**PRELIMINARY MARKET CONSULTATION (PMC) UNDER THE PPI4MED PROJECT**

**CALL DOCUMENT**

# INFORMATION OF THE CONTRACTING AUTHORITY AND THE PRELIMINARY MARKET CONSULTATION

## CONTRACTING AUTHORITY

This Preliminary Market Consultation (PMC) will be carried out by the National Center for Research and Development (NCRD) on behalf of the National Agriculture Research Center (NARC) and the Scientific Research and Innovation Fund (SRIF). Both the NARC and the SRIF have directly participated in this consultation by defining and identifying public challenges and needs. If needed, their members will offer technical assistance to the NCRD during the PMC process.

## PRELIMINARY MARKET CONSULTATION PURPOSE

The purpose of this preliminary market consultation is to identify and gather information on innovative solutions that could potentially address the public challenges and needs described in Annex II. These challenges and needs have been identified within the framework of the execution of various public services and their resolution is expected improve the efficiency and capabilities of the Jordanian public sector.

In this sense, the information obtained through this PMC may be used for the development of Innovation Procurement tenders through which the suitable innovative solutions could be developed or acquired.

This Preliminary Market Consultation will be carried out within the framework of the PPI4MED project. PPI4MED is a project that aims to transfer the R&D results from National Research Centers (NRCs) in five Mediterranean countries to society through Innovation Procurement, to boost the commercialization of research results from public research institutions through Innovation Procurement programs and projects, as well as private-public commercialization partnerships.

# CHALLENGES

The purpose of this PMC is to gather the necessary information for a subsequent Innovation Procurement tender regarding the following challenges:

* Challenge I: Innovative methods for early detection of the red date palm weevil.
* Challenge II: Ensuring the quality and traceability of organic agricultural products**.**
* Challenge III: Dam water management.
* Challenge IV: Innovative methods for cancer detection.

This consultation, in which both individual and legal bodies are allowed to participate, enables the presentation of innovative solutions aimed at responding to the challenges posed. To this end, technologies that exceed the capabilities of those currently available in the market will be used, defining their innovative technical and functional specifications, and this can be achieved through public procurement.

The NCRD expects to gather information from the market on the aforementioned Challenges for their correct execution. The challenges are described in detail in Annex II.

# LEGAL BASIS

The PMC will be developed in the framework of the PPI4MED project under the ENI CBC Mediterranean Sea Basin Programme. The legal basis for the procedure includes the EU legal framework, in particular the GDPR Regulation in absence of national law in this regard.

# PARTICIPANTS

The consultation is open and is aimed at individuals or legal bodies, public or private, who may provide market information to the contracting authority, such as experts or independent authorities, professional associations or, due to their knowledge, manufacturers, marketing companies or partners.

Each participant may submit more than one proposal. However, each proposal must provide an innovative solution for just one of the challenges.

The proposals may be submitted individually or jointly. If a proposal for an innovative solution is submitted jointly by a group of entities, only a single form will be submitted by a single legal entity that represents the rest.

Due the informative nature of the proposals presented in this preliminary market consultation; its presentation will not prevent the participation in the subsequent public procurement process.

Participation in the PMC does not grant any right or preference with respect to the awarding of any contracts that may subsequently take place within the scope of the object of this call and, as a consequence, the NCRD is not obliged to finance or accept the proposals submitted in this call.

# PROCEDURE

## DEADLINE AND UPDATES

The period for submitting proposals will be from the day following the publication of this call on the NCRD website (<http://www.ncrd.gov.jo/>) until October 15, 2023, at 15:00H.

This period may be extended if it is necessary, which will be informed through the NCRD website.

The Challenges or issues raised in this call may be updated by the NCRD. Therefore, new challenges may be added or those already published may be reformulated, as a consequence of the evolution of the PMC itself.

Likewise, information sessions, meetings and any other communication and dissemination actions may be held.

## PRESENTATION OF PROPOSALS

The proposals will contain the following documents:

* The application form (Annex I), which may be completed in part or in full to the best of the participant’s knowledge. The application form will be available for download on the NCRD website.
* If applicable, any other documentation that is deemed of interest or appropriate. Documents that include text must be submitted in PDF format and not exceed, in aggregate, 30 pages; pages that exceed this limit will not be analyzed. If participants wish to attach a video, a link must be included for viewing or downloading it.

Proposals shall be sent to the following e-mail addresses: [info@ncrd.gov.jo](mailto:info@ncrd.gov.jo) and Dor challenge I and II [ghaidajbara@yahoo.com](https://novadays-my.sharepoint.com/personal/bviniegra_novadays_onmicrosoft_com/Documents/Escritorio/Novadays/Proyectos/NCRD/ghaidajbara@yahoo.com) (NARC) and challenge III and IV [Samar.Wrekat@mohe.gov.jo](mailto:Samar.Wrekat@mohe.gov.jo). The participants will indicate in the subject "PMC - NCRD + the acronym of the challenge the proposal responds to (as established in Annex II) + the title or acronym of the project". In this e-mail the participants shall expressly state their decision to participate in this preliminary consultation.

The title of the proposal indicated in the subject of the email and in the application form will be used in all communications with the NCRD during the process of the PMC.

The costs derived from the participation in the call will be borne by the participants.

The NCRD, on the basis of the responses received, may request a clarification from the participants.

## PRINCIPLES OF TRANSPARENCY, EQUAL AND NON-DISCRIMINATION TREATMENT AND DISTORTION OF COMPETITION

The development of this consultation will be carried out with full respect for the principles of transparency, equal treatment and non-discrimination and non-distortion of competition, so that no restriction or limitation of competition may occur, nor may any advantage or preference be granted to its participants with respect to the award of contracts that may subsequently be concluded within the scope of the object of this consultation. Thus, the submission of the application form shall not prevent the submission of bids at the time of the tender subsequently drawn up.

The NCRD will continuously guarantee the confidentiality of the innovative proposals and will take the appropriate measures to ensure the upholding of the aforementioned principles, both in the development of this consultation and in the subsequent contracting procedure.

During the period of presentation of the preliminary consultations, a document of frequently asked questions (FAQs) will be drawn up and published, where the questions and answers considered to be frequent and recurrent within the PMC will be collected in an orderly manner, with the aim of resolving certain basic questions in the most operative way possible and ensuring the access to the information to every participant in an equal and non-discriminative manner.

This form shall be published on the NCRD website.

## CONFIDENCIALITY AND PERSONAL DATA PROTECTION

During preliminary consultation process, participants' answers shall not be disclosed to others. The final conclusions report shall be published at the time of its completion.

To ensure the transparency of the process, the availability of the greatest possible information and the effective exchange of experiences and opinions, participants will expressly state their agreement for the NCRD to maintain accessible and updated the necessary information, in whole or in part, about their proposals, without prejudice to that which has been designated as confidential.

To do this, participants will indicate the documentation or the technical or commercial information of their proposal that is confidential in the points of Annex I enabled for this purpose, and it will not be admissible for them to make a generic declaration in which they declare that all the information is confidential. This confidentiality protects, in particular, technical secrets and confidential aspects of the solutions.

Information not considered confidential may be published in the conclusions of the Preliminary Market Consultation in order to promote collaboration between the participants, as well as these interested agents who have not participated in it.

Personal data that may be included in the proposals, shall be processed in a file for which the NCRD is responsible, in order to facilitate communication with the participants during the PMC process.

## RESULTS OF PRELIMINARY MARKET CONSULTATION

The NCRD, the NARC and the SRIF will study the proposals presented and may use them to define detailed administrative, functional or technical specifications within the framework of future Innovation Procurement tenders.

The NCRD will prepare a PMC Conclusions Report in which the actions carried out will be detailed. In any case, the Conclusions Report will list the evaluations and analyses carried out and their authors, the entities consulted, the questions that have been asked and their answers. The Conclusions Report will be published on the NCRD website.

Neither the proposals received nor the present consultation process itself are binding for the NCRD, the NARC, the SRIF or the agents that may participate in the future tenders that may be articulated.

The future Innovation procurement tenders will be open to any economic operators, irrespective of their participation in this PMC.

## LANGUAGE

Documents of PMC procedure shall be available in Arabic or English. If there is any conflict between Arabic version and English version, the Arabic version will prevail.

Participants shall submit their solutions in Arabic or English. Communication with the participants to answer the questions posed may be done in Arabic or English by the NCRD.

# INTELECTUAL PROPERTY

The data included in the proposals may only be used to carry out the administrative, technical and functional specifications that shall be included in the subsequent Innovation Procurement tenders.

The possible ideas for solutions submitted within the framework of the PMC shall not mention a specific manufacturing process, nor shall they refer to a brand, a patent or existing origins or types of production.

# TECHNICAL SUPPORT

The NCRD may take into account the advice provided by other entities or experts when it is needed to the correct execution and conclusion of the PMC. Such entities or experts shall sign a confidentiality agreement about proposals submitted data before they may access to them.

# PPI4MED project

The project, which has received an EU contribution of €3.3 million (90%) out of a total budget of €3.6 million, will last 37 months and will conclude with at least 12 public procurement tenders for innovation based on this new model for transferring the results of national research centres to meet the major challenges of the Mediterranean region.

*This document has been produced with the financial assistance of the European Union under the ENI CBC Mediterranean Sea Basin Programme. The contents of this document are the sole responsibility of NCRD and can under no circumstances be regarded as reflecting the position of the European Union or the Programme management structures.*

# ANNEX I: APPLICATION FORM

## Identification Data for the Proposal

|  |  |
| --- | --- |
| Proposal title |  |
| Acronym |  |
| Challenge it addresses |  |
| Entity or group |  |
| Email |  |

## PARTICIPANT’S information:

* Is this a joint proposal with more than one participant? YES/NO
* If yes, fill in the following table for each participant and indicate the participant in the first line (“Participant 2, Participant 3, etc.)

|  |  |  |  |
| --- | --- | --- | --- |
| Single Participant/Participant 1 | | | |
| Natural Person | Forma | | |
| Legal Person | Forma | | |
| Entity or business name |  | | |
| Name, surname and position of the interlocutor |  | | |
| Email |  | | |
| Phone number |  | | |
| Physical Address |  | | |
| Type of Entity (Self-employed, Private company, Public entity, University, Research Center, ,Other). |  | | |
| Area of Activity |  | | |
| Incorporation of the company |  | | |
| Number of employees: |  | | |
| Entity total turnover in recent years (€): | 2022 | 2021 | 2020 |
| Accumulated investiment in R&D in the last 3 years (€). If no investment has been made in this area, indicate N/A. |  | | |
| Public financing for R&D projects obtained during the past 3 years (€). If no financing has been obtained answer N/A. |  | | |
| Does the entity have experience in the execution of projects in the proposed area? Answer YES or NO | YES | NO | |
| If the answer is yes, please briefly describe such experience (area, client, execution period and description of the project). |  | | |

## General Description of the Proposal

|  |  |  |
| --- | --- | --- |
| General summary of the innovative solution. Functional specifications.  (A description of the solution that can meet the technological challenge posed from a functional approach should be made. Maximum 5,000 characters) |  | |
| Indicate the benefits that the proposed solution would bring in relation to overcoming the challenge, including the impact in terms of cost savings.  (Maximum 5,000 characters) |  | |
| Description and quantification of the potential national and international market associated with the proposal. (Maximum 1,000 characters) |  | |
| Justification of experience in developments related to the proposed project (Indicate for each project the year of execution, amount and description of the results).  (Maximum 1,000 characters) |  | |
| Indicate the normative and regulatory context of the project, justifying how you would approach its alignment with the same, as well as the technical and temporal disadvantages derived from the same.  (Maximum 2,500 characters) |  | |
| Is this section confidential? | YES | NO |
| State of the Art – Technology to develop.  It is necessary to:  - Describe the previous product or process (if any).  - Describe the new product or process or its improvement, with its main technical and functional characteristics, highlighting the most significant differential aspects and potential technological risks.  - Technological innovations presented by the project (indicate whether the innovations are national or international) and advantages for the company.  - Indicate the most significant technologies incorporated or planned to be developed in the project.  - Description of the state of development of these technologies for the defined functionality, among competing companies at national and international level.  - Technological novelty with respect to what currently exists.  - R&D results expected to be generated.  (Maximum 9,000 characters) |  | |

## Progress Criteria

|  |  |
| --- | --- |
| Definition of technical criteria to define and validate the TRL jumps in the project.  (Maximum 3,000 characters) |  |
| Technological risks associated with the proposed innovative solution.  (Maximum 3,000 characters) |  |

## TIMELINE

Include a basic project development schedule. Include the main activities and milestones (TRL jumps).

|  |  |  |  |
| --- | --- | --- | --- |
| Activity | Initial TRL | Final TRL | Duration (months) |
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| Identify potential risks that could prevent the project from being completed on schedule.  (Maximum 1,000 characters) | |  | |

## Economic Evaluation of the Proposed Solution

Estimated economic value of the R&D services, broken down by item (€); additionally, indicate the hours under the heading of PERSONNEL:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  | TRL n | TRL n+1 | TRL n+2 | TRL n+3 | Total |
| FIXED ASSET INVESTMENT |  |  |  |  |  |  |
| PERSONNEL | HOURS |  |  |  |  |  |
| University Graduates |  |  |  |  |  |  |
| Non- University Graduates |  |  |  |  |  |  |
| Materials |  |  |  |  |  |  |
| External Collaborations |  |  |  |  |  |  |
| OTHER EXPENSES |  |  |  |  |  |  |
| TOTAL |  |  |  |  |  |  |

## INTELLECTUAL PROPERTY RIGHTS

|  |  |
| --- | --- |
| Is this section confidential? | YES NO |
| Intellectual Property Rights  (It is necessary to identify:  -Whether there are pre-existing intellectual property rights (by the proponents or third parties) to the proposed development or not.  -If there is a potential risk of infringing any IPR.  -Whether intellectual property rights will be generated during the development.  -Whether the technology developed in the project will be patented.  -Whether scientific dissemination of the research results obtained will be allowed.  -Indicate the most important differences with other patents.  -Proposed policy for the management of the IPRs generated in the project by the entity.  (Maximum 3,000 characters) |  |

## Complementary Documents

|  |  |  |
| --- | --- | --- |
| Name of the file and format | Brief description of the content | Confidential: YES/NO |
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## Mandatory Declarations.

The submitted proposal is free of commercial patents, copyrights or any other copyright or business rights that would prevent its free use by the NCRD or any other collaborating entity in the development of future projects.

YES / NO

I authorize the NCRD, the NARC and the SRIF to use the contents of the proposal. This use will be limited exclusively to assess the possible inclusion of the contents in the process of defining the lines of work, which will be specified in the possible specifications of the possible procurement procedures to be processed subsequently under the formula of Public Procurement of Innovation. If applicable, during this process the NCDR may share the content of the proposal with other entities and bodies of the Hashemite Kingdom of Jordan that act as potential users of the solutions and with external experts, for the sole purpose of the aforementioned assessment.

YES / NO

I authorize the NCRD to store and disseminate my contact data, to keep accessible and updated the necessary information, in whole or in part, on the proposal submitted and to disclose technical or commercial information or documentation that, if applicable, is not identified as confidential. The rights of access, rectification, cancellation and opposition may be exercised by contacting the following e-mail address: [info@ncrd.gov.jo](https://novadays-my.sharepoint.com/personal/bviniegra_novadays_onmicrosoft_com/Documents/Escritorio/Novadays/Proyectos/NCRD/info@ncrd.gov.jo)

YES / NO

# aNNEX II: CHALLENGES

**Challenges Description for Preliminary Market Consultations (PMC):**

CHALLENGES from NARC (National Agricultural Research Center)

Challenge I: ***Innovative methods for early detection of the red date palm weevil***

Interested Administration: NARC (National Agricultural Research Center)

Strategic line.

Use of modern technology in plant protection on protected crops, open field crops and fruit orchards.

Introduction and framework

Palms are considered within the most characteristics trees of Middle East. Palm crops hold a unique and significant place in the agricultural landscape of Jordan, a country characterized by its arid climate and challenging environmental conditions. The cultivation of palm trees, particularly the iconic date palm (Phoenix dactylifera), has played a pivotal role in the history, culture, and economy of Jordan for centuries. These resilient and hardy trees have thrived in the country's harsh desert regions, offering a lifeline to local communities by providing sustenance, economic opportunities, and even a symbol of heritage.

There have been efforts in Jordan to promote date palm cultivation and increase production through modern agricultural techniques, improved irrigation methods, and the use of treated wastewater for agriculture. These efforts are part of the government's strategy to enhance food security and reduce reliance on imports.

The Red Date Palm Weevil, scientifically known as Rhynchophorus ferrugineus, is a type of insect pest that poses a significant threat to date palm trees (Phoenix dactylifera). It is commonly referred to as the "Red Palm Weevil" due to its reddish-brown coloration. This insect is native to South Asia but has spread to various parts of the world, including the Middle East, Europe, Africa, and the Americas, primarily through the global trade of palm trees and plant materials.

Here are some key characteristics and information about the Red Date Palm Weevil:

1. *Appearance*: Adult Red Date Palm Weevils are relatively large beetles, measuring about 2-5 centimetres in length. They are typically reddish-brown in colour, with a long, curved snout or rostrum, which they use to bore into the palm tree trunk.
2. *Life Cycle*: The life cycle of the Red Date Palm Weevil consists of several stages: egg, larva, pupa, and adult. Adult females lay eggs inside the palm tree's tissue, typically near the crown. After hatching, the larvae tunnel into the palm's trunk and feed on the soft tissue, causing significant damage.
3. *Damage*: The Red Date Palm Weevil is a destructive pest to date palm trees, as its larvae bore into the tree's core, causing structural damage and ultimately leading to the tree's death. Infestations can go unnoticed until the damage becomes severe, making it challenging to control.
4. *Economic Impact*: Date palm trees are economically important in many regions, as they produce dates, which are a valuable fruit crop. Infestations of Red Date Palm Weevils can lead to substantial economic losses due to reduced date production and the cost of pest control measures.
5. *Control Measures*: Managing Red Date Palm Weevil infestations is a significant challenge. Control methods include the use of pheromone traps to monitor and trap adult weevils, injecting pesticides into infested trees, and implementing cultural practices such as pruning and removing infested palm trees. Biological control methods, like the introduction of predatory insects, have also been explored.
6. *Spread*: Human activities, such as the movement of infested palm trees, contribute to the spread of the Red Date Palm Weevil to new areas. Quarantine measures and monitoring are often implemented to prevent its introduction into uninfected regions.

Efforts to control and manage the Red Date Palm Weevil are critical for protecting date palm tree populations, the date industry, and the livelihoods of those who depend on these trees for their income and food source. Early detection, quarantine, and integrated pest management strategies are essential components of combating this invasive pest.

Needs to be solved.

As in many other cases, for plants, animals and humans, prevention policies and, in particular, early detection is one of the most effective strategies to fight against all kinds of diseases and threats.

In view of the current experience, it is clear that the current means of detecting the Red Palm Weevil are not effective, because when the infection is identified in a tree, the level of disease progression in the tree is so advanced that it is impossible to recover it; therefore, the only possible solution is to eliminate it in order to avoid the spread of the pest.

Consequently, this challenge aims to provide the Jordanian public authorities with the means to detect the Red Palm Weevil disease at its earliest possible stage, in order to enable a control that includes the healing of as many of the affected trees as possible.

Characteristics of the solutions to be developed.

Possible solutions to this challenge can be of any kind: physical, chemical, remote sensing or any other applicable technology. No technical limits will be placed on them. They may be presented either in the form of products or in the form of services to be provided to the responsible authorities.

In any case they must be solutions whose application can be carried out over the entire palm crop area within reasonable time and cost limits. In fact, they must be mainly non-invasive solutions that can be carried out periodically on the whole of this crop within the country or, in case of a given alert, specifically for a given area at a given time.

Among the parameters of the solution, the cost and duration of its application per hectare and the time needed to put it into operation will be assessed. Depending on the types of solutions proposed, other relevant parameters may be identified for their evaluation in future tenders.

Challenge II: ***Ensuring the quality and traceability of organic agricultural products***

Interested Administration: NARC (National Agricultural Research Center)

Strategic lines.

Production chain studies for plant and animal agricultural products.

Research on organic agriculture/ farming.

Introduction and framework

Livestock and agriculture are two sectors that are fundamental to human livelihoods, providing essential food for our diets. However, they also play a crucial role in climate change, contributing significantly to greenhouse gas (GHG) emissions and environmental degradation.

On the other hand, some of these activities also generate significant environmental problems due to both the products used to improve their productivity, such as fertilisers, pesticides and medicines, and the waste they generate.

Organic farming and livestock management are sustainable agricultural practices that prioritize environmental stewardship, animal welfare, and human health. These methods eschew synthetic chemicals, genetically modified organisms (GMOs), and intensive confinement, focusing instead on natural and holistic approaches to cultivation and animal husbandry.

In organic agriculture, farmers employ organic fertilizers, crop rotation, and biological pest control to nurture the soil and protect plants. The absence of synthetic pesticides and herbicides promotes biodiversity and reduces harm to beneficial insects, birds, and aquatic life. Organic livestock management emphasizes humane treatment, access to pasture, and organic feed, ensuring that animals lead healthy and stress-free lives.

The principles of organic farming and livestock production not only benefit the environment but also yield nutritious, chemical-free food products that consumers can trust. This introduction will delve deeper into the practices, benefits, and challenges of organic agriculture and livestock, shedding light on how these methods contribute to a more sustainable and eco-friendly food system.

Policies exist in many countries around the world, including Jordan, to promote a greater presence of products from organic agriculture and livestock in the regular consumption of their inhabitants.

However, these production methods can result in higher-priced products by forgoing artificial means of productivity enhancement. On the other hand, according to surveys by multiple organisations around the world, a significant part of the population is willing to consume this type of product at the extra cost it represents.

To this end, monitoring systems for this type of products are implemented at all points in the food chain; the aim of these systems is to guarantee consumers that the extra cost they may be assuming allows the environmental effects of these products to be mitigated.

Needs to be solved.

Within de responsibilities of the food control public authorities a very important one consists in guaranteeing that the consumers buy what is indicated in the different labelling of the products.

This is even more critical in the case of organic farming and livestock products for two main reasons:

1. Because consumers are supposed to accept higher prices.
2. Because thus imply a better performance from the environment and climate evolution points of view

Therefore, the detection of any fraud in this specific area is crucial for the development of Organic farming and livestock.

The challenge is therefore to develop methods to identify the origin of foodstuffs from organic agriculture and livestock farming. Considering the breadth and variety of products generated by these sectors, at this stage we will limit the proposals to methods applicable to two specific products: tomatoes and cucumbers.

Characteristics of the solutions to be developed.

Possible solutions to this challenge can be of any kind: physical, chemical, or any other applicable technology. No technical limits will be placed on them. They may be presented either in the form of products or in the form of services to be provided to the responsible authorities.

The proposed solutions can provide for the means to ensure adequate measurement of parameters at any point in the logistics chain: both at the start of harvesting through analysis at the production sites and at the retail outlets, and at all intermediate points in the food chain logistics. The solution must include the IT component that will allow the corresponding authorities to follow the data in a near real time and to ensure the authenticity of data in case it is needed in legal proceedings.

Among the parameters of the solution, the cost of the Service or the product, the amplitude of the points of the food chain that it can cover the time needed to deploy it will be assessed. Depending on the types of solutions proposed, other relevant parameters may be identified for their evaluation in future tenders.

CHALLENGES from SRIFS (Scientific Research and Innovation Support Fund)

Challenge III: ***Dam water management***

* ***Minimizing water loss from dams***
* ***Early alarm monitoring system for sustainability in the dams***

Interested Administration: SRIFS (Scientific Research and Innovation Support Fund)

Strategic line.

Dam support projects in the Jordan Valley: maintenance and sustainability.

Introduction and framework

Water dams play a crucial role in Jordan's efforts to manage its scarce water resources, mitigate the impact of droughts, and support various sectors of its economy, including agriculture, industry, and domestic water supply. Jordan, located in the arid region of the Middle East, faces significant challenges related to water scarcity, which makes the construction and management of dams a strategic necessity for the country's development and sustainability.

Dams in Jordan serve multiple purposes, primarily to store and manage water resources effectively. They help in the collection and storage of rainwater, allowing for the conservation and controlled release of water to meet various demands, such as irrigation, drinking water supply, and hydropower generation.

As Jordan faces ongoing population growth and climate variability, the demand for water will continue to rise. Managing existing dams efficiently and exploring new technologies for water conservation and desalination will be critical for the country's water security.

Water dams in Jordan are indispensable for addressing the country's water scarcity and supporting its economic and social development. However, they also require careful planning, management, and environmental considerations to ensure sustainable water resource management for the future.

This issue has become more critical with climate change, since on the one hand the periods of rainfall have been shortened and, consequently, the water contributions to the water system are lower and, on the other, both the periods without rain and the temperatures have increased, which has led to an increase in evaporation.

In addition, another effect of climate change is the repetition of extreme climatic phenomena such as torrential rains, including periods of high intensity rainfall in which large floods occur. This type of event generates a large flow of materials that increase the clogging of reservoirs, reducing their capacity and, consequently, reducing their storage capacity. In addition, such events affect water quality.

Among the main threats affecting these infrastructures, two are particularly critical:

1. The first of these is conditioned by scarcity and affects the quantity of water in reserves: that is the water losses occurring in the reserves. These losses can be due to different factors, within which the evaporation has become a very important one due to the extreme climate conditions.
2. The second concerns the quality of the water in reserves, since any factor that prevents or limits the use of the water in reserves, particularly for human consumption but also for agricultural and livestock uses, reduces the available water resources. In this respect, the materials washed away by floods represent a major threat to the capacity of reservoirs and the usefulness of the dammed water.

Needs to be solved.

In order to optimise water management in the dam environment, Jordan needs new solutions to address these two types of problems; consequently, the solutions proposed in the framework of this challenge should address the following needs:

1. Water losses reduction. Solutions should enable to significantly limit the evaporation loses.
2. The development of systems that prevent the arrival in reservoirs of the large quantities of materials carried by floodwaters or that allow them to be efficiently removed.

Characteristics of the solutions to be developed.

It is up to economic operators to propose solutions that address these challenges in a complete or partial manner. Even partial solutions can be of interest if their effectiveness or efficiency allow significant improvements in the main parameters of water management and water quality.

Data collection methods can be of any type: direct or indirect, using different types of systems, either automatic or operator intervened. Barrier methods and strategies can be build-up in different ways.

The proposed solutions must integrate the management process of the data obtained, as well as their possible processing and presentation in such a way that they are useful for the operators responsible for managing the dams. For instance, early alert systems to prepare barriers shall be installed in the operational systems of the water management authorities.

Challenge IV: ***Innovative methods for cancer detection***

Interested Administration: SRIFS (Scientific Research and Innovation Support Fund)

Strategic line.

Cancer Detection.

Introduction and framework

Breast cancer is a significant health concern in Jordan, as it is in many countries around the world. Nevertheless, this question has some specificities in Jordan:

* *Incidence:* Breast cancer is one of the most common types of cancer among women in Jordan. The incidence of breast cancer has been increasing over the years, which may be attributed to various factors such as lifestyle changes and an aging population.
* *Risk Factors:* Several risk factors contribute to the development of breast cancer in Jordan, including age, family history, genetics, hormonal factors, and lifestyle choices such as diet and physical activity. Additionally, late marriage and delayed childbearing have been associated with an increased risk of breast cancer in the region.
* *Screening and Diagnosis:* Early detection is crucial for improving breast cancer outcomes. In Jordan, efforts have been made to promote breast cancer screening programs, including mammography and clinical breast exams. However, access to healthcare and awareness about the importance of early detection remain challenges, especially in rural areas.
* *Treatment:* Jordan has made advancements in breast cancer treatment and has well-established cancer centers and hospitals that provide comprehensive care. Treatment options include surgery, radiation therapy, chemotherapy, hormonal therapy, and targeted therapy. The choice of treatment depends on the stage and characteristics of the cancer.
* *Support and Awareness:* There are various support organizations and initiatives in Jordan that aim to raise awareness about breast cancer, provide support to patients and their families, and promote early detection. These efforts are vital in improving the overall breast cancer situation in the country.
* *Government Initiatives:* The Jordanian government, along with non-governmental organizations and international partners, has implemented programs and campaigns to address breast cancer. These initiatives focus on education, screening, and improving access to quality healthcare services.

Research on breast cancer is ongoing in Jordan, with efforts to better understand the disease's prevalence, risk factors, and treatment outcomes. Collaboration with international organizations and research institutions has also been important in advancing breast cancer research and treatment.

Due to the specific relevance of this type of cancer, it is considered necessary to develop and implement new advances in the detection and monitoring of its evolution in patients undergoing treatment.

Needs to be solved.

Within the framework of this challenge, two problems need to be tackled as a matter of priority:

1. Early detection: early detection is a key issue, as the survival and recovery rate are significantly increased if detection occurs in an early stage of the disease development. This issue can be addressed in different ways; preventive campaigns are one of them and have already been launched in Jordan. Nevertheless, improvements in the diagnostic systems can still provide significant advances. The objective of the present consultation is oriented towards new methos of diagnosis that can detect the minimum number of affected cells and allow the identification of patients as soon as possible.
2. Monitoring diagnostics. Throughout the treatment of the disease, it is important to detect the resilience of tumour cells, therefore precise methods of cell detection are needed to ensure the efficacy of the treatments applied.

Characteristics of the solutions to be developed.

It is up to economic operators to propose solutions that address these challenges covering all or part of the treatment process.

The Solutions can include any kind of test be it invasive or non-invasive. They can also propose any combination of tests that are considered as optimal to the objective of the challenge.

The Solutions proposed must cover the full chain of diagnosis: from the obtention of test simples or images up to its useful presentation to the doctor, including the process of materials and data during the diagnosis activities.