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DIGITAL TRANSFORMATION IN UAE METROLOGY

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Abstract – The government of the United Arab Emirates (UAE) is actively introducing digital technology to improve the efficiency and availability of the services it provides to its customers. As government entities the UAE national metrology institute, Emirates Metrology Institute (EMI) and Designated Institute for ionizing radiation, Federal Authority for Nuclear Regulation Secondary Standards Dosimetry Laboratory (FANR SSDL) have developed customer service portals which have now been in use for some years. This paper presents the customer service portals, highlights the portals results in 2019-2021, explains how these portals will be used as a basis for further digital transformation (DT) and discusses the DT strategy in EMI.

Keywords: Digital transformation, metrology, Emirates Metrology Institute (EMI), the Secondary Standards Dosimetry Laboratory of the Federal Authority for Nuclear Regulation (FANR SSDL), Customer Service Portal, Strategy.

1. INTRODUCTION

This section focuses on the following topics: the aspects that direct, lead, and motivate the DT in UAE metrology entities in the UAE, how these entities are related and interact, DT developments in the UAE and the international metrology community, how COVID-19 pandemic affect the DT and from where DT application can be started.

1.1. UAE measurements System

The measurements system in the UAE includes several entities (Fig.1). This paper principally deals with three of them: Emirates Metrology Institute (EMI) as a one of the core business sectors of Abu Dhabi Quality and Conformity Council (ADQCC), the Secondary Standards Dosimetry Laboratory (SSDL) as a part of the Federal Authority for Nuclear Regulation (FANR) and the Ministry of Industry and Advanced Technology (MOIAT), the Federal Regulatory Authority for metrology.

1.1.1. EMI

The Abu Dhabi Quality and Conformity Council (ADQCC) was established in 2009. One of its initiatives was the founding of the Abu Dhabi Metrology Center to provide the calibration services to support its testing and legal metrology functions. In December 2014, EMI was nominated as the National Metrology Institute (NMI) of the UAE by the Emirates Standardization and Metrology Authority (ESMA), now incorporated into MOIAT. EMI provides Calibration, Training, Consultancy, and Interlaboratory Comparison Services to the local and regional customers in Dimension, Electrical, Time, Frequency, Power, Mass Volume, Flow, Force, Torque, Pressure, Temperature and Humidity [1].

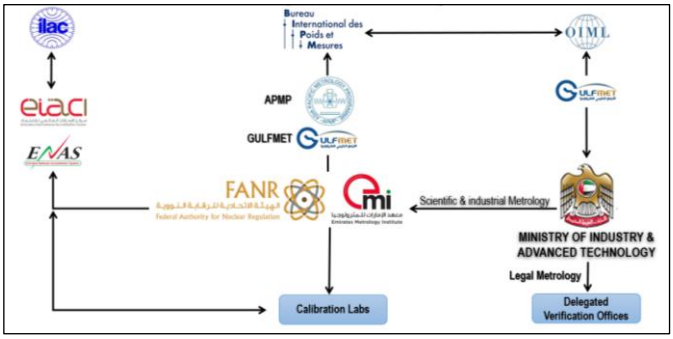

Fig.1. UAE Measurements systems

1.1.2. FANR SSDL

FANR was established in September 2009 to be the regulatory body for the nuclear sector in the UAE, concerning the peaceful uses of nuclear energy. FANR protects the UAE's public, its workers and the environment from radiation risks by conducting nuclear regulatory programmes in safety, security, radiation protection and safeguards, which fulfill

key objectives in licensing and inspection in accordance with best international practices. FANR also oversees the implementation of the UAE's obligations under the international treaties, conventions and agreements in the nuclear sector, and determines administrative standards, which support excellence in regulation.

In 2011, the FANR SSDL was established to support the infrastructure of the country in ionizing radiation metrology. The FANR SSDL provides radiation measurement and calibration services to a growing number of licensees who are using radioactive sources in the country and customers from outside UAE. Calibration of instruments ensures that accurately known doses are delivered to patients undergoing diagnosis and therapy, and that radiation measurement instruments used throughout the UAE, including in the nuclear energy programme, provide the expected degree of accuracy to support radiation protection. FANR SSDL assists customers from different fields, such as medical, industrial, nuclear, academic and research sectors, to comply with FANR regulations as well as enable them to obtain the calibration services for their instruments locally within the UAE [2]. On 19 May 2021. FANR SSDL was nominated as the Designated Institute for the ionizing radiation field [3].

1.1.3. MOIAT

MOIAT was established in July 2020, with the aim to boost the UAE's industrial sector, and increase its contribution to the UAE economy. The Office of the Minister of State for Advanced Technology, the Emirates Authority for Standardization and Metrology (ESMA) and the industry sector in the Ministry of Energy and Infrastructure have been merged into the structure of MOIAT, and all authorities, responsibilities and duties have been transferred to the newly founded Ministry [4].

1.2. Digital Transformation in the UAE

Digital Transformation in the UAE is a topic that has great support from the government. Starting from the establishment of the public authority for information in 1982, the UAE has pursued digital technology as a way of enhancing government services (Fig.2) [5]. In 2021 it was announced that Dubai was the world's first paperless government [6].

In March 2021, MOIAT launched its strategy "UAE Industry 4.0". This strategy aims to accelerate the digital transformation of the industrial sector, support leading industrialists throughout their journey, boost the sector's productivity and create thousands of new, high-skilled jobs. In additional, MOIAT is deploying the 4th Industrial Revolution Readiness Index to assess the digital maturity of processes, technologies, and organization in the industrial sector. The index also identifies priority areas for improvement, prompting the formulation of digital transformation strategies [7].

1.3. Digital Transformation in UAE Metrology

EMI and FANR SSDL, as governmental entities responsible for metrology in the UAE, need to be aligned with the UAE government digital transformation strategy and the initiatives within the global metrology community.

In line with the requirements of the UAE government, both entities have developed customer service portals, to allow online paperless provision of calibration services to their customers. These portals have been operational for several years.

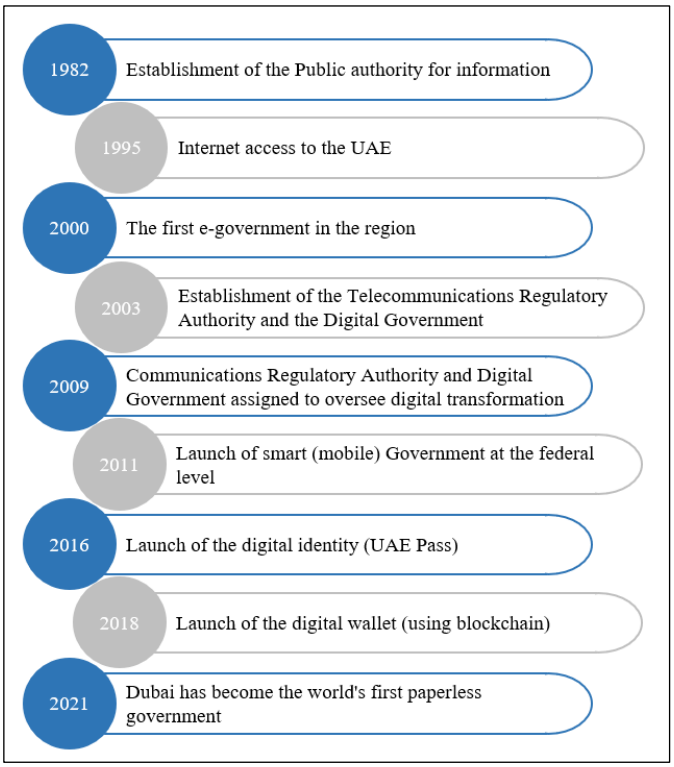

Fig.2. DT Milestone in the UAE [5]

1.4. COVID-19 acceleration of Digital Transformation

The COVID-19 pandemic highlighted the importance of, and the need for, digital transformation in metrology in the whole world. At the beginning of the pandemic some EMI procedures relied on people being present in the building and others required access to paper documents stored in filing cabinets in the laboratories. EMI realized that digital transformation was essential to ensure business continuity and changes were made to the technical and quality procedures to allow the laboratory to function efficiently during periods of remote working. Receiving, releasing items, and taking measurements are the only processes that still needed the physical presence of the metrologist in EMI.

1.5. Starting point to Digital Transformation

With the initiatives in the UAE government and the international metrology community in the last few years, it has become clear that the UAE metrology entities need to take further steps in digital transformation. The big question was where and how to start? The approach selected is to start from the existing digital tools and use them as a base on which to build future developments. One of these tools is the customer service portal. Examples are the EMI customer service portal "JAWDAH" and FANR SSDL customer service portal. The plan is to evaluate the efficiency of these systems, highlight the weaknesses and upgrade them to serve their new missions as a first step. The second step is to build a digital transformation strategy that draws a road map to achieve digital transformation and brings the focus to the whole final image. The details are described in section 2.

2. METHODOLOGY

This section describes EMI Customer service portal, FANR SSDL customer service portal and EMI strategy for digital transformation as following:

2.1. EMI Customer service portal "JAWDAH"

Before 2019 EMI customers manually filled a calibration or Interlaboratory Comparison (ILC) request form and then submitted the request to EMI customer service office (EMI.CS) via email. EMI.CS forwarded the request to the corresponding lab that assessed if they had the capability for the work, added the service fees and expected start date of the calibration and sent it back to EMI.CS who would return the request to the customer to approve the price and date. A contract was issued once the customer gave his approval and the item was then received on the agreed date to be calibrated. A paper calibration certificate was issued, signed, stamped, and submitted as a hard copy to the EMI.CS together with the released item. Once the customer had completed the payment process, they received the certificate and the item. The customer would contact EMI.CS to ask about the progress in the service. This put a great load on the EMI.CS who acted as a focal point between the customer and the laboratory.

After applying JAWDAH this load was reduced. The customer can register, create an account, and apply for Calibration, ILC, Training and Consultancy services. The customer can also follow the progress of the work through JAWDAH any time from his dashboard (Fig.3).

JAWDAH is an integrated system applying to all ADQCC services: metrology, conformity, and testing. Originally developed by an external contractor, the development was brought in-house in 2019. JAWDAH was fully operational by mid-2019 and it was a great support for customer service during the pandemic period because it is a paperless and remotely operated system. All service stages from submitting the request, review of the request by the laboratory, issue of the offer, offer review by the customer, device inspection, starting the calibration process, completing the calibration process, releasing the item, uploading the calibration certificate, service feedback and even the payment are managed through the system.

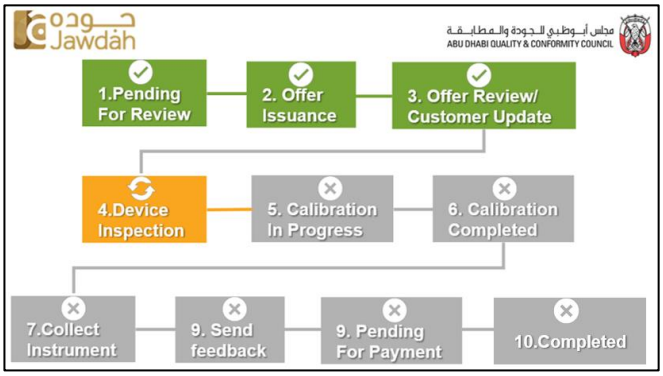

Fig.3. Request flowchart in JAWDAH

Before the pandemic, a paper calibration certificate was printed, signed, and stamped and then scanned as a pdf into JAWDAH. Remote working made this impractical and the quality procedures were modified so that the certificate was issued as a PDF file with digital signatures and stamp, although some customers still require an original hard-copy certificate.

JAWDAH is reviewed and improved periodically based on the internal and external customer comments.

2.2. FANR SSDL customer service portal

In 2019, FANR SSDL started to operate and receive customer's requests through e-mail by filling PDF forms found on FANR website or printed out forms shipped together with instruments. However, after one-year FANR launched SSDL Portal and Customer Relationship Platform (WASL), in line with its efforts to strengthen its smart channels to engage with stakeholders to ensure customer happiness and satisfaction. SSDL Portal was developed in-house customized to FANR needs and requirements.

SSDL portal allows the customer to communicate with SSDL staff and track their requests digitally. Each customer can create their account and add their information and requests which are protected and kept confidential by the system. Once the service is completed, the customers receive notifications from the system, and they can download the calibration certificates which are provided in electronic version (Fig.4). SSDL Portal also collects data of the service delivered to customers. Annual reports are generated automatically by the portal which gives statistical analysis of the service (Fig.5). As a result, it supported the external audit to become easier and more efficient.

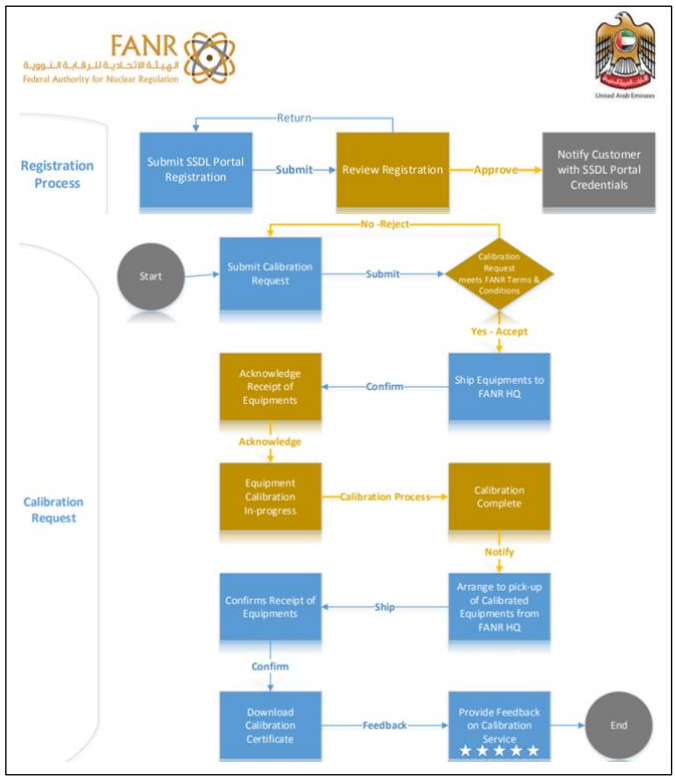

Fig.4. Request flowchart in SSDL Portal

WASL is designed using state-of-the-art features that enables current and future licensees as well as the public to connect directly with FANR to address, raise, track any suggestions, complains, compliments or inquiries. This system was developed in support of UAE government smart

transformation of its services as well as adopting the criteria of Mohammed bin Rashid Government Excellence Award to ensure customers and employees' efficiency and happiness. FANR has been automating a wide variety of its services to ensure business transactions are completed in a timely fashion and considering the current situation of Coronavirus (COVID-19) pandemic. WASL and SSDL are linked by allowing the customer to open a case against a service requested through SSDL portal or can provide feedback wither positive or negative to specific service in SSDL portal.

Fig.5. Services Report generated via SSDL Portal

2.3. EMI Strategy for digital transformation

A brainstorming session was held to discuss EMI's approach to digital transformation and from this EMI developed a strategy based on four main pillars as described below:

2.3.1. Integrate EMI systems

All EMI systems must be integrated to ensure easy data exchange, avoidance of re-entering data, and reuse data whenever needed throughout different processes. EMI will investigate if this integration can be achieved through the expansion of the current JAWDAH.

2.3.2. Automate EMI services

Wherever practicable EMI Calibrations, ILCs or Training services will be automated. EMI will investigate the software currently used and consider standardization of software.

2.3.3. Investigate the requirements for Digital Calibration Certificate (DCC)

EMI will investigate the type of data its customers need to have included in the DCC as well selecting a suitable DCC format to be implemented. The DCC will be issued through the JAWDAH.

2.3.4. Research the application of Artificial Intelligence (AI) and Machine Learning (ML) to EMI services

EMI must understand state-of-the-art in AI and ML field, identify possible applications of AI and ML in metrology services, follow what has been done by its peers and establish relationships with local centers of AI and ML expertise.

3. RESULT AND DISCUSION

Since launching the customer service portals, the customer's satisfaction in FANR SSDL and EMI has increased (Fig.6). This encourages EMI and FANR SSDL to continue upgrading and enhancing these systems with more digital transformation applications such as an integrated data system that exchanges data with JAWDAH and enables it to issue the DCC.

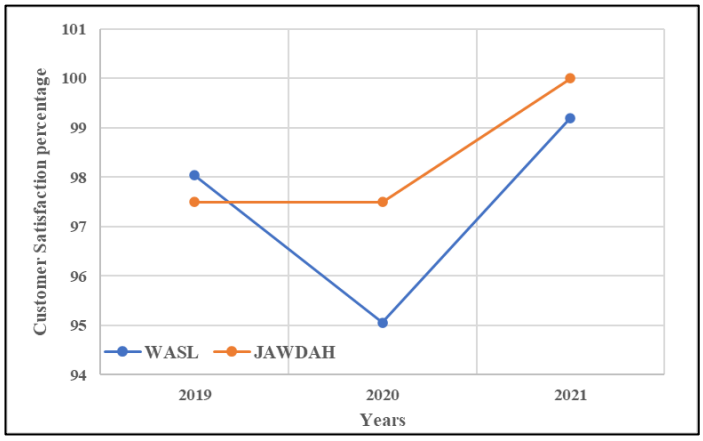

Fig.6. Customer satisfaction

4. CONCLUSIONS

EMI and FANR SSDL have developed customer service portals. They are planning to enhance these portals, by adding the appropriate technologies that improve their function and aim to fulfil their customer requirements. The digital transformation strategy will be used as a road map, to ensure a smooth and gradual transfer to digital reality in the UAE metrology sector.

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