Open Government Case Study - Sample Case Submission Form

[Open Data, Participation, Collaboration, Citizen Engagement, and Public Sector Innovation]

Important Information

The Economic and Social Commission for Western Asia (ESCWA) and the Organisation for Economic Co-operation and Development (OECD) are conducting a joint study on the economic and social impact of open government for the Arab region. The study will reflect on literature review and previous studies and reports made by OECD and ESCWA and other organizations, and it will consider case studies and best practices from Arab and OECD countries. As such, and for the preparation of the study, this Sample Case Submission Form is intended to help the collection efforts for inspiring case studies and best practices from government entities and agencies in the Arab region. It should be noted that selected cases may be published within the ESCWA portal for the open government, which is under design and implementation, as well as the OECD Open Government case platform[1]. Furthermore, the relevant experiences will be in featured in the planned Joint OECD-ECSWA meeting of the MENA Working Group on Open and Innovative Government this year, in coordination and collaboration with authorities concerned by these experiences.

The attached form serves as a submission form for open government activities that have been or are currently being developed and implemented at any level of government, and specifically those authorities that are working on open government development in the country, including local levels. The Case Study might cover one of the following topics: Open Government, Open Data, Stakeholder Participation, Collaboration, Citizen Engagement, Transparency, Accountability or Innovation in the Public Sector.

In the context of the attached form, an "activity" refers to any processes and actions taken to work towards the achievement of open government at national, area or local levels. An activity can consist of one or more actions. Participants can submit as many activities they wish, and it is preferable to choose activities with an economic or social impact. ESCWA will make the analysis of the contributions and may contact participants with follow-up questions.

To share a case, please complete the MS Word form, either in English or in Arabic, as many times as you wish. We must receive all submissions no later than [15/05/2020]. Should you have any questions, do not hesitate to send an email to Ms. Nibal Idlebi, chief of Innovation at ESCWA (email: idlebi@un.org, & escwa-tdd@un.org) and to the OECD Open Government Unit (Opengov@oecd.org).

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[1] https://oecd-opsi.org/case_type/open-government/

1. Organisation Details

1.1. Organisation Name	*Ministry of Health*
1.2. Organisation Type [Government, NGO, International, Academia, Private Sector]	*Government*
1.3. Country	*Sultanate of Oman*
1.4. Primary Sector [Economic affairs, Education, Public administration, Health, Transport, etc.]	*Health*

2. Activity Case Study

Now, we are going to ask you several questions about your activity. We are very excited to find out ==what you did, how you did it== and who benefited from it. The more comprehensive your answers are, the easier it will be for the reviewers and readers to appreciate the aims and achievements of your activity.

2.1. Title [a title for your activity]	Early Diagnosis of Breast Cancer using Artificial Intelligence (AI)	
2.2. Website [the website about your activity, if existed]	[https://www.moh.gov.om]	
2.3. Year Your Activity was Put Into Practice	*2019*	
2.4. Which of the following best describes your activity? [Please mark the main category]		*Open Data*
		Participation
	✓	*Collaboration*
		Citizen Engagement
		Transparency
		Accountability
	✓	*Public Sector Innovation*

2.5. Summary (Short and Simple Explanation)

The summary should describe your activity and be short and simple (few sentences), and it should use clear language, compel the reader to continue reading, use simple, not sector-specific terminology (no idioms, slang, or domain-specific "buzz" words). The summary should answer the following questions:

- What the activity is?
- Why it was developed or the problem/opportunity being addressed?
- And who it benefitted?

Early Diagnosis of Breast Cancer using Artificial Intelligence (AI) is aimed at aiding the radiologist in the early detection of Breast Cancer by analyzing mammograms using AI thereby saving the patient's life and reduce the costs associated with treatment of cancer.

AI is used to analyze digital mammograms and score them. The score helps Radiologist review critical patients, comparing the actual diagnostic quality mammograms with interactive decision support system of AI showing the groups of calcification and lesions and to record their own BIRADS.

2.6. Case Study Overview

The Overview is an overview of the activity and outcomes. You will have the opportunity to elaborate on some of the details. Please tell us:
- What problem the activity solves or what opportunity was taken advantage of
- What the activity is
- Objectives
- Beneficiaries
- How is it envisioned for the future? For example, how will it be institutionalised in its current context? How will it scale even bigger?

Objective: This project aimed at aiding the radiologist in the early detection of Breast Cancer by analyzing mammograms using AI thereby saving the patient's life and reducing the costs associated with treatment of cancer. In addition, because there are fewer qualified experts in this field in MOH, Oman, this also would aid in processing more numbers of patients than currently possible.

Beneficiaries :
- Ministry of Health
- Hospitals and medical centres
- Patients

The projects future perspective are as follows…

a. *Breast cancer is the leading cause of cancer-related diagnosis and deaths in women globally. Earlier detection could have a positive impact on decreasing mortality, as this could offer more options for successful intervention and therapies when the disease is still in its early stages.*

b. *Improving the early detection ratios further by feeding in more and more data for the AI system to improve itself.*

c. *Ability to predict the possibility of the patient to have cancer later in life.*

d. *More prediction that is accurate could hold the potential to reduce the number of women sent for unnecessary tests.*

e. *Combining clinical data with imaging information could offer the potential to more accurately validate initial results.*

f. *CAD or clinical decision support systems, in the future, might be able to provide more information on a suspicious finding than they do now. They might, for example, define the tumor and make therapy recommendations – which would mean biopsies would no longer needed. This would clearly revolutionize workflow and procedures in mammography screening.*

2.7. What Makes Your Activity Different, Unique, or Innovative?

Artificial intelligence (AI) is a ubiquitous term in healthcare that has aroused both promise and suspicion. In radiology, AI investigated as a solution to enable radiologists to improve cancer detection more efficiently and effectively. AI with its deep learning based software has proven to be an effective solution to this detection. In many clinical trials, AI based analysis has shown promise to be as effective as manual interpretation.

If we see in general, early detection of breast cancer means less cost for treatment, a better probability of curing and stopping it. In our society, the woman is the pivot of the house. In such an environment, it is quite natural that not only the patient but also the whole family benefits with this early detection and treatment of breast cancer.

3. Development

3.1. Collaborations & Partnerships

Were there partners involved? Describe what each brought to the table and why it was important to the case. These may include: Citizens, Government officials, Civil society organisations, and Companies.

The partners involved in this project are:

    a. *Ministry of Technology and Communications (MTC) – Project Coordination and Supervision*
    b. *Ministry of Health (MOH) – As the main User of the System*
    c. *Directorate General Information Technology (DGIT) in MOH – Project Development & Integration with Hospital Information System (HIS) & Implementation*
    a. *Screen Point Medical implementing their Transpara AI Solution*

3.2. Users, Stakeholders & Beneficiaries

Who are the users, beneficiaries, and stakeholders targeted? How each group are affected. These may also include: Citizens, Government officials, Civil society organisations, and Companies.

The end users in MOH, mainly the radiologists, have been a great support for the implementation and design of the project. Without their technical inputs related to their medical field, this project would not have achieved anything.

MTC has been a great partner in coordinating and supervising the whole project right form inception to closure. Without their support, coordination with other external service providers would not have been possible to achieve in a timely manner.

DGIT Team comprising of Architects, Developers, Testers, Network Engineers, Server Engineers, Security Specialists and Hospital IT Technicians worked in tandem for the project development, integration, implementation, installation, testing and troubleshooting of the entire project. A Special mention would be for the management of DGIT involving the Director General, Director and Section heads in order to coordinate and guide the project.

Screen Point Medical is the provider of the AI Software and the Decision Support Viewer. Their support in implementing and helping in the troubleshooting of the application and its integration is valuable.

4. Reflections

4.1. Results, Outcomes & Impact

- What results and impacts have been observed from the activity so far?
- How have the results and impacts been measured (e.g., methodologies used)?
- What results and impacts do you expect in the future?
- To the extent possible, please indicate the tangible or numeric results.

Results Achieved:

The radiologists were able to process many more patients and focus their attention on the patients where AI reported positive findings while reliving the patients with negative findings. They were also able to detect with higher degree of accuracy the cases, which were in Early Stages of Cancer thereby reducing the cost of the treatment.

The major impacts of the project as follow:

1. *Foremost is the reduction of the turnaround time in reporting. A manual reading by the Radiologist might take anywhere between 20 mins to 1 hour depending upon capability, training and experience to report one mammogram. AI could technically do it in LESS than 3 minutes.*

2. *The reduction in the need of multiple qualified experts. In MOH, Oman the number of specialized mammogram radiologists at the current time is 3 to 4. This will be a huge pressure on them to report in a time bound fashion, and would likely to induce errors, thereby adding to the cost of treatment and maybe even litigations. If the number of cases increase, MOH would be forced to get more trained personnel thereby adding to the cost of the treatment.*

3. *The interactive decision support workflow and interactive querying of suspicious regions can aid the radiologists to diagnose accurately the patient and not to miss certain areas. Anything, which can aid the radiologists in this endeavor, is a step in the positive direction.*

4. *The reduction in false positives would be one of the most positive outcomes of this project as it deals with not only the patient's life but also those surrounding the patient. It also saves on the huge cost and time spent on treating false positive cases. Litigations costs can be avoided by the reduction of such cases.*

5. *The reduction in errors due to fatigue would be an added advantage thereby reducing the costs from litigations. Due to the increase in the number of screenings being done as the awareness in the community grows, means more load on the qualified radiologists. This could lead to natural fatigue, which could induce mistakes on the reading of the mammograms. Anything aiding them to find the correct areas would be a great aid to them. This is where AI can truly help.*

6. *The overall reduction in healthcare costs. A full treatment of a patient diagnosed in the third stage, by some estimates, could cost anywhere between R.O. 25000 to R.O. 50000. Treatment of a patient diagnosed in the first stage, by estimates, could cost anywhere between R.O. 5000 to R.O. 10000. Even if we take the lower figure that is a saving of 80% which is a huge reduction. If we have 5000 cases at this rate, the savings could be in the tune of 100000000 (One Hundred million) or thereabouts.   AI would help us in diagnosing early thus giving us this huge reduction in healthcare costs both to the center and to the patient and their family.*

4.2. Challenges

- What challenges have been encountered?
- What failures have been encountered along the way (e.g., structural failures or significant setbacks)?
- And how, if at all, have those challenges and/or failures been responded to?

The main challenges in this project are as follows...

a. *Convincing the radiologists about the accuracy of the AI system to detect breast cancer is one of the biggest challenges of the project.*

b. *Having data needed to train and validate AIs deep learning.*

c. *To make sure that the proper medical imaging infrastructure is in place for acquiring images in a particular format.*

d. *Another challenge is the IT infrastructure especially the speed of the network, which has to cater to huge images as data.*

e. *Another challenge was to ensure that the correct workflow is adopted.*

f. *To reduce the turnaround time of the report*

g. *Final challenge is to reassure the radiologists that the AI system is to aid them and not to replace them.*

4.3. Conditions for Success

What conditions do you think are necessary for the success of your activity? Conditions for success may include:
- Supporting infrastructure and services
- Policy and rules
- Leadership and guidance
- Human and financial resources
- Personal values and motivation

The partnership between Ministry of Technology and Communications (MTC), Ministry of Health (MOH) and Directorate General Information Technology (DGIT) in MOH has a great impact on the project. The effective cooperation and coordination of all the parties involved is required for the success of the project.

Sustainability of a project is the ability of the project to continue into the future. One of the main category to decide its sustainability would be financial.

All the software used for this project are open source and hence entail no cost of purchasing. The HIS/RIS used for the project for displaying the worklist with the score and integrating to the AI Viewer and the PACS Viewer is AlShifa, an in-house developed project of the Ministry Of Health in Oman and which holds the source code rights of the project.

4.4. Replication

Has the activity been replicated to address similar problems? If so, how? In your opinion, what is the potential for it to be further replicated in the future? You may wish to discuss how the activity has already been used by others, as well as how you believe it could be used by others in the future. These others may be in: Other organisations, within your organisation, larger or smaller agencies, organisations or governments.

The project is replicable since both public and private fixed medical centers and mobile screening centers producing Digital Mammograms can all replicate this process. Digital mammography machines follow the international open standard of DICOM for producing and transferring these mammograms. The applications deployed to read, transfer, receive these DICOM files and log them into databases are either open source or made using open source software like java. The applications deployed on open source LINUX platforms. This project can be deployed even in virtual machines thus saving on the cost of multiple physical hardware. The communication can happen on any kind of networks both LAN (Local Area Network), WAN (Wide Area Network) and even the Internet provided they meet certain specific security guidelines.

4.5. Lessons Learned

What lessons from your experience would you like to share with others like you? Where there any pitfalls to avoid?

1. *The key lessons learnt is that communication with the stakeholders and beneficiaries are the critical for the success of the programmes. There are several stakeholders and each with unique roles. Getting them together required a sound structure to achieve a specific goal. Once the goal is agreed, and each of the stakeholder is assigned the objectives with the structure, the implementation plan will be more effective, and the outcome is successful.*
2. *The availability of highly motivated and trained project team is essential for the successful implementation of the initiative and the system.*
3. *Highly coordinated efforts between Ministry of Technology & Communications, Royal Oman Police and Telecom providers are also essential for the successful implementation of the system and the sustainability of this initiative to other application.*

4.6. Anything Else

Is there any other information you would like to share about the activity?

As phase one, the project implemented in four hospitals (Royal Hospital, Khawla Hospital, Ibra Hospital & Sultan Qaboos Hospital.

Royal Hospital and Khawla Hospital are the two main tertiary care hospitals which are situated in Muscat. These were selected because they cater to the huge population living in Muscat and Muscat being the major Governorate in terms of population and business. Royal hospital is also the main referral center for cancer. It has a Radiation Oncology Department.
The next Sultan Qaboos Hospital in Salalah is selected due to its distance from Muscat and being another important center in Oman catering to a very wide region. Salalah Governorate is the largest governorate in terms of area in Oman.   Also it is one of the hospitals having a PACS.
Ibra Hospital was selected due to its location being in the interior of Oman and due to the availability of PACS and the digital Mammography Machine. Ibra would give us the feedback of the challenges faced of implementing a solution like this in the interiors of Oman in terms of providing healthcare services to the local population and IT Infrastructure.

5. Materials

5.1. Materials

Do you have online materials you would like to include with your submission? Please use the fields below to insert your links.

Link for images	*[https://…]*
Link for supporting files	*[https://…]*
Project-Related Video URL 1	
Project-Related Video URL 2	
Other related URL	

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