



SULTANATE OF OMAN
MINISTRY OF EDUCATION



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4 - 8
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NOVEMBER
2019

Final report

Oman Science Festival Second Edition



Final report

Oman Science Festival 2019 (Second Edition)

4-8 November 2019

Ministry of Education 2021







The late Sultan of Oman
His Majesty Sultan Qaboos Bin Said



His Majesty
Sultan Haitham Bin Tarik



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Introduction

Oman Science Festival is a scientific event targeting all society members where science is presented in an interactive, unusual manner that contributes to creating a positive attitude towards these sciences and encouraging young people to continue learning in scientific disciplines and enhancing their creativity and innovation skills in order to be contributors to knowledge economy. Various governmental and private institutions participated in presenting these events with great support from the private sector. The number of visitors to the festival in its first edition, which was carried out from 26-28 October 2017, reached more than 100,000 visitors within three days while activities exceeded 90 activities in different fields of science varied between presentations, experiments and interactive workshops. Nearly 31 governmental, private and community institutions engaged in presenting these activities.

In the second edition of the festival, various interactive programmes and workshops were hosted in all corners, attracting new activities related to the scientific and technological revolution witnessed in all life fields in our contemporary world. The festival was carried out from 4 - 8 November 2019, at Oman Convention and Exhibition Centre in the main showroom, received 184,000 visitors. The festival was run, on an area of 8000 square meters, where more than 80 institutions from government and military sectors participated in presenting events, with a distinguished participation from the private sector. The number of events reached nearly 300, in addition to pioneering competitions in programming, robotics, hackathons, drone competitions and interesting scientific shows on the festival stage and science cinema. The festival also witnessed participation from several international organizations, such as the International Atomic Energy Agency **IAEA**, **CERN**, **WIPO** and **Rolls Royce**.

In addition to the interactive corners in the exhibition hall, the festival hosted prominent international speakers from different countries around the world in a hall specified to discussion sessions to talk about science in different fields such as **STEM**, supporting science and innovation, the outlook of the energy sector, robotics, artificial intelligence and future jobs.

Vision

The festival aims to help building a society that keeps pace with and contributes to scientific and technological developments to guarantee a better future.

Objectives

- Delivering science to students and community members easily and interactively to stimulate creative thinking.
- Promoting the value of science in students 'lives.
- Encouraging young students to continue learning in scientific disciplines.
- Creating a positive trend towards science, innovation and scientific research.
- Enhancing students 'skills to integrate into the knowledge-based economy.
- Looking ahead and keeping abreast of future changes and developments.
- Directing the attention of researchers, experts and officials in various fields to develop work systems in light of the Fourth Industrial Revolution.
- Benefiting from local and international expertise and experiences in the fields of science and technology.
- Enhancing the orientation towards future jobs to contribute to achieving the goals of Oman 2040 vision.



Festival Theme

The Fourth Industrial Revolution “Technologies without Limits”

The Fourth Industrial Revolution is based on the digital revolution, which represents new ways in which technology becomes an integral part of societies and even the human body. It is characterized by a mixture of technologies in which the lines intersect between the physical, digital and biological fields. Several studies expect replacing 47% of the existing jobs with machines within the next twenty years, which poses a danger and a challenge to many people in their jobs and businesses. Consequently, it was imperative for governments to stand up to these accelerating changes, hoping to be able to keep pace with them, to make ambitious decisions that advance the nation intellectually, economically and culturally, and to review the educational process to accommodate the major transformations, and to harmonize qualifications and new business, as new technology means new resources, new markets and new businesses.

The selection of this topic came to be the title of Oman Science Festival in its second edition in order to spread awareness of the Fourth Industrial Revolution among the society in general and students in particular. It aims to shed light on opportunities and challenges since that the Sultanate is not isolated from the developments the world is witnessing now, especially as it possesses qualified human expertise that should be trained and directed on the right track in this field.

This event is carried out to support the efforts made by the Ministry of Education to develop the innovative and creative capabilities of students. This is represented in spreading scientific innovation culture in the school community, caring for creators and innovators, and

providing quality programmes for students in programming, smart applications, robotics and electronics. It also worked to create an effective partnership between the Ministry and other governmental and private sectors to enhance the innovative aspects by finding creative ideas and solutions to the challenges faced by the various sectors at the internal and external levels, such as energy and water sectors. This enhances students' orientations towards scientific research to keep pace with modern technologies in these fields. Focusing on developing students' skills will help reduce the gap between educational outcomes and the requirements future labor market that would be dominated by artificial intelligence applications and software of all kinds. Choosing the topic of the Fourth Industrial Revolution and its technologies aims in general to shed light on changes that these technologies will cause in various areas of life such as medicine, agriculture and energy and the resulted effects the technologies will bring on the labor market in terms of the skills required for future jobs. We could summarize these objectives as follows:

- Keeping pace with the expected future changes and developments brought by the Fourth Industrial Revolution.
- Looking to the future while considering the various fields of the Fourth Industrial Revolution.
- Creating a link between school, college and university students on the one hand and institutions on the other hand
- Preparing society for future jobs associated with the Fourth Industrial Revolution.
- Sponsoring student initiatives to take advantage of smart technologies and creative solutions
- Attracting companies specialized in the field of modern technologies and applications.

Festival Opening

The activities of Oman Science Festival in its second edition were inaugurated on November 4th, 2019, under the patronage of His Excellency Sheikh Al-Fadl bin Mohammad bin Ahmed Al-Harthi, Secretary-General of the Council of Ministers, with Her Excellency Dr. Madiha bint Ahmed Al-Shaibani, Minister of Education. Some ministers and honored members of the State Council and their Excellencies the Undersecretaries and chief executives of some sponsor companies and many representatives of the participating governmental and private institutions attended the event. The sponsor of the ceremony went through the corners of the festival and learned about the nature of the participations and events that would be presented.



After that, Professor Charles El Ashi, delivered a paper on the festival stage, titled “The Golden Age of Space Exploration”, in which he talked about the development of modern technologies for space exploration and how they contributed to accessing information about planets, especially the current missions to explore Mars.



The General Structure

of the Oman Science Festival 2019

In its second edition, the structure of the festival included three main topics:

1 Interactive corners:

Corners were set in the exhibition hall of Oman Convention and Exhibition Centre in an area of 8000 square meters which included the following:

- (9) Nine main areas in which interactive workshops were presented to visitors through the latest technologies included in the field: health, programming and design, space and aviation sciences, environment, food and water, energy, economics, transportation and communication, robotics and artificial intelligence and military technologies.
- Children corner: It included scientific activities for young age groups, which varied between workshops, events and scientific shows.
- **STEM OMAN:** focused on **STEM OMAN** programme implemented by Omani teachers in the Ministry of Education in cooperation with the British Rolls-Royce Company. The teachers presented workshops and activities that received great success among students and visitors.
- Various scientific competitions: The competitions continued throughout the days of the festival and they included hackathons, robot competitions, drone competitions and programming competitions.
- Scientific innovations and innovators' exhibition: The exhibition included innovations from different educational institutions and there are corners to support innovators in aspects of intellectual property, prototyping, marketing and entrepreneurship.
- International organizations and agencies: The European Organization for Nuclear Research participated in activities on an area of 200 square meters. Also the International Atomic Energy Agency participated in a special corner to present activities related to the education of peaceful nuclear science and technology. In addition, the World Intellectual Property Organization (WIPO) participated in a national workshop for educators about intellectual property education for young people.
- Scientific cinema: short films in various scientific fields were screened in the festival.

2. Theatre:

An integrated programme for a variety of activities that included scientific performances, purposeful sketches, and dialogues with Omani inspirers and various scientific competitions. In addition to the launch of a number of educational initiatives in partnership with the private sector.

3. Discussion sessions:

Four discussion sessions on the 5th and 6th of November were conducted in the morning and evening timings. It focused on the four topics with the participation of Omani and international speakers.

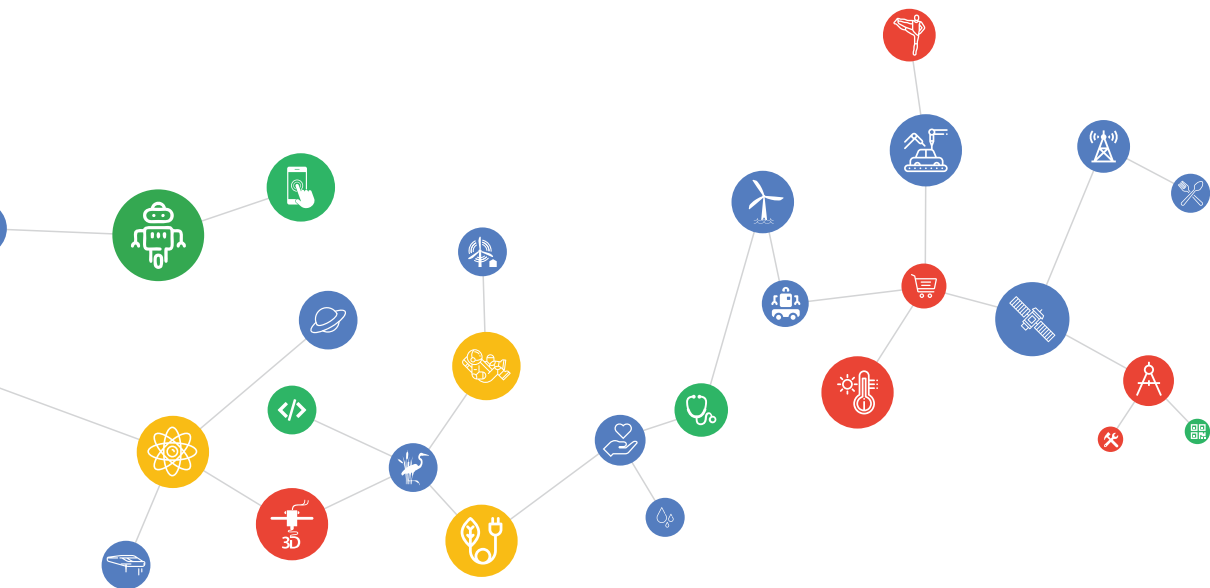
The report reviews the festival's various events that attracted a group of audience reached 200,000 visitors.





First

Interactive corners



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Health (Health and Life)

This corner introduced the latest modern technologies in the field of medicine and health care. Seventeen events were presented for all society members since it included activities related to the latest technologies in the field of diagnosing various diseases such as blood diseases, tissues, biochemistry and microbiology. It also included practical applications of microscopic examination methods for diseases and changes that occur on cells in various disease states such as infections, cancer, and the effect of life factors on them such as smoking, obesity and their treatment. It tackled practical applications of how to use the simulation system by taking blood samples through a vein or pulse. The corner included also some practical applications on cardiac resuscitation and on the effectiveness of simulating heart and lung diseases with the use of wireless detection headsets. It also included simulations for examining breast diseases such as breast cancer, simulating examination of ear diseases and eye diseases using advanced technical devices and simulations of how to deal with accidents, emergency, and critical situations and how to handle medical conditions.

Visitors got to know some modern techniques in treating diseases such as the use of 3D printing in prosthetics to treat some disabilities such as impeding the loss of fingers and the palm. The visitors also explored, by the use of advanced techniques, the effects of some plant medicines on treating diseases and how these medicines affect tissues.

Activities were presented in the field of health care on some smart applications to help the elderly and people with special needs. A space was allocated inside the corner to simulate surgery room using practical applications with sensors to perform surgeries. In addition, interesting activities were presented in this corner for young age groups, such as an innovative medical station activity for future generations in which scientific competitions, intelligence games and challenges are presented.

These events were presented by several institutions from government and private sector such as Sultan Qaboos University, Oman College for Health Sciences, Higher Technical College, Nizwa College of Technology and **3D Factory** company.



Environment, Food and Water (Our Sustainable Environment)

This corner represented an important aspect in the activities and programmes in the Festival as its activities provided an important aspect of knowledge and applications used in the field of water, food, agriculture and biodiversity. It also focused on ways to deal with different types of waste. 128 specialists participated in presenting the activities in this corner which hosted 20 activities throughout the five days of the festival. Its visitors showed interactively a lot of passion and excitement for all presented programme. The Ministry of Agriculture and Fisheries participated with seven activities that included Plant nutrition, Tissue Cultivation, Fish preservation methods, Honeybees, Aquaculture, The Secrets of the Ocean world and the Young Veterinarian. The Public Authority for Water participated with four activities covered the modern methods for managing water assets, the hydraulic modeling system and how satellites are used to determine water losses. The Ministry of Regional Municipalities

and Water Resources participated with two activities: The Hydrometric monitoring network and food and water laboratory workshop.

The Ministry of Environment and Climate Affairs organised a workshop explaining how technology works to mitigate the impact of climate change. Be'ah Holding Company presented various activities using virtual reality shows.

The Food Technology Laboratory participated with analyzing honey and water. Oman Centre for Animal and Plant Genetic Resources delivered presentations of forms of biological diversity in Oman and its importance. Oman Geological Society presented two presentations: How do you distinguish between types of rocks? And experiments with rock types. **NUTTY Scientists** co-hosted an event titled: How to be Green?!



Education Technologies (Learn with Passion)

Finding a space for modern technologies in the field of education is one of the general objectives of the festival, which aims also to shed light on the latest technology reached in the field of education and provide them later for the festival's visitors. The festival aims to target all society members, especially school and university students. The corner is named 'We learn with passion' to enhance the importance of these activities and their role in spreading passion towards science among learners.

Education Technologies corner included (19) activities implemented by more than (14) public and private sector organizations. Among the activities that were presented in the corner, there was a set of technical applications and programmes specific to teaching and learning presented by a group of Omani teachers, such as augmented reality techniques and Interactive curriculum. The corner included presenting specialized workshops in the field of **STEM** provided by EduTech Oman and the use of the **Z-space** platform in interactive education provided by the Science and Technology Centre in Al Dakhiliyah Governorate.

In this corner, visitors discovered their passion for learning by interacting in workshops provided by the Innovative Technology Company for Educational Solutions in the field of 3D printing and electronics. The **4D FRAME** Foundation's participated also with an interactive workshop on creative thinking in solving everyday problems using **STEM** technologies. Omani Society for Educational Technology had a remarkable presentation on the latest technologies used in the field of education. In addition, Sultan Qaboos University presented a distinguished group of activities which dealt with the use of augmented reality technology and a project on Robots.

The Ministry's Science Laboratories Department also participated in organizing various activities for visitors, such as experiments using nanotechnology and chemical missiles, a simulation exercise of a theft crime, then analyzing its data to identify the criminal. The department provided also training workshops in modern technology (interactive screens - probes - computerized microscopes).

Transport and Communications (Faster Communication)

This corner highlights the latest technologies used in the fields of transportation and communications, where (10) activities were presented by (7) institutions targeting different age groups. In the field of transportation, the National College of Automobile Technology presented modern technologies in vehicles and methods to discover their faults. Asyad Group presented the use of augmented reality in simulating the operations of transporting and storing goods in warehouses and ports and simulating production lines.

In the field of communications, the Communications Regulatory Authority participated with exploring the techniques used to detect non-ionizing electromagnetic waves and their impact on the environment. It also highlighted the atomic technology and the monitoring systems and analyzing frequency spectrum.

Sultan Qaboos University implemented a simulation of a miniature smart city that includes augmented reality technologies with architectural and structural details in which the visitor passes through to explore the principles of smart cities using **AR** technology in relation to aspects of water drainage and lighting systems in streets and buildings. The Smart Engineering Technologies Company also participated in providing training on operating modern technologies using Internet of things applications.



Energy (sustainable energy)

This interactive corner represented the different energy applications and technologies through providing 14 events introduced by (12) institutions. The corner targeted different age groups and it included workshops that highlighted the most prominent modern applications in the fields of energy. Petroleum Development Oman (PDO) had a group of interactive virtual reality workshops that simulated oil and gas installations, oil reservoirs, operation of wells and hybrid motors. Daleel Petroleum participated in implementing an interactive workshop on how to analyze big data in oil and gas production. The corner also included various activities related to renewable energy such as solar energy, water energy, wind and hydrogen energy where visitors interacted through connecting electrical circuits for daily life uses. A group of governmental and private institutions participated in presenting these workshops such as Sultan Qaboos University, Nizwa College of Technology, Children international Centre, Interactive Education Technology Company, Engineering Village and Al Noor Company for solar and renewable energy.



Robot and Artificial Intelligence (Future fellows)

This corner included a group of interactive activities that focused on building robots, their programming and how they work in order to raise visitors' imagination and creativity. The corner included 13 various activities implemented by 8 institutions from the government and private sectors targeting all society members. Science and Technology Centre in Al Dakhiliyah Governorate presented interactive workshops on applications of artificial intelligence and the Internet of things. **Frontiertech** Foundation presented the "Skills of the Future" which included workshops in robots manufacturing, drones and robotics applications in scientific innovations and it delivered a presentation of techniques for interaction using virtual and augmented reality. The activities also included presentations of the multiple tasks performed by robots such as the firefighting robot presented by **3D factory** and PDO. This corner also contained robot activities that aim to enhance positive impressions of children towards the robot. These activities included "the Robot Friends" event presented by Fadha'a Al Tiqniyah. It also included short workshops for children on designing and programming robots. The corner also contained interactive activities related to artificial intelligence that challenge the visitors and provide them with self-biometric information.

Some of these activities were the smart kiosk that analyzes the visitor's facial expressions and shows his mood, age and gender. Also the **ORACKLE CHATBOT**, through which artificial intelligence is used to predict potential risks for users of smart devices on a continuous and daily basis and the **TIC - TAC-TOE** in which the visitor competes with the machine that develops its learning after each round, making it difficult to be beaten by its competitor.

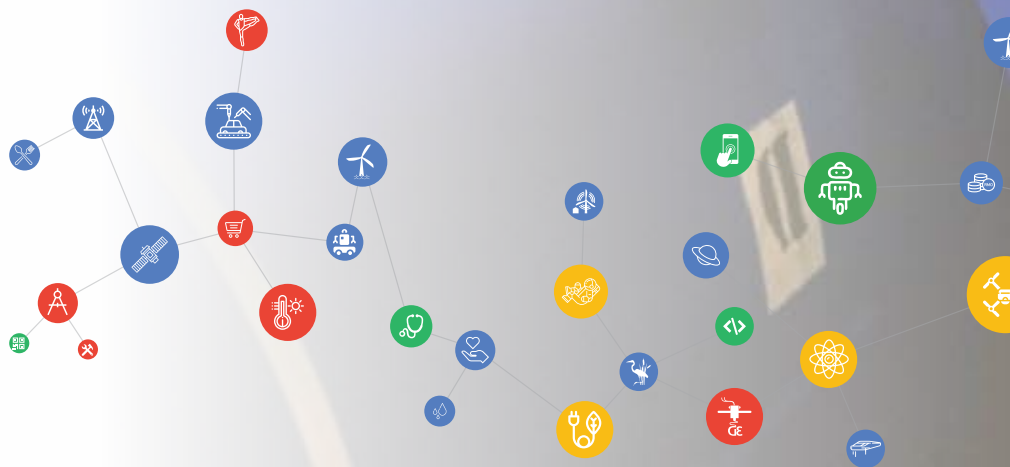
Programming and Design (Future Programmers)

Future Programmers' Corner included 18 diverse events from 10 specialized programming bodies from the government and private sectors such as Sultan Qaboos University, Ibri College of Applied Sciences, Al Seeb Vocational College, the Scientific College of Design, the Scientific Club Talents Foundation, the Engineering Village, the Horizons Stat Company, Atoms Lab and Interactive Learning Technology Company.

The corner hosted scientific workshops in 3D designs and Arduino programming. The visitors also learned about the voting process via a block chain-based platform and a programming training platform that helps students register in programming courses and data programming workshop. It included, as well, diagrams drawing workshop using a 3D printing pen, a simplified workshop on drones for children, how they are used, their applications and their relevance to data science. Another workshop covered the role and importance of microcontrollers in controlling all electronics in daily life in an organized and easy way and workshops were scheduled on how to move drawings and pictures using stop motion technology in the animation industry. Also, some workshops were organized to introduce sensors and IOT devices and how to program and control devices remotely through this technology. A training workshop was run on how to design and manage websites, personal blogs, commercial and private pages through the **Wordpress** platform.

Economy (Tomorrow's Economy)

This corner included different activities for all age groups with the participation of 6 government and private institutions. Banks had featured prominently in this corner, where the Central Bank of Oman participated by presenting an interactive presentation of the Omani currency and its history and it provided a virtual tour of the Money Museum. Sohar International Bank presented the most important applications used in the banking sector and the security applications associated with them. The Knowledge Foundation Academy also participated in an interactive way in introducing visitors to the mechanism of bank work, inflation and types of bankcards. Through the Young Merchant event, presented by the Children's Museum, visitors especially the young ones, learned how to transfer an idea into a product using some crucial steps. The Excellence Platform Institute participated in providing an interactive explanation of the types of markets and e-shopping while the National Centre for Career Guidance also participated in presenting pioneering student companies with innovative and technical ideas.





Space and Flight (Let's Fly in Space)

Many activities hosted in this corner aimed at linking the technologies of the Fourth Industrial Revolution with the astronomy and space sector. These events focused on learning about the latest technologies used in monitoring and air navigation. The corner included 20 different events presented by 9 institutions such as Oman Astronomical Society, the Modern Land of Innovation, the Department of Astronomical Affairs at the Ministry of Endowments and Religious Affairs, the General Authority for Civil Aviation, Sultan Qaboos University, the Pioneer Foundation for Engineering and Scientific Research, Andromeda Training Foundation, in addition to Al-Dhahirah Amateur Team and Fida Basic Education School at the General Directorate of Education in Al-Dhahirah.

All events were presented interactively by simulation, experimentation, and augmented reality technologies as the visitors were able to fly in space using virtual reality and they learned about aviation laws through interactive practical experiments. Visitors were also introduced to the components of wireless aircrafts, how to manufacture and test-try them, and what are their components using virtual reality glasses. Visitors were also able to track air traffic in the Omani airspace and the communication processes between the aircraft and the Air Traffic Management Centre. The young visitors had the chance to use applications in the field of photography to capture images in space. Visitors learned about different techniques of Observation process the solar planets and stars through the hologram technology. They also had the opportunity to experience day and night observations using a different group of telescopes.



Military

In its second edition Oman Science Festival 2019, witnessed for the first time the participation of the military authorities in presenting events that highlighted the modern technologies used in various military fields, such as security, safety and rescue. Seven military entities participated: the Royal Army of Oman, the Royal Air Force of Oman and the Royal Navy Oman, the Royal Oman Police, the Royal Guard of Oman, the Public Authority for Civil Defense and Ambulance, and the Military Technical College. The activities presented in this corner reached 64 various activities, as the Public Authority for Civil Defense and Ambulance came with 7 activities such as: safe house specifications, ambulance and firefighting tools, land, water and mountain rescue, handling dangerous materials, in addition to raising awareness of disasters risks. The Royal Air Force of Oman participated in 13 different activities that included air traffic control simulation, search and rescue devices, lifeboat, life jacket, pilot helmet, anti-gravity suit, hydraulic equipment, personal rescue bag, pilot parachute, basic hydraulic system and aircraft movement control. The Royal Army of Oman participated with (11) events included various military equipment and devices such as parachute equipment, cavalry equipment, military laser devices, first aid and adventure equipment and robots used for metal detection and cutting weeds, etc.

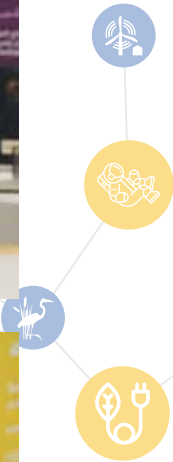
The Royal Oman Police also organized nine activities delivered by Special Task Force on the detection devices for narcotic substances and modern techniques in controlling speed, such as radar speed gun and Special Task Force by means of detecting drugs, metals and underground wires. The Royal Navy also participated in three interesting activities which were hydrography and blue economy, various diving equipment and marine medicine (depth medicine and oxygen therapy). The Royal Guard of Oman, represented by the Royal Guard of Oman College of Technology, came with (3) interactive activities on ways to build 3D products, how to manufacture a Formula One car and ways to use a face camera.

Finally, the Military Technical College organized an event showing a training plane and (18) military equipment. The college also presented the facilities of the Department of Virtual Education Centre, which allowed visitors to try some training sessions using virtual reality techniques. The college also presented (9) distinguished projects from its various departments of engineering, marine, civil and aviation systems and the registration department for those visitors who are interested in joining the college.



Shell Oman

Shell Oman participated in Oman Science Festival for the second time by providing qualitative interactive workshops that explained many applications in a simplified and interesting way to the audience. The corner contained (4) activities targeting different age groups (8 years and above). One of them was “the energy mix” through which photovoltaics were used to move aircraft installed on a shaft. This activity aims to raise awareness of solar energy as a sustainable and clean source of energy. Another event is carbon capture and storage technology, in which the visitors lived the experience of entering into tubes where the balls resembled flying gas particles, which the visitors try to catch and model carbon capture and storage technology. This experiment focused on reducing greenhouse gas emissions and thus employing the stored carbon in less harmful uses to the environment. “Salt Water Car Race” was another activity where visitors competed to install Salt cars and then use them to compete on a special track in the competition which aimed to raise awareness of the diverse, innovative and clean energy sources of transportation fuel. The final activity included designing and installing Shell Environmental Marathon vehicle through which the visitor learned about the operation of high-efficiency vehicles.

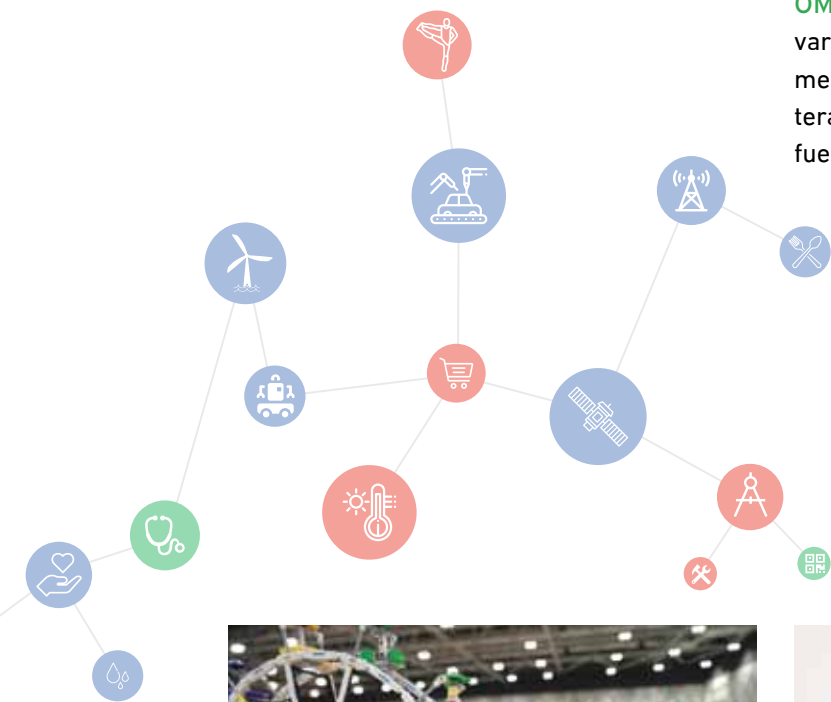


Children Corner

This corner was allocated to the festival' young visitors as it included a group of interactive workshops for children aged 5-12 years, which focused on experimentation and exploration in various scientific fields. A number of interactive scientific workshops were run in this corner, which focused on electronics, amazing gases, making ice, the universe and its secrets, artificial intelligence and education through augmented and virtual reality. The corner included also interesting competitions and shows for children.

SETM OMAN

SETM OMAN is one of the enrichment educational programmes applied in (30) schools in different educational directorates. It was developed with the aim of stimulating curiosity for exploration and inspiring innovation among students by studying the main activities of the course of the programme according to educational experiences that focus on linking education to daily life. It develops their critical thinking, which in turn contributes to preparing them for scientific specialties. Due to this, the corner aimed to introduce **SETM OMAN** using practical and realistic experiences implemented in front of visitors in an interesting way. The national team for **STEM OMAN** presented a set of experiments, which varied between engines, forces and the momentum. They explored the effect of force interactions, physical properties in hydrocarbon fuels.



Future Jobs

This corner aims to raise awareness and introduce the expected future jobs stemming out of the technical developments associated with the Fourth Industrial Revolution, which will be mostly dominated, by robots and artificial intelligence technologies. These expected future jobs were presented using virtual reality technology, where a virtual environment was created for a number of potential future jobs such as Robot programmer, self-driving car designer, 3D printing engineer and virtual reality engineer. The visitor wears **VR** glasses and lives in a virtual environment that resembles the job.

Peaceful Nuclear Power Technology

This corner was allocated to promote the knowledge development and associated skills in the field of nuclear science and technology which the Ministry of Education seeks to achieve through cooperation with the International Atomic Energy Agency (**IAEA**). This came within the regional project concerned with teaching and presenting nuclear science and technology to school students in an innovative way.

During the days of the festival, specialized workshops were presented by the Omani National team of teachers who joined the training courses abroad within the regional project that the agency boasts with the participation of two experts from International Atomic Energy Agency. The interactive workshops included a presentation of experiences, techniques and applications of the peaceful use of radiation to serve different areas of life such as agriculture, medicine and industry, etc. Some of these were the Radiation Protection Principles Workshop, the absorbed radiation dose measurement competitions; the Cloud Hall experiment explained to the visitors the path of radiation according to its types and an interesting visual presentation of the story of radioactivity. A performance was delivered on the stage of the festival theatre aimed at highlighting the peaceful applications of this technology.



CERN (Meet the Universe)

The participation of the European Organization for Nuclear Research (CERN) with its science and art programme had a remarkable touch to the festival's activities. The organization's activities "Let's Meet the Universe" were very exciting that students from various institutions, teachers and those interested in particle physics benefited from interactive workshops in which physics intersected with art.

The activities of this corner included interactive workshops targeting school students from Cycle 1, students of post-basic education, physics and arts teachers and the festival's interested visitors. A workshop was presented on the secrets of the universe from particle physics to gravitational waves, a science and art workshop and a virtual visit to the CERN laboratory. This corner added a value to teachers, students and all visitors as it included different

sessions delivered by **Dr. Michael Hoch**, a scientist and physicist who founded the Science and Art Programme at the European Organization for Nuclear Research (CERN), and Professor **Martin Henry**, Professor of Astrophysics and Cosmology at University of Glasgow, Chair of Physics and Astronomy Department at the same university, and **Dr. Amr Radi**, Professor of Physics at Sultan Qaboos University.



Scientific Innovations Exhibition

Developing the capabilities of innovators, highlighting their creative ideas and attracting institutions that support them from various sectors in the Sultanate are some of the main objectives of the festival. Due to this, a corner was designated for the exhibition of scientific innovations from various educational institutions. This corner included 35 students innovations done by students from the Ministry of Education, Sultan Qaboos University, Colleges of Applied Sciences, private colleges and technical colleges.

Students displayed their innovations in various fields and they benefited from other corners supporting innovations by workshops presented in several fields such as intellectual property, prototyping and 3D printing. They benefited also from corners focusing on establishing entrepreneurial companies and marketing. Some of these supporting institutions were Oman makers, Intellectual Property, Industrial Innovation Centre, Al Rafd Fund and Riyada.



Oman Makers

This corner supported student scientific innovations in particular and other students from various educational institutions. It highlighted the capabilities of Oman Makers Centre in supporting students to manufacture prototypes for their innovations and develop them by providing workshops on machine technology and their operating programs. Some of these workshops focused on 3D printing, cutting workshop using a laser printer and thermal printer. These workshops were presented to all visitors from all age groups and carried out by specialists from Oman Makers Centre in Innovation Park.

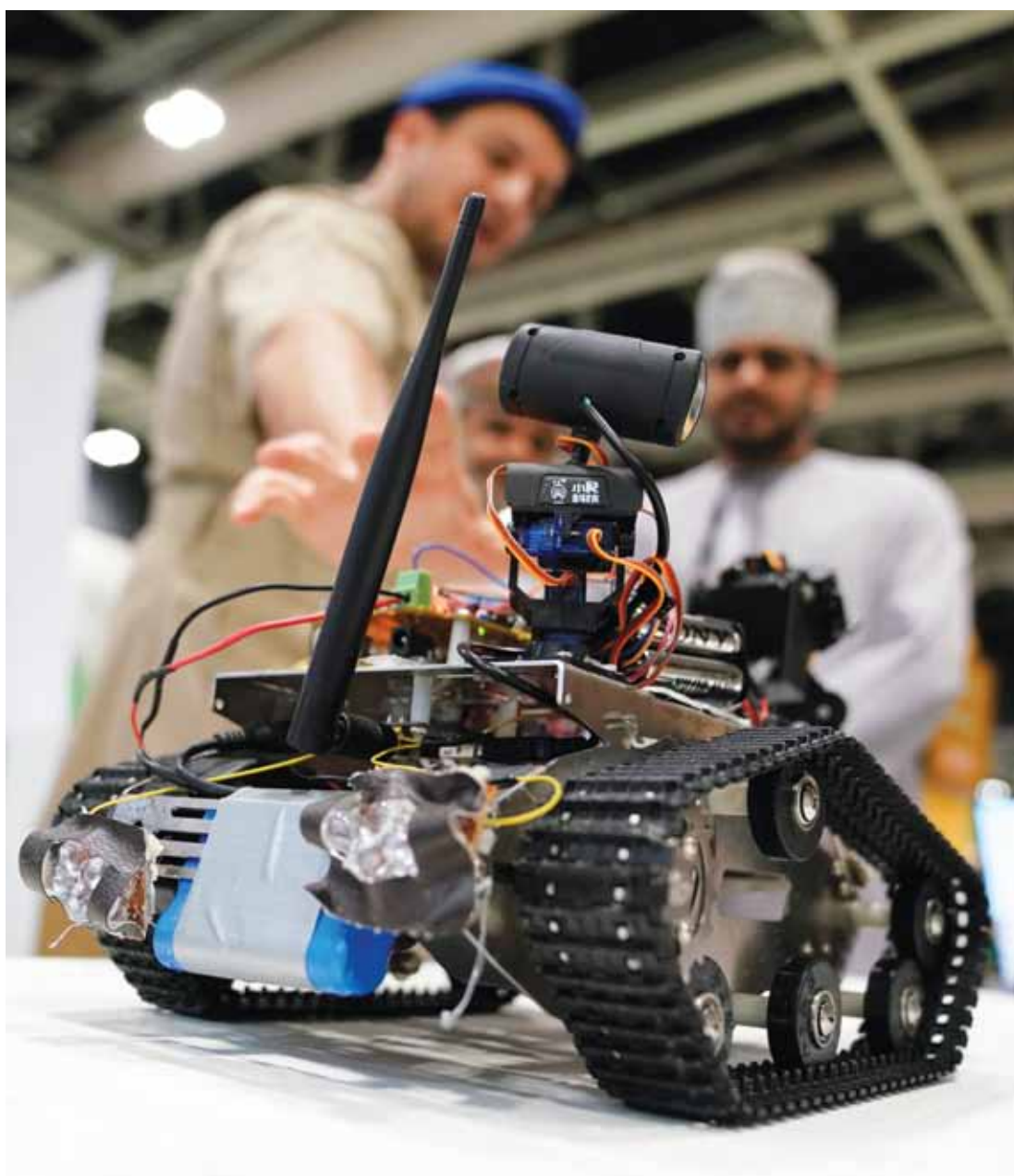
Intellectual Property (IP)

Intellectual Property is one of the useful corners that aimed mainly to raise awareness of the importance of intellectual property in an interesting and interactive manner among the festival visitors. It aimed at measuring their knowledge of intellectual property, its types, related laws and its economic and social consequences. It also included an interesting activity called “Passing game” which focuses on providing innovators with the skills of establishing a company through the use of a path or road that includes a number of levels and stages through which innovators go through the experience of establishment of a company and marketing. This event was held by Innovation & Technology Transfer Centre at Sultan Qaboos University.



Industrial Innovation Centre

The participation of the Industrial Innovation Centre in the festival is one of the main contributions to support innovators especially school students, colleges and universities. The Centre took the responsibility of introducing its innovative services and programmes, presenting a group of workshops in new companies' establishments, building capacities, innovation in existing companies and innovation in industrial sectors.



Hackathons and scientific competitions

There were other various activities that included some competitions in robotics and programming in addition to the interactive corners. These competitions were preceded by qualifying rounds in the governorates before the festival began.

Hackathons

The Scientific Research Council participated in the festival by presenting competitive events through hackathons that involved different groups of society in finding a solution to a problem, through brainstorming sessions and providing solutions with modern technical applications. The council has organized two types of hackathons:

Talent Hackathon:

It targeted different age groups (specifically 8-24 years), where the participants competed for a YouTube competition to produce an educational scientific film. It also launched a foundational and practical programme consisting of four concepts related to the applications of the Fourth Industrial Revolution based on an independent hackathon format for each day of the festival that targets talented people. Talent hackathon targeted all talented school students in the Sultanate from all different age groups.

Family Hackathon:

Family Hackathon targeted age groups of 10 years and above. It aimed to encourage family participation in innovation industry and to involve its members in interactive experiences using the techniques of the Fourth Industrial Revolution to solve one of the main issues related to sustainable development and to motivate participants to find practical solutions using the techniques of the Fourth Industrial Revolution. Each day is assigned for a specific field where participants are trained to create creative innovations.



Robot Olympiad

The Robot Olympiad is robot competitions that have been organized in cooperation with the Engineering for Kids. It includes a set of challenges that aims to find solutions using the robot. This stimulates the imagination and creative thinking of students in engineering, mathematical and programming fields. The challenges are mainly in robotics, bowling, tug-of-war, and sumo. All participating teams compete in these challenges and the points of all the teams are collected in all competitions and accordingly given a rating in the Olympiad. More than 40 teams from different Omani governorates participated in this Olympiad.

Drone Competition

This competition aims to highlight the importance of this type of aircraft nowadays, as this technology is been used in various fields, including transportation, services, healthcare, defence, security, medicine, humanitarian aid, media, archaeology, agriculture, industry, Internet, and global information system. Oman Science Festival 2019 afforded an opportunity to launch such competition to attract a talented segment of innovative and creative students in this field from various governorates. It also highlighted the importance of investing in such promising future technologies. Students pass this challenge through several stages which gradually increase in difficulty while moving to higher stages. Guidance and instructions were provided for students about safety procedures and respect for privacy when using the drones if it is used in other contexts.

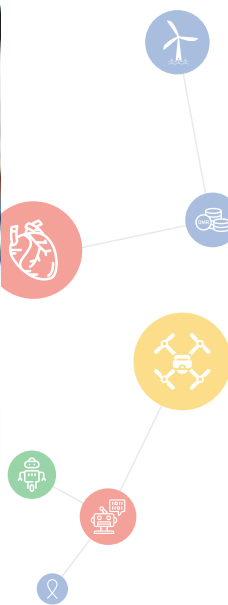


Ideathon Competition

The Ideathon competition is a data science competition designed for young age groups. It includes a number of workshops in data science and data analysis that support decision-making, research mechanisms and resources. It also includes dialogues and specialized sessions that aim to come up with a project concept that serves the community. Five teams were participating in this competition: two teams were from Muscat Governorate schools and the other three teams were from private schools, Al Batinah-South Governorate schools, and Al Dakhiliyah Governorate schools.

Programming Competition

The programming competition is held every two years for all schools in the Sultanate during Oman Science Festival. This competition combines the idea of School Programming Olympiad and Collegiate Programming Contest. Schools are competing in teams of two students to solve a range of life issues related to the school curricula. It requires designing effective mathematical algorithms to be programmed during the competition in one of the high-level programming languages using computers. Such programming competition is among the most famous computer science competitions in the world such as International Olympiad in Informatics (programming) and International Collegiate Programming Contest (ICPC). This competition mainly aims to discover and encourage gifted and young talents and draw their attention to the importance of information technology in general and procedural programming which is the basis of computer science. It also aims to redirect their attention to the benefits of using the computer in areas of development and innovation instead of using it as a mean of entertainment through gaming software that invades our Arab world. All educational governorates participated in two teams (male + female) from each governorate except for Al Buraimi Governorate, which participated in one team, in addition to two teams from private schools. Male teams got the first three places as Muscat Governorate won the first place. Al Dakhiliyah Governorate team won the second place, and Dhofar Governorate team ranked third.



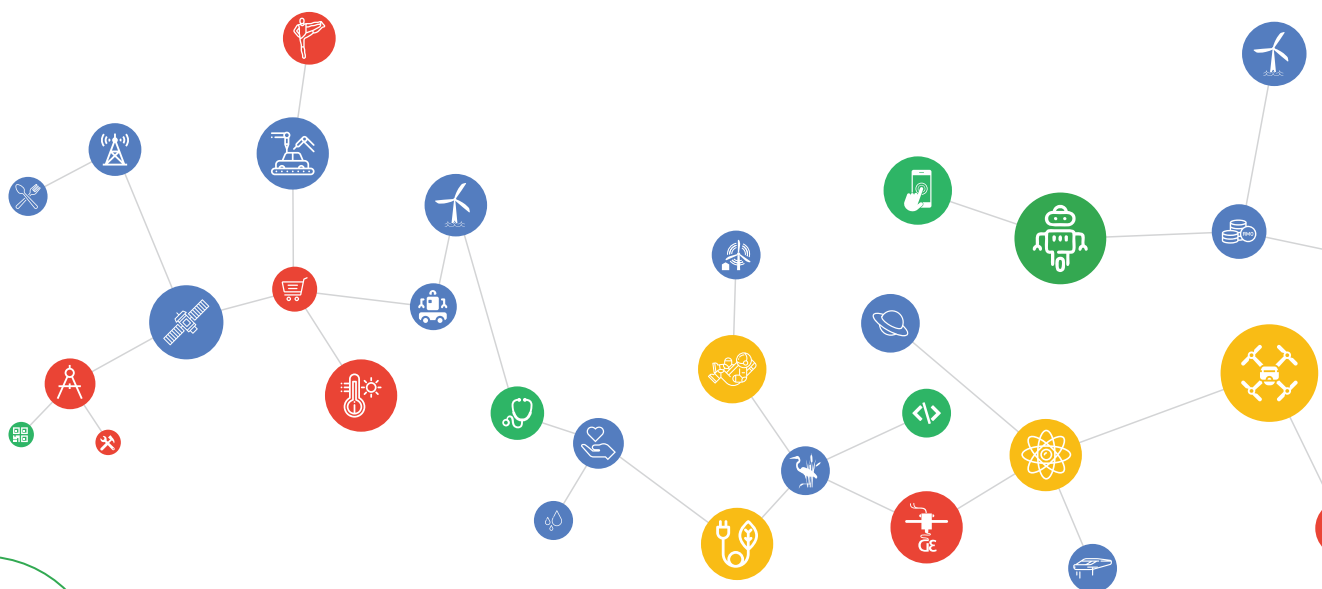
'Capture the Flag' (Cybersecurity)

Electronic Information Security Department participated in Oman Science Festival through Capture the Flag Competition. This competition aims to discover students' capabilities and help them to explore their passion for technology and cybersecurity by introducing them to the world of ethical hacking and directing their potentials to the right track along with legal awareness in this field. In addition, it aims to stimulate scientific curiosity and their capabilities of dealing with electronic challenges and consolidating the concepts of legal ethical hacking among school students that are interested in modern electronic technologies and applications within a competitive atmosphere. The number of participants in this competition reached 45 male and female students over the specified days.



Scientific Cinema

With an area of 100 square meters, a scientific cinema was implemented in a spaceship design. This design simulates the interest in technology related to space and aviation. 36 modern scientific films were presented, most of which were related to space exploration and all of them were presented using three-dimensional glasses. The scientific cinema witnessed a remarkable turnout throughout the days of Oman Science Festival, as the number of cinema visitors was estimated at more than 3,500 of various age groups. The number of shows reached 169 throughout the five days of the festival, with an average of 18 people per film.



Mobile Labs

In addition to the previous corners, a space in the festival hall was allocated for mobile laboratories that provide services according to the nature of the laboratory, and these mobile laboratories were:

Mobile Fab Tech Lab

It is an educational initiative that falls under the umbrella of the social investment programs of BP Oman. It aims to spread the culture of manufacturing and technologies of the Fourth Industrial Revolution in programming, electronics, design, and 3D printing. This mobile laboratory contains all the necessary manufacturing tools such as 3D printing, electronics, programming tools etc. This lab is visiting several governorates, targeting 26 schools annually, 4 summer camps and 3 national events. It also aims to give school students the opportunity to use the latest manufacturing techniques to implement their projects.

Drug Testing Bus

It is a mobile bus belonging to the Royal Oman Police (ROP) that participated during the festival. Visitors were allowed to have a tour in the bus and learn about modern technologies for drugs detection, as well as awareness of these substances and their dangers.



Second Theatre (Ibn Al-Dhahabi)

This corner included a special theatre named after the Omani Azdi physician, known as Ibn Al Dhahabi. A total of 33 events and activities were presented in Ibn Al-Dhahabi Theatre such as: interesting scientific presentations, lectures, scientific competitions, and purposeful scientific sketches that seek to convey some contemporary and scientific issues in an interesting artistic way. In addition, “Molhimoon” sessions were presented in the theatre as well as the launching of some scientific and technological projects.

Twelve institutions from government and private sectors participated in presenting the theatre events, targeting all age groups. The educational directorates participated with a group of scientific plays that were presented throughout the five days of the festival. These plays highlighted the most prominent scientific technologies and their impact on society. The theatre also hosted a group of Omani figures Prominent in various scientific fields such as medicine, innovation, and entrepreneurship to motivate the young generation towards seriousness, perseverance and facing challenges to reach goals under the name of “Molhimoon”. Molhimoon figures such as Dr. Hani Al-Qadhi and Dr. Rawhiyah Al-Khaiffee. They talked about their professional biography and how they face the challenges until they reached the top and became a source of Inspiration to all. In addition, Khaled Al-Harathi, Hilal Al-Siyabi, Youssef Al-Hadrami, and Inas Al-Amiriya have talked about the stages of transformation of their scientific paths until they achieved their goals in the field of innovation and entrepreneurship.

The audience of Ibn Al-Dhahabi Theatre also enjoyed the interesting scientific shows and scientific competitions presented by a group of private sector companies that deliver scientific information in an attractive, professional, and interactive way which combines interest and fun. The performances included selected scientific experiments and scientific content prepared with great care.

Ibn Al-Dhahabi Theatre also witnessed launching scientific projects and initiatives throughout the festival period, such as the PDO Award for Renewable Energy, the Educational Network, and the Virtual Reality Library.





الثلاثاء 0 نوفمبر ٢٠١٩م	
الفعالية	الوقت
عروض علمية (mad science)	١١:٠٠ - ١٠:٠٠
الرياضيات الذهنية	١١:٣٠ - ١١:٠٠
عروض تفاعلية لتقنيات المختبرات	١٢:٠٠ - ١١:٣٠
تدشين الشبكة التربوية	١٢:٣٠ - ١٢:٠٠
عش مغامرة تحدي (كيو. آر) شركة بيئة	٣:٠٠ - ٢:٣٠
عروض علمية (nutty scientists)	٤:٠٠ - ٣:٣٠
ملهمون (د. هاني القاضي)	٥:٠٠ - ٤:٣٠
مسرحية أمير البحر (تعليمية جنوب الشرقية)	٦:٠٠ - ٥:٣٠
عروض علمية (nutty scientists)	٧:٠٠ - ٦:٣٠
إعلان نتائج الفائزين في مسابقات الهاكاون مجلس البحث العلمي	٧:٣٠ - ٧:٠٠

الجمعة ٨ نوفمبر ٢٠١٩م	
الفعالية	الوقت
عروض علمية (شغف الكيمياء)	١٠:٤٥ - ١٠:٠٠
الرياضيات الذهنية	١١:٣٠ - ١١:٠٠
مسرحية «الثقافة السلمية للطاقة النووية»	١٢:٣٠ - ١٢:٠٠
عروض تفاعلية لتقنيات المختبرات	١:٠٠ - ١٢:٣٠
عش مغامرة تحدي (كيو. آر) شركة بيئة	٢:٣٠ - ٢:٠٠
ملهمون (يوسف الحضرمي، إيناس العامرية)	٣:٠٠ - ٢:٣٠
مسرحية لتبحر في عالم البيانات (تعليمية مسقط)	٤:٠٠ - ٣:٣٠
عروض علمية (mad science)	٥:٣٠ - ٤:٣٠
إعلان نتائج الفائزين في مسابقات الهاكاون مجلس البحث العلمي	٦:٠٠ - ٥:٣٠
الحفل الختامي للمهرجان	٧:٠٠ - ٦:٣٠

الاثنين ٤ نوفمبر ٢٠١٩م	
الوقت	الفعالية
١٠:٣٠ - ٩:٠٠	الافتتاح
١١:٣٠ - ١١:٠٠	كلمة المتحدث الرئيس Prof. Charles Elachi (أبرز التقنيات الحديثة لاستكشاف الفضاء)
١٢:٣٠ - ١٢:٠٠	تدشين جائزة شركة تنمية نفط عمان للطاقة المتجددة
٢:٣٠ - ٢:٠٠	عش مغامرة تحدي (كيو. آر) شركة بيئة
٤:٠٠ - ٣:٣٠	عروض علمية (mad science)
٥:٠٠ - ٤:٣٠	مسرحية الخلايا الشمسية (تعليمية الداخلية)
٦:٠٠ - ٥:٣٠	عروض علمية (mad science)
٦:٣٠ - ٦:٠٠	ملهمون (المبتكر خالد الحارثي)
٧:٠٠ - ٦:٣٠	عروض تفاعلية لتقنيات المختبرات
٧:٣٠ - ٧:٠٠	إعلان نتائج الفائزين في مسابقات الهاكاون مجلس البحث العلمي

الخميس ٧ نوفمبر ٢٠١٩م	
الوقت	الفعالية
١١:٠٠ - ١٠:٠٠	عروض علمية (mad science)
١٢:٠٠ - ١١:٣٠	الرياضيات الذهنية
١٢:٣٠ - ١٢:٠٠	مبادرة اللجنة الوطنية للشباب (دعم المبادرات العلمية والثقافية والتقنية للشباب)
٢:٣٠ - ٢:٠٠	مسرحية "الثقافة السلمية للطاقة النووية"
٤:٠٠ - ٣:٣٠	عش مغامرة تحدي (كيو. آر) شركة بيئة
٥:٠٠ - ٤:٣٠	مسرحية بيتنا حياتنا (تعليمية جنوب الباطنة)
٦:٣٠ - ٥:٣٠	عروض علمية (nutty scientists)
٧:٣٠ - ٧:٠٠	ملهمون (الدكتورة روجية الخافيفة)
٨:٠٠ - ٧:٣٠	إعلان نتائج الفائزين في مسابقات الهاكاون مجلس البحث العلمي



الأربعاء ٦ نوفمبر ٢٠١٩م	
الوقت	الفعالية
١٠:٤٥ - ١٠:٠٠	عروض تفاعلية لتقنيات المختبرات
١١:٤٥ - ١١:٠٠	عش مغامرة تحدي (كيو. آر) شركة بيئة
١٢:٣٠ - ١٢:٠٠	تدشين مكتبة الواقع الافتراضي
٢:٠٠ - ٢:٣٠	الرياضيات الذهنية
٤:٠٠ - ٣:٣٠	ملهمون (هلال السبابي)
٥:٠٠ - ٤:٣٠	مسرحية يوم الأرض (تعليمية الباطنة جنوب)
٦:٣٠ - ٥:٣٠	عروض علمية (mad science)
٧:٣٠ - ٧:٠٠	إعلان نتائج الفائزين في مسابقات الهاكاون مجلس البحث العلمي

Discussion Sessions

In an extension of the great scientific event - Science Festival 2019, the themes were chosen with care because of the importance of these topics in the modern global scientific trends and the promotion of the scientific methodology to establish a society capable of entering the fourth industrial revolution. From 5 - 6 November, the festival hosted prominent speakers from around the world to talk about science in different fields and themes, such as STEM, supporting and promoting science and innovation, future vision of energy, robotics, artificial intelligence, and future jobs. These sessions targeted different parts that included students of various educational levels, teachers, academics, researchers, representatives of the private sector, and those interested in these fields. A group of prominent scholars, academics, and specialists from inside and outside the Sultanate participated in presenting papers, including:

- National STEM Learning Centre, University of York, UK.
- International Atomic Energy Agency IAEA.
- Makerspace People.
- Rolls Royce.
- College of Technological Studies, Kuwait.
- Scientific Research Council.
- Science Centre World Summit Foundation.
- Petroleum Development Oman (PDO).
- Science fair, London.
- Sultan Qaboos University.
- Malaysian Nuclear Agency.
- PASCO Scientific Foundation.
- California Institute of Technology.
- Ericsson.

The sessions events included four main topics:



المتحدث	عنوان الورقة	الزمن
حبيبة عدنان الوكالة المانيزية للطاقة الذرية	استراتيجيات التواصل حول العلوم والتقنية النووية السلمية في المدارس والبيئة المحيطة	٩:٤٠ – ١٠:٣٠
د. سوسن الريامية مجلس البحث العلمي	هل يمكن لطاقة الهيدروجين أن تصبح الطاقة الخضراء المستقبلية؟	١١:٠٠ – ١١:٣٠
د. عبدالله العبري المدير التقني لمؤسسة إيجاد	مصادر الطاقة المتجددة في عمان: محرك للنمو الاقتصادي	١١:٤٠ – ١٢:٠٠
مناقشة		١٢:١٠ – ١٢:٤٠
ختام الجلسة		١٢:٤٠ – ١٣:١٠

٦ نوفمبر ٢٠١٩ الذكاء الاصطناعي واقتصاد المستقبل		
المتحدث	عنوان الورقة	الزمن
إدارة الجلسة الفاضل: د. جميل الشقصي جامعة السلطان قابوس		
د. محمد قاسم أستاذ مساعد، كلية الدراسات التكنولوجية، الكويت	تأثير الذكاء الاصطناعي على تضاريس العمل في المستقبل	١٠:٣٠ – ١٢:١٠
خالد الحريبي رجل أعمال ورائد في الابتكار والاستثمار المستدام	أفاق الاستفادة من الذكاء الاصطناعي	١٢:١٠ – ٢:٥٠
Dr. Asger Haeg السريع للثروة والرخاء، المدير التنفيذي السابق لمركز العلوم العالمي في كوبنهاجن	«العلم والابتكار: الطريق السريع للثروة والرخاء»	٢:٥٠ – ٣:٣٠
د. زهرة بنت راشد الرواحية مديرة دائرة بناء القدرات الابتكارية بمجلس البحث العلمي	الاستراتيجية الوطنية للذكاء الاصطناعي «مراثيات وتوجهات»	٣:٣٠ – ٤:١٠
مناقشة		٤:١٠ – ٤:٤٠
الختام		٤:٤٠ – ٤:٥٠

November 5, 2019 The Role of STEM in Promoting Learning in the Light of the Fourth Industrial Revolution		
Speaker	Title	Time
Moderator: Dr. Mubarak Al-Salami Technical Office for Studies and Development, Ministry of Education		
Mark Langley STEM centre at York University, UK	Supporting STEM Education: How Rolls-Royce and the STEM Ambassador network effectively engages primary and secondary education with STEM industries, leading to a wider benefit to society	9:00 - 9:40
Siham Al Saidi Teacher at Batinah North Directorate of Education	STEM OMAN Omani experience of STEM program	9:40 - 10:20
Paul Guddan CEO, Makerspace People	STEAM in the Makerspace Environment: Creating the Innovators of the Future	10:20- 11:00
Discussion		11:00 - 11:30
Moderator: Salim Al-Khaldi General Authority for Privatization and Partnership		
Dr. JP Keener Director for Mathematics, Science and STEM +C programs for the State of Florida (United States)	In Search of the Perfect STEM	11:30 - 12:10
Paul Landers Program Manager, Sustainability and Corporate Responsibility, Ericsson	The potential of 5G to transform STEM skill development	12:10 -12:50
Discussion		12:50 - 1:20
Session closing		1:20 - 1:30

0 نوفمبر ٢٠١٩ دعم وتعزيز العلوم والابتكار		
المتحدث	عنوان الورقة	الزمن
إدارة الجلسة الفاضلة: د. زهرة الرواحية مجلس البحث العلمي		
Erik Jacquemyn خبير عالمي بارز في المراكز العلمية ومراكز الابتكار والمتاحف العلمية التفاعلية	العلم والابتكار في عالم متغير	٢:٣٠ – ٣:١٠
Dr. Daniel Glaser عالم أعصاب، والمدير المؤسس لمعرض العلوم في لندن	ماذا يحدث عند تداخل الفنون مع العلوم؟	٣:١٠ – ٣:٥٠
Dr. Charles H. Troutman باحث زائر في جامعة كورنيل والمدير السابق لمركز العلوم في أيثاكا بنيويورك	«علم الدماغ: مفتاح النجاح في الثورة الصناعية الرابعة»	٣:٥٠ – ٤:٣٠
د. جميلة الهنائية مديرة مشروع الاستراتيجية الوطنية للبحث العلمي والتطوير ٢٠٤٠	الاستراتيجية الوطنية للبحث العلمي والتطوير	٤:٣٠ – ٥:١٠
مناقشة أوراق العمل		٥:١٠ – ٥:٤٠
ختام الجلسة		٥:٤٠ – ٥:٥٠

٦ نوفمبر ٢٠١٩ النظرة المستقبلية للطاقة		
المتحدث	عنوان الورقة	الزمن
إدارة الجلسة الفاضل: د. عامر بن سيف الهنائي جامعة السلطان قابوس		
د. سونيل سابهاروال خبير من الوكالة الدولية للطاقة الذرية	العلوم والتقنية النووية السلمية وتطبيقاتها... النظرة المستقبلية	٩:٤٠ – ١٠:٠٠

November 5, 2019 Supporting and promoting science and innovation		
Speaker	Title	Time
Moderator: Dr. Zahra Al Rawahi The Research Council		
Erik Jacquemyn Leading global expert in scientific centers, innovation centers and interactive scientific museums	Science and innovation in a changing world	2:30 - 3:10
Dr. Daniel Glaser Neuroscientist and founding director of the London Science Fair	What happens when art and science collide?*	3:10 - 3:50
Dr. Charles H. Troutman Visiting researcher at Cornell University and former director of the Ithaca Science Center in New York	«Brain Science: The Key to Success in the 4th Industrial Revolution	3:50 - 4:30
Dr. Jameela Al Hanai Project Manager of the National Strategy for Scientific Research and Development 2040 The Research Council	The National Strategy for Research and Development 2040	4:30 - 5:10
Discussion		5:10 - 5:40
Closing Session		5:40 - 5:50

November 6, 2019 Future Vision of Energy		
Speaker	Title	Time
Moderator: Dr. Amer Saif Al Hanai Sultan Qaboos University		
Dr. Sunil Sabharwal Expert at the International Atomic Energy Agency (IAEA)	NST and their applications (future vision)	9:00 - 9:40

0 نوفمبر ٢٠١٩ دور منهجية STEM في تعزيز التعلم في ظل الثورة الصناعية الرابعة		
المتحدث	عنوان الورقة	الزمن
إدارة الجلسة: د. مبارك السلاامي المكتب الفني للدراسات والتطوير، وزارة التربية والتعليم		
Mark Langley مركز STEM بجامعة يورك بالمملكة المتحدة	دعم منهجية STEM: كيف تعمل رولز-رويس وشيكه سفراء STEM بفعالية على إشراك التعليم الابتدائي والثانوي مع صناعات STEM.	٩:٤٠ – ١٠:٣٠
سهم السعيدة معلمة بتعليمية شمال الباطنة	التجربة العمانية لبرنامج STEM OMAN	١٠:٣٠ – ١١:٤٠
Paul Guddan الرئيس التنفيذي لشركة Makerspace	برنامج STEAM في عالم الصناعات: ممتكني المستقبل	١١:٤٠ – ١٣:٣٠
مناقشة		١١:٣٠ – ١١:٥٠

إدارة الجلسة: سالم الخالدي الهيئة العامة للتخصيص والشاركة		
Dr. JP Keener مدير برنامج الرياضيات والعلوم STEM في ولاية فلوريدا	في بحث عن STEM المثالي	١١:٣٠ – ١٢:١٠
Paul Landers مدير برنامج الإستدامة بشركة إريكسون	إمكانات الجيل الخامس 5G في التحول لتطوير مهارات STEM	١٢:١٠ – ١٢:٥٠
مناقشة		١٢:٥٠ – ١:٣٠
ختام الجلسة		١:٣٠ – ١:٤٠

Speaker	Title	Time
Habiba Adnan Malaysian Nuclear Agency	Communication strategies about NST in schools and their environment	9:40 - 10:20
Dr. Sausan Al-Riyami The Research Council	Can H2 be the Future Green Energy?	10:20 - 11:00
Dr. Abdullah Al-abri General Manager of EJAAD	Oman Renewables: An Engine for Economic Growth	11:00 - 11:40
Discussion		11:40 - 12:10
Session Closing		12:10 - 12:20

November 6, 2019 Artificial Intelligence and the Future Economy		
Speaker	Title	Time
Moderator: Dr. Jamil Al Shaqsi Sultan Qaboos University		
Dr. Mohammad Qasim Assistant Professor, College of Technological Studies, Kuwait	The impact of artificial intelligence on the terrain of future work	1:30 – 2:10
Khaled Al Haribi Entrepreneur and pioneer in innovation and sustainable investment	Prospects for benefiting from artificial intelligence	2:10- 2:50
Dr. Asger Haeg Director of Asger Hogg Consulting, former Executive Director of the World Science Center in Copenhagen	“Science and Innovation: The highway to wealth and prosperity”.	2:50– 3:30
Dr. Zahra Rashed AlRawahi Director of Innovative Capacity Building at the Research Council	Toward a National Strategy for Artificial Intelligence: «Vision and trends»	3:30 – 4:10
Discussion		4:10 – 4:40
Session Closing		4:40 – 4:50

Session 1:
The role of STEM's Methodology in Promoting Learning
in the Fourth Industrial Revolution (November 5th, 2019)

The first session was devoted to STEM education as it has been one of the vital pillars of the modern learning process which the Ministry of Education gives great concern to due to its role in further scientific and technical development. STEM seminar reinforces of the ministry's aims in this field, by creating greater opportunities for students in research and learning. The session hosted international expertise in STEM education to share their experience on the impact of STEM educational programs on the educational process. It also shed the light on the Omani experience in STEM education on selected schools by hosting Omani STEM teachers.

The First Paper

Mark Langley (STEM center at York University, United Kingdom) spoke about how to establish a real partnership with the Industrial sector, energy sector and private sector to support the implementation of STEM at the school education level. The paper highlighted three themes:

- Strategies to achieve the partnership with the industry sector and the private sector:
 - Cooperation with famous companies like Rolls-Royce: through the STEM ambassadors' network programme, more than 30000 male and female students have been trained via internet and face-to-face programmes, in addition, to training in the company's building to benefit from the available technological resources.
 - Cooperation with small and medium companies through establishing an electronic platform (web-up) which encourages technicians and engineers in these companies to volunteer in providing technical support for teachers and students in implementing STEM programmes on selected schools. Volunteers are awarded later at the end of year or on any occasion related to teachers' awarding.
- How to establish STEM clubs and programming clubs inside schools.
- The effects of the partnership with the Industrial and private sectors when the STEM programmes are implemented on students represented in their passion for science, their understanding for the relationship between science and professions and its importance in the industrial sector, supporting their professional tendencies towards STEM fields and reinforcing their understanding of the different career paths.



The second paper

The second paper was presented by Siham Al-Saidi, one of STEM OMAN teachers in the Directorate General of Education in North Batinah. She addressed the Sultanate's experience in implementing STEM programme in cooperation with York University. She highlighted three main points:

- The nature of the partnership between the Ministry of Education, York University and Rolls- Royce in implementing **STEM** programme in Oman in terms of preparing the trainers, providing the necessary materials and the technical support.
- The implementation plan of the programme in the next coming three years and the number schools, trained teachers, and the beneficiary students from different governorates.
- The effects of the implementation of **STEM** in Oman on both students and teachers.

The Third Paper

The third paper was presented by **Dr. Peter Masson** who addressed the programmes and services that **Rikaz Global Company** has provided to support innovation and innovators. This included all stages of the innovation process, starting from forming the innovative concept, providing the required technological and technical support, and then reaching the stage in which the first pattern of the product is developed. The company provides the following services:

- Providing consultative, technical, technological and laboratory services.
- Preparing and improving the innovators.
- Supporting and developing **STEM** programmes and developing students' skills.
- Providing the tools, devices, 3D printers and the necessary programmes to design the first patterns.
- Supporting the partnership with different educational sectors and institutions in enhancing innovation.
- Developing the post- school **STEM's** programs and clubs.

Moreover, the paper addressed the Oman makers as an example of the ongoing programmes between Rikaz company and other institutions.

In the second session about STEM, two papers were presented, with the first paper presented by Dr. JP. Keener, director of STEM mathematics and science programme at the University of Florida, who talked about various global experiences in the application of STEM program.

Paul Landers, the manager of the sustainability programme at Ericsson Company, presented the second paper where he spoke about the potential of 5G to transform STEM skills development.

The presentations were followed by an enriching discussion with the attendants.



Session 2:

Supporting and Promoting Science and Innovation (November 5th, 2019)

Session two was about supporting and promoting science and Innovation. Three international experts and one Omani expert were hosted. Four papers were presented in which the international and local initiatives to support and enhance science and innovation were discussed.

The First Paper

The first paper was presented by **Erik Jacquemyn**, a famous international expert in the scientific centers. He is participating now in developing many scientific communication initiatives worldwide. **Erik Jacquemyn** is the president of the Society for the popularization of cooperative sciences and the president of the Global Summit for the Science Center. In his lecture entitled "Science and Innovation in a changing World", he discussed concepts related to **STEM** Education and the enhancement mechanisms through the scientific events and festivals. He, in addition, focused on the global strategies and the international expertise to integrate STEM in the scientific events.



The Second Paper

The second paper presented by **Dr. Daniel Glaser**, a neuroscientist and founding director of The Science Fair in London, was head of science at the Wellcome Trust and responsible for external finance for public participation and the arts. He has a scientific background on brain imaging of the visual system. He was appointed as a resident scholar in 2002 at the London Institute of Contemporary Art (ICA) and received the Cultural Leadership Award from the National Foundation for Science, Technology and Arts (NESTA) in 2005. He has also presented several television and radio programmes. He gave his lecture entitled: What happens when the arts overlap with science? He discussed the importance of the arts to understand science, and the importance of this according to brain research to integrate the brain lobes into thinking. He argued that the integration of artistic sense enhances science and supports innovation and innovators.

The Third Paper

The third paper entitled "Brain Science: The Success Key in the 4th Industrial Revolution" was conducted by the international expert **Dr. Charles H. Troutman**. He was the former director of Ithaca Science Center at Cornell University in New York in the United States of America. He worked there as the director of Science Museum. In addition, he worked



for International Museums Associations: Association of Science and Technology Centres and Child Museum Association. Furthermore, he headed the board of directors of New York Economy Development Agency, two regional museums associations and Montessori School. He worked at Cornell University for four decades and he have presented more than 100 presentations at the museums and other international conferences over the last three decades. Moreover, he was the main speaker in big international conferences in Hungary and South Africa, and he published 120 articles about museums, administration, science, and engineering. He was the only one who won the International **Leading-Edge Award** for the innovative museum practices three times.

The Fourth Paper

The fourth paper was about the national strategy for scientific research and development 2040, its principles and orientations implemented by the Scientific Research Council, and was presented by Dr. Jamila Al-Haniya, the project manager. The lecture focused on the overall direction of the strategy and mechanisms for integrating different segments of the society in it, integrating it with Oman Vision 2040, and guiding it on ways to enhance the understanding of the outcomes of applied scientific research and the marketing of knowledge - converting knowledge into money.

Session 3:

Outlook of Energy (November 6th, 2019)

Scientists, politicians, and entrepreneurs are joining forces rapidly, seeking to develop the use of energy sources of various kinds, at a time when humanity is entering advanced worlds in which technology has become an important element in the continuous change and development of those sources of a world that has become smaller, more sophisticated, less expensive, and environmentally friendly practices. Renewable energy sources have become the most used and preferred for humanity, such as wind, hydrological, solar, and others. Oman is constantly developing fossil energy sources and expanding the use of renewable energy sources in our daily lives. Four working papers presented by experts and specialists from international expertise such as the International Atomic Energy Agency (IAEA) and energy companies in Oman:

- **Dr. Sunil Sabharwal**
An International Atomic Energy Agency, expert on peaceful applications of nuclear energy.
- **Dr. Habiba Adnan**
Malaysian Atomic Energy Agency specialized in developing educational programs for nuclear energy applications.
- **Dr. Sawsan Al-Riyami**
Scientific Research Council, researcher in the field of renewable energy and hydrogen energy.
- **Dr. Abdullah Al-Abri**
The general director of Ejaad Platform.



The First Paper

The first paper was presented by **Dr. Sunil Sabharwal**, an expert from the International Atomic Energy Agency, in which he talked about nuclear energy applications in various fields including medical, sterilization, agricultural and food industry, in addition to the applications of electricity production and other uses.

The Second Paper

Dr. Habiba Adnan of the Malaysian Nuclear Energy Agency presented the fourth paper on the educational aspect and supporting the development of curricula for the peaceful use of nuclear energy.

The Third Paper

The third paper was presented by **Dr. Sussan Al-Rayamia** from the Scientific Research Council. She spoke about Hydrogen energy and its various uses and the future of Oman's use of Hydrogen energy and its production of clean energy such as renewable energy.

The Fourth Paper

The fourth paper was presented by **Dr. Abdul-lah Al-Abri**, the Executive Director of EJAAD. He spoke about renewable energy and Oman's plans for the future to boost the economy with these vital renewable resources, which are seen as a substitute for fossil fuels.



Session 4:

Artificial Intelligence and the Future Economy (November 6th, 2019).

The final topic of the festival was about artificial intelligence and the future economy. Highlights were given to potential future changes related to automation and the future of work and how to cope with these changes. Omani and foreign speakers were hosted in this session:

- **Dr. Mohammed Qasim**
assistant professor, Technological Studies College, Kuwait.
- **Khalid Al Haribi**
a businessman, and an innovation and sustainable investment pioneer.
- **Dr. Asger Hoeg**
manager of Asger Hoeg Investments company, the former executive manager of the international scientific Centre in Copenhagen.
- **Dr. Zahra bint Rashid Al-Rawahi**
The head of innovative abilities building department at the Research Council

Four working papers that focused on artificial intelligence and its impact on the promising economic sectors were presented.

The First Paper

The first paper which was presented by **Dr. Mohammed Qassem**, entitled “The Impact of Artificial Intelligence on the Future Work Terrain”, discussed the need for the profession of creative intelligence, social intelligence, and good awareness. He also discussed the effects of the delayed laws and regulations in keeping with artificial intelligence, which leads to serious policy gaps, as well as the need to renegotiate legal standards on reasonable or acceptable privacy to include new technologies adopted in a fast and widespread manner. He addressed the readiest sectors to be needed by artificial intelligence.



The Second Paper

In the second paper, **Khaled Al Haribi** talked about the prospects of benefiting from artificial intelligence, where he showed that artificial intelligence will be an integral part of our daily lives in the next decade, especially as the economic sectors continue their pursuit of technical transformation, which will lead to rapid developments in areas such as big data, equipment, and complex algorithms. It will also lead to increasing the usage of these tools to benefit the sector and startups operating in it.

The Third Paper

Dr. Asger Hogg's third paper on science and innovation: “The Highway of Wealth and Prosperity”. He showed that both science and innovation are the true wealth of nations of the twenty-first century. It also highlighted the fact that it is a huge transformational sector for the world economy in terms of earnings, job creation and transfer of profits. It is also an essential element of sustainable development and a source of creativity and innovation for individuals, communities, and governments alike.

The Fourth Paper

The fourth paper was presented by **Dr. Zahra Al-Rawahi** entitled “Towards a National Strategy for Artificial Intelligence: Vision and Trends”. The paper highlighted the building of the artificial intelligence team, and the activation of many programs, initiatives and workshops in all government agencies on the applied mechanisms of artificial intelligence and the launching of government accelerators for artificial intelligence. It also dealt with developing the government’s capabilities in the field of artificial intelligence, promoting the skills of technology-related jobs, and organizing training courses for government employees.



Specialized Workshop
Accompanying Oman Science Festival 2019

In addition to the interactive corners of the festival in various categories, the festival witnessed the participation of the World Intellectual Property Organization (WIPO) through organising a national workshop for teachers from cycle one and cycle two. This seminar provided an important aspect of the knowledge and application of practices that fall in the aspects of intellectual property. (3) The workshop was conducted by specialists from the World Intellectual Property Organization (WIPO), (4) specialists from the Department of Intellectual Property of the Ministry of Commerce and Industry and Technology, and specialists from Transfer Centre of Sultan Qaboos University and colleges of Technology.

The workshop included topics such as the WIPO Academy's educational programs on intellectual property, national and regional perspectives on adapting the intellectual property education, innovation teaching methodologies at various levels of the education system, and scientific sessions on the preparation and adaptation of copyright, trademark, research and other intellectual property-related courses.



Institutional and Community Partnership

There is no doubt that it is not possible to achieve the objectives and vision of the festival without the integration of the efforts between various institutions whether in the government or private sectors. The festival has proved in its first edition that institutional integration and communication is a key to the success of any national project. This was evident through the large number of governmental, private and community institutions that contributed in Oman Science Festival 2017. The biggest challenge in promoting the festival in its second edition was ways to attract the largest number of participating institutions to support the holding of the festival, especially considering the updates and development aspects of this edition in terms of increasing the area of implementation of the festival to reach 8080 square meters from 3200 square meters in the first edition, as well as increasing the time of the festival from three days to five days and increasing the number of events participating in the festival. This expansion means increasing the area of decoration, the technical equipment, and the accompanying increase in the number of participants and their needs for housing and nutrition during the festival. Accordingly, organising a promotional ceremony for the festival long enough from its launch was needed. This early promotion and presentation of the special vision of the festival in the presence of public and private sector institution contributed to attracting a good number of institutions to fund the festival.

The event was prepared taking into consideration various media and technical aspects, where a marketing guide was prepared and designed for the festival explaining its idea, objectives, and contents, as well as the festival's identity. later, sixty-six institutions from the private sector were addressed to support the holding of the festival as well as participating in its activities. Then, teams from the Ministry visited the entities that showed willingness to support and participate. These teams played a big role in clarifying what the festival is and its objectives and how to participate to attract the largest number of participants and supporters. Perhaps the most difficult task was to convince private sector companies to sponsor the festival and cover its costs. However, a number of thirty-three companies responded to cover most of the costs of the event which were classified according to the nature of the support as follows:

1. Financial support: fifteen institutions provided cash support to the festival.
2. Providing services to support the festival: four institutions provided services to the festival including mobile phones, VR glasses and charging cards, fuel filling cards and various prizes activated as draws to attract audiences and promote the festival. They were distributed to students participating in interactive workshops in various corners of the festival and to the winning students in the accompanying scientific competitions.
3. Hotel services: Eight hotels provided a total of seventy-nine hotel rooms for participants from different provinces, government agencies and organisers, and providing them with breakfast and dinner during their stay.
4. Logistics: Four institutions provided logistic services to participants and organisers of the festival, including drinking water, juices and snacks.

5. Media support: Two institutions provided media services through press coverage, visitor cards printing, daily direct coverage of the festival, interviews, and discussions before and during the festival.

الشريك الفضي



الشريك الذهبي



الشريك البرونزي



شريك التزل

الفضي

الذهبي



الشريك الإعلامي





Media Coverage

The preparations for Oman Science Festival were supported with a large media campaign aimed at introducing this event and its activities for different segments of society. In addition to the marketing guide, the Ministry's main committee of the festival conducted several procedures including:

- Holding a festival's promo for various government and private sector institutions to introduce the Ministry's vision in the second edition of the festival.
- Developing a festival's promotional film in Arabic and English to be broadcasted on television and radio channels, in coordination with the General Authority for Radio and Television, and on social media platforms.
- Developing a website that includes all the festival details.
- Preparing a guide book for the festival activities that included details of events in the Oman Convention and Exhibition Centre.
- Preparing a guide for (Ibn Al Dhahabi Theatre) activities that included details of events in the theatre during the festival days.
- Preparing the activities guide for the discussion sessions.
- Holding a press conference preceding the launch of the festival.

These procedures include covering the festival events in different press, radio, television, and electronic media, as follows:

First: Press Coverage

Press coverage for Oman Science Festival events was carried out before and during the festival. At the beginning, the meetings of the main committee of the festival were covered followed by the festival's promo. Then, the press conference was done by media and it was held by the Under-secretary of the Ministry for Educational Planning and Human Resources Development, the Head of the Main Committee. The five days of the festival were covered in local newspapers, especially in Al Roya Newspaper, which was the media sponsor of the festival and photographs were taken of all activities held in Oman Science Festival. Press coverage was published in local newspapers in both Arabic and English.



Second: Radio Coverage

Radio coverage of the activities of Oman Science Festival was conducted through various radio interviews held with members of the main committee and the scientific committee. The radio coverage coincided with the press coverage mentioned above through the interviews covering the promo and the press conference. Special news reports were conducted during the days of the festival.

Third: TV Coverage

The TV coverage of Oman Science Festival activities was done through the following:

- Broadcasting many television reports and broadcasts in news bulletins on the Sultanate of Oman National TV, especially at 5 and 10 pm news. The Undersecretary of the Ministry for Educational Planning and Human Resources Development, the Head of the Main Committee, was interviewed in the 10 pm news to talk about the festival and its opening.
- Reports about the festival opening were broadcasted in various news programmes.
- Live coverage of the opening ceremony of Oman Science Festival was in Oman Live Channel.
- A special programme for the festival was allocated during the days of the festival where all activities and interviews with organizers, participants and visitors were broadcasted in the various corners of the festival.



Fourth: Electronic Media Coverage:

The festival's electronic media campaign was launched on the festival's account in various social media platforms through hashtag # Oman_Science_Festival. Short teasers were released about the festival's launching date. News of the festival's main committee meetings was covered, and continuous tweets were posted about the festival's main theme (the Fourth Industrial Revolution, Technology Without Borders), its objectives and components, and its corners. This electronic media coverage aimed to keep the audience informed of the scientific content that will be presented at the festival and to cover the press conference. The festival's activities were also covered by posting continuous and varied tweets about the festival and direct interviews were made with students and participants from government, military agencies, the private sector, and the visitors. All corners, events, scientific competitions, robot competitions, theatre events and scientific dialogues were covered.

Other Print Media for the festival

In addition to the media coverage that was mentioned previously, some other print media have been utilized. These media have contributed greatly to the media campaign and the advertisement of the festival. These print media include:

- **Street Billboards:**
Billboards were placed on the ministries' road next to the main building of the Ministry of Education and on the road leading to the Oman Convention and Exhibition Centre, to attract all segments of society.
- **Billboards at Oman Convention and Exhibition Centre:**
Many billboards of different sizes were placed at various corners in the centre, including indicative panels that the festival could be implemented, including information panels on the festival and its sponsors.
- **Banners:**
A set of banners were printed and distributed at the Ministry's main building, other MOE buildings and the hotels sponsoring the festival.



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Oman Science Festival

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Oman Science Festival 2019

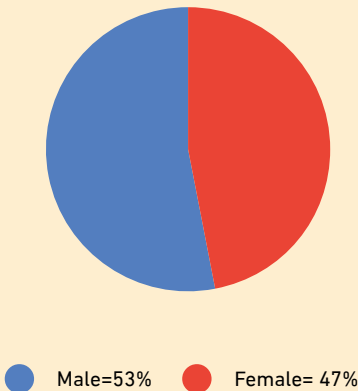
Statistical indicators

For future development of the festival, an electronic questionnaire was distributed to identify the visitors' opinions about the festival. The results showed that the festival addressed various groups of society and met their satisfaction. The questionnaire indicated the diversity of the festival activities and programmes and the adequacy of its timings, services, and targeted groups. It also showed the participants' satisfaction about the interaction of the organizing committee and supervisors with them. The festival was praised for the overall design and appropriateness of the decor to the content of the festival. There have been demands from visitors to increase the number of days so they can have more time and chance to visit the festival

This is clarified in the graphs illustrating visitor responses:

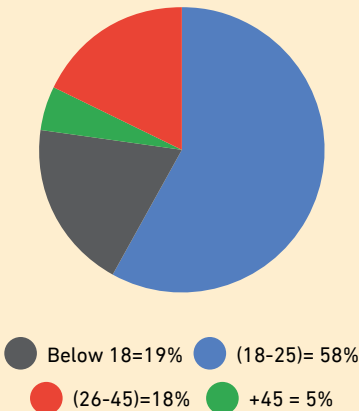
1. Gender

The male attendance rate was higher than that of female.



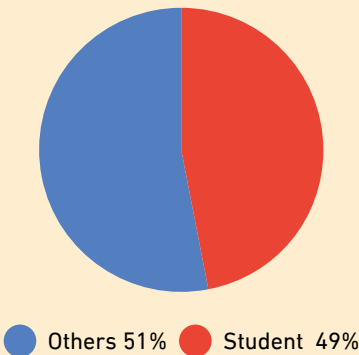
2. Age

It is noted that the age group (25-18) years has the highest attendance rate. The second is age group below 18 years.



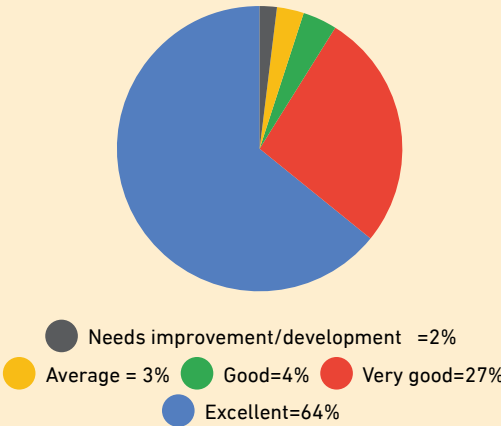
3. Students vs Adults

It is noticed a convergence in the ratio between the student group and the adult group. This is due to the diversity of the festival's activities to suit various society groups.



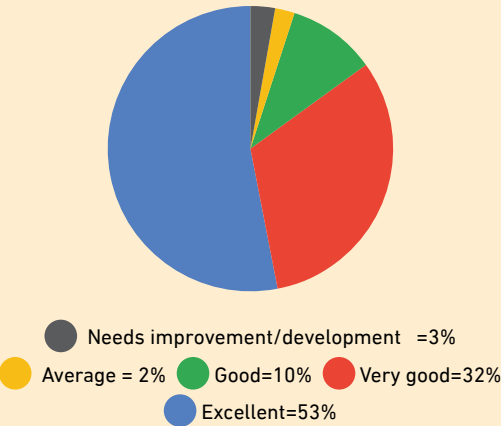
4. The diversity of events and programmes

The diversity of events and programs in the festival is obvious through the responses of visitors, which were mostly excellent..



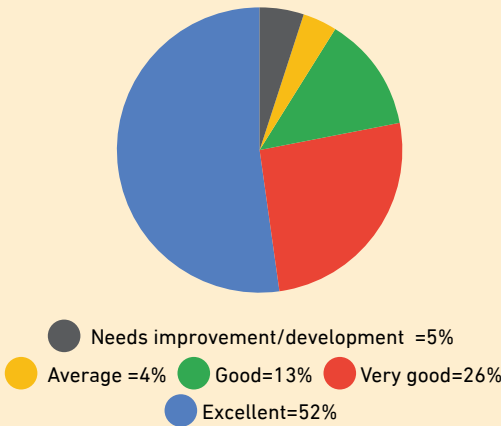
5. The Overall organization of the festival

The overall organization of the festival is excellent, as illustrated by the following figure that shows the responses of the festival visitors.



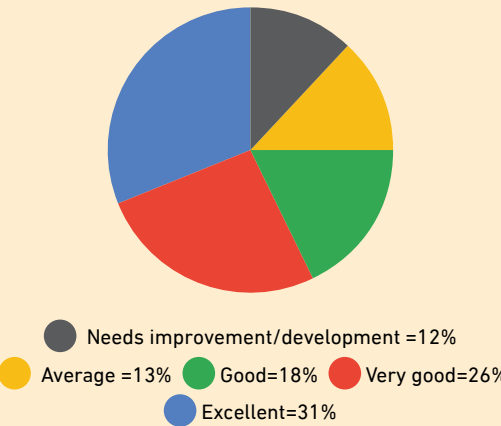
6. Timing

We noted that the timing of the festival is very appropriate as more than half of the festival visitors agreed that the timing of the festival is excellent.



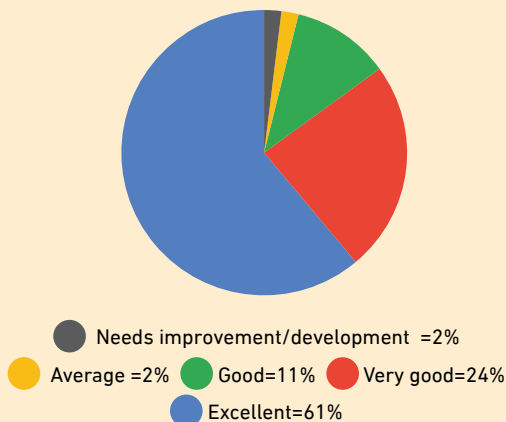
7. Number of festival days

Responses of the visitors on the number of the festival days revealed a convergence, this showed that the number of the festival days is appropriate.



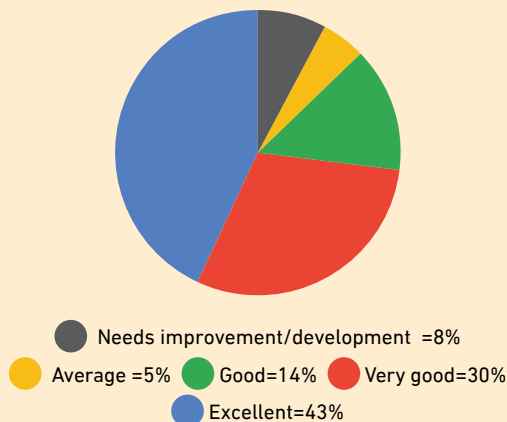
8. The festival's advantage

The visitors' responses about the festival's advantages was excellent, as it is shown in the following figure.



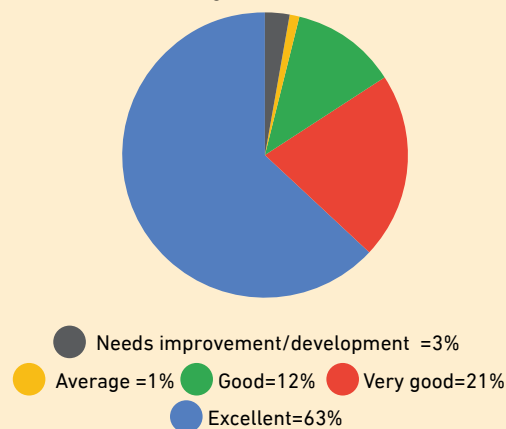
9. Availability of services in the festival

The services provided in the festival varied between excellent and very good. This indicated that the services were appropriate considering the number of participants and volunteers.



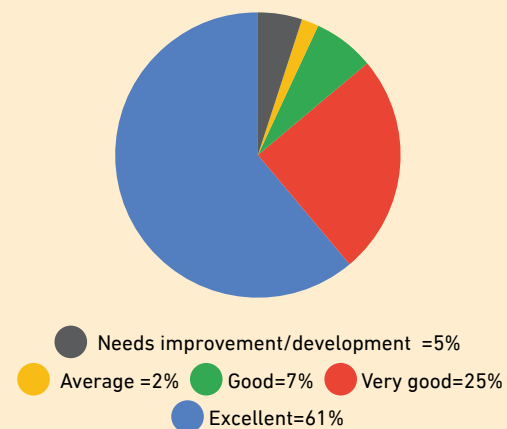
10. Interaction between the organizing committee and supervisors and visitors

Most of the festival visitors expressed their satisfaction about the interaction of the organizing committee and the supervisors, as shown in the figure.



11. The suitability and the overall aesthetic design and decoration of the festival

The overall aesthetic design and decoration of the festival is excellent, as reflected through the visitors' views.



The festival targeted various segments of the society and met the satisfaction of these groups. It was distinguished by the overall organization, and the diversity of its activities and programmes. It indicated the adequacy of its timings, days, services, and the participants' satisfaction with the interaction of the Organizing Committee and supervisors. The festival was praised for the overall design and appropriateness of the decor to the content of the festival.

Conclusion

With attendance reaching about 200,000 visitors on the five days of the festival that witnessed an enriching interaction between the events' presenters, programmes and visitors from all age groups, Oman Science Festival 2019 had created a distinguished space for passion and excitement in shaping and creating the trends toward a lot of different professions, technologies, and sciences. This was reinforced by the implementation method of those events and programmes that were distinguished by its professionalism and excitement achieved by specialists coming from different sectors in the Sultanate and abroad.

This report has provided a through look inside the festival's corners, events and programmes which exceeded 300 events and more than 1800 participants from different civil, military, voluntary and private sectors. Those events were designed to suit all group ages of different interests and trends. They mainly focused on the most prominent modern technologies of the scientific and technological revolution in order to guide young people towards ambitious and passionate of studying various branches of modern applied sciences.

The statistical indicators attached in this report provides a scientific value for learners and those who are interested in this scientific movement that succeeded in keeping pace with international scientific festivals. Young Omani youth reaching 100% have worked hard and persist to face all challenges to succeed as the intensive preparations that proceeded the festival largely contributed to achieving success. It was mainly based on the cooperation of the Ministry of Education with different civil, military, private and community institutions. "Oman Science Festival" is a distinguished event that received a high degree of appreciation and satisfaction from its visitors who are eagerly and passionately waiting for the third edition.

