrigated water management in Jordan.</p> <p>The main idea of the application is to calculate crop water requirements and provide recommendation (notifications) for farmers on irrigation management (irrigation scheduling) and water productivity in Jordan using both remote sensing data from an open source (WaPOR) and/or climatic data from reliable metrological stations. The application will be designed to assist farmers achieving efficient and productive irrigation management, and keep track of their water usage.</p>
<b>Scope of work</b>	<p>The task of consultant/ developer is to design and develop a functional, user-friendly mobile application for irrigated water management for both Android and iOS platforms, and to assist IT coordinator to integrate with other NARC applications and systems.</p> <p>This will be done by assessing the received requirements from the project team, deciding on the most convenient information system to handle and present the</p>

	<p>data, and transform the design a functional application along with its related modules.</p> <p><b>OBJECTIVES</b></p> <ol style="list-style-type: none"> <li>1. Developer should support project operations team to be integrated with other NARC developed Application.</li> <li>2. The development of any system workflow should be utilized using NARC resources (Google cloud platform, MS SQL servers).</li> <li>3. Provide essential information and documentation for any development (e.g. forums, manuals, reports and other useful information).</li> <li>4. Content of the development has to be in line with NARC’s standards.</li> <li>5. The developer will work closely with the IT coordinator.</li> </ol>
<p><b>Developer main duties and responsibility</b></p>	<p>Within this framework, an application developer will be recruited to perform the following tasks:</p> <ol style="list-style-type: none"> <li>a) Designing user friendly, efficient and easily accessible application/system that integrates with other applications and systems at NARC</li> <li>b) Provide helpful information for the workflow, background information and other appropriate information to the project team at NARC.</li> <li>c) Suggesting regular upgrading possibilities to both Android and iOS platforms, and the content in terms of topics, style of presentation, designs...etc.</li> <li>d) The developer will provide the source code with the documentation after delivery of the project.</li> </ol> <p><b>Other Duties</b></p> <ul style="list-style-type: none"> <li>- Work with IT coordinator in the designing, development and delivery of the application/system and any task related to the application development.</li> <li>- Work with IT coordinator in proposing the most convenient and latest technology solutions.</li> <li>- Develop responsive web interfaces using latest technology needs.</li> <li>- Design and develop bilingual interface for the application (English and Arabic)</li> <li>- Develop advanced data visualization tools (for offline and online presence).</li> <li>- Perform all necessary steps to build the new application/ system in order to achieve a final satisfactory working version.</li> <li>- Develop responsive front end for a website/portal (in html and dynamic mode) as per the design.</li> <li>- Delivery all necessary relevant documents and source codes to insure a final working version of the application/ system.</li> <li>- Performing initial application testing/debugging, in particular unit testing and integration testing procedures in addition to regression testing whenever required.</li> <li>- Being ready to work on a testing host server to put the developed version and any new changes on a daily basis.</li> </ul>

	<ul style="list-style-type: none"> <li>- Preparing and submitting the required technical deliverables, as detailed in the deliverables section below.</li> <li>- Performing all fixes/new components required by the IT coordinator during the agreed duration.</li> <li>- The application/system must be compatible with and well rendered in Microsoft Internet Explorer 11 and above, Mozilla Firefox 50.0 and above, and Google Chrome 55.0 and above.</li> <li>- The application/system must run on any screen sizes, using modern UI frameworks for responsive design is mandatory.</li> <li>- Participating in the launching of the installation of the application and other related meetings as necessary.</li> <li>- The mobile platform should be accessible on multiple platform</li> <li>- The data displayed on the app should update automatically</li> <li>- Features such as notification system, specification for target devices and localization (Geo tagging)</li> <li>- The web application will download and runs either from web browsers or mobile stores as application.</li> <li>- Training one staff designated by the IT coordinator for the use of the final version.</li> <li>- Regularly report to the IT coordinator on the process of the application/ system development.</li> <li>- Meeting with project team when requested.</li> <li>- Perform any other tasks requested by the IT coordinator and related to the development of the application/ system.</li> </ul>
<b>Deliverables</b>	<p>Progress towards achieving each task during the contract will be monitored on a regular basis and with reference to a clear set of deliverables, including, where needed/applicable:</p> <ul style="list-style-type: none"> <li>- Monthly progress reports on the tasks performed and/or completed</li> <li>- Application detailed design report.</li> <li>- End-of-mission report that concludes mission and assesses it.</li> <li>- Final coding standards and conventions document.</li> <li>- Source codes of the application (ASP.net).</li> <li>- System User Manuals (both administrator and user manual)</li> <li>- All related electronic materials (CDs, e-books, etc) acquired as part of the project (originals where applicable)</li> <li>- All necessary documentation (hardware and Software): to maintain the sites where the software has been installed and all related passwords.</li> <li>- All user profiles and access credentials: including the administrator profile and any related password to the database or source code or online host/website related to the application/ system.</li> </ul>
<b>Task stages</b>	<p>Three task stages must be performed by the developer</p> <ol style="list-style-type: none"> <li>1- Application design and development stage</li> <li>2- Application stabilization and User Acceptance Test (UAT) stage</li> <li>3- Support and Maintenance stage</li> </ol>

<p><b>Stage 1: Application design and development</b></p>	<p>The consultant/ developer shall complete the following activities / tasks for the period of scheduled months:</p> <ul style="list-style-type: none"> <li>- Development of the design must be submitted for review and approved by NARC project team followed by update based on feedback.</li> <li>- Development and configuration of an Alpha version of the App focusing on key features (to be defined during project timeline);</li> <li>- Review and approval of the Alpha App design and functionalities by NARC project team;</li> <li>- Quality, security and performance testing and fix;</li> <li>- Full implementation and delivery of the features and design of the app (Beta version);</li> <li>- Finalization, including final quality testing and approval;</li> <li>- Adopt Role-Based Access Control (RBAC) to authorize users access to system resources based on roles</li> <li>- System should be scalable and upgradeable as and when the number of users and contents increases</li> <li>- The web-based software should have provision to support bilingual (English and Arabic).</li> <li>- Using Email, SMS and Application notification system to notify the users.</li> <li>- Support for the application process and launch of the app in Google Play and Apple App Store.</li> </ul>
<p><b>Stage 2: Application stabilization and User Acceptance Test (UAT)</b></p>	<p>The consultant/ developer shall complete the following activities / tasks for the period of scheduled months:</p> <ul style="list-style-type: none"> <li>- Dedicated On-site support to NARC project team</li> <li>- Preparation of UAT environments.</li> <li>- Incorporate all minor and major changes such as changes in database objects and relationships among the objects, system workflows, and other necessary and critical changes which impact the overall working functionalities.</li> <li>- Prepare all the System User Manuals (both technical and user manual) and hand over to NARC.</li> <li>- Trainings and workshops wherever necessary as desired by the NARC</li> <li>- The consultant/ developer shall provide relevant training materials to the Key Users from NARC with no escalation in the cost.</li> </ul>
<p><b>Stage 3: Support and Maintenance</b></p>	<p>The consultant shall provide free Support and Maintenance support for a period of 1 year after the application/system is officially launched.</p> <p>The Consultant shall perform all maintenance activities related to the following:</p> <ul style="list-style-type: none"> <li>- Trouble shooting at both Applications level and User level.</li> <li>- Assist the IT coordinator in operation of the systems.</li> <li>- Solution up-gradation such as installation of patches, fixing bugs, minor changes, higher versions of the applications, etc.</li> <li>- Prompt attention to the issues raised by NARC.</li> </ul>
<p><b>Duration and working schedule:</b></p>	<p>TASKS DEADLINES</p>

	<p>The consultant/ developer should complete all required tasks as stated above within the following timeline (starting from 15<sup>th</sup> of August 2022 and by no later than 30<sup>th</sup> of November 2022):</p> <ol style="list-style-type: none"> <li>1- Design, development and install of the application on NARC's Servers (Start from 15<sup>th</sup> August, 2022 and by no longer than 31<sup>st</sup> of October, 2022).</li> <li>2- User Acceptance Test (UAT) and feedback changes (Start from 1<sup>st</sup> of November, 2022 and by no longer than 30<sup>th</sup> of November, 2022).</li> <li>3- Maintenance until the end of November 2023.</li> </ol>
<p><b>Application Modules</b></p>	<p><b>User registration Module</b></p> <p>The users shall be able to register online with following information for registration.</p> <ol style="list-style-type: none"> <li>(1) Username,</li> <li>(2) Password,</li> <li>(3) First name,</li> <li>(4) Last Name,</li> <li>(5) National ID,</li> <li>(6) Farmer ID (JIAMIS), if available</li> <li>(7) Mobile Number,</li> <li>(8) email ID,</li> </ol> <p>Based on their roles and access rights, only authorized users will have access on information or data or functions of the application.</p> <p><b>Information Modules</b></p> <p>The application/system shall be form to Create, Search, Edit, Update and Delete with the following information:</p> <ol style="list-style-type: none"> <li>1) Farm information <ul style="list-style-type: none"> <li>- Farm name</li> <li>- Total cultivated area</li> <li>- Farm Geo area</li> <li>- Farm GPS coordinate</li> <li>- Soil analysis, if available</li> <li>- Water analysis, if available</li> <li>- Available irrigated water</li> <li>- Allowable irrigated water</li> <li>- Crop type</li> <li>- Add new farm</li> </ul> </li> </ol>

	<p>2) Crop information</p> <ul style="list-style-type: none"> <li>- Crop type (Trees or Vegetables)</li> <li>- Crop cultivated area</li> <li>- Crop name</li> <li>- Planting date / age</li> <li>- Irrigation system</li> <li>- Add new crop</li> </ul> <p>3) Irrigation system</p> <ul style="list-style-type: none"> <li>- Irrigation type</li> <li>- Irrigation specification</li> <li>- Add new irrigation type</li> </ul> <p>4) Irrigation system specification</p> <ul style="list-style-type: none"> <li>- Pump discharge</li> <li>- Distance between lines</li> <li>- Distance between dripper (for drip irrigation)</li> <li>- Dripper discharge (for drip irrigation)</li> <li>- Sprinklers discharge (for sprinklers irrigation system)</li> <li>- Distance between trees</li> <li>- No. of dripper per tree</li> </ul> <p><b>Processing Module</b> The Application/ system must process all information provided by metrological station, NARC database as well as information collected by the end users with the possibility to collect data from open access portal (WaPOR) to calculate crop water requirement and provide recommendation based on input information</p> <p><b>Scheduling and Tracking Module</b> The application/system must calculate crop water requirement based on selected schedules and provide the accumulated usage of irrigated water and allowable in an annual based</p> <p><b>Integration Module</b> The Application/system shall be integrated with other application developed by NARC on API based data platform.</p>
<b>Place where services are to be delivered:</b>	NARC headquarter
<b>Delivery dates and how work will be delivered</b>	<ul style="list-style-type: none"> <li>- Delivery Date will be by end of November 2022</li> <li>- The developer will provide the source code with the documentation after delivery of the project.</li> <li>- Maintenance will be for one year after the delivery</li> </ul>

<b>Monitoring and progress control, including reporting requirements:</b>	<ul style="list-style-type: none"> <li>- The consultant/ developer will work closely with NARC’s IT coordinator and will provide monthly report on work progress.</li> <li>- The consultant/ developer will report directly to NARC’s responsible officer and assist in reporting to funding agency (FAO)</li> </ul>
<b>Qualifications and skills, including language requirements:</b>	<p><b>Qualifications:</b></p> <ul style="list-style-type: none"> <li>- University degree in computer science/ information technology management / software engineering or related field.</li> <li>- At least 3 years of relevant experience in software-development.</li> <li>- Experienced in Mobile App development on both iOS and Android platforms.</li> <li>- Experience in Google developer tools, Google Analytic and API.</li> <li>- Experience in web programming languages</li> <li>- Experience in developing responsive web designs (HTML5/Bootstrap/CSS)</li> <li>- Strong Microsoft SQL Server skills.</li> <li>- Strong knowledge in iOS and Android SDK.</li> <li>- Experience in the following roles: Web Development, ASP.Net framework, SQL server and design/architectural patterns (Model-View-Controller (MVC))</li> <li>- Experienced in Desktop Application development.</li> <li>- Experienced in systems integration.</li> <li>- Experienced in the following languages are preferred C# .NET and Razor/JavaScript/Ajax.</li> <li>- Familiarity with REST and/or SOAP APIs.</li> <li>- Excellent knowledge and use of computers and of office applications.</li> <li>- Knowledge of LINQ are preferred.</li> <li>- Ability to build high-quality scalable web application.</li> <li>- Design and execute functional, performance and security testing and verification.</li> </ul> <p>Language requirements:</p> <ul style="list-style-type: none"> <li>- Excellent knowledge of spoken and written Arabic and English.</li> </ul> <p>Other qualifications:</p> <ul style="list-style-type: none"> <li>- Good organizational and communicational skills.</li> <li>- Strong attention to detail.</li> <li>- Understanding of Agile methodologies.</li> <li>- A team player</li> <li>- Excellent communication skills, oral, written and presentation</li> </ul>
<b>Scope of Price Proposal and Schedule of Payments</b>	<p>Payment Schedule</p> <ul style="list-style-type: none"> <li>- The payment will be an “all inclusive” lump sum for the design, development and launch support of the mobile application.</li> <li>- The payments will be made based on the deliverables.</li> <li>- The first payment not to exceed 20% will be made once the developer produce and present the initial work frame.</li> </ul>

	<ul style="list-style-type: none"> <li>- The second payment not exceed 30% will be made once the developer fully implement and delivery application features and design of the application (Beta version);</li> <li>- The third payment not to exceed 30% will be made once the developer fully implement the final version of the application, including end-of-mission report, final quality testing, UAT and the approval of NARC’s project team.</li> <li>- The fourth payment not to exceed 10% will be made once the developer deliver application source code and all related documentations.</li> <li>- The fifth payment not to exceed 10% will be made at the end of maintenance support period.</li> </ul>
<b>Recommended Presentation of Offer</b>	<p>For purposes of generating offers whose contents are uniformly presented and to facilitate their comparative analysis, it is recommended to have in yours offer the following documents:</p> <ul style="list-style-type: none"> <li>- <b>Cover Letter</b> of Confirmation of Interest and Availability;</li> <li>- <b>Personal CV</b>, indicating all past experience from similar projects, as well as the contact details (email and mobile number) of the candidate and at least three (3) professional references;</li> <li>- <b>Financial Proposal</b> that indicates financial cost categorized by developing stages or by deliverables within the period of consultants (6 months) and one-year maintenance support after deliver the application and all related documentation. If you are employed by an organization/company/institution, and you expect your employer to charge a management fee in the process of releasing you to NARC, you must indicate this at this point, and ensure that all such costs are duly incorporated in the financial proposal submitted to NARC.</li> </ul>
<b>Criteria for Selecting the Best Offer</b>	<p>The selection of the best proposal will be done by using combined scoring method – where</p> <ul style="list-style-type: none"> <li>- Qualifications and methodology will be weighted a maximum of 70%,</li> <li>- Financial proposal which will be weighted a maximum of 30%.</li> </ul> <p>The technical part of the application will be assessed based on the strength of the mobile design that best fits NARC’s needs, as well as previous experiences of the provider in developing such tools.</p>
<b>Services to be provided by NARC</b>	<p>NARC will provide</p> <ul style="list-style-type: none"> <li>- Office Space to report to the office for the entire consulting period</li> <li>- Access to NARC network infrastructure and server room</li> <li>- All technical information related to equations used to calculate crop water requirement will be provided by NARC experts</li> <li>- ICT equipment if needed</li> <li>- NARC shall make the necessary logistical arrangements for training.</li> </ul>
<b>Confidentiality of Data</b>	<p>Data handled by the consultant/ developer during the task period of the project is classified and restricted in nature, consultant/developer must sign a Non-Disclosure Agreement with NARC.</p>



<b>Ownership of Source Code and other Intellectual Property</b>	NARC will be the rightful owners of the Source Code and all Intellectual Property associated with the system and NARC shall have full rights over these resources. The entire software component developed as part of this assignment shall be the sole property of NARC. The consultant/ developer will have no right to commercially use or apply the software elsewhere.
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To express your interest, please submit your cover letter, updated CV, reference letters and financial proposal before July 11<sup>th</sup>, 2022 to [director@narc.gov.jo](mailto:director@narc.gov.jo)